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It's not the Economy, Stupid!

Municipal School Expenditures and School Achievement Levels in Denmark

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1. Introduction

One distinguishing feature of the Danish welfare state is the important role played by benefits in kind in the public provision of welfare to the population. In 2000, public expenditures on various types of welfare services – childcare, care for the elderly, education, health services etc. – amounted to about 17 percent of BNP.

Another characteristic feature of the Danish welfare state is that most types of benefits in kind (or welfare services) are produced and allocated at the local level, i.e. in municipal or county institutions. While this production is regulated by standards, rules and prescriptions fixed at the central (state) level, there is normally quite some room for municipalities or counties to decide on their desired level of spending on various types of welfare services.

A recent series of surveys by the Ministry of Finance has shown that variations in user satisfaction with various types of welfare services offered by municipalities are not or only weakly related to variations in municipal expenditure levels (Finansministeriet 1998; 2000). Users in municipalities with a high level of spending on a particular welfare service (per potential user) are not necessarily found to be more satisfied with this service than users in municipalities with a lower expenditure level.

One possible and straightforward interpretation of this finding could be that the quality of a welfare service need not be related to the price paid for it. Such an interpretation would fit nicely into a line of theorizing about behaviour in public institutions that constitutes part of New Public Management and that points to the self-interest maximizing aspects of this behaviour (Niskanen 1971; Mueller 1989). According to that view increased appropriations for the production of a certain welfare service will have a tendency to translate into more slack or other private benefits for public employees rather than into more or better service to the public. Unless prevented by proper institutional arrangements, the public employees in the institutions involved, rather than the users, reap (most of) the benefits when appropriations in a particular area of welfare service production are increased.

Unsurprisingly, public employees tend to view things differently. If problems with the quality of public services surface in one area of welfare production or another, most of the relevant employees seem more willing to point to insufficient funding than to inefficient production as the main cause. And more often than not, politicians will react to such problems by demanding and, if possible, allocating more money to the area in question. Both public employees and politicians thus seemingly tend to act on the (implicit) premise that there is a positive relationship between quality and price in public welfare production.

The aim of the present study is to use a new set of data to take a look at the relationship between (variations in) municipal spending and (variations in) the quality of the service produced in one particular field of municipal service production in Denmark, *primary education*, while controlling for a range of potentially relevant background variables. Primary education plays an important part in the production of welfare services at the municipal level. The primary school system constitutes the second-largest spending area of Danish municipalities (after social expenditures). In 1999 about 15 percent of total municipal spending was on primary schools. Thus primary education is not only of interest as a case of public welfare service production. It also commands interest in its own right because it weighs quite heavily on municipal budgets. Furthermore, following the results of the recent PISA-studies, the quality of Danish primary education has once again become an issue and suggestions to improve quality by increasing spending have frequently been aired.

So far, international studies have generally found only weak, if any, relationships between levels of resource input to the school system and levels of scholarly achievement (or quality of output), although there is some controversy about these findings (see e.g. Burtless (ed.) 1996; Angrist and Lavy 1999). A recent OECD-study showed that although Danish expenditures on education exceed the OECD-average by 30 percent, this excess spending is not mirrored in available measures of scholarly achievements among Danish pupils (OECD 2001). This finding, however, does not preclude that a relationship between spending levels and scholarly achievements might nevertheless be found *within* Denmark at a lower level of aggregation, e.g. the municipal or individual level (Robinson 1950). Heinesen, Graversen and Madsen

(1999) report a significant, but weak, relationship between municipal spending on primary schools and a pupil's probability of continuing in the primary school system beyond the ninth grade. They also report a weak relationship between municipal spending on primary schools and a pupil's probability to embark on and finish a youth education program (*ungdomsuddannelse*). On the other hand, they did not find any significant relationships between the level of municipal spending on primary schools and a pupil's probability of dropping out of the school system, of continuing in high school, of enrolling in higher education beyond high school, or of becoming unemployed after finishing education.

The study proceeds as follows: the next section (which can be skipped by Danish readers) outlines the organization of primary education in Denmark; in section 3 the dependent and the independent variables are introduced and discussed together with some methodological issues; section 4 contains the empirical results, while section 5 discusses the findings.

2. The Danish system of primary education

According to law, nine years of schooling are mandatory in Denmark, applying to all permanent residents in the age bracket 7 – 16 years. It is, however, up to the parents to decide how to comply with this requirement. Basically three options exist: using the system of publicly financed and run primary schools; using a publicly recognized private primary school; or providing (supervised) home instruction. The latter option has become nearly obsolete today. About 88 percent of the total population of pupils are enrolled in a public primary school, while private schools take care of the remaining 12 percent. There is quite some local variation in these figures, however. In some municipalities the proportion of pupils enrolled in private schools approaches 30 percent.

According to the Danish constitution (chap. VIII, §76), all children in the age bracket to which mandatory schooling applies are entitled to free instruction in a publicly run and financed primary school (*Folkeskolen*). These primary schools are financed and run by the municipalities within a framework set up by laws and by ordinances, rules and guidelines emanating primarily from the Ministry of Education. Thus the mandatory subjects to be taught are fixed by law. The law also fixes the minimum number of

weekly hours to be taught. The Ministry of Education specifies the goals to be attained within each subject. It also issues guidelines and suggestions for study plans and time allocation, as well as teaching guidelines for the various subjects.

Within this framework, each municipal council is responsible for running the primary school system within its municipality. It provides the resources and decides on the number of schools, classes and teachers. It also has to approve study plans for its schools. Thus both the structure and the content of primary schooling can vary quite a lot between municipalities – as can the cost per pupil.

At the end of the ninth grade, pupils in the public primary schools can take a final examination (*Folkeskolens afgangsprøve*) comprising of tests in Danish (oral and written), English (oral), arithmetic (oral and written), physics/chemistry (oral), and a second foreign language (German or French; oral). Results are scored on a scale from zero (worst) to 13 (best), where scores of 6 and above are passing scores and the average score is 8. This examination is not mandatory, however. Pupils can choose not to take it at all, or to take it in some subjects only. Pupils who do not take the examination in some or all subjects are given scores based on the last year's work instead.

State supported private primary schools have a long tradition in Denmark as alternatives to the municipal primary schools. As long as they keep the same standards in their teaching as municipal primary schools in general they are free to choose their own pedagogical approach and to express a particular worldview, if they have one. Thus some private schools, like religious schools, attract pupils mainly due to their outlook. Others appeal to parents rather by virtue of their reputation for stricter discipline, a stronger achievement orientation or a more agreeable social composition among their pupils than can be found in the municipal primary school. Private primary schools need not offer their pupils a possibility to take the final examination after the ninth grade, but they can apply to the Ministry of Education for the right to do so. If they offer this examination, the rules are the same as in municipal primary schools.

A special type of private primary school is the *Efterskole*, which is a boarding school that takes in pupils in the age bracket 14 to 18 years only. As other private schools these schools can be based on different religious or ideological orientations. Besides teaching the same subjects and contents as municipal primary schools some also specialize in sports or various forms of creative arts. *Efterskole* is a popular alternative to the municipal primary school for pupils with domestic, social and/or school problems (“school fatigue”), but this school type also attracts its share of ordinary pupils.

3. Variables and models

3.1. Dependent variable: Measuring school quality

As its dependent variable this study uses the average score in the ninth grade examinations (over all subjects, pupils and municipal primary schools) obtained in each of the 275 municipalities in Denmark at the end of the terms 1999-2000, 2000-2001 and 2001-2002. These data have only recently become available, when an ombudsman ruling in 2001 forced the Ministry of Education to abandon its protracted opposition and allow public access to the average examination results from each individual school in each municipality.

The average score for each municipality (s_i) is weighted according to the number of pupils taking the examination in each particular subject in each municipal primary school and is hence given as

$$s_i = \frac{\sum_{j=1}^{N_i} \sum_{k=1}^K n_{ijk} s_{ijk}}{\sum_{j=1}^{N_i} \sum_{k=1}^K n_{ijk}}$$

where

$i = 1, \dots, 275$ municipalities

$j = 1, \dots, N_i$ primary schools in municipality (i)

$k = 1, \dots, K$ exams (subjects)

n_{ijk} = number of pupils in primary school (j) in municipality (i) taking the examination in subject (k)

s_{ijk} = average score obtained by pupils in primary school (j) in municipality (i) in examination in subject (k)

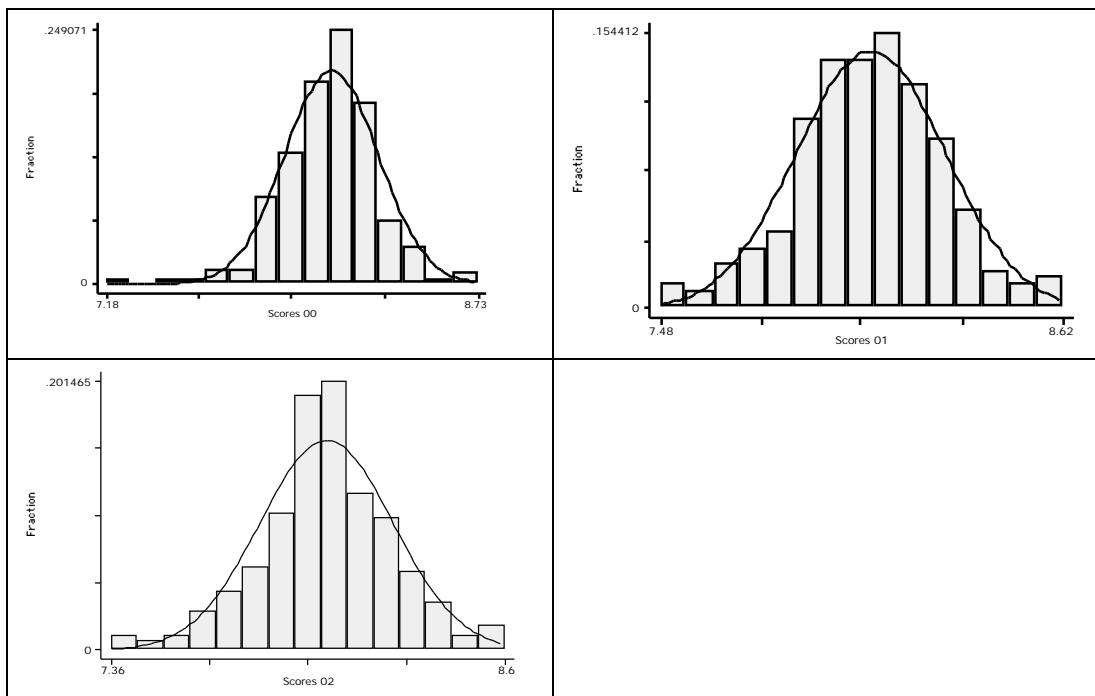
Table 1 shows some basic statistics for the scores from the three examination terms. As can be seen, there has been a weak trend downwards in average scores over the last three years while the variability over municipalities seems to have increased.

Table 1. Average examination scores: Descriptive statistics

Term	Average score over municipalities	Std. deviation	Max	Min.	N
1999-2000	8.12	0.196	8.73	7.18	269
2000-2001	8.08	0.211	8.62	7.48	272
2001-2002	8.04	0.210	8.60	7.36	273

Figure 1 shows the average scores plotted with a standard normal variable. As can be seen, the S_i 's appear approximately normally distributed (except for the tails). The bulk of observations lie within ± 2 standard deviations from the mean.

Figure 1. Distribution of average examination scores



The use of examination scores as measures of school output and quality is quite widespread in educational research. That does not mean that this practice is uncontroversial, however. Quite to the contrary: the validity of examination scores as a measure of the quality of schooling is a contested issue, as witnessed, i.a., by heated discussions accompanying the first disclosure of the Danish ninth grade examination results in late 2001.

While there is broad agreement that school quality is a multidimensional concept, there seems to be less of an agreement as to which dimensions should enter the concept of school quality. Furthermore, not all conceivable dimensions lend themselves easily to numerical measurement. And even if they could all be measured, it is not clear how the various dimensions should be weighted in the derivation of a single measure of school quality. Hanushek (1986; 1992) has suggested that school output should be measured as the total sum of value added to pupils by the schooling process. While this is an elegant way to side-step the problems of defining and weighting the dimensions of the concept of school quality, it also seems prohibitively difficult to devise a practical way to measure the value added due to school attendance.

When using examination scores as a measure of school quality, one is primarily focusing on one particular dimension of schooling, viz. the skill and knowledge dimension. Few would probably be willing to deny that there is more to primary school quality than the extent of successful installment of skills and knowledge in pupils. But it seems equally hard to deny that teaching skills to their pupils and installing some basic knowledge in them is a core activity of schools – to some even *the* core activity. A school that sent out its pupils largely illiterate after nine years of teaching would probably be considered a failure by most, regardless of how beautiful attitudes and personalities these pupils might have developed instead of reading and writing skills. Thus, examination scores cannot easily be dismissed as measures related to just some peripheral dimension of school quality. They tap into a central one.

Furthermore, even if granted that schools also have to play a role in developing their pupils' social competences, as well as in molding their attitudes and personalities, as stipulated in the Danish law on public primary schools, quality with respect to such

dimensions might well be (positively) correlated with quality with respect to the skill and knowledge dimension. At least there seems no obvious reason to assume a priori that there must be a zero or even a negative relationship. This, however, is the tacit assumption one has to make if one wants to reject the use of examination scores as measures of school quality just by pointing to the fact that there are other dimensions to school quality. If a school's quality with respect to the teaching of skills and knowledge (as measured by examination scores) is positively related to its quality with respect to other dimensions, then examination scores can even be taken as proxies for the school's quality with respect to those other (probably not measurable) dimensions as well. And it seems at least as reasonable to assume that a school which does well on the skills and knowledge dimension will also do well on the others as to assume that more quality with respect to teaching skills and knowledge has to be paid for with less quality with respect to other dimensions.

Another common objection to the validity of using examination scores as measures of the quality of schools stresses that such scores do reflect the pupils' social background rather than the quality of their schooling. Whether true or not, this objection need not concern us in the context of the present study, since social background will be included among the control variables used in modeling the relationship between (average) examination scores and municipal spending on schools (cf. below).

In short, while care should certainly be exercised in order to avoid overselling results based on measurement of school quality by examination scores, there is no reason either to succumb to the tendency to consider examination scores void of any valid information on school quality. Even though examination scores may not tell the whole story about school quality, they contain a lot of relevant information pertaining to that question. And normally even some knowledge should be considered preferable to no knowledge at all, although some in the teaching profession obviously tend to take the opposite view when it comes to the question of school quality.

A second set of questions concerns the reliability of examination scores as measures of the quality of schooling. Here it has to be admitted that examination scores will normally contain a certain element of randomness. For that reason, this study treats

examination scores as random variables, despite the fact that the data used do not come from a sample, but are population data. It will be assumed, however, that the scoring of examination results is fair and unbiased. In technical terms this implies that the random component in examination scores will be assumed to have a zero expectation and a finite variance.

Another problem could arise from the fact that the ninth grade examination is not compulsory. As mentioned, pupils can choose whether to take the examination in all subjects, in just some of them or not at all. It seems reasonable to expect that the pupils skipping examinations in some or all subjects will be those who could else look forward to receiving failing or low scores. This would mean that the average scores over schools and over municipalities are biased upwards. Since this study is not interested in absolute levels of examination scores, such a self-selection bias is inconsequential to the relationships to be analyzed as long as the tendency to skip examinations is approximately the same in all schools and municipalities. Data do not tell whether such is the case. But it can be seen from the data that the number of pupils skipping the ninth grade examination in the various subjects is generally quite small. It hence seems save to assume that self-selection bias is not a serious threat to the reliability of our data on examination results.

3.2. Independent variable: School expenditures

As its measure of municipal expenditures this study uses figures from the official municipal statistics (Indenrigsministeriet 2002) on each municipality's expenditure on municipal primary schooling per person in the age bracket 7 – 16 years, corrected for the proportion of pupils actually enrolled in private schools. These data are available back to 1993. Thus for each municipality we have data on expenditures per pupil in municipal primary schools covering most of the period of schooling, or all of it, for the age cohorts from which we have data on examination results, i.e. pupils who took the ninth grade examination at the end of the term 1999-2000, 2000-2001 and 2001-2002.

While much of the public debate on primary schooling in Denmark may convey a somewhat different impression, municipal expenditures per pupil on municipal pri-

mary schooling have actually increased quite substantially since 1993. The expenditure data used in this study show an average increase of 31 percent between 1993 and 2000. This increase has been strongest in municipalities starting from relatively low expenditure levels: between 1993 and 2000 the coefficient of variability (standard deviation relative to the mean) has decreased from 0.124 to 0.104. Even so, considerable variations over municipalities in their expenditures per pupil on municipal primary schooling remain.

The available data thus allow us to relate inter-municipal variations in the average examination scores from the end of the terms 1999-2000, 2000-2001 and 2001-2002 to variations in spending on municipal primary schools both in the year of examination and during most or all of the preceding years of schooling for the relevant age cohort of pupils. Including expenditure levels back in time must be assumed to result in a more realistic model of the relationship between school quality at time (t) and spending than a “pure” cross-section model including examination scores and expenditure data from the same point in time only. Expenditures from each year between 1993 and the year of final examinations will be included in the model as lags.

3.3. *Controls*

In order to arrive at a reasonable estimate of the relationship between expenditures on municipal primary schools and the quality of schooling (examination scores) we have to control for the impact of other municipality-related variables which may influence examination scores in a systematic way. In this study three sets of control variables are used, cf. Table 2. The first set taps into the “social profile” of the municipalities. The second one tries to cover some potentially relevant aspects of the schooling situation in each municipality. The third one picks up political differences between municipalities.

The importance of a “social inheritance” factor for pupils’ achievements at all levels in the Danish educational system appears well documented (e.g. Togeby 1983; Jensen 1999). Therefore eight indicators for relevant aspects of the social, economic and educational “profile” of the municipalities are included in the model.

Table 2. Control variables

<i>Social, economic and educational:</i>
Urbanization
Pct. social housing
Pct. owner-occupied housing
Pct. unemployed (of 16 –67 years)
Pct. low-income earners
Pct. single parent children (0-7 years)
Pct. with no education beyond primary
Pct. with higher education
<i>School related:</i>
Pct. bilingual pupils
Average class size in municipal primary schools
Average school size in municipality
Pct. of pupils in private schools
<i>Political:</i>
Stable socialdemocratic municipality (0-1)
Unstable socialdemocratic municipality (0-1)
Unstable bourgeois municipality (0-1)
Stable bourgeois municipality (0-1)

Besides eight social-structural controls four variables pertaining to the school system will be included. The first one is the average class size in the municipal primary schools. According to pedagogical folklore, smaller class sizes should make for more efficient teaching and hence higher average scores. The second variable is the proportion of pupils in private primary schools. Variations in the proportion of pupils in private primary schools could affect average examination scores in municipal primary schools both negatively and positively. The effect should be expected to be negative if private schools are “skimming” pupils, i.e. if private schools tend to attract the most able and most motivated pupils, leaving to the municipal primary schools the scholarly and/or socially weaker ones. The effect should be expected to be positive to the extent that private schools relieve the municipal primary schools of pupils suffering from “school fatigue” or other learning impediments. It should also be positive if competition from private schools makes municipal schools perform better than they otherwise would do. The third variable in this set to be controlled for is the proportion of bilingual pupils in the municipality in question. Since this variable is correlated with several social background variables it controls if the proportion of bilingual pupils also has a direct impact on average examination scores.

As in the case of the independent variable, it seems reasonable to assume that average examination scores at time (t) are not only influenced by the values of the control variables at time (t), but by their values at time (t-1), (t-2) ... as well. In order to take account of this, one could include the individual lags of the control variables. Since

most structural and school-related control variables do not vary strongly over time, however, averages over the period from 1993 to the year of final examinations will be used in order to preserve degrees of freedom.

As mentioned earlier, Danish municipalities have some leeway to set their own priorities with respect to what their school system to achieve and how. For that reason, a political contol variable is introduced as well to pick up variations in school quality that may be the direct effect of different political choices. A Swedish study (Waldo 2001) has found that Swedish municipalities with a socialist majority in the city council perform less well in the production of education than others, indicating that (party)politics may indeed matter in this field.

If municipal politics have a direct effect on average examination scores, such political interventions must be expected to work at long and variable lags. For that reason the municipalities in this study are scored on a party-politics variable according to the results of the municipal elections in 1989, 1993 and 1997. A municipality is scored as “stable socialdemocratic” if all three elections returned a socialdemocratic (or socialist) mayor. A municipality is scored as “unstable socialdemocratic” if two of the three elections returned a socialdemocratic (or socialist) mayor. A municipality is scored “unstable bourgeois” or “stable bourgeois” if two or all three elections, respectively, returned a non-socialdemocratic (non-socialist) mayor. For use with the estimations the variable is broken down into three dummy variables with “stable socialdemocratic” municipalities always serving as the reference category.

3.4. Model

With lagged yearly expenditure data the model simply becomes

$$\mathbf{s} = \mathbf{X}\beta + \mathbf{C}\gamma + \varepsilon$$

\mathbf{s} is a column vector of average examination scores for the 275 municipalities, \mathbf{X} is a matrix of the municipalities’ yearly expenditures per pupil in primary school from 1993 to the year of final examination, \mathbf{C} is a matrix of control variables (averaged over the period 1993 to the year of final examinations), and ε is a column vector of error terms. γ denotes the vector of coefficients to the control variables, and β denotes the vector of coefficients to the (lags of) the expenditure variable. The main question

then becomes if the elements in β are (1) jointly significantly different from zero and, if so, (2) positive.

Provided the model is correctly specified, and under the usual assumptions about ϵ , valid estimates of the coefficients can be obtained by OLS. Since the municipalities' average examination scores are based on widely different numbers of examinations, analytically weighted OLS is used with the number of examinations as weights. To deal with possible heteroskedasticity problems, the correction proposed by White will be used in the computation of standard errors and significance levels (White 1980).

With respect to certain variables it might be argued that there could be a causal relation from average examination scores to these variables alongside the reverse causal relationship we are trying to estimate. Thus the proportion of pupils enrolled in private schools might be influenced by the quality of the municipal primary schools as well as influence it. But since the regressors (\mathbf{X} and \mathbf{C}) are observations referring to points of time that precede the date of the examinations, and since it is obviously not possible for examination scores at time (t) to influence any variable at time ($t-k$, $k=1, \dots, T$), the risk of simultaneity biases need not concern us here.

Multicollinearity is another likely problem with variables like the ones used as controls in this study. However, multicollinearity within the set of the control variables is inconsequential in the present context, since the primary interest is to estimate the impact of the expenditure variable on (average) grades rather than to arrive at a precise estimate of the impact of each of the control variables on grades. As long as there is no strong collinearity between (the lags of) the expenditure variable and one or several control variables, multicollinearity problems can be disregarded.

4. Estimation results

We begin by estimating the basic model on the average of the municipalities' (average) examination scores over examinations from the three examination terms 1999-2000, 2000-2001 and 2001-2002. Averaging over three examination terms is likely to reduce the impact of chance fluctuations on estimation results. Table 3 gives the results from a weighted OLS-estimation using White-corrected standard errors.

Table 3. Estimation results with average examination scores over three examination terms (1999-2000, 2000-2001, 2001-2002). Weighted OLS, White-corrected standard errors

	Coefficient	t (robust)
Urbanization	0.002	2.12**
Pct. social housing	0.002	1.46
Pct. owner-occupied housing	0.002	1.09
Pct. unemployed (of 16–67 years)	-0.006	-0.92
Pct. low-income earners	0.006	1.56
Pct. single parent children (0-7 years)	-0.009	-1.71*
Pct. with no education beyond primary (25-67 years)	-0.004	-1.17
Pct. with higher education (25-67 years)	0.013	4.22***
Pct. bilingual pupils	-0.011	-5.05***
Average class size in municipal primary schools	0.007	0.85
Average school size in municipality	0.000	0.17
Pct. of pupils in private schools	-0.002	-1.67*
Unstable socialdemocratic municipality ¹	0.051	2.51***
Unstable bourgeois municipality ¹	0.015	0.60
Stable bourgeois municipality ¹	0.064	2.73***
Constant	7.344	16.97***
	F	p
Lags of expenditure per pupil	0.88	0.53
R ²	0.62	
<i>Specification tests:</i>		
RESET	F = 0.37	p = 0.78
LINK	t = 0.32	p = 0.75
Schapiro-Wilk	z = 2.22	p = 0.01

¹ Relative to stable socialdemocratic municipalities

*** significant at 0.01 pct.-level

** significant at 0.05 pct.-level

* significant at 0.1 pct.-level

As can be seen the impact of the (lags of the) expenditure variable on average examination scores is not even close to attaining the conventional levels of statistical significance in this estimation. Thus Table 3 indicates very clearly that – seen over a three-year period – there is no statistically reliable relationship between levels of municipal school expenditure in the past and average examination scores, when controlling for a number of background variables. The model's R²-value is quite satisfactory and RESET- and Link-tests for omitted variables and misspecification of the model turn out insignificant results, rejecting these possibilities. On the other hand, there may be a problem with non-normal residuals.

Table 4 shows the results when the model is applied to average examination scores from each examination term (1999-2000, 2000-2001 and 2001-2002) separately, using once more OLS-estimation. Since the same set of regressors is used in all cases, there are no efficiency gains from SUR-estimation.

Table 4. Estimation results with average examination scores from each of the three examination terms (1999-2000, 2000-2001, 2001-2002) *separately*. Weighted OLS, White-corrected standard errors

	Term 1999-2000		Term 2000-2001		Term 2001-2002	
	Coeff.	t (robust)	Coeff.	t (robust)	Coeff.	t (robust)
Urbanization	0.003	2.03**	0.003	1.40	0.002	1.58
Pct. social housing	0.000	0.14	0.004	1.83*	0.002	0.66
Pct. owner-occupied housing	-0.002	-0.79	0.007	2.25**	0.001	0.31
Pct. unemployed (of 16-67 years)	0.004	0.43	-0.017	-1.49	-0.003	-0.37
Pct. low-income earners	0.005	1.16	0.005	0.93	0.007	1.22
Pct. single parent children (0-7 years)	-0.017	-2.76***	-0.004	0.57	-0.010	-1.52
Pct. with no education beyond primary (25-67 years)	-0.007	-1.30	-0.001	-0.24	-0.006	-1.35
Pct. with higher education (25-67 years)	0.011	2.41**	0.015	3.42***	0.013	3.15***
Pct. bilingual pupils	-0.015	-5.00***	-0.006	-2.07**	-0.012	-4.09 ^{III}
Average class size in municipal primary schools	0.006	0.58	0.028	2.01**	-0.004	-0.33
Average school size in municipality	0.000	0.68	-0.000	-0.29	-0.000	-0.22
Pct. of pupils in private schools	-0.003	-1.29	-0.003	-1.64*	-0.02	-0.73
Unstable socialdemocratic municipality ¹	0.032	1.32	0.062	1.92*	0.054	2.12**
Unstable bourgeois municipality ¹	0.048	1.56	0.028	0.89	-0.025	-0.71
Stable bourgeois municipality ¹	0.071	2.39**	0.060	1.92*	0.055	1.65*
Constant	7.807	15.78***	6.571	10.02***	7.634	13.20***
	F	p	F	p	F	p
Lags of expenditure per pupil	0.61	0.72	1.36	0.22	0.57	0.80
R ²	0.54		0.45		0.50	
<i>Specification tests:</i>						
RESET	F = 3.28		p = 0.02		F = 0.10	
LINK	t = 0.24		p = 0.81		t = -0.39	
Schapiro-Wilk	z = 2.96		p = 0.00		z = 0.28	

¹ Relative to stable socialdemocratic municipalities

*** significant at 0.01 pct.-level

** significant at 0.05 pct.-level

* significant at 0.1 pct.-level

The main result in Table 4 is very much the same as in Table 3: also when examination scores are analyzed separately for each of the three examination terms we have data from, the impact of (the lags of) the expenditure variable on average examination scores remains clearly insignificant. In general, the model fits the data from each of the three examination terms well, although there are indications of non-normal residuals in two of the three cases.

5. Discussion

The main result emerging from the estimations above is a negative one: variations between municipalities in past levels of their expenditure on primary schools are not – or at best only very weakly and highly unreliably – related to variations in average examination scores obtained in the ninth grade examination at the end of the terms 1999-2000, 2000-2001 and 2001-2002. This finding thus confirms the results of the OECD-study (OECD 2001) at a lower level of aggregation. It also seems to agree quite well with the results reported by Heinesen, Graversen and Madsen (1999) who used different measures of school output.

The result does not imply, of course, that there is no relationship between expenditure levels and quality of output from the municipal school system *at all*. What the result implies is (only) that there seems to be no such relationship *within the range of variation in expenditure levels in our data*. In that respect, the result is contingent on the existing state of affairs with respect to the level of funding of the municipal primary school system in Denmark.

There can be several reasons why variations in past expenditure levels are not reflected in variations in average examination scores, and these reasons need not be mutually exclusive. One possible reason could be that we are facing diminishing returns to scale in the municipal primary school system: as the level of expenditures increases, the marginal gain from every additional Dkr. devoted to the school system may diminish continuously and approach zero in the limit. Given the – comparatively – high expenditure levels that characterize the municipal school system in Denmark, one could hypothesize that Danish municipalities have (long) passed the point where additional funding to the school sector can be expected to translate into tangible improvements in output.

As mentioned in the introduction, theories centered around the concept of self-interest maximizing bureaucrats (or public service producers in general) would also predict the lack of any stable and reliable relationships between variations in municipal expenditures and variations in output from the school system. The present results obviously do not contradict such theories. Thus one cannot rule out that slack-maximiza-

tion and other sources of inefficient production can be part of the explanation why we do not find a relationship between variations in expenditure levels and in output in the municipal school system. Examples of behaviour within the school system that appears at the very least strongly reminiscent of slack-maximization endeavors are certainly not too hard to come by.

When it comes to the control variables the results must be approached with some caution due to possible multicollinearity problems. The findings seem to confirm, however, the importance of the municipalities' "educational profile" for the average level of scholarly achievement in the primary school system, although they cannot tell anything about how the relationship works at the individual level. Thus the reason why a high proportion of inhabitants with higher education in a municipality tends to be related to a higher average level of scholarly achievement could be that pupils tend to get higher examination scores if their parents have a higher education and hence can provide scholarly stimulation to them. Alternatively it could be that parents with higher education tend to take a greater interest in school matters and in the quality of schooling, thus pressing for better teaching which in the end results in higher examination scores for all pupils.

The proportion of bilingual pupils was found to have a highly reliable and stable negative impact on average examination scores in the municipalities in all four estimations. But again, we cannot tell how exactly the proportion of bilingual pupils impacts on average examination results. It could be quite simply that bilingual pupils tend to get lower examination scores than do Danish pupils. But there is also the possibility that a high proportion of bilingual pupils has a negative impact on the scholarly achievements of Danish pupils as well. In a survey from 1996 among primary school teachers in Copenhagen 74 percent of the respondents agreed to the (politically blatantly incorrect) statement that the bilingual pupils are a detriment to Danish pupils (Gimbel, Holmen and Jørgensen 2000: 101), which could seem to suggest the latter interpretation.

Also the proportion of pupils enrolled in private schools was found to have a negative impact on average examination scores in the municipal primary schools in two of the

four estimations. The straight-forward interpretation of this result would seem to be that private schools tend to skim the pool of pupils for the socially and scholarly strongest, leaving the weaker pupils to the municipal system. There is not much in the results to suggest that competition from private schools has a positive impact on the performance of the municipal school system. Rather they suggest that competition tends to lead to a segmentation of the primary school system.

Finally, politics seems to matter in the field of primary education and school quality. In all four estimations stable socialdemocratic municipalities tend to have average examination scores that are significantly lower than the average scores found in stable bourgeois municipalities. This finding agrees with the results from Sweden reported by Waldo (2001). It also seems to agree with the results from the internal German PISA-study (Baumert et al. 2002). Two possible interpretations come easily to mind. In the first place, (stable) socialdemocratic municipalities may be less efficient – or more tolerant of inefficiency – than (stable) bourgeois municipalities in the sense of getting value (in terms of examination scores) for their money. In the second place, (stable) socialdemocratic municipalities may simply have different priorities for their schools than (stable) bourgeois municipalities, placing less emphasis on skills acquisition and examination performance and more emphasis on other aspects of primary schooling.

6. Conclusion

From a policy point of view, the results reported here may seem to give little guidance to politicians bent on improving the scholarly achievement levels in municipal primary schools. Still, given the present state of affairs, it appears safe to conclude that increasing *general* spending on municipal primary schools (further) looks like a highly unreliable and grossly inefficient way of improving the quality of primary schooling in Denmark, at least with respect to the skills dimension. The significant impact of the politics variable suggests that – at present expenditure levels - *how* money is spent in the school system may be more important to output quality than *how much* money is spent.

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