AN EFFICIENCY ANALYSIS OF THE CARE FOR THE ELDERLY SECTOR IN NORWAY*

Lars-Erik Borge and Marianne Haraldsvik**
Department of Economics and Center for Economic Research
Norwegian University of Science and Technology
N-7491 Trondheim, Norway

Abstract
The purpose of the paper is to provide an analysis of efficiency in the care for the elderly sector in Norway. In a first step we perform a DEA analysis to calculate the degree of efficiency in each municipality and the national level efficiency potential. The analysis reveals substantial variation in efficiency across municipalities, and the national level efficiency potential is calculated to 10 percent. In a second stage analysis we try to explain the variation in efficiency across municipalities using TOBIT regressions. The TOBIT analysis indicates that a high level of municipal revenue, a high degree of party fragmentation and a low degree of user charge financing are associated with low efficiency.

Keywords: Efficiency potential, Data envelopment analysis, Determinants of efficiency, Care for the elderly

*The paper is part of a project on efficiency in the local public sector and is financed by the Ministry of Local Government and Regional Development.

**Corresponding author. E-mail marianne.haraldsvik@svt.ntnu.no, fax +47-73596954, phone +47-73591940.

Date: January 2005

1. Introduction

In the next decades the number of elderly people will increase sharply in most West European countries due to increased duration of life and the large cohorts born in the years after WWII. This wave of the elderly puts pressure on public budgets, and pension reforms are heavily debated in most countries. The wave of the elderly will also increase the demand and need for health services and elderly care. Since the pressure on care for the elderly will come 10-15 years later than the pressure on pensions, the debate regarding the future organization and financing of elderly care has hardly started. However, it is likely that efficiency will be a key issue when organization and financing are to be discussed since the increase in the number of elderly will coincide with a stagnation of the workforce.

There are several contributions in the literature that calculates the efficiency potential in the care for the elderly sector, and in particular nursing homes. Among these are the Dutch analysis of Kooreman (1994), the Swiss studies of Fillippini (2001) and Crivelli, Filippini and Lunati (2002), the Danish study of Hougaard, Kronborg and Overgård (2004) and the Finnish study of Laine et al (2005). In the US literature the focus has been on efficiency differences between for-profit and not-for-profit organizations, e.g. Nyman and Bricker (1988) and Vitaliano and Toren (1994). The first contribution of this paper is to add an efficiency analysis of the care for the elderly sector in Norway to the international literature.[1] As in the other Nordic countries, care for the elderly is a municipal responsibility and the DEA analysis is carried out at the municipal level. The analysis reveals substantial variation in efficiency across municipalities. Around 17 percent of the municipalities come out as fully efficient, whereas the least efficient municipality should be able to reduce spending by 50 percent without reducing output. The national level efficiency potential is calculated to 10 percent.

Our second, and perhaps main, contribution is to provide an extensive analysis of variation in efficiency across municipalities. Except for the US contributions comparing for-profit and not-for-profit nursing homes, most studies rely on descriptive evidence of the efficiency scores or simple correlations between efficiency scores and other characteristics of the decision making units. We investigate the impact of municipal revenue, the financing of the

[1] This is no means the first efficiency analysis of the care for the elderly sector in Norway. Earlier contributions include Edvardsen, Førsund and Aas (2000), Erlandsen to pet al (1997) and Kalseth (2003), but most analyses are only available in Norwegian.

care for the elderly sector as well as political variables. The variation in efficiency is analyzed using TOBIT regressions with the efficiency score from the DEA analysis as dependent variable. The TOBIT analysis indicates that a high level of municipal revenue, a high degree of party fragmentation and a low degree of user charge financing are associated with low efficiency.

The rest of the paper is organized as follows: Section 2 provides the necessary institutional background. The principles of DEA analysis are discussed in section 3, while section 4 discusses data and model specification. The results from the DEA analysis are presented in section 5. Section 6 is devoted to the TOBIT analysis of the determinants of efficiency.

2. Institutional background

Norwegian municipalities are multi-purpose authorities, and the care for the elderly sector 'competes' with other sectors over the municipal budget. In addition to care for the elderly, the municipalities are responsible for welfare services like child care, primary health care and primary and lower secondary education. Other important tasks are culture and infrastructure. As the largest service sector, care for the elderly amount to more than ¼ of the total budget.

The main revenue sources for Norwegian local governments are taxes (45 percent of current revenue), grants (35 percent) and user charges (15 percent). Interest and other revenue account for the rest. Compared to most other countries, the system of financing is quite centralized. Around 95 percent of local taxes are income and wealth taxes where effective tax limits have been in place for the last 25 years. The opportunity to influence current revenues is limited to property tax and user charges.

Within the care for the elderly sector it is usual to separate between home based care and nursing homes. The users of home based care receive services in their own homes or in specially adapted dwellings (*omsorgsboliger)*. Specially adapted dwelling is a recent phenomenon, and has the advantage that it offers great flexibility with respect to the amount of care. The amount of care varies from a level similar to private homes to 24-hour services (as in institutions). It is the municipalities that decide the type and amount of care for each user.

3. Data envelopment analysis (DEA)

We analyze production efficiency in public care for elderly and disabled, by using data envelopment analysis (DEA). This nonparametric method is based on Farrell (1957) and extensions of his work by Charnes et al. (1978). In the Farrell approach, the efficiency of a production unit is measured relative to the efficiency of all other production units, subject to the restriction that all units are on or below the frontier. The reason for choosing this method, in addition to the fact that it is a standard method for efficiency measurement of individual production units, is that the production process consists of multiple inputs and multiple outputs. This is easily handled with this nonparametric method compared to a traditional production function approach.

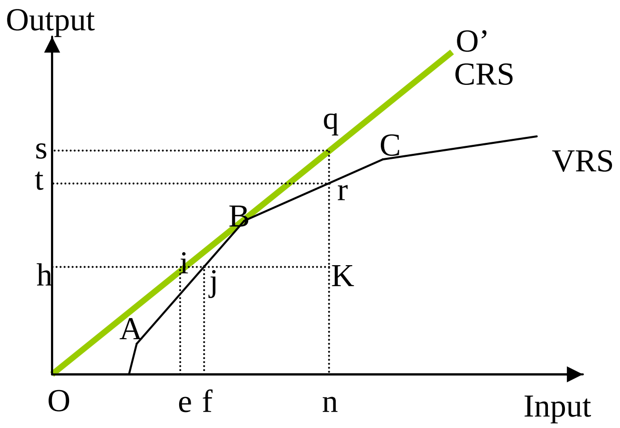
Technical efficiency and scale efficiency are key concepts when efficiency are to be measured. When a unit is classified as technically efficient, it is impossible to increase production without increasing the use of input, or similarly, the use of inputs can not decrease without a decrease in production. This characterizes optimal production give the size of the production unit. On the other hand, the degree of scale efficiency measures how close to optimal size the production unit is. If the production unit either has increasing or decreasing returns to scale, it is said to be scale inefficient.

The identification of the efficient units (or the efficiency frontier) depends on the assumption that is made regarding economies of scale. By choosing constant returns to scale (CRS), the efficiency frontier will consist of units that are both technically and scale efficient, while variable returns to scale (VRS) allows units that are technically efficient, but not scale efficient, to be part of the efficiency frontier. As scale efficiency measures how close to optimal size the units are, applying CRS technology in our context means that the efficiency improvement is associated with merging of municipalities. The VRS technology on the other hand, typically has increasing returns to scale for small units and decreasing returns to scale for large units. This assumption allows for the fact that the production of elderly care may be more expensive in small municipalities due to diseconomies of scale.

Figure 1 illustrates best practice reference front using VRS and CRS technology, in a two dimensional diagram. This simplified case is used to illustrate the principles of how the efficiency scores are calculated within the DEA approach. The observations A, B, C and K represent different production compositions in the input-output space.

The observation A, B and C makes the reference frontier under VRS technology. These units are technical efficient, but not necessarily scale efficient. Only observation B is both scale and technical efficient, as this unit represents the production process where the input-output ratio is largest. Scale inefficiency is illustrated as the range between the CRS and the VRS frontier. Observation K does not satisfy any requirement for efficiency, and is classified as inefficient regardless of what technology we apply. Given best practice reference frontier, inefficiency implies that the observed units could have produced the same level of outputs by using less input, or similarly, produced a higher level of outputs by using the same level of input.

Figure 1: Best practice reference frontier applying CRS and VRS



When we apply CRS technology, best practice reference frontier is represented by the line OO' that passes through origin and observation B. The efficiency of the other units is measured relative to this frontier. In view of that, observation K has an input-saving improvement potential equal to the distance from K to *i* on the CRS frontier. This implies that observation K can maintain the same level of output even though the level of input reduces from *n* to *e*. Observation Ks input-saving improvement potential measured in percent is then (*hi/hK)**100%. Corresponding reasoning then implies an output-increasing improvement potential equal (*nK/nq)**100%.

VRS reference frontier is characterized by a piecewice linear curve passing through the technical efficient observation A, B and C. Dependent on whether we consider input-saving or output-increasing approach, the point *j* and *r* function as efficient reference for observation K. The point *j* on the VRS technology front results from a linear combination of the technical efficient observation A and B, while point *r* result from a linear combination of B and C. Percentage improvement potential is computed similar to the case of CRS technology, giving an input-saving improvement potential equal *(hj/hK)**100%, and output-increasing improvement potential equal *(nK/nr)**100%.

As other methods, the DEA method has its limitations. First, the efficiency measure will not decrease as the number of variables increases. As number of variables increases relative to the sample size, this method tends to produce a large number of efficient units. To avoid underestimation of the efficiency potential, it is necessary to keep number of variables at a minimum. At the same time, excluding an important variable may lead to biased estimates. The method is also sensitive to outliers. Outliers with high output and/or low input will affect the position of the frontier and thereby the efficiency score. As inefficiency is measured relative to the frontier, including such outlier will lead to lower relative efficiency, and thereby overestimation of the improvement potential. If we include an outlier with low output and/or high input, the position of the frontier will not be influenced, but it will lead to a minor overestimation of mean improvement potential, as the outlier is relatively less efficient.

4. Data and specification of the production function

When applying DEA approach to investigate efficiency in the care for the elderly sector, the key challenge is to develop good measures of production. Production within this sector may be improvement in state of health, possibility to function in the daily living or improvement in quality of living. The quality aspect of the production is very important in almost all production of welfare services, but generally difficult to capture in data. Also improvement in state of health and the possibility to function in daily living is not measured in the available data. A common approximation done in earlier studies (e.g. Erlandsen et al. (1997), Edvardsen et al. (2000), and Kalseth (2003)), who we apply here, is to count number of recipients. As the users of these services are complex, both due to age and disability, it is a challenge to separate out relatively homogenous groups of users.

The elderly is the main user group of these services, but physical and psychic disabled also makes a substantial part. The allocation of users between institutions and homes, vary among municipalities. Still, the trend is that the oldest individuals live in institutions while the younger more often receive care in their own homes.

Residents of nursing homes and retirement homes receive around the clock services. It is difficult to intercept what kind of services the individual patient receive, but it is convenient to separate the users based on the length of the stay (permanent or short time[2]), as this generally reflects how capable of functioning the patients are[3] (Romøren, 2003). Patients on short time stay seems to be younger and more vigorous compared to the once on permanent stay. Because care in institutions is organized with a fixed number of employees on a group of patients, we do not know the actual scope of the care each patient receives. Therefore it is difficult to determine which of these groups that is the most resource demanding. As patients with limited duration of the stay often need treatment or rehabilitation of some kind, it is possible that this user group actually is quite resource demanding. Nevertheless, this user group scores higher on Barthels ADL index, and therefore we assume that this user group is less resource demanding than those admitted to permanent stay.

Generally, institutionalized care for the elder is offered the patients that scores relatively low on Barthels ADL index. The once that to a larger extent can function in activities of daily living, are to a larger extent offered care in their own homes or in special dwellings. This user group receive both practical help and home nursing care, or either one of the two services. This gives us three groups of home based care based on type of service, where each service is expected to reflect different resource use. Fimreite et al. (1999) shows that offering both home nursing care and practical help is the most resource demanding service within home based care, followed by offering only home nursing care. The less resource demanding service seems to be practical help. As the patients get older a study shows (Romøren, 2003) that they tend to receive more hours home nursing care and slightly less practical help.

[2] The definition of short time stay is that the stay has limited duration. Often stay that last less than three months is classified as short time stay.
[3] Measured with Barthels ADL index, the patients on short time stay scores higher, where higher ADL score indicates more capability of functioning in daily living.

In our baseline model, we use type of service as classification criteria. First we separate institutionalized care from home based care, and these groups are further divided into two and three groups respectively. For residents in institutions, we exploit the division between permanent and short time stay, as this is supposed to reflect different resource use. Similarly, the recipients of home based care are divided into three groups based on the type of service they receive. In addition we include single bed rooms in institutions as an indication of quality as well as number of mentally handicapped to capture that this group is particular in need of nursing. This gives an output vector that consists of seven elements. As input we use gross running expense, since the quality of the man-labor year data is questionable.

Table 1: DEA model specification

Inputs	Outputs
Gross running expense	Number of patients in institutions on • Permanent stay • Short time stay Number of receivers of home based care with • Practical help • Home nursing care • Both home nursing care *and* practical help Number of single bed rooms in institutions (measure of quality) Number of mentally handicapped

The analysis we do is based on data obtained from the 2003 Nursing and care statistics collected by statistics of Norway. Because of missing values, 13 municipalities are excluded, and further one municipality is excluded because of extreme values[4]. For a selection of 65 municipalities, we have detailed information about the size of the services carried out in home based care, measured as number of hours per user per week. This data is exploited to investigate the characteristics of efficient and inefficient municipalities.

5. The results of the DEA analysis

[4] This municipality had relatively low costs, but wage bill was the same as for comparable units. By including this municipality, we probably overestimate the improvement potential, as this affects the position of the frontier.

Descriptive statistics for efficiency scores calculated from the DEA model is reported in table 2. The model we use indicates an input-saving improvement potential of 10 %, as (weighted) mean efficiency is 0.90. It is substantial variation in efficiency scores across municipalities. The efficient municipalities, with efficiency score equal to 1, make 17 % of the sample (72 of 420). As the least efficient unit has an efficiency score equal to 0.52, the efficient units exploit the resources almost twice as efficient. 25 % of the municipalities has an efficiency score below 0.76, and 25 % has an efficiency score above 0.94.

Table 2: Descriptive statistics for calculated efficiency scores

# of observations	# of efficient units	Unweighted meab	Weighted mean	Minimum	1st quartile	3rd quartile
420	72	0.84	0.90	0.52	0.76	0.94

The efficiency score itself does not give much information about what characterize the efficient and inefficient municipalities. In the following we try to identify whether it is features with the composition of users or the resource use that distinguish the efficient from the inefficient municipalities. We compare mean for the efficient units with mean for the 10% least efficient and 25% least efficient units respectively.

Table 3: Resource use and composition of users for efficient and inefficient municipalities

	Sample mean	Efficient units	10% least efficient	25% least efficient
Home based care				
Share receiving practical help	0.34	0.38	0.33	0.32
Share receiving nursing care	0.29	0.26	0.28	0.28
Share receiving practical help *and* home nursing care	0.37	0.36	0.39	0.40
Institutionalized care				
Share on permanent stay	0.86	0.84	0.88	0.89
Share single-bed room	0.87	0.84	0.89	0.91
All users				
Share in nursing homes	0.20	0.21	0.20	0.20
Share mentally handicapped	0.10	0.10	0.11	0.10
Input				
Running expense per user	210.92	192.60	267.87	249.42
Number of observations	420	72	43	106

As we see from table 3, efficient municipalities are characterized with considerable *lower* resource use per recipient. Running expense per user is for this group 10 % below sample mean, while both 10- and 25% least efficient lies 27- and 18% above sample mean respectively. Further, the efficient units seem to have less resource demanding composition of users. As discussed in earlier section, offering only practical help is supposed to be the least recourse demanding service, while offering both practical help and home nursing care is the most resource demanding. In table 3, we see that efficient units are characterized with higher share of recipient receiving practical help, compared to sample mean, while the 10% and 25% least efficient both has a lower share than the sample mean. Also for the assumed most resource demanding services, efficient and inefficient units are located on each side of the sample mean. Still, the differences in composition of users can not fully explain the difference in resource use. To investigate this further, we exploit the sub sample of 65 municipalities with detailed information about home based care.

This sample contains information about number of hour practical help per user, and number of visits within home nursing care that lasted less than 15 minutes, between 15 minutes and an hour, and visits that last more than one hour. Based on this information we generate a measure of number of hours home nursing care by assuming that on average visits under 15 minutes lasted 10 minutes, visits between 15 minutes and an hour lasted 35 minutes, and that visits over an hour lasted 1 hour and 15 minutes.

Table 4: Comparison of the distribution of efficiency score in the two samples

	# obs	#effective	Mean	Weighted mean	Minimum	1st quartile	3rd quartile
Sub sample	65	15	0.84	0.90	0.57	0.75	0.97
Full sample	420	72	0.84	0.90	0.52	0.76	0.94

We merge the efficiency scores that we obtained from running DEA on the full sample of 420 municipalities, with the detailed information about home based care for the sub sample of 65 municipalities. As shown in table 4 the distribution of efficient and inefficient municipalities are comparable in the two samples. We then group the municipalities based on the efficiency distribution for the full sample: i) one group with efficiency score below 0.76 (1st quartile), ii) one group with efficiency score between 0.76 (1st quartile) and 0.84 (median), ii) one group with efficiency score between 0.84 (median) and 0.94 (3rd quartile), and iv) one group with efficiency score above 0.94 (3rd quartile). For these groups we calculate number of hours produced within home based care.

Table 5: Number of hours home based care received by each user, municipalities grouped by efficiency score

	Below 1st quartile	Between 1st quartile and median	Between median and 3rd quartile	Above 3rd quartile	100% efficient	Sample mean
#Hours practical help	2.57	2.65	4.81	4.28	4.60	3.44
#Hours home nursing care	4.48	4.80	5.62	4.81	5.04	4.84
#Hours home nursing care and practical help	7.04	7.45	10.43	9.09	9.65	8.28
#observations	18	18	10	19	15	65

The trend in table 5 is that the least efficient municipalities produce less hour home nursing care and practical help per users. The group of municipalities that has an efficiency score above 3rd quartile (includes the 100 % efficient municipalities), offers on average 9 hours home nursing care and practical help per user per week, while the municipalities that are among the 25 % least efficient offers on average 7 hours care per user. The difference in mean is not statistically significant, but the trend is still interesting as it is the opposite of what is expected. Even though the efficient units have a lower resource use per user, we can not conclude that they offer less hours care compared with the least efficient.

6. Explaining variation in efficiency

In this section we try to explain variations in efficiency within care for elderly along the lines of earlier studies of efficiency in Norwegian municipalities that focuses on political and budgetary institutions. The earlier studies include Kalseth and Rattsø (1998) who analyze administrative spending, Kalseth (2003) who analyzes the nursing home sector, and Borge, Falch and Tovmo (2005) who analyze all service sectors simultaneously.

With regard to political institutions several studies of Norwegian municipalities have emphasized the impact of political strength. There is evidence that political strength contributes to lower user charges (Borge, 2000) and to lower budget deficits (Borge, 2005). One interpretation of these findings is that a strong political leadership has an advantage in opposing pressure from external interest groups to increase spending (which in turn has to be financed by higher user charges and/or higher budget deficits). Moreover, political strength is shown to reduce administrative spending (Kalseth and Rattsø, 1998) and to increase efficiency (Kalseth, 2003, and Borge, Falch and Tovmo, 2005), which indicates that a strong political leadership also has an advantage in opposing internal pressure to increase budgetary slack. A traditional Herfindahl-index has been the most widely used indicator of political strength. The index is calculated as

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

where SH_p is the share of representatives from party *p*. The index takes the maximum value of 1 when a single party holds all the seats in the local council, while the minimum value of 1/*P* is attained when the seats are equally divided among the *P* parties. The Herfindahl-index is inversely related to the degree of party fragmentation in the local council and thereby positively related to strength. We expect the Herfindahl-index to have a positive impact on efficiency.

In Norway the socialist camp is dominated by the Labor Party, while the non-socialist camp is more fragmented. As a consequence, there is a positive correlation between the Herfindahl-index and the share of socialists in the local council. There is then an argument to include the share of socialists in the analysis to get an unbiased estimate of the Herfindahl-index. More substantial arguments are that earlier studies document that a high share of socialists are associated with high administrative spending (Kalseth and Rattsø, 1998), low efficiency in the care for the elderly sector (Kalseth, 2003) and low overall efficiency (Borge, Falch and Tovmo, 2005). A possible explanation for these results is that it might be harder for socialists to impose a hard budget constraint on the service producers because they are more concerned about service quality.

When it comes to budgetary procedures, we distinguish between centralized (top down) and decentralized (bottom up) procedures in the initial phases of the budget process. A centralized budgetary procedure is characterized by the head of the administration (administrative centralized procedure) or the executive board (political centralized procedure) presenting an overall budget proposal for each sector, and the sectors only work out specific details within their sector. A decentralized or fragmented budgetary procedure is on the other hand characterized by each sector working out their own budget proposals, while the head of the administration or the executive board coordinates an overall budget proposal to be approved by the local council. Tovmo (2005) finds that a centralized budgetary process contributes to lower budget deficits, while Borge, Falch and Tovmo (2005) find no significant effect on overall efficiency.

The earlier studies (Kalseth and Rattsø, 1998, Kalseth, 2003, and Borge, Falch and Tovmo, 2005) also indicate that high levels of local government revenue are associated with low efficiency. The underlying argument may be that the service producing agencies are able to take advantage of "a rich sponsor" by enjoying more budgetary slack. As indicator of municipal revenue we use local taxes and block grants per capita deflated by an index that captures varying cost conditions and spending needs across local governments. This revenue indicator is widely accepted as the most reliable indicator of differences in economic conditions across local governments.

Borge and Rattsø (2005) analyze the impact of user charge financing on the unit cost in the sewage industry. They find that a high degree of user charge financing contributes to lower costs. The underlying theoretical argument is developed within a sponsor-bureau model where user charge financing (combined with net budgeting) makes slack more costly for the bureau. It is of interest to investigate whether user charge financing has a similar effect on efficiency in the care for the elderly sector.

Table 6: The determinants of efficiency

	I	II	III	IV
Municipal revenue	-0.128	-0.150	-0.103	-0.104
	(3.40)	(3.43)	(2.79)	(2.82)
Herfindahl-index of (the inverse of)	0.184	0.144	0.239	0.219
party fragmentation	(2.86)	(1.95)	(3.76)	(3.33)
The share of socialists in the local	-0.010	-0.043	-0.033	-0.040
council	(0.23)	(0.82)	(0.77)	(0.88)
The degree of user charge financing	1.565	1.238	1.601	1.559
	(5.44)	(3.77)	(5.58)	(5.15)
Centralized budgetary procedure		0.007		
		(0.33)		
Population size (in 1000)			0.003	0.003
			(4.40)	(4.53)
The share of the population living in			0.024	0.024
rural areas			(0.83)	(0.72)
The share of the population below 6				-1.127
years of age				(1.40)
The share of the population 6-15 years				0.702
of age				(1.21)
The share of the population 67-79 years				0.602
of age				(1.09)
The share of the population 80 years and				-0.712
above				(1.09)
Log likelihood	149.7	120.5	165.0	167.6
Observations	420	306	420	420

Note: TOBIT-estimates with absolute t-values in parentheses.

The determinants of efficiency are analyzed using TOBIT regressions. This is an appropriate method since the dependent variable, the calculated efficiency score from the DEA analysis, is censored at 1. The regression results are presented in table 6. In the first regression (I) we disregard the impact of budgetary institutions (because the variable is not available for all municipalities) and focus on municipal revenue, the two political variables and the degree of user charge financing. Municipal revenue comes out highly significant and with a negative sign, i.e. municipalities with high levels of revenue tend to be less efficient than others. Of the two political variables, only the Herfindahl-index has a significant impact on efficiency. The interpretation of the negative sign is that less fragmentation (an increase in the index) is associated with increased efficiency. Finally, user charge financing comes out highly significant with the expected positive sign. The impacts of revenue, party fragmentation and user charge financing is consistent with earlier studies of Norwegian local governments that analyze variations in efficiency across local governments.

In the second column we include the dummy variable for centralized budgetary procedure. The positive sign is consistent with the hypothesis that a centralized budgetary procedure implies a harder budget constraint for the service sector and thereby increases efficiency. However, the estimated coefficient is close to zero far from significant. The inclusion of the budgetary dummy implies that the number of observations is reduced by more than 25 percent due to missing values. However, the impact of municipal revenue, party fragmentation and the degree of user charge financing is largely unaffected by this substantial reduction in the number of observations.

In the third and fourth column we check out whether the impacts of municipal revenue, party fragmentation and user charge financing are robust to the inclusion of more controls. In the third column we include population size and the share of the population living in rural areas. It turns out that high population size is associated with high efficiency, whereas the settlement pattern has no significant impact on efficiency. It is important to notice that the impact of population size does not capture economies of scale since variable returns to scale is allowed for in the underlying DEA analysis. It rather reflects that the variation in efficiency across municipalities is related to population size, and more precisely that the variation is larger among the small municipalities.

In the fourth column we include four variables capturing the age composition of the population. The variables may capture the demand for child care (the share of the population below 6 years of age), primary and lower secondary education (the share 6-15 years) and care for the elderly (the share 67-79 years and 80 years and above), and thereby fiscal pressure. None of the four variables has a significant impact on efficiency, possibly reflecting that spending needs related to the age composition of the population are sufficiently controlled for in our measure of municipal revenue.

7. Concluding remarks

The purpose of this paper was to provide an efficiency analysis of the care for the elderly sector in Norway. The first step was to perform a DEA analysis to calculate the degree of efficiency in each municipality and the national level efficiency potential. The analysis revealed substantial variation in efficiency across municipalities. Around 17 percent of the municipalities came out as fully efficient, whereas the least efficient municipality should be able to reduce spending by 50 percent without reducing output. The national level efficiency potential was calculated to 10 percent. The purpose of the second step was to explain the variation in efficiency across municipalities using TOBIT regressions with the efficiency score from the DEA analysis as dependent variable. The main results from the TOBIT analysis are that a high level of municipal revenue, a high degree of party fragmentation and a low degree of user charge financing are associated with low efficiency.

References

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 Deficits: Evidence from Norwegian Local Governments, European Journal of Political Economy 21, 325-344.

Borge, L.-E. and Rattsø, J. (2005), The relationships between costs and user charges: The case of a Norwegian utility service, FinanzArchiv 61, 98-119.

Borge, L.-E., Falch, T. and Tovmo, P. (2005), Efficiency in Public Service Production: The Impact of Political and Budgetary Institutions, Mimeo, Department of Economics, Norwegian University of Science and Technology.

Charnes, A., W. W. Cooper, and E. Rhodes (1978), Measuring the Efficiency of Decision Making Units, European Journal of Operational Research 3(4), 392-444.

Crivelli, L., M. Fillipini and D. Lunati (2002): Regulation, ownership and efficiency in The Swiss nursing home industry, International Journal of Health Care Finance and Economics 2, 79-97.

Edvardsen, D.F., F.R. Førsund og E. Aas (2000): Effektivitet i pleie- og omsorgssektoren, Rapport nr. 2/2000, Frischsenteret, Oslo.

Erlandsen, E., F.R. Førsund, E. Hernæs og S.B. Waalen (1997): Effektivitet, kvalitet og organisering av pleie- og omsorgssektoren i norske kommuner, SNF-rapport nr. 91/97, Stiftelsen for samfunns- og næringslivsforskning, Oslo.

Farrel, M. J. (1957), The Measurement of Productive Efficiency, Journal of the Royal Statistical Society, Series A, 120, 253-281.

Filippini, M. (2001): Economies of scale in the Swiss nursing home industry, Applied Economic Letters 8, 43-46.

Fimreite, A.L., et al. (1999): Kommunal monitor 1999; Søkelys på tjenesteproduksjon, ressursbruk og prioriteringer i norske primærkommuner, Norsk samfunnsvitenskapelig datatjeneste, Bergen.

Hougaard, J.L., D. Kronborg and C. Overgård (2004): Improvement potential in the Danish Elderly care, Health Care Management Science 7, 225-235.

Kalseth, J. (2003), Political Determinants of Efficiency Variation in Municipal Service Production: An Analysis of Long-Term Care in Norway, PhD thesis, Department of Economics, Norwegian University of Science and Technology.

Kalseth, J. and Rattsø, J. (1998), Political Control of Administrative Spending: The Case of Local Governments in Norway, Economics and Politics 10, 63-83.

Kooreman, P. (1994): Nursing home care in the Netherlands: A non-parametric efficiency analysis, Journal of Health Economics 13, 301-316.

Nyman, J.A. and D.L. Bricker (1988): Profit incentives and technical efficiency in the production of nursing home care, Review of Economics and Statistics 56, 586-594.

Romøren, T.I. (2003): Del II – NOVAs rapport, i Helsetilsynet: Pleie- og omsorgstjenesten i kommunene: tjenestemottakere, hjelpebehov og tilbud.

Tovmo, P. (2005), Budgetary Procedures and Deficits in Norwegian Local Governments, Economics of Governance, forthcoming.

Vitaliano, D.F. and M. Toren (1994): Cost and efficiency in nursing homes: A stochastic frontier approach, Journal of Health Economics 13, 281-300.