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PUBLIC SECTOR EFFICIENCY: THE ROLES OF POLITICAL AND BUDGETARY INSTITUTIONS, FISCAL CAPACITY AND DEMOCRATIC PARTICIPATION[*]

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Abstract The purpose of this paper is to investigate whether efficiency in public service provision is affected by political and budgetary institutions, fiscal capacity, and democratic participation. In order to address this issue we take advantage of a new global efficiency measure for Norwegian local governments. There is strong evidence that high fiscal capacity and a high degree of party fragmentation contributes to low efficiency. In addition we find that increased democratic participation tends to increase efficiency, while a centralized top down budgetary process is associated with low efficiency.

Keywords Public sector efficiency · Political and budgetary institutions · Fiscal capacity · Democratic Participation
JEL codes H72, H75

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1. Introduction

The economic performance of governments is an important topic in political economy, and the ability to control debt and deficits have received large attention since the seminal contributions by Roubini and Sachs (1989a,b) and Von Hagen (1992). Roubini and Sachs showed that weak or fragmented governments lead to high budget deficits in OECD countries, whereas Von Hagen found that hierarchical budget procedures were associated with low budget deficits in EU countries. The following empirical literature has to a large extent focused on the impact on fiscal policy, including taxes and public spending in addition to debt and deficits (see e.g Kontopoulus & Perotti, 1999; Volkerink & De Haan, 2001).

Controlling debt and deficits is no doubt an important part of the economic performance of governments, but other aspects are equally important. One obvious candidate is efficiency in public service provision, which has been a heavily debated issue in Western countries for many years. One reason for the interest in public sector efficiency is the fact that many countries face a demographic development that increases the demand for public services, and at the same time experience substantial fiscal deficits and public debt. Improved efficiency in public service provision facilitates more services without increasing government expenditures.

The question we ask in this paper is what characterizes political systems that are successful in terms of efficient provision of public services. We pay particular attention to the roles of political and budgetary institutions, democratic participation, and fiscal capacity. Following earlier contributions in the literature on public sector efficiency the issue is addressed using data on the local government level. The advantages by using local government data is that local governments within the same country are more comparable than different countries and that richer data on service provision and efficiency can be utilized, while there at the same time is sufficient variation in the key explanatory variables. A few recent studies (e.g. Afonso et al., 2005; Afonso & Aubyn,

2005) have performed efficiency analyses using OECD data, but they make no attempt to explain variations in efficiency across countries.

The econometric analysis takes advantage of a new measure of total output in Norwegian local governments that is very comprehensive and based on a large number of indicators of production for the different service sectors. Efficiency is measured as the ratio between total output and available resources. The efficiency measure is global in the sense that it relates to overall service provision, and not to provision of a particular service. We think the use of a global efficiency measure is highly appropriate when the explanatory variables characterize the local government institution rather than being sector specific. The main advantage compared to previous studies using global efficiency measures (see the overview by De Borger & Kerstens, 2000) is that we have access to better and a larger number of indicators of service production. In addition we use a panel data set covering five years, whereas the earlier studies have used cross section data.

With this improved efficiency measure at hand we analyze how the degree of inefficiency is related to political and budgetary institutions, fiscal capacity, and democratic participation. Determinants of global efficiency are analyzed by De Borger et al. (1994), De Borger and Kerstens (1996), Ashworth et al. (2006), and Geys (2006) using Belgian data, Hayes and Chang (1990) and Hayes et al. (1998) using US data, and Balaguer-Coll et al. (2007) using Spanish data. Earlier Norwegian studies have focused on specific efficiency measures for nursing homes (Kalseth, 2003) and lower secondary education (Borge & Naper, 2006). Studies of educational efficiency in the US include Duncombe et al. (1997), Grosskopf et al. (2001), and Eom and Rubenstein (2006).

The rest of the paper is organized as follows. We proceed in Section 2 by introducing and discussing the output and efficiency measures used in the analysis. We construct three efficiency measures that all reveal substantial variation in efficiency across local governments, and the aggregate efficiency potential is in the order of 33-35 percent. Our understanding of inefficiency as a principal-agent problem is discussed in Section 3. We argue that efficiency can be improved through hard budget constraints and incentive

schemes, and that the likelihood of implementing these means is affected by political and budgetary institutions, fiscal capacity, and democratic participation. The empirical analysis of the determinants of efficiency is presented in Section 4. The main findings are that a high degree of party fragmentation and a high fiscal capacity contributes to low efficiency. There is also some evidence that democratic participation increases efficiency and that a top down centralized budgetary procedure reduces efficiency. The results are fairly robust to which efficiency measure we use, to the choice of estimation method, and also to outliers. Finally, Section 5 offers some concluding remarks.

2. Measuring output and efficiency

The main challenge for analyses of efficiency in the public sector is how to measure output. Bradford et al. (1969) made an important conceptual contribution by distinguishing between the services directly produced (*D*-output) and the thing or things of primary interest to the citizen-consumer (*C*-output). The general idea is that a traditional production function describes the relationship between inputs and *D*-output, and that *C*-output is determined by the amount of *D*-output and a vector of environmental variables.

In the present study we take advantage of an aggregate output measure developed by the Norwegian Advisory Commission on Local Government Finances (*Det tekniske beregningsutvalg for communal og fylkeskommunal økonomi, TBU*). The commission's idea was to establish a measure of aggregate output based on indicators of production for several service sectors. Six service sectors were included: care for the elderly, primary and lower secondary education (1st to 10th grade), day care, welfare benefits, child custody, and primary health care. The aggregate output measure has been calculated and reported annually since 2001.[1]

[1] The authors of this paper were all involved in this work. In a report to the commission (Borge et al., 2001) we discussed the general properties of the aggregate output measure and showed how it could be implemented. Unfortunately, the report is only available in Norwegian.

Table 1 Indicators and weights in the aggregate output measure, 2005.

Sector/ Indicator	Weight
Care for the elderly	0.374
Share of inhabitants above 80 years of age receiving home based care	0.269
Share of inhabitants above 80 years of age in nursing homes	0.231
Share of single rooms in nursing homes	0.231
Share of users of home based care receiving both practical help and Nursing	0.269
Primary and lower secondary education	0.339
Teaching hours per student	0.947
Share of children 6-9 years in day-care facilities for school children	0.0265
Share of users in day-care facilities with attendance above 15 hours a week	0.0265
Day care	0.129
Adjusted hours of attendance in local government day care institutions per child 0-5 years	0.864
Play and outdoor area per child	0.064
Financial support from the local government to private day care institutions per child 0-5 years	0.072
Welfare benefits	0.069
Share of inhabitants aged 20-66 receiving economic assistance	0.500
Average support per month	0.500
Child custody	0.034
Number of investigations as share of inhabitants aged 0-17	0.307
Number of children receiving help as share of inhabitants aged 0-17	0.693
Primary health care	0.055
Man-hours by doctors per 10000 inhabitants	0.405
Man-hours physiotherapists per 10000 inhabitants	0.405
Man-hours by nurses per 10000 inhabitants 0-6 years	0.190

Note: The weight for each sector reports the sector's weight in the aggregate output measure, while the weights for the individual indicators are their weight within the sector. Both the weights of the individual indicators within the same sector and the weights of the sectors sum to unity. The weighing of sectors and indicators is based on expenditure shares. In cases where it is impossible to divide expenditures between two or more indicators, the indicators under consideration are given equal weight.

Table 1 reports indicators and weights for the 2005 version of the aggregate output measure.[2] The output is based on 17 indicators of production for the six service sectors. As a general characterization it seems reasonable to consider the output measure as an example of a *D*-output. It captures activities and services provided by local governments

[2] It has only been minor changes in indicators and weights from 2001 to 2005.

that in most cases are clearly distinguished from inputs, but it provides little information about the effects of these activities and services on consumers and citizens. Although it would be satisfactory to come closer towards *C*-output, *D*-output is far from invalidated as starting point for analyses of efficiency. As pointed out by De Borger and Kerstens (2000), efficiency can be defined at each stage of the production process. That is, efficiency analyses can focus on the relationship between inputs and *D*-output, the relationship between *D*-output and *C*-output, as well as the relationship between inputs and *C*-output.

Care for the elderly and mentally and physically disabled is the largest service sector. The local governments are responsible for nursing homes and for care in private homes. The quantity of services provided are captured by the fraction of elderly (80 years an above) in nursing homes and the fraction of elderly that receive home based care. The two additional indicators capture the quality in nursing homes (the share of single rooms) and the amount of services provided in home based care (the share of users receiving both practical help and nursing).

The educational sector is the second largest service sector, and the main indicator of educational output is the number of teacher hours per student. Basically one teacher hour is produced when one teacher is teaching one class for one hour. The schools do also provide day care services before and after the school day for 1st through 4th graders that demand it. This is captured by two indicators, the fraction of children that use day care facilities and the fraction of users that attend more than 15 hours per week.

For day care the main indicator of production is hours of attendance in local government day care centers per child in the relevant age group (0-5 years). The indicator reflects both the fraction of children that is enrolled in local government day care centers and whether they are on full time or part time. The number of hours is adjusted to take account of the fact that younger children require more resources.[3] The additional

[3] The maximum children-adult ratio increases with the age of the children according to national regulations.

indicators for child care take account of quality (play and outdoor area) and financial support to private day care centers.

The social sector is divided into the two sub sectors child custody and welfare benefits. Child custody includes activities such as foster homes, child care institutions, and advice and help to families with children at risk. As indicators of production we include the number of investigations and the number of children that receives some kind of assistance (either in their own family, in foster homes, or in institutions). Both indicators are measured per inhabitant 0-17 years of age. The local governments provide welfare benefits and advice for low income households that are not eligible for benefits from the national social security system. Most recipients are alcohol and drug addicts and younger adults with weak connections to the labor market. The included indicators are the share of inhabitants 20-66 years receiving social assistance and the average amount per recipient.

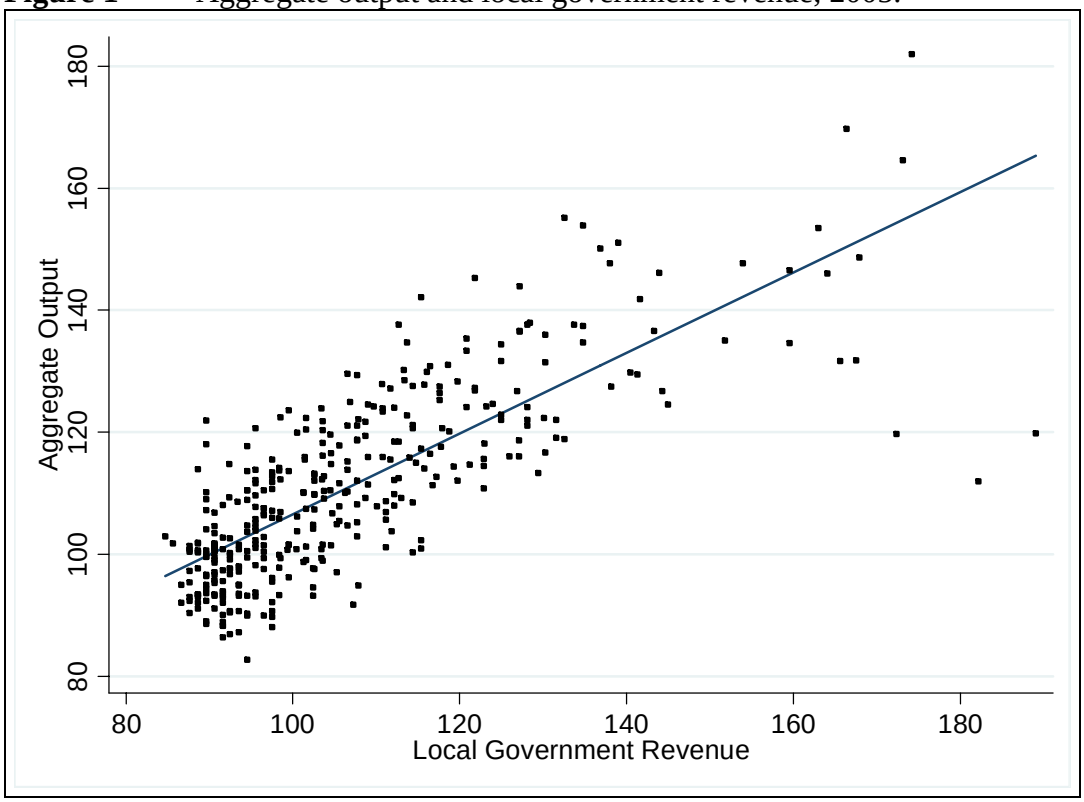
The local governments are responsible for primary health care to all citizens. They run health centers, arrange emergency wards and provide financial support for doctors and physiotherapists in private practice. In lack of better indicators, man-hours by doctors, nurses and physiotherapists are included as indicators of production.

The calculation of the aggregate output measure goes as follows. First, an output measure for each service sector is calculated as a weighted average of the indicators of production. The weight assigned to each indicator is equal to its average share of the sector's expenditure and are presented in Table 1. To make the indicators comparable they are measured as percentage of their sample means (weighted by population size). Second, the aggregate output measure is calculated as the weighted average of the output measures for the individual service sectors using average spending shares as weights. The weighted mean of the aggregate output measure is set equal to 100.

A plot between the aggregate output measure and available resources is shown in Figure 1. Available resources are denoted local government revenue, which is the sum of local taxes and block grants per capita. The revenues are normalized such that the weighted

average equals 100. Revenues are measured per capita and are 'deflated' by an index that captures varying cost conditions across local governments. The point of departure for the deflating is the cost index used in the spending needs equalization system, which is based on variables such as population size, settlement pattern, the age composition of the population, and social factors. We also take account of differences in labor costs due to the regional variation in the pay roll tax.

Figure 1 Aggregate output and local government revenue, 2005.



It is evident from Figure 1 that there is a positive relationship between aggregate output and local government revenue (the coefficient of correlation is 0.78).[4] Local governments with high revenues provide better services to their citizens than local governments with low revenues.

[4] In the figure, two local governments with revenue above 200 are excluded. When they are included the coefficient of correlation equals 0.71.

We also observe substantial variation in aggregate output between local governments with similar levels of revenue, i.e. some local governments are able to get more services out of their revenues than others. The variation in output conditioned on revenues may reflect variation in efficiency. This is the point of departure for our baseline measure of global efficiency (E^B), which is defined as the ratio between aggregate output and local government revenue.[5] As output and revenues, the efficiency measure is normalized such that the weighted average equals 100.

Table 2 Descriptive statistics for the three efficiency measures, 2005.

Efficiency measure	Min	Q_1	Median	Q_3	Max	St. dev.
Baseline efficiency (E^B)	45.4	97.6	104.8	110.9	135.4	10.5
Alternative 1 (E^{A1})	38.7	94.2	100.9	106.6	133.9	11.1
Alternative 2 (E^{A2})	64.2	96.2	102.0	108.1	132.9	9.3

Note: The number of observations is 374. Data for 59 local governments are missing.

Some descriptive statistics for the baseline efficiency measure are reported in Table 2. We observe a substantial variation in efficiency across local governments. Variation from a low of 45.4 to a high of 135.4 indicates that the most efficient local government is nearly three times as efficient the least efficient. The efficiency of the middle half of the local governments varies within a range of 13 percentage points. Since the sample mean is normalized to 100, we get the implicit efficiency potential by subtracting 100 from the maximum value. In the baseline case, output could on average be increased by about 35 percent if all local governments increased the ratio between output and revenue to the highest value in the sample.

In addition to the baseline efficiency measure, we develop two alternatives that take account of some weaknesses by the baseline measure. The motivation for the first alternative is that, even at the standard of *D*-output, a few of the indicators in our aggregate output measure can be questioned. These are teacher hours in education and

[5] We depart from earlier analyses of global efficiency in local governments by not utilizing frontier techniques. The reason is that we have a large number of indicators of production, in which case frontier techniques would tend to produce an unreasonable large number of efficient units. The global efficiency studies using frontier techniques referred to by De Borger and Kerstens (2000) only have 2-6 outputs. Afonso et al. (2005), who analyses efficiency in the OECD countries, also utilize a large number of indicators for output. Based on the indicators of output they calculate a performance measure much in the same way as we calculate our aggregate output measure.

man hours in health care, which would typically be considered as inputs in specific analyses of education or health care.[6] However, since the level of revenues is our (implicit) measure of input, the analysis is still meaningful. In the context of efficiency it is relevant to ask how many man hours devoted to service production that comes out of a given budget.[7] Nevertheless, we are still concerned when the main output in the second largest service sector can be questioned. Therefore we also use an alternative output measure where the number of teacher hours is replaced by an indicator of student achievement developed by Borge and Naper (2006). Student achievement is measured by assessment grades adjusted for a large number socioeconomic characteristics capturing family background, and can be interpreted as the schools' contribution to achievement.[8] The efficiency measure based on the aggregate output measure where teacher hours is replaced by student achievement in the core subjects Norwegian, English and mathematics (each subject is given equal weight) is denoted E^{A1}.

In the second alternative (E^{A2}) we take account of some other weaknesses by the baseline efficiency measure. First, the aggregate output measure does not include indicators for the (minor) services culture, communication, infrastructure and housing. Second, there is not a one-to-one correspondence between our revenue measure, which includes taxes and block grants, and resources devoted to service provision. Local governments supplement taxes and grants by user charges, some of the revenues cover interests and installment on debt, and they run surpluses or deficits. Other things equal, there will be a tendency to overestimate efficiency in local governments with high user charges, low interest and installment, large deficits, and low budget shares for culture, communication,

[6] Borge and Naper (2006) use teacher hours as input in a recent efficiency analysis of the Norwegian educational sector.

[7] This understanding is in line with De Borger and Kerstens (2000) who consider the amount of teaching as an intermediate output.

[8] The indicator of student achievement is calculated on the basis of a dataset covering all Norwegian 10th graders. The data set facilitates student level regressions with assessment grade as dependent variables and variables describing family background as explanatory variables. Family background is captured by parents' education and income (separate for the mother and the father) and dummy variables reflecting whether the parents are married to each other, cohabitants, separated, divorced or neither of these. The individual student is described by dummy variables for gender, quarter of birth, graduation earlier or later than expected, and whether they are immigrants or adopted. In addition a set of municipal fixed effects are included, and the coefficients of these can be interpreted as grades adjusted for family background. We refer to Borge and Naper (2006) for a further description of the procedure.

infrastructure and housing. These weaknesses are accounted for by regressing the baseline efficiency measure on user charges, interests and installment, net operating surplus and the budget shares for the service sectors that are left out. The results from the regressions are reported in Table A1 in the Appendix. The sign of the coefficients are in line with the above discussion and most of them are statistically significant. As the second alternative efficiency measure we use the residuals from these regressions (separate for each year), but add a constant term such that the weighted averages equals 100.

Descriptive statistics for the alternative efficiency measures are reported in Table 2. Like the baseline efficiency measure they reveal substantial variation in efficiency across local governments, and the implicit efficiency potential (derived from the maximum value) is strikingly similar across the three efficiency measures. Despite the large similarity in efficiency potential, the three efficiency measures rank the local governments quite differently. The rank correlations are 0.80 (between E^B and E^{A1}), 0.79 (between E^B and E^{A2}), and 0.65 (between E^{A1} and E^{A2}).[9] However, there is substantial agreement on the most and least efficient units. Three local governments are ranked among the five most efficient by all three efficiency measures, and another three are ranked consistently among the five least efficient.

We will argue that the global efficiency measures developed here, although not ideal, represent a clear improvement compared to existing measures.[10] The improvement first and foremost is due to access to a larger number of indicators of production than in previous studies.[11] Whereas our measure of aggregate output is based on nearly 20 indicators, none of the earlier studies use more than 6 indicators. And in the Belgian

[9] De Borger and Kerstens (1996) compare efficiency scores using different frontier techniques. They report correlations that range from 0.59 to 0.99 with an average of 0.79.
[10] The same measure of aggregate output is used by Revelli and Tovmo (2006) in analysis of the spatial pattern of efficiency.
[11] These studies include Athanassopoulos and Triantis (1998) analyzing Greek local governments, Conceição Sampaio de Sousa and Ramos (1999) analyzing Brazilian local governments, Hayes and Chang (1990) and Hayes et al. (1998) analyzing US local governments, and De Borger et al. (1994), De Borger and Kerstens (1996), and Vanden Eeckaut et al. (1993) analyzing Belgian local governments, and Balaguer-Coll et al. (2007) analyzing Spanish local governments.

studies (De Borger et al., 1994; De Borger and Kerstens, 1996) that have the largest number of indicators, variables like total population and population above 65 years of age are in our view better characterized as spending needs than as outputs.

3. Political and budgetary institutions, fiscal capacity, democratic participation, and efficiency

Inefficiency in public service provision is usually understood as a principal-agent problem originally formulated by Niskanen (1971, 1975) and Migué and Bélanger (1974). The context is that production is delegated to a service producing agency (bureau) that is better informed about costs than voters and politicians (sponsor). In addition there is a conflict of interest between the agency on one the hand and voters and politicians on the other because the agency has preferences for budgetary slack. Budgetary slack can be interpreted as all kind of non-productive activities, including low effort, over-employment and extra salary. Thus, budgetary slack is conceptually equal to inefficiency.

The later theoretical contributions have focused on how budgetary slack is affected by the institutional setup and the use of incentive schemes. The literature on institutional setups (e.g. Moene, 1986; Chan & Mestelman, 1988) emphasize that the budgetary slack can be reduced if the sponsor takes on a more active role in the budgetary process. One way of being more active is to impose a hard budget constraint in the sense that the bureau faces a fixed budget. A hard budget constraint will contribute to lower budgetary slack because the bureau no longer is able to increase the budget by reducing efficiency. In a similar type of model Falch (2001) shows that a hard budget constraint will reduce public sector wages. The literature on incentive schemes, summarized by Dixit (2002) in a public sector context, emphasizes that budgetary slack can be further reduced with a financing scheme that rewards the bureau for high production. However, because of specific features of the public sector like measurement problems, multi-tasking and multiple principals, the general recommendation is that incentives should be low-powered rather than high-powered. Although hard budget constraints and incentive schemes may improve efficiency, they may be difficult to implement in a political context. To make a

hard budget constraint credible it may be necessary to accept periods with low production, and strong public sector unions may resist the introduction of incentive schemes.

In this paper we focus on the roles of political and budgetary institutions, fiscal capacity and democratic participation, and we now turn to the discussion of how these factors will affect the interaction between the politicians and the service producing agency. Starting with political factors, a natural point of departure is the weak government hypothesis. The hypothesis was first introduced and tested by Roubini and Sachs (1989a,b), and basically says that debt and deficits increases when the fragmentation of the government increases. Ashworth et al. (2005) summarize the extensive empirical testing of the hypothesis, and conclude that the results are supportive of the main idea that a strong political leadership has an advantage in keeping debt and deficits low. The type of government and the strength of the political leadership may also be important for efficiency in public service provision. A strong political leadership may find it easier to impose a hard budget constraint because it is more likely to resist pressure to accommodate low efficiency by larger budgets. Moreover, strong political leaderships may have more power in internal bargains with public sector unions about the implementation of incentive schemes and other means to increase performance.

Following earlier studies of Norwegian local governments we use a Herfindahl-index as indicator of political strength.[12] The index is inversely related to party fragmentation, and is calculated as

$$HERF = 100\sum_{p=1}^{P} SH_p^2, \qquad (1)$$

[12] These studies include among others Falch and Rattsø (1997) analyzing school spending, Kalseth and Rattsø (1998) analyzing administrative spending, Borge (2000) analyzing user charges, Kalseth (2003) analyzing efficiency in nursing homes, Borge (2005) analyzing budget deficits, and Borge and Naper (2006) analyzing educational efficiency.

where SH_p is the share of seats in the local council held by party p and P the total number of parties in the council. The index can be interpreted as the probability that two randomly drawn members of the council belong to the same party. Alternatively, we can say that it captures the number of parties in the local council and the distribution of seats among them. The value of the index is reduced (fragmentation increases) when the number of parties increases and when the seats are more equally divided among a given number of parties.

Our second indicator of political strength is a 4-way classification of political regimes developed by Kalseth and Rattsø (1998). It is based on the party affiliation of the mayor and the deputy mayor and the number of seats held by their parties:

One party, majority: The mayor and the deputy mayor are from the same party, and their party is in a majority position.

Different parties, majority: The mayor and the deputy mayor are from different parties and, when combined, their parties are in a majority position.

Same party, minority: The mayor and the deputy mayor are from the same party, and their party is in a minority position.

Different parties, minority: The mayor and the deputy mayor are from different parties, and their parties are in a minority position.

At the outset we expect that the strength of the different types of political leaderships follows the above ordering, i.e. “one party, majority” is expected to be the strongest type and “different parties, minority” the weakest type. This ordering is however, not imposed in the empirical analysis where we use a dummy variable approach with the type “one party, majority” as reference. The advantage of the 4-way classification is that it provides a direct measure of the type of political leadership, whereas the Herfindahl-index is a more indirect indicator. On the other hand the 4-way classification is somewhat crude for the minority cases, which constitute 60 percent of the sample, since the classification does not capture the number of additional parties that supported the election of the mayor

and the deputy mayor.[13] Under the likely assumption that the additional number of parties increases with the fragmentation of the local council, this will to some extent be captured by the Herfindahl-index. We think the use of several indicators of political strength increases the robustness and the validity of the results.

In addition to political strength, we take account of political ideology measured by the share of socialists in the local council. Socialist parties are defined as the social democratic party (The Labour Party) and all parties to its left. The basic hypothesis in political economy is that socialists prefer a larger public sector than non-socialists. Strong preferences for public services can make it harder to impose a hard budget constraint because the temptation to accommodate cost increases will be larger. In addition, socialist parties have strong ties to public sector unions and do often support the unions' resistance towards incentive schemes and other reforms of the public sector. The finding of Strøm (1995) that socialist influence increases local government wages is indicative of the ties to the unions, and does also suggest that socialist influence may affect efficiency through wages. These arguments suggest that socialist influence will be associated with low efficiency. On the other hand it may be argued that the ties to the unions create a more cooperative climate that is beneficial for efficiency.

With respect to budgetary institutions we separate between a top down centralized procedure and a bottom up decentralized procedure, and it is the early stages of the budgetary process that differs between the two procedures. The starting point for the decentralized procedure is that each sector works out a budget proposal. Then the chief administrative officer or the executive board coordinates the proposals and prepares an overall budget to be approved by the local council. In contrast, under a centralized budgetary procedure the chief administrative officer or the executive board presents an overall budget proposal to the sectors, including the budget size for each sector, and the sectors are only allowed to propose changes within the given budgetary limits. The centralized procedure may be understood as a mean to impose a hard budget constraint

[13] In most local governments the mayor and the deputy mayor are elected of and among the members of the local council. In a few local governments they mayor is elected directly by the electorate.

that reduces the influence of the service producing agencies and thereby contributes to higher efficiency. The finding of Tovmo (2007) that a centralized budgetary procedure reduces the budget deficits in Norwegian local governments is in line with this understanding. However, Poterba (1996: 48-49) speculates that aggregate budget objectives may be achieved "at the cost of reducing the amount of information that can be brought to bear on particular budget decisions". And less information is obviously a disadvantage for politicians that seek to maximize the degree of efficiency in service provision.

The fiscal capacity of the local government is an important economic factor that may affect efficiency. As an indicator of fiscal capacity we use the revenue concept introduced in Section 2, i.e. taxes and block grants adjusted for spending needs and payroll tax.[14] A high level of revenue may contribute to lower efficiency of several reasons. First, local governments with high levels of revenue will have reasonably good service standards even if they are not fully efficient. The politicians may then be less eager to implement incentive schemes and other reforms that may be controversial politically or in conflict with the preferences of the unions. Second, high levels of revenue tend to go along with larger operating surpluses and less fiscal stress (Borge, 2005; Tovmo, 2007), in which case a hard budget constraint is less likely to be credible.

As a final determinant of efficiency we focus on democratic participation, measured as the number of votes in the previous election in percent of the number of eligible voters. Earlier analyses of the economic consequences of democratic participation (e.g. Mueller & Stratmann, 2004) have focused on redistribution and growth. The typical argument is that an increase in the degree of democratic participation first and foremost reflects increased propensity to vote among low-income voters. The median voter becomes relatively poorer and the policy is shifted towards higher and more progressive taxation. The distribution of income becomes more equal, but at the possible cost of lower economic growth. In our view, a high degree of democratic participation is also likely to

[14] This measure of local government revenue can be interpreted as fiscal capacity and treated as exogenous because the local tax rates are decided at the national level within the Norwegian centralized system of financing.

reduce inefficiencies in public service provision through more efficient monitoring of politicians. The argument is that active and engaged voters give the politicians incentives to implement policies that benefit the electorate at large at the expense of policies benefiting public sector unions and other special interests.

4. Estimation results

The hypotheses outlined in the previous section are tested empirically on a panel data set for Norwegian local governments over the period 2001-2005. Because data on output and efficiency are not available for all local governments, the panel is unbalanced. The baseline efficiency measure (E^B) is each year available for between 362 and 384 local governments, and with a total number of observations equal to 1,856 the sample covers around 85 percent of the local governments on average. Since there are a few missing observations for the participation rate, the Herfindahl-index and the share of socialists in the local council, a maximum of 1,853 observations is available for estimation. In the cases where the 4-way classification of political regimes and the dummy for centralized budgetary procedure are included as explanatory variables the sample is further reduced. The number of observations is 1,684 when we include the 4-way classification of political regimes and 1,342 when we include the budgetary dummy. In order to economize on the number of observations, we do not include the 4-way classification and the budgetary dummy in the same equation.

The first alternative efficiency measure (E^{A1}), where teacher hours is replaced by student achievement, is only available for 2004 and 2005.[15] The second alternative efficiency measure (E^{A2}) can be calculated for all units where the baseline efficiency measure is available.

[15] When E^{A2} is used as dependent variable, the number of observations is 736 when neither the 4-way classification nor the budgetary dummy is included, 721 when the 4-way classification is included, and 490 when the budgetary dummy is included.

Although we have a panel, the time series variation in the data is insufficient to estimate fixed effects models.[16] The time series variation is particularly limited for the political variables that only change every fourth year, and in our case they only change from 2003 to 2004. For the most part we report results from pooled OLS regressions where all cross section variation in the data is utilized in the estimation of the parameters. It is well known that pooled regressions may underestimate the standard errors and thereby overestimate the significance of the estimates. We deal with this problem by reporting t-values based on clustered standard errors taking into account that the error terms from the same local government are correlated. As an alternative to OLS with clustered standard errors, we also estimate models that allows for random effects. In the random effects model the correlation between error terms from the same local government is taken into account in the estimation of the parameters. The use of different methods for handling the correlation between error terms from the same local government may increase the robustness of the results.

The estimation results for the baseline efficiency measure are presented in Table 3.[17] The starting point is Model I, where political strength is captured by the Herfindahl-index and the budgetary dummy is not included. This is the specification that maximizes the number of observations. It appears that all four variables come out as significant and largely in line with the hypotheses developed in the previous section. The negative effect of local government revenue is consistent with the hypothesis that high fiscal capacity decreases efficiency. According to the estimate a revenue increase of 10 percentage points is predicted to reduce efficiency by 3.2 percentage points. The positive effect of democratic participation supports the hypothesis that monitoring of elected officials leads to more efficient provision of local public services. An increase in democratic participation by 10 percentage points is predicted to increase efficiency by 2.3 percentage points. The positive sign of the Herfindahl-index means that a high degree of party fragmentation in the local council leads to low efficiency. If the Herfindahl-index is reduced by 10 percentage points (indicating more party fragmentation), efficiency is

[16] If fixed effects are included, local government revenue is the only variable that comes out as significant.
[17] Descriptive statistics for the explanatory variables are reported in Table A2 in the Appendix.

expected to be reduced by 2.5 percentage points. Finally, a high share of socialists in the local council is associated with low efficiency. However, the quantitative effect of ideology is rather weak as an increase in the share of socialists by 10 percentage points is predicted to reduce efficiency by 0.6 percentage points.

Table 3 Determinants of local government efficiency, the baseline efficiency measure (E^B).

	I	II	III	IV	V
Local government revenue	-0.319 (-17.38)	-0.318 (-17.12)	-0.325 (-17.68)	-0.312 (-14.35)	-0.373 (-26.80)
Democratic participation	0.230 (3.36)	0.266 (3.85)	0.214 (2.98)	0.246 (3.09)	0.176 (3.95)
The share of socialists in the local council	-0.059 (-1.99)	-0.032 (-1.12)	-0.062 (-2.05)	-0.076 (-2.21)	-0.006 (-0.30)
Herfindahl-index (inverse party fragmentation)	0.248 (4.32)		0.247 (3.08)	0.232 (3.71)	0.109 (3.19)
Different parties, majority		-3.416 (-2.66)	-0.399 (-0.28)		
Same party, minority		-4.023 (-2.77)	-1.007 (-0.64)		
Different parties, minority		-5.133 (-3.92)	-0.933 (-0.55)		
Centralized budgetary process				-2.050 (-2.14)	
Estimation method	OLS	OLS	OLS	OLS	Random effects
Observations	1,853	1,684	1,684	1,342	1,853
Estimation period	2001-05	2001-05	2001-05	2001-05	2001-05
R^2	0.413	0.378	0.387	0.418	

Note: The t-values for models I-IV are based on clustered standard errors. Time dummies (not reported) are included in all equations.

In Model II the Herfindahl-index of party fragmentation is replaced by the 4-way classification of political regimes. The strongest type of political regime (same party, majority) is used as reference. The three weaker types do all come out with significantly negative coefficients, confirming the hypothesis that political strength is associated with high efficiency. Moreover, the ordering of the coefficients is in line with the ordering of regimes suggested in Section 3 and the hypothesis of equal coefficients of the three

variables can be rejected at the 10 percent level.[18] The estimated efficiency difference between the strongest and weakest type of political leadership is slightly above 5 percentage points. The impact of local government revenue and democratic participation is not affected by this modification of the model, but the share of socialists in the local council become insignificant. In Model III both measures of political strength are included as explanatory variables. The Herfindahl-index seems to be the superior indicator of political strength since it remains significant, while the three variables capturing the 4-way classification of political regimes all become insignificant.

The budgetary dummy is included in Model IV. It comes out negative and significant, and indicates that introduction of a centralized top down budgetary process reduces efficiency by 2 percentage points. Although the inclusion of the budgetary dummy reduces the number of observations substantially (nearly 30 percent), the impacts of local government revenue, democratic participation, the share of socialists, and party fragmentation are very similar to Model I.

In Model V we reestimate Model I using random effects instead of pooled OLS regression with clustered standard errors. It appears that the two methods of handling correlation between error terms from the same local government yield somewhat different results. The main difference is that the coefficient of the share of socialists in the local council becomes insignificant and close to zero. In addition the quantitative effect of the Herfindahl-index is reduced by a half and the quantitative effect of democratic participation by nearly 30 percent. However, party fragmentation and democratic participation are still highly significant. On the other hand, the magnitude of the effect of local government revenue increases compared to the estimate in Model I.

Table 4 reports the results when the two alternative efficiency measures are used as dependent variables. In Models I-IV we use the efficiency measure E^{A1}, where student achievement is the main output in the educational sector. It appears that the sign and significance of local government revenue, party fragmentation, and the budgetary dummy

[18] The F-statistic with df1=4 and df2=411 is 2.73 and the corresponding p-value is 0.066.

are the same as with the baseline efficiency measure, i.e. high levels of revenue, a high degree of party fragmentation and a centralized budgetary process is associated with low efficiency. There are however, quite sizeable changes in the quantitative effects. While the magnitude of local government revenue increases, the magnitude of party fragmentation is reduced by a half. Neither democratic participation nor the share of socialists in the local council comes out as significant when efficiency measure E^{A1} is applied.

The efficiency measure E^{A2} that controls for left out sectors, user charges, net operating surplus, and interest payments, is the dependent variable in Models V-VIII. Again it is the case that high levels of local government revenue and a high degree of party fragmentation significantly contribute to lower efficiency.[19] However, the coefficient of local government revenue is substantially reduced compared to the two other efficiency measures and the coefficient of the Herfindahl-index is reduced by a half compared to the baseline measure. Democratic participation, which became insignificant with efficiency measure E^{A1}, now comes out as significant in Models VI (4-way classification of political regimes as indicator of political strength) and VIII (random effects). The budgetary dummy becomes insignificant and the share of socialists is still insignificant.

Compared to the results using the baseline efficiency measure, the impact of the 4-way classification of political regimes is weaker with the alternative measures. This is particularly the case when efficiency measure E^{A1} is used, in which case the three variables are not jointly significant. Again the Herfindahl-index seems to be the superior indicator of political strength. This is confirmed when we include the Herfindahl-index and the variables capturing the 4-way classification in the same equation (not reported). We then obtain the same result as with the baseline efficiency measure in Table 3. The Herfindahl-index remains significant, while the three variables capturing the 4-way classification become insignificant.

[19] The Herfindahl-index does not come out as significant in model VII where the budgetary dummy is included. The reason for this is not the inclusion of the budgetary dummy, but the substantial reduction in the number of observations.

Table 4 Determinants of local government efficiency, the alternative efficiency measures.

	I	II	III	IV	V	VI	VII	VIII
Local government revenue	-0.409	-0.405	-0.395	-0.415	-0.165	-0.191	-0.149	-0.212
	(-12.94)	(-13.29)	(-9.09)	(-30.53)	(-3.90)	(-5.97)	(-2.88)	(-15.51)
Democratic participation	0.055	0.100	0.073	0.060	0.102	0.128	0.126	0.107
	(0.85)	(1.53)	(0.94)	(0.93)	(1.51)	(1.93)	(1.64)	(2.26)
The share of socialist in	-0.029	-0.006	-0.028	-0.026	-0.048	-0.018	-0.061	-0.013
the local council	(-1.19)	(-0.24)	(-0.93)	(-1.06)	(-1.76)	(-0.71)	(-1.95)	(-0.65)
Herfindahl-index (inverse	0.108		0.105	0.118	0.147		0.105	0.070
party fragmentation)	(2.23)		(1.75)	(2.67)	(2.39)		(1.49)	(1.88)
Different parties, majority		-1.715				-2.179		
		(-1.43)				(-1.94)		
Same party, minority		-2.244				-2.201		
		(-1.67)				(-1.74)		
Different parties, minority		-1.537				-3.216		
		(-1.23)				(-2.65)		
Centralized budgetary			-2.343				-1.149	
process			(-2.57)				(-1.37)	
Efficiency measure	E^{A1}	E^{A1}	E^{A1}	E^{A1}	E^{A2}	E^{A2}	E^{A2}	E^{A2}
Estimation method	OLS	OLS	OLS	Random effects	OLS	OLS	OLS	Random effects
Observations	736	721	490	736	1,853	1,684	1,342	1,853
Estimation period	2004-2005	2004-2005	2004-2005	2004-2005	2001-2005	2001-2005	2001-2005	2001-2005
R^2	0.674	0.671	0.655		0.174	0.197	0.158	

Note: The t-values in columns I-III and V-VII are based on clustered standard errors. Time dummies (not reported) are included in all equations.

In Table 5 we investigate whether the results are sensitive to extreme observations and outliers. The motivation is that there are a few observations with very low levels of efficiency, and also a few observations with quite high levels of efficiency. For 2005 the minimum value for the baseline efficiency measure is 45, but only 1 percent of the observations are below 65. In the other end of the distribution the maximum value is 135, but only 1 percent of the observation is above 125. It can not be ruled out that some of the extreme observations reflect measurement error, and it is therefore important to investigate whether some of the results presented above are driven by outliers. This issue is investigated in Table 5 where, for each efficiency measure, only observations with efficiency between 80 and 120 are included. It appears that the results are very robust to this reduction of the sample size. The main modification compared to Tables 3 and 4 is that democratic participation become statistically significant when efficiency measure E^{A2} is applied.[20]

Table 5 Sensitivity analyses excluding observations with high and low efficiency

	I	II	III
Local government revenue	-0.238	-0.413	-0.130
	(-12.76)	(-20.15)	(-3.32)
Democratic participation	0.225	0.079	0.106
	(3.84)	(1.32)	(1.78)
The share of socialists in the local council	-0.063	-0.034	-0.040
	(-2.64)	(-1.44)	(-1.69)
Herfindahl-index (inverse party fragmentation)	0.203	0.136	0.126
	(3.90)	(3.16)	(2.28)
Efficiency measure	E^{B}	E^{A1}	E^{A2}
Estimation method	OLS	OLS	OLS
Observations	1,723	690	1,794
Estimation period	2001-05	2004-05	2001-05
R^2	0.230	0.482	0.125

Note: Local governments with efficiency below 80 or above 120 are excluded. The t-values are based on clustered standard errors. Time dummies (not reported) are included in all equations.

[20] We have also investigated whether the results are robust to outliers in terms of population size by excluding local governments with less than 1,000 inhabitants or more than 50,000 inhabitants. Again, the main modifications compared to Tables 3 and 4 is that democratic participation becomes significant when efficiency measure E^{A2} is applied.

5. Discussion and concluding remarks

This paper contributes to the literature on the impact of political systems on policy outcomes. While most of this literature has focused on the intertemporal decision variables deficits and debt, we investigate the impact on efficiency in public service provision. The analysis takes advantage of a new global efficiency measure for Norwegian local governments that is based on a large number of indicators of production, and that represents an improvement compared to existing measures. With this improved efficiency measure at hand we analyze how the degree of inefficiency is related to political and budgetary institutions, fiscal capacity, and democratic participation.

Our most robust finding is that high fiscal capacity is associated with low efficiency. Although the quantitative impact of local government revenue is somewhat sensitive to how efficiency is measured, it comes out as highly significant in all equations estimated. This finding is in line with earlier analyses of global efficiency in Belgian (De Borger et al., 1994; De Borger & Kerstens, 1996)[21], Spanish (Balaguer-Coll et al., 2007) and US local governments (Hayes et al., 1998), and with Norwegian studies of nursing homes (Kalseth, 2003) and education (Borge & Naper, 2006). Also US studies of educational efficiency (e.g. Duncombe et al., 1997; Eom & Rubenstein, 2006) document a negative relationship between efficiency and fiscal capacity. A possible objection regarding the interpretation of the revenue effect is that it may pick up that local governments with high levels of revenue provide services of higher quality, and that quality is not well captured by our output measure. However, this argument is weakened by the fact that the quantitative effect of revenue increases when we include student achievement as an output measure in the educational sector.

With respect to political institutions, the Herfindahl-index measuring political strength by party fragmentation has the most consistent impact. It is highly significant in most equations and indicates that a strong political leadership contributes to higher efficiency.

[21] The effect of fiscal capacity is more ambiguous in more recent Belgian studies. Ashworth et al. (2006) find that increased tax revenues contribute to lower efficiency, whereas a grant increase has the opposite effect. Also Geys (2006) reports that grants increases efficiency.

The importance of political strength is confirmed by the estimates of a 4-way classification of political regimes. There is some evidence that socialist influence is associated with low efficiency, but the effect is in most cases insignificant. The findings with respect to political strength is line with the earlier Norwegian studies by Kalseth (2003) and Borge and Naper (2006), but in contrast to us they provide clearer evidence that socialist influence is associated with low efficiency. The Belgian studies by De Borger et al. (1994) and De Borger and Kerstens (1996) also include political variables. They do not find any significant effect of party fragmentation (measured by the number of coalition partners), but there is some tendency that socialist influence increases efficiency. Ashworth et al. (2006), in a more recent study of Belgian local governments, report similar results as us. They find that single party governments contribute to higher efficiency, whereas socialist influence has the opposite effect.

It is also reasonably robust results that high democratic participation contributes to high efficiency and that a centralized top down budgetary procedure has the opposite effect. The impact of democratic participation supports our understanding that politicians are more effectively monitored when voter engagement is high. A related finding in the literature is that a high level of education contributes to higher efficiency, which is a robust finding in the Belgian studies of global efficiency (De Borger et al., 1994; De Borger & Kerstens, 1996) and the US studies on educational efficiency (Duncombe et al., 1997; Grosskopf et al., 2001, Eom & Rubenstein, 2006). The effect of the budgetary variable is a bit surprising, but may reflect that bottom up information flow is important for efficiency. However, since our budgetary variable only captures the initial stages of the budgetary process, one should be cautious to conclude that hierarchical budgetary procedures in general contribute to lower efficiency.

Our most robust results points toward two opposing future trends in public sector efficiency. On the one hand, the aging of the population in many European countries is likely to increase public sector efficiency by causing fiscal stress, thereby facilitating the handling of the wave of the elderly. On the other hand, the tendency of reduced support

for the largest political parties will increase party fragmentation and work in the opposite direction.

References

Afonso, A. & Aubyn, M.St. (2005). Non-parametric approaches to education and health expenditures efficiency in OECD countries. *Journal of Applied Economics, 8*, 227-246

Afonso, A., Schucknecht, L. & Tanzi, V. (2005). Public sector efficiency: An international comparison. *Public Choice, 123*, 321-347.

Ashworth, J., Geys, B. & Heyndels, B. (2005). Government weakness and local public debt development in Flemish municipalities. *International Tax and Public Finance, 12*, 395-422.

Ashworth, J., Geys, B., Heyndels, B. & Wille, F. (2006). Political competition and local government performance: Evidence from Flemish municipalities. Paper presented at the Annual Meeting of the European Public Choice Society, Turku.

Athanassopoulos, A. & Triantis, K. (1998). Assessing aggregated cost efficiency and the related policy implications for Greek local municipalities. *INFOR: Information Systems and Operational Research, 36*, 66-83.

Balaguer-Coll, M.T., Prior, D. & Tortosa-Ausina, E. (2007): On the determinants of local government performance: A two-stage nonparametric approach. *European Economic Review, 51*, 425-451.

Borge, L.-E. (2000). Charging for public services: The case of utilities in Norwegian local governments. *Regional Science and Urban Economics, 30*, 703-718.

Borge, L.-E. (2005). Strong politicians, small deficts: Evidence from Norwegian local governments. *European Journal of Political Economy, 21*, 325-344.

Borge, L.-E., Falch, T. & Tovmo, P. (2001). Produksjonsindeks for kommunale tjenester (An aggregate output measure for local government services), Report, ALLFORSK, Norwegian University of Science and Technology.

Borge, L.-E. & Naper, L.R. (2006). Efficiency potential and efficiency variation in Norwegian lower secondary schools. *Finanzarchiv, 62*, 221-249.

Bradford, D.F., Malt, R.A. & Oates, W.E. (1969). The rising cost of local public services: Some evidence and reflections. *National Tax Journal, 22*, 185-202.

Conceição Sampaio de Sousa, M. & Ramos, F.S. (1999). Measuring public spending efficiency in Brazilian municipalities: A nonparametric approach. In G. Westermann (Ed.), *Data envelopment analysis in the service sector* (pp. 237-267). Wiesbaden: Gabler Edition Wissenschaft.

Chan, K. S. & Mestelman, S. (1988). Institutions, efficiency and the strategic behavior of sponsors and bureaus. *Journal of Public Economics, 37*, 91–102.

De Borger, B. & Kerstens, K. (1996). Cost efficiency of Belgian local governments: A comparative analysis of FDH, DEA and econometric approaches. *Regional Science and Urban Economics, 26*, 145-170.

De Borger, B. & Kerstens, K. (2000). What is known about municipal efficiency? The Belgian case and beyond. In J.L.T. Blank (Ed.), *Public provision and performance* (pp. 299-330). Amsterdam: North-Holland.

De Borger, B., Kerstens, K., Moesen, W. & Vanneste, J. (1994). Explaining differences in productive efficiency: An application to Belgian municipalities. *Public Choice, 80*, 339-358.

Dixit, A. (2002). Incentives and organizations in the public sector. An interpretative review. *Journal of Human Resources, 37*, 696-727.

Duncombe, W.D., Miner, J. & Ruggiero, J. (1997). Empirical evaluation of bureaucratic models of inefficiency. *Public Choice, 93*, 1-18.
Eom, T.H. & Rubenstein, R. (2006). Do state-funded property tax exemptions increase local government inefficiency? An analysis of New York State's STAR program. *Public Budgeting & Finance, 26(1)*, 66-87.
Falch, T. (2001). Collective bargaining in the public sector and the role of budget determination. *European Journal of Political Economy, 17*, 75-99.
Falch, T. & Rattsø, J. (1997). Political economic determinants of school spending in federal states: Theory and time–series evidence. *European Journal of Political Economy, 13*, 299–314.
Geys, B. (2006). Looking across borders: A test of spatial interdependence using local government efficiency ratings. *Journal of Urban Economics, 60*, 443-462.
Grosskopf, S., Hayes, K.J., Taylor, L.L. & Weber, W.L. (2001). On the determinants of school district efficiency: Competition and monitoring. *Journal of Urban Economics, 49*, 453-478.
Hayes, K. & Chang, S. (1990). The relative efficiency of city manager and mayor-council forms of government. *Southern Economic Journal, 57*, 167-177.
Hayes, K.J., Razzolini, L. & Ross, L. (1998). Bureaucratic choice and nonoptimal provision of public goods: Theory and Evidence. *Public Choice, 94*, 1-20.
Kalseth, J. (2003). Political determinants of efficiency variation in municipal service production: An analysis of long-term care in Norway. Mimeo. Department of Economics, Norwegian University of Science and Technology.
Kalseth, J. & Rattsø, J. (1998). Political control of administrative spending: The case of local governments in Norway. *Economics and Politics, 10*, 63–83.
Kontopoulos, Y. & Perotti, R. (1999). Government Fragmentation and Fiscal Policy Outcomes: Evidence from OECD Countries. In J.M. Poterba and J. von Hagen (Eds.), *Fiscal institutions and fiscal performance* (pp. 81-102). Chicago: The University of Chicago Press.
Migué, J. & Bélanger, G. (1974). Toward a general theory of managerial discretion. *Public Choice, 17*, 27-43.
Moene, K. O. (1986). Types of bureaucratic interaction. *Journal of Public Economics, 29*, 333–345.
Mueller, D.C. & Stratmann, T. (2003). The economic effects of democratic participation. *Journal of Public Economics, 87*, 2129-2155.
Niskanen, W.A. (1971): *Bureaucracy and representative government*. Chicago: Aldine–Atherton.
Niskanen, W.A. (1975): Bureaucrats and politicians. *Journal of Law and Economics, 18*, 617-643.
Poterba, J.M. (1996): Do budget rules work? Working Paper 5550. National Bureau of Economic Research.
Revelli, F. & Tovmo, P. (2006). Revealed yardstick competition: Local government efficiency pattern in Norway. *Journal of Urban Economics*, forthcoming.
Roubini, N. & Sachs, J. (1989a). Political and economic determinants of budget deficits in the industrial democracies. *European Economic Review, 35*, 903-933.
Roubini, N. & Sachs, J. (1989b). Government spending and budget deficits in the industrial countries. *Economic and Policy, 8*, 99-132.

Strøm, B. (1995). Envy, fairness and political influence in local government wage determination: Evidence from Norway. *Economica, 62*, 382-409.
Tovmo, P. (2007). Budgetary procedures and deficits in Norwegian local governments. *Economics of Governance, 8*, 37-49.
Vanden Eeckhaut, P., Tulkens, H. & Jamar, M.-A. (1993). Cost efficiency in Belgian municipalities. In H.O. Fried, C.A.K. Lovell & S.S. Schmidt (Eds.), *The measurement of productive efficiency: Techniques and applications* (pp. 300-334). New York: Oxford University Press.
Volkerink, B. & De Haan, J. (2001). Fragmented government effects on fiscal policy: New Evidence. *Public Choice, 109*, 221-242.
Von Hagen, J. (1992). Budgeting procedures and fiscal performance in the European communities. Economic Paper 96. Commission of the European Communities.

Appendix

Table A1 The regressions underlying efficiency measure E^{A2}.

	2001	2002	2003	2004	2005
Budget share culture	-2.329	-1.990	-1.706	-1.718	-2.406
	(-6.16)	(-5.76)	(-4.14)	(-5.40)	(-5.69)
Budget share communication	-1.456	-0.246	-2.018	-1.797	-1.018
	(-2.82)	(-0.40)	(-3.15)	(-3.36)	(-2.13)
Budget share housing	-0.510	-0.205	-0.300	0.064	-0.260
	(-3.46)	(-1.50)	(-1.70)	(0.40)	(-1.85)
Budget share infrastructure	0.031	0.506	-0.581	-1.296	-0.730
	(0.08)	(1.87)	(-1.53)	(3.44)	(-1.99)
Net operating surplus	-0.722	-0.379	-0.399	-0.947	-0.931
	(-3.69)	(-1.71)	(-2.09)	(-5.30)	(5.21)
Net interests and installment	-0.230	-0.259	-0.404	-0.766	-0.871
	(-1.38)	(-1.21)	(-2.37)	(-4.32)	(5.03)
User charges day care	0.073	0.534	0.456	0.583	0.646
	(0.81)	(6.40)	(5.86)	(7.86)	(7.54)
User charges nursing homes	0.292				
	(1.22)				
User charges home based care	0.419				
	(1.28)				
User charges care for elderly		1.320	0.956	0.868	0.552
		(5.39)	(4.16)	(4.07)	(2.49)
Observations	362	384	374	362	374
R^2	0.249	0.327	0.314	0.406	0.365

Note: Budget shares, net operating surplus and net interest and installment are measured in percent of total expenditures, while revenues from user charges are measured as percent of expenditures in the corresponding sector. Since 2002 it has not been possible to split user charge revenues in the care for the elderly sector on nursing homes and home based care. The dependent variable is efficiency measure E^{A1} and the t-values in parentheses are based on robust standard errors.

Table A2 Descriptive statistics for the explanatory variables, 2001-2005.

Variable	Description	Mean (st.dev)
Local government revenue	The sum of local taxes and lump-sum grants from the central government. Measured per capita and adjusted for spending needs and pay roll tax. Normalized such that the weighted average equals 100 each year.	107.47 (22.81)
Democratic participation	The number of votes in the local election as share of the number of eligible voters, percent.	61.68 (5.63)
The share of socialists in the local council	The share of socialists in the local council, percent.	37.74 (14.06)
Herfindahl-index	The inverse of the party fragmentation in the local council	24.85 (13.57)
Same party, majority	A dummy variable that equals 1 if the mayor and the deputy mayor are from the same party and their party is in a majority position.	0.077 (0.266)
Different parties, majority	A dummy variable that equals 1 if the mayor and the deputy mayor are from different parties and their parties are in a minority position.	0.298 (0.458)
Same party, minority	A dummy variable that equals 1 if the mayor and the deputy mayor are from the same party and their party is in a minority position.	0.137 (0.344)
Different parties, minority	A dummy variable that equals 1 if the mayor and the deputy mayor are from the same party, and their party is in a majority position.	0.484 (0.500)
Centralized budgetary process	A dummy variable that equals 1 if the initial stages of the budgetary process is top-down centralized	0.840 (0.367)