ACEI working paper series

LOCAL GOVERNMENT ALLOCATION OF CULTURAL SERVICES

Lars Håkonsen

Knut Løyland

AWP-06-2013

Date: October 2013

Paper presented at the 6th EWACE Workshop in Ljubljana, 5-7 September 2013

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by

Lars Håkonsen, Telemark Research Institute and Telemark College, Norway*
and
Knut Løyland, Telemark Research Institute, Norway**

Keywords: Allocation of cultural services; Local government budget; Demand system

JEL-codes: Z11; Z18; H72

Abstract

In the present paper we analyse the allocation process of cultural services in Norwegian municipalities. The cultural sector on this administrative level is decomposed into the following eight subcategories: children and youth activities, libraries, cinemas, museums, arts dissemination, sports, cultural schools, and other cultural services. By means of budget shares for these eight cultural services and a residual sector consisting of all other municipal services, we estimate a system of demand relations which are interdependently linked to each other by a budget restriction. Our analyses are based on data from 406 out of 429 Norwegian municipalities during the period 2002 to 2010. In the empirical analyses we mainly focus on the effects of income variation for the cultural services. We estimate effects of free income, matching grants to each sector, and user fees and other sector-specific income for each sector. We also estimate crowding-out effects for the cultural sectors of demographic variables indicating higher demand for services like education, child care, and health services. Our results confirm previous results. There are interesting differences within the group of cultural services, and these are partly related to different national standardization and regulation among the cultural services. In the concluding section we discuss some cultural policy implications of the results obtained.

* e-mail: lars.hakonsen@hit.no
** e-mail: loyland@tmforsk.no

Vidar Ringstad, Luis César Herrero and participants at the IV Workshop on Cultural Economics and Management in Bilbao, 2012, are gratefully acknowledged for comments and suggestions for improvements on an earlier version of this paper. Any remaining errors are our own.

1. Introduction

In most countries the provision of cultural services is divided by the public and the private sector. In addition, the public provision is divided between different administrative levels – central, county level and local municipalities. The empirical literature on local or regional government provision of cultural services is somewhat limited. However, there exist several interesting studies of various aspects of local cultural policy and local cultural spending, c.f. Depalo and Fideli (2011) and Benito et al (2013) for two recent examples. Most studies of local cultural policies analyse local cultural expenditures as a whole, i.e., an aggregate of all cultural expenditures in the municipality. This applies to the two studies mentioned above, as well as for Werck et al (2008), and Stastna (2009). In addition, some studies analyse a specific local or regional cultural institution like an opera house, cf. Schultze and Ursprung (2000) or a theatre, cf. Getzner (2004).

The contribution of the present study is that local cultural expenses are disaggregated into eight different cultural purposes like e.g. cinemas, libraries, museums or cultural schools. In addition to these eight cultural services, we aggregate all other municipal services into a residual spending category. By means of budget shares for the eight cultural services and the aggregate of all other municipal services, we estimate a demand system of relations which are interdependently linked to each other by a budget restriction. Thus we analyse how local governments allocate recourses to the nine services in question given their needs, preferences, income and other factors of interest. The set of control variables accounting for needs, preferences and political factors are closely related to the control variables used in Benito et al (2013) and Werck et al (2008). Our analyses are based on data for 406 Norwegian municipalities which are quite homogenous in their purposes, but very heterogeneous in other respects. For example, the richest 10 % of the municipalities had in 2011 a per capita income of about 2.3 times higher than the 10 % poorest. Such large income differences will of course strongly affect the provision of local services in general.

It is well established in the cultural economics literature that most cultural goods and services are luxury goods with an income elasticity well above unity, see for instance Ringstad and Løyland (2012). The general conception of cultural services as income elastic goods is also confirmed in several previous empirical studies of Norwegian municipalities, cf. Rattsø (1989), Borge and Rattsø (1995), Aaberge and Langørgen (2003), and Håkonsen and Løyland (2011). All these studies estimate income elasticities for various municipal services, among which an aggregated cultural sector represents one of these sectors. The cultural sector belongs to the most income elastic service sectors in all these studies. Aaberge and Langørgen find a relatively suppressed structure for the income elasticities, i.e., levels close to 1.0 for most sectors, and the income elasticity for culture is 1,09. Although this is only modestly elastic, the cultural sector nevertheless is the second most elastic among the eight sectors included in their study (the only sector being more elastic is infrastructure). Borge and Rattsø also identify culture as an income elastic sector, with short- and long run income elasticities of 1.32 and 1.23 respectively. In a more recent analysis, Håkonsen and Løyland (2011) (in Norwegian) find an income elasticity for culture as high as 2.04.

There are two main reasons why culture services typically belong to the most income elastic service sectors. The first is that the character of the cultural services themselves suggests that these services are less necessary than services that deal with more immediate and fundamental needs like e.g. health issues or primary education. This explanation relates to the "genuine" income elasticity, i.e., the preference structure per se implies that cultural services are less strictly necessary than e.g. schools or health care. The second reason is that many other local

services are strongly regulated by the central government. These regulations involve both quantity and quality, and are particularly strong for sectors like child care and primary education. Also within care for the elderly, there has gradually been introduced more and more regulations giving quite strong individual rights. Such rights and regulations restrict the room for manoeuvre for the municipalities, and enforce the municipalities to have a more standardised supply of child care, education and care for the elderly than would otherwise be the case. This naturally leads to relatively low income elasticities for the most regulated sectors. This is confirmed in the results found in Håkonsen and Løyland (2011), where the lowest income elasticities are found for kindergartens and primary education at 0.6, followed by health care at 0.8. However, sectors like cultural services, infrastructure and general administration are to a far lesser extent subject to restrictions and regulations from the central government. These sectors are therefore typically more income elastic, with elasticities well above 1.0, and – as mentioned – an elasticity as high as 2.04 for the cultural sector. Stronger regulations and more standardisation of some services naturally lead to more variation within the least regulated sectors. This follows directly from the budget constraint and the derived result that the budget share-weighted sum of income elasticities equals one.

An interesting contribution from this paper, is to analyse the structure of income elasticities *within the group of locally provided cultural services*: Are all local cultural services luxuries, or do we find both necessities and luxuries among the cultural services? And are all local cultural services equally free from central government regulations? These are some of the main questions we will address in the present paper.

With this background, we will in section two take a closer look at the Norwegian local government system in order to give the reader an idea of the different administrative levels and how and by whom public goods and services are provided in Norway. In section three we describe the theoretical and econometric approach. Section four describes the data and section five presents the results of the analysis. Finally, in section six, we discuss the results and conclude.

2. The Norwegian setting

Norwegian municipalities are organised as multi-purpose providers of core goods of the Norwegian welfare state. Thus they are, independent of size and location, expected to provide their inhabitants with a numbers of goods and services like care for the elderly, primary education, child care, primary health care, social benefits and infrastructure like roads, water and sewage systems. In addition, the municipalities shall provide cultural services. Even if all municipalities are expected to provide an identical set of the core goods of the Norwegian welfare state, they are strongly heterogeneous many other respects. While the smallest have less than 1000 inhabitants the largest have more than 500 000. The large differences in congestion between for instance northern and southern parts of the country also make differences in the need for travel time, in order to provide inhabitants with different services and infrastructural investments.

The cultural services provided by the municipalities can be divided into eight different services. This is the maximum disaggregation available from the national information system for municipal services ("Kostra") operated by Statistics Norway. These cultural subcategories are: provision of cultural related activities for children and youth, libraries, cinemas, museums, arts dissemination, sports, cultural schools, and other cultural services. In addition, municipalities are partly responsible for issues relating to cultural heritage, but the share of expenditures related to cultural heritage is on average very marginal compared to other cultural services, and it is also mixed up with services related to infrastructure. Thus we have omitted cultural heritage from the analysis.

In Table 1 we present some figures of the local government's provision of cultural services. Budget shares, number of municipalities providing the services in question and how the funding of the services are distributed between grants from the central government and the counties, user fees, and own funding by the local government, are presented. The table shows that cultural services make a rather small share of the total budget. Except for sports, none of the eight services constitutes on average more than 1 % of the total budget, and the total cultural budget represents less than four per cent of the total budget. Only three out of eight services have faced an increase in the budget share in the period analysed. In the same period the municipalities have faced a real increase in (free) income of about 4 per cent.

Table 1. Budget shares, number of municipalities with zero-budgets and the funding of local government provision of cultural services (inhabitant weighted averages). 2002 and 2010. N=406.

	Budget shares (per cent)		**Number of municipalities with no expenses on cultural services**		**Sources of funding (per cent)**					
					Central and county government grants		**User fees and box office income**		**Local government funding**	
	2002	**2010**	**2002**	**2010**	**2002**	**2010**	**2002**	**2010**	**2002**	**2010**
Children and youth activities	0.44	0.33	9	9	6.4	11.1	5.7	6.3	87.9	82.6
Libraries	0.68	0.51	0	0	4.6	5.6	2.1	2.3	93.3	92.1
Cinemas	0.19	0.12	200	197	2.9	3.6	75.3	68.5	21.8	28.0
Museums	0.16	0.11	72	65	24.0	5.3	10.0	3.8	66.0	90.9
Arts dissemination	0.17	0.17	112	144	5.2	15.7	9.4	10.8	85.4	73.6
Sports	1.08	1.15	8	4	9.6	12.3	14.7	12.8	75.7	74.9
Cultural schools	0.60	0.64	19	1	17.6	9.4	18.8	19.8	63.6	70.9
Other cultural	0.68	0.83	0	0	9.0	8.2	10.8	11.5	80.2	80.3
Other services	96.00	96.14	0	0	11.9	17.7	16.3	14.1	71.8	68.3
Total culture	4.00	3.86	**0**	**0**						

The fact that the expenditure share of the aggregated cultural goods falls from 4 % in 2002 to 3.86 % in 2010 at first sight seems to contradict the relatively high income elasticities found in the empirical studies cited in the introduction. As will be shown from the results in section 5, however, one cannot infer information about the genuine income elasticities of cultural services only by observing the development of the expenditure share over a certain period of time.

From Table 1 we also notice that some of the cultural services are not provided at all by many municipalities. Especially, this goes for cinema, arts dissemination and museums. About 50 per cent of the municipalities have no provision of cinema. But this is only partly due to the lack of cinemas in the municipalities in question. The reason is also due to a complete privatization of cinemas in some municipalities. Arts dissemination includes dissemination of the performing arts as well as visual arts and some infrastructural investments necessary to provide such services. Smaller municipalities are not in the position of exploiting the economies of scale due to big fixed costs related to such investments, and are thus less likely to provide arts dissemination

services. This explanation applies to museums as well. There are also a number of small municipalities that are located close to larger towns and cities, and thereby may choose to "free ride" on the supply of such cultural services in their larger neighbouring municipalities.

Table 1 also includes information about the funding of the cultural services. As can be seen from the table cinemas are mainly funded by user fees, but the share of user fees have decreased from 2002 to 2010, probably due to a decline in attendance. There has also been a decrease in the share of user fees for museums from about 10 per cent in 2002 to less than 4 per cent in 2010, also most likely due to a decline in attendance in combination with falling ticket prices in real terms.

For museums we also notice a large decrease in central and county government grants. This is most likely due to a consolidation of the owner structure of museums during the time period analysed. Many museums have merged into bigger units and been organised in separate companies. They are thus not under direct municipal control and receive their central and county government grants directly. A decrease in grants also appears in the cultural school sector. This is due to a substitution of earmarked funding by general grants during the studied period. On the other hand, arts dissemination has faced an increase in the share of central and county government grants. This is mainly because a central government program aiming at increasing arts dissemination in contemporary schools. The program is denoted "The Cultural Rucksack", and was introduced in from 2001, and then gradually expanded in size and scope. We may also note an increase in the central and county government grant share of the funding of the aggregate of all other services. This is mainly due to central government increased ambitions in reaching full coverage of child care services for children in the age from 1 to 5 years. Until 2011 this policy program was funded by steadily increasing matching grants each year.

3. Theoretical framework and empirical model specification

The primary goal of this paper is to study how local governments allocate resources to the range of cultural services or sectors outlined in the previous section. The natural approach is then to model each municipality as a utility maximizing agent on behalf of the inhabitants. This approach is quite standard in the literature on local government behaviour, and rests on the tradition from median voter models, cf. Inman (1979) and Rubinfeld (1987). A key difference between the literature based on American local government decisions and our Norwegian setting, is that Norwegian municipalities have very little local freedom with respect to tax rates and tax bases. The main decision problem for a Norwegian municipality is therefore to choose the budget shares to be allocated to the various service sectors within a (more or less) given total budget.

The approach in this paper differs from the Norwegian empirical studies cited in section 1, in at least two important respects. First of all, we adopt a tailor-made decomposition of municipal services for studying cultural goods, with maximum detail (eight sectors) for cultural services, while we aggregate all other municipal services into one residual sector. Furthermore, we do not include price data (unit costs) in our model. This omission is done for several reasons. First of all, there is a well known problem of identifying unit costs of adequate quality for municipal services in general. This problem arises primarily because of the nature of most municipal services, which typically are rather multi-faceted services for which there lacks good output-measures. The solution to this problem is typically to replace unit costs with proxy variables based on wage data, the so-called public employment approach, cf. Ehrenberg (1973) and Bahl et al (1980). Another approach is taken by Aaberge and Langørgen (2003), who infer infor-

mation about unit costs from variation in local cost factors in a modified extended linear expenditure system (ELES). The problem of identifying relevant unit cost data is exacerbated further with our highly disaggregated cultural services. Furthermore, we are primarily interested in the effects of general income, matching grants and fee incomes on the various culture services. The effects of removing price proxies from the demand system have been tested in the eight-sector model adopted in Håkonsen and Løyland (2011). The results (elasticities) with respect to general income and sector-specific matching grants and fee incomes are only marginally different in the models with and without price proxies. Instead of having nominal price or unit cost-proxies in the model, we deflate all economic data (income variables) to 2010-prices by a special cost index for Norwegian municipal services maintained by the Ministry of Local Government and Regional Development and the Ministry of Finance.[1]

Our empirical demand system thus consists of the budget shares S_i for nine service sectors, indexed $i = 1,..,9$, where sectors 1 to 8 are the eight cultural services and sector 9 is the residual sector comprising all other services, cf. Table 1 above. The demand system is quite standard, except for prices being removed and total income Y split into general income I (tax income and general purpose grant from the central government), sector-specific matching grants G_i from the central government and the 18 counties, and user fees and other sales income for each sector UF_i, i.e., $Y = I + \Sigma G_i + \Sigma UF_i$.[2] The dependent variables are the expenditure shares of each service sector, S_i. In addition to general income, matching grants and fee incomes, we include a vector of altogether 26 control variables Z_k. This vector comprises municipality-specific variables that potentially reflect the preferences, demand, or cost level of municipal services, and include socio-demographic characteristics, political variables and geographic characteristics. The list of control variables are described in more detail in the next section. In addition we include a trend variable, τ, running from 0 to 8 for the years 2002 to 2010. The stochastic error term is u_i and is assumed to be independently and identically, normally distributed.

Since many municipalities have zero expenditure on some of the cultural services, cf. Table 1, we use a Tobit model to avoid potential biases due to this particular feature of the data. Since observations with zero expenditure are due to a corner solution for the municipalities in question, and not data censoring as such, we follow the corner solution interpretation of the Tobit model, cf. Wooldridge (2003). Thus the demand system becomes the following:

$$S_i = \max\left[\alpha_i + \omega_i I + \sum_{j=1}^{9}\eta_{ij}G_j + \sum_{j=1}^{9}\varphi_{ij}UF_j + \sum_{k=1}^{25}\mu_{ik}Z_k + \theta_i\tau + u_i, 0\right] \quad where\ i = 1,...,9 \quad (1)$$

The budget constraint of course implies that the sum of gross expenditures for each sector must equal total income Y, or alternatively that $\Sigma S_i = 1$.[3] The following set of restrictions follows from the budget constraint:

[1] The cost index for municipalities is increasing considerably faster than the consumer price index, since the main cost component for the municipalities is wage cost and there is rather limited room for productivity improvements for municipal services, cf. Baumol (1967).

[2] The total number of counties in Norway is 19 including Oslo, but Oslo has been omitted from the dataset due to some missing variables, thereby reducing the number of counties in the dataset to 18.

[3] For simplicity we have assumed that the local governments cannot make any intertemporal adjustments. Thus savings are not allowed within this model.

$$\sum_{i=1}^{9}\alpha_i = 1, \sum_{i=1}^{9}\omega_i = 0, \ \sum_{i=1}^{9}\eta_{ij} = 0, \ \sum_{i=1}^{9}\varphi_{ij} = 0, \sum_{i=1}^{9}\mu_{ik} = 0, \ \sum_{i=1}^{9}\theta_i = 0, \quad (2)$$
$$j = 1,....,9, \quad k = 1,...,25.$$

The matching grants G_j and the fee incomes UF_j represent a potential endogeneity problem, since the levels of G_j and UF_j in part are the results of priorities made by the municipalities themselves. Thus there might be a problem with reversed causality in the model which in turn implies a positive bias in the estimated η's and φ's. In order to eliminate the reversed relationship, we use a simple instrumental variable method by introducing a one year lag in the *G*'s and *UF*'s. At least the direct (reversed) relationship between the local government priorities in the budget and the level of the *G*'s and *UF*'s is reduced by this procedure.

Some municipalities have no expenditures on six out of nine purposes. Thus the dependent variable is equal to S_i for municipalities with strictly positive expenditures and 0 for the corner solution outcome. Following Wooldridge (2003), when employing the corner solution model, we are both interested in the conditional probability of having strictly positive expenditures, $P[S_i > 0 \mid \mathbf{x}]$, and the conditional expected budget share, $E[S_i \mid \mathbf{x}, S_i > 0]$.[4] If u_i is independent of $\mathbf{x}$ and u_i follows a normal distribution, we can find and explicit expression for $E[S_i \mid \mathbf{x}]$. This can be written as:

$$E[S_i \mid \mathbf{x}] = P(S_i > 0 \mid \mathbf{x}) \cdot E(S_i \mid \mathbf{x}, S_i > 0) = \Phi\left(\frac{\boldsymbol{\beta}_i \mathbf{x}}{\sigma}\right)(\boldsymbol{\beta}_i \mathbf{x} + \sigma\delta_i) \quad (3)$$

where

$$\delta_i = \frac{\phi[(0 - \boldsymbol{\beta}_i \mathbf{x})/\sigma]}{1 - \Phi[(0 - \boldsymbol{\beta}_i \mathbf{x})/\sigma]} = \frac{\phi(\boldsymbol{\beta}_i \mathbf{x})/\sigma)}{\Phi(\boldsymbol{\beta}_i \mathbf{x})/\sigma)} \quad (4)$$

$\Phi(\cdot)$ and $\phi(\cdot)$ are the cumulative and density distributions, respectively, for the standard normal distribution function and σ is the standard error. This expression is often denoted the inverse Mills ratio, see Wooldridge (2003) for more details.

The marginal effect of the corner solution model is given by:

$$\frac{\partial E[S_i \mid \mathbf{x}]}{\partial x_{ij}} = \beta_{ij} \cdot \Phi\left(\frac{\boldsymbol{\beta}_i \mathbf{x}}{\sigma}\right) \qquad j = 1,...,K, \quad (5)$$

where *K* is the number of municipalities. McDonald and Moffit (1980) decompose (5) as follows:

$$\frac{\partial E[S_i \mid \boldsymbol{\beta}_i \mathbf{x}]}{\partial x_{ij}} = \mathrm{P}[S_i > 0]\frac{\partial E[S_i \mid \mathbf{x}, S_i > 0]}{\partial x_{ij}} + E[S_i \mid \mathbf{x}, S_i > 0]\frac{\partial \mathrm{P}[S_i > 0]}{\partial x_{ij}} \quad (6)$$

This means that a change in the independent variables have two effects: (i) it affects the conditional mean of S_i for $S_i > 0$ and, (ii) it affects the probability that an observation will fall in this

[4] To avoid notational clutter we include the *I*, *G*, *UF*, *Z* and τ variables in the vector $\mathbf{x}$ in the rest of this section. The corresponding vector of parameters for equation *i* is denoted $\boldsymbol{\beta}_i$.

part of the distribution, i.e. where $S_i > 0$. In our application of the model where municipalities chose quantities of cultural services, the derivative in (6) accounts for the fact that some municipalities that have chosen the corner solution at $S_i=0$, may switch to $S_i>0$ when x_j changes.

In order to calculate the different income elasticities from the income elements of (1) we need the slope coefficients or the marginal effects as given by (5). Instead of calculating $\Phi(\cdot)$ by predicting the average probability of having strictly positive budget share from the output of the maximum likelihood procedure used to estimate the Tobit coefficients, we use an approximation which simply is the observed proportion of those municipalities with a strictly positive budget share, see for instance Greene (2003 p. 766).

4. The data

The data used in the present analysis is based on two main sources. First, we use Kostra, which is a national information system for all 429 Norwegian municipalities plus the 19 counties. Kostra provides a wide variety of information tailored to carry out economic analyses of the municipalities, for instance information on economic, social, demographic, and political factors. The data system is maintained and administered by Statistics Norway. Second, we also use criteria data from the cost redistribution element of the General Purpose Grant Scheme (GPGS) which, in addition to taxes, are the main funding system of Norwegian municipalities. The criteria from GPGS used in the present analysis is maintained and administered by The Ministry of Local Government and Regional Development. The data have a panel structure that runs over the period 2002 to 2010. It comprises the same 406 municipalities in all years and we thus have a balanced panel data set consisting of 3654 observations.

In the analyses we divide the municipal budget as shown in Table 1. Thus the cultural sector is divided into eight different purposes which all together represent about four per cent of the total budget. The remaining local government services are aggregated into one single purpose representing about 96 per cent of the budget. The calculation of the budget shares for the nine purposes is based on the gross operating expenses. In addition, for each of the nine sectors, we collect separate information about matching grants from central and county government as well as any grants from other municipalities. User fees for various purposes, including box office income, are also added. Gross operating expenses minus user fees and matching grants are defined as net operating expenses.

In the following we present summary statistics of the data used in the analysis. Requiring a balanced data set implies that municipalities with missing data in at least one year will be omitted for the whole period. Among other municipalities, the largest cities Oslo, Bergen and Trondheim have been omitted for this reason.

We have divided the presentation of the variables in two tables: (i) Budget shares, matching grants, user fees and general income, and (ii) other explanatory variables. Table 2 shows the nine purposes' budget shares, as well as matching grants, user fees and municipal free income. As mentioned in section 2, culture constitutes a very small proportion of the total municipal budget. In contrast to Table 1 the averages in Table 2 are not weighted by the number of inhabitants.

In Table 2 we also present matching grants, user fees and free income per capita measured in NOK deflated to 2010-prices.[5] As can be seen from the table the grants and user fees per capita

[5] NOK 1000 = EURO 123,7 in 2010.

are quite small as compared to general incomes measured by the free income variable and matching grants and user fees for other services, reflecting the small proportion the cultural services makes of the total budget.

Table 2. Summary statistics for budget shares and income variables. N=3654. All income terms in 2010-prices.

Variable	*Label*	*Mean*	*Standard deviation*	*Min*	*Max*
Budget share, activities for children and youth (%)	S_1	0.32	0.33	0.00	11.23
Budget share, libraries (%)	S_2	0.59	0.25	0.05	3.22
Budget share, cinemas (%)	S_3	0.10	0.20	0.00	2.16
Budget share, museums (%)	S_4	0.16	0.44	0.00	12.21
Budget share, arts dissemination (%)	S_5	0.09	0.17	0.00	2.64
Budget share, sports (%)	S_6	0.88	0.64	0.00	6.65
Budget share, cultural schools (%)	S_7	0.71	0.39	0.00	5.67
Budget share, other cultural services (%)	S_8	0.80	0.64	0.00	7.06
Budget share, other welfare services (%)	S_9	96.35	1.34	82.92	99.18
Grants per capita, activities for children and youth (%)	G_1	25	142	0	5858
Grants per capita, libraries (NOK)	G_2	23	136	0	4098
Grants per capita, cinemas (NOK)	G_3	2	10	0	187
Grants per capita, museums (NOK)	G_4	21	213	0	10071
Grants per capita, arts dissemination (NOK)	G_5	9	41	0	1132
Grants per capita, sports (NOK)	G_6	89	207	0	4711
Grants per capita, cultural schools (NOK)	G_7	50	108	0	2876
Grants per capita, other cultural services (NOK)	G_8	51	117	0	2356
Grants per capita, other welfare services (NOK)	G_9	8602	3656	1163	54213
User fees per capita, activities for children and youth (NOK)	UF_1	13	105	0	5834
User fees per capita, libraries (NOK)	UF_2	5	13	0	185
User fees per capita, cinemas (NOK)	UF_3	35	79	0	736
User fees per capita, museums (NOK)	UF_4	11	127	0	2768
User fees per capita, arts dissemination (NOK)	UF_5	8	37	0	1232
User fees per capita, sports (NOK)	UF_6	64	103	0	1263
User fees per capita, cultural schools (NOK)	UF_7	75	64	0	640
User fees per capita, other cultural services (NOK)	UF_8	52	97	0	1309
User fees per capita, other welfare services (NOK)	UF_9	8504	2586	2660	29962
Municipal free income per capita (NOK)	I	43745	12458	13101	164013

In Table 3 we present descriptive statistics for the other variables used in the analyses. We distinguish between policy variables, variables of social conditions, population, personal income, local cost criteria and educational background of the inhabitants. We will return to hypotheses concerning the different variables below. Here we limit ourselves to a summary description of the variables we think deserves some extra attention.

The first political variable is the share of representatives of liberal/conservative parties in the municipal council (R). Liberal/conservative parties are defined from the political centre and towards the right (mainly Liberals, Christian Democrats, Conservatives, etc). Moreover, we also have the share of representatives on independent lists (F) and the share of representatives of left wing parties (L). The left wing parties include representatives from The Labor Party and

further left, i.e. socialist and communists. Share of representatives from liberal/conservative parties is the reference category in the calculations below. Finally, we have calculated a Herfindahl index of party concentration. It is defined as follows:

$$Herf = \sum_i \left(\frac{x_i}{\sum_i x_i} \right)^2$$

where x_i is the number of representatives from party i. Thus we have $0 < Herf \leq 1$. With equal numbers of representatives from all political parties, the index will limit zero and we have a fragmented and less quorum council. The opposite is the case when one of the parties has all the representatives. When the index limits unity we have a strong party concentration and thus a more quorum council. From Table 3 we see that the average Norwegian municipal is quite fragmented with a Herfindahl index of 0.26.

The variables accounting for social factors include share of non-married, immigrants, unemployed, divorced and share of mentally retarded inhabitants both above and below 16 years old. In addition, municipal mortality rate is included. The reason why we include information on such matters is that these variables are supposed to affect the need for municipal provided core welfare services of various kinds. On average, these shares are very low, but if we look at the maximum values we find that some are very much higher than in the average municipality. If a municipality is facing high scores on these variables, they are also subject to latent costs that might crowd out services of less importance, for instance cultural services.

Population variables are divided by age groups because different age groups are supposed to have different needs regarding welfare services. For example, the proportion in the age group 0-5 year olds express needs for child care services, the size of the age group of 6-15 year olds express requirements for contemporary school services, while the proportion aged 80 years and older will express the need for elderly care services. Regarding the latter, these are very resource-intensive services and from Table 3 we can see that there are likely to be big differences between municipalities regarding care for elderly: While the average share of inhabitants aged 80 years and older is about 5% for Norway, some municipalities have a share of this age group between 10 and 15%. In the calculations below, inhabitants 16-66 years is the reference category.

In Table 3 we also present figures for average and median private income in the municipalities. Earnings are calculated for inhabitants 17 years and older. Median income is the income of the person in the middle of the distribution (within a municipality) when the population is sorted from lowest to highest income. We have a symmetric income distribution when median income equals average income. Because some inhabitants have very high income and thereby pulling the average income upwards, the average and median income will differ. We have, in other words, a skewed income distribution. Median income would in such cases be more representative because it represents the income of a "typical" person in the population. To take care of potential effects of these income conditions, we introduce a rough measure of income inequality, more precisely the relationship between average and median income (variable name "AINC/MINC"). If this relationship equals unity we have a symmetrical distribution of income. Is the ratio greater than 1, we have an upward skewed income distribution and the opposite if it

is less than unity. From Table 3 we see that the relationship between average and median income is 1.13 for Norwegian municipalities on average. This means that in Norway we have a moderately upward skewed income distribution.

Table 3. Summary statistic for other factors. N=3654

Variable	***Label***	***Mean***	***Standard deviation***	***Min***	***Max***
Share of representatives from right wing parties	R	0.54	0.19	0.00	1.00
Share of representatives with no party connection	F	0.08	0.15	0.00	1.00
Share of representatives from left wing parties	L	0.37	0.15	0.00	1.00
Party fragmentation (Herfindahl's index)	HERF	0.26	0.09	0.14	1.00
Non-married inhabitants per capita	NM	0.08	0.02	0.03	0.16
Divorced per capita	DIV	0.05	0.01	0.02	0.09
Immigrants per capita	IMM	0.01	0.01	0.00	0.09
Unemployed per capita	U	0.01	0.01	0.00	0.07
Mortality rate	MORT	0.007	0.00	0.00	0.01
Mentally retarded above 16 years old per capita	PU_16a	0.0046	0.0025	0.00	0.04
Mentally retarded less than 16 years old per capita	PU_16u	0.0011	0.0007	0.00	0.01
Inhabitants, 80 years and older per capita	POP80	0.06	0.02	0.02	0.14
Inhabitants, 67-79 years per capita	POP67_79	0.10	0.02	0.04	0.17
Inhabitants, 6-15 years per capita	POP6_15	0.14	0.01	0.09	0.19
Inhabitants, 0-5 years per capita	POP0_5	0.07	0.01	0.03	0.11
Number of inhabitants	POP	8,980	13,156	444	123,850
Average income for inhabitants 17 years and older (NOK) (Deflated by CPI)	AINC	299 949	41 026	202 563	734 977
Median income for inhabitants 17 years and older (NOK) (Deflated by CPI)	MINC	266 183	33 118	177 671	377 506
Measure of disparity (AINC/MINC)	ULIK	1.13	0.07	1.00	2.54
Average travel time to closest school district zone (minutes)	ZONE	7.93	6.85	0.86	95.5
Average travel time to municipality centre (minutes)	TRAVEL	9.00	6.66	0.75	74.5
Share of inhabitants in areas with high population density	TETT	0.50	0.28	0.00	1.01
Share of inhabitants 16-74 years old with primary school education	EDU_1	0.40	0.08	0.18	0.67
Share of inhabitants 16-74 years old with secondary school education	EDU_2	0.51	0.05	0.30	0.69
Share of inhabitants 16-74 years old with degree from college and/or university (1-3 years)	EDU_3	0.17	0.04	0.08	0.32
Share of inhabitants 16-74 years old with degree from college and/or university (more than 3 years)	EDU_4	0.03	0.02	0.00	0.17
Share of inhabitants 16-74 years old with unknown education	EDU_5	0.03	0.02	0.00	0.22

Different criteria are used in GPGS in order to capture differences in urban structure between municipalities and in the municipal revenue system to capture additional costs due to the settlement pattern. Here we use two such criteria: Travel Distance to the municipal centre and the

zone criterion. The travelling criterion is a measure of average travel time of inhabitants travelling from the population centre in its own due-circuit to the administrative centre. The zone criterion is the inhabitant aggregated distances from the centre of each population centre in the municipality to the centre of the zone. Each zone includes about 2000 inhabitants and is designed to capture the average school district. We also have included a variable describing the population density in the municipality. Municipalities with an urban population are often associated with a more active cultural life, but we have no justification beyond this to include the variable. From Table 3 we see that about half the population lives in urban areas in the 406 municipalities included in the data. However, we must have in mind that this figure is not weighted for the population of the municipalities. Thus small and sprawled municipalities in terms of population, have the same weight as large municipalities with a more dense population pattern.

Finally, we also include variables describing the local population's average level of education. More precisely, we have divided the inhabitants between 16 and 74 years in various educational groups. Table 3 shows that on average, people with primary and secondary education dominate. The motivation for these variables is that we assume that a more educated population tend to demand more cultural services, especially relating to the finer arts. Share of inhabitants, 16-74 years old with primary school education, is the reference category in the calculations carried out in the next section.

5. Results

5.1 Elasticities with respect to free income

The elasticities with respect to free income *I* is found from A.3 in Appendix 2. The expenditure share weighted sum of income elasticities with respect to *I* does not sum to 1.0 since *I* does not constitute the full income Y. The weighted sum instead becomes the share of free income of total income *I*/*Y*. Thus the definition of "income neutrality" is shifted from 1.0 to $I/Y = 0.71$ in our dataset. For most readers we believe it is more convenient to maintain the familiar scale of income elasticities, such that services with an income elasticity above one is defined as luxuries and below one as necessities. We have therefore chosen to scale up all elasticities ε_I with respect to free income by the factor *Y*/*I*.

Table 4. Free income elasticities, Tobit-estimation. Linear model.

	1. Children and youth activities	*2. Libraries*	*3. Cinemas*	*4. Museums*	*5. Arts dissemination*	*6. Sports*	*7. Cultural schools*	*8. Other cultural*	*9. Other services*
ε_I	1.44	1.13	1.15	2.72	1.92	2.14	0.94	2.52	0.97

As discussed in section 1, Håkonsen and Løyland (2011) found the income elasticity for an aggregate of all cultural services to be 2.04. This made the cultural sector the most income elastic service sector in their study. The level of the income elasticities in Table 4 confirms the finding in several earlier studies (cf. references in section 1) that cultural services indeed are clearly income elastic on average. However, we also see substantial variation within the cultural subcategories. The least elastic categories are cultural schools, libraries and cinemas, and cultural schools is the only culture sector with an income elasticity below one. In the other end of the spectrum we find quite high income elasticities for museums (2.72), other cultural services (2.52), sports (2.14) and arts dissemination (1.92). These results fit well into the general idea described in section 1 and 2 that the level of the income elasticities in part reflects the degree of central government regulations and standards within the various sectors. To our knowledge

there are few or none such regulations within the four most elastic subcategories. In these sectors we find expenditures like grants or supports to private sports clubs (sector 6), performing artists and ensembles (s. 5), and voluntary organisations (s. 8), expenditures to sports facilities and arenas (s. 6) and cultural houses and concert venues (s. 8 and/or s. 5), the municipal culture administration and consultants (s. 8), and grants or supports to private museums (s. 4). None such expenditures are in any way compulsory or regulated by the central government. In the cultural subcategories with more moderate income elasticities, however, we find the two sectors where a supply is statutory in all municipalities regardless of income. This is the case for cultural schools and public libraries. In the former case there is a paragraph in the Law for primary education, stating that all municipalities, alone or in collaboration with neighbouring municipalities, must maintain education for children and youths within music and other arts. In the latter, there is a similar paragraph in the Law of public libraries, stating that all municipalities must have a public library. There is also a requirement that all such libraries must have personnel with a specialized educational background. Thus, libraries and cultural schools are more regulated and standardised than the other cultural services, making the income elasticities more suppressed.

5.2 Effects of matching grants

The model gives a full set own- and cross-effects of matching grants to each sector. However, the majority of the cross-effects are not significant at 5 % level. We therefore confine the discussion to the own-effects of the matching grants, i.e. the effects for sector *k* of giving grants to the same sector. These effects may be measured as elasticities in the same manner as the elasticity with respect to free income in the previous section, cf. A.4. However, since these elasticities become rather small numbers due to the grants' small share of total income, we find it more illustrative to scale the effects to show the increase in gross expenditures for each sector following from one extra NOK as a matching grant to the same sector, cf. formula A.6 in Appendix 2. This is shown in Table 5.

Table 5. Effects of increasing matching grants to each sector.

	1.Children and youth activities	***2.Libraries***	***3.Cinemas***	***4.Museums***	***5.Arts dissemination***	***6.Sports***	***7.Cultural schools***	***8.Other cultural***	***9.Other services***
Extra gross expenditures per NOK extra grant income	0.45	0.83	0.63	0.39	0.56	0.86	0.92	0.85	0.95

An interesting issue regarding the effects of grant financing, is the degree of "accuracy" or "leakage", i.e., how large a share of the grant financing that is spent in the grant receiving sector and how large a share that leaks over to higher expenditures in other sectors. In the scale chosen in Table 5, a number of 1.0 would indicate 100 % accuracy and zero leakage, i.e., each NOK received as a grant is being spent in the intended (grant receiving) sector. The figures in Table 5 show that the leakage effects are greatest for museums (61 %) and children and youth activities (55 %).The leakage per cent is smallest for the cultural schools (8%), sports (14 %), and other cultural services (15 %). In other words, giving 1 NOK extra as a matching grant to the cultural schools, NOK 0.92 extra is spent on cultural schools, while the remaining 0.08 are spent elsewhere according to the estimated own- and cross-effects of the matching grants in our model.

It should be added, however, that grant financing is very limited for several of the cultural sectors, and especially low for the cinemas where only 2.6 % of the expenditures are financed by matching grants. Although the effects of matching grants to cinemas is significant at 1 per cent level, the very small use of matching grants to this sector makes it clear that matching grants are of little importance for the development of this sector.

5.3 Effects of user fees and other sector-specific revenues

In this section we show the corresponding results as for the matching grants above, only replacing matching grants with user fees and other sector-specific revenues to each sector. Again, we focus on the own-effects for each sector only. The interpretation of the own effects is the same as for the matching grants – increased gross expenditures measured in NOK in each sector if the same sector increases its own revenues by means of higher user fees or other sector specific revenues by one NOK, cf. A.7 in Appendix 2.

Table 6. Effects of increased user fees and other sector-specific revenues to each sector.

	1.Children and youth activities	***2.Libraries***	***3.Cinemas***	***4.Museums***	***5.Arts dissemination***	***6.Sports***	***7.Cultural schools***	***8.Other cultural***	***9.Other services***
Extra gross expenditures per NOK extra fee income	0.77	1.65	0.79	1.05	0.89	1.46	2.15	1.81	0.95

The effects of user fees or other sector specific incomes are generally higher than one, implying a negative leakage effect or an adding up-effect from extra municipal free income. The only exceptions are children and youth activities, where 78% of extra fee income is spent in that sector (i.e. leakage of 22 %), and cinemas with an own-effect of 79 % and leakage 21 %. The strongest own-effects of user fees are found in the cultural schools (2.15), other cultural activities (1.81) and libraries (1.65). The user fees in the cultural schools are a rather important source of finance for this sector, since there are substantial parental fees per child attending cultural schools in most municipalities. On average the parental fees finance 18 % of the gross expenditures to cultural schools, cf. Table 1.

5.4 Effects for cultural expenditures from the local age pyramid

In this section we focus on control variables accounting for the age pyramid in the municipalities. Borge et al (1995) find that a high percentage of young people and elderly people reduce spending on cultural services. Their explanation is that higher expenditures on education and elderly care crowd out cultural spending. The three sectors day care (for pre-school children), primary education, and care for the elderly alone accounts for around 60 % of the gross expenditures for the average municipality. It therefore seems reasonable to believe that higher need for expenditures in such large and expensive service sectors may crowd out expenditures to smaller sectors like the cultural services. However, there are also other mechanisms related to the age pyramid that may affect cultural spending. A high share of families with children may reduce cultural spending since the parents have a more scarce time constraint and therefore demand little cultural services, cf Werck et al. (2008). Likewise, a high share of elderly people may lead to higher demand for cultural services in a municipality because this age group has a low opportunity cost of time and therefore demands much culture. This effect is found by both Werck et al. (2008) and Stastna (2009). As discussed in Benito et al. (2013), however, this effect is

probably reversed as the elderly becomes older, since most very old people simply become too old to attend cultural events (or other events in general), Thus, as pointed out by Benito et al. (2013), the age pyramid may be expected to affect cultural spending both via demand factors, acting through the voting behaviour, and via crowding out effects from a given budget constraint.

The control variables are measured as population shares, with a scale from 0 to 1. Since the dependent variable is the budget share of the nine sectors, the interpretation of the regression parameters shown in Appendix 1 is the increase in budget share if the population share increases by the number 1. We have then used the regression parameters to compute new predicted budget shares and expenditures following from a 10 per cent point increase for each of the population shares. Since the dependent variables (expenditure shares) for cultural services are very small in numbers (cf. Table 2), we scale the expenditure shares to per cent shares, and show the change in per cent points for each sector following from a 10 per cent point increase in the population shares in Table 7.

Table 7. Effects on cultural services from population share variables. Change in per cent points in expenditure shares per 10 per cent point increase in population shares.

	Children and youth activities	Libraries	Cinemas	Museums	Arts dissemination	Sports	Cultural schools	Other cultural	Other services
Inhabitants above 16 years old, mentally retarded, per capita	-0.22	-0.93**	0.08	-0.64**	-0.61**	-1.55**	-0.74**	-1.75**	6.00**
Inhabitants less than 16 years old, mentally retarded, per capita	-1.65**	-1.32**	-0.41	-0.38	-0.43	-5.81**	-1.93**	-5.63**	16.74**
Inhabitants, 67-79 years, per capita	0.02	0.13**	0.04	-0.04	0.05	-0.30**	-0.11*	-0.22*	0. 43**
Inhabitants, 6-15 years, per capita	0.03	0.003	0.002	-0.04	-0.12**	-0.15*	0.02**	-0.80**	1.05**
Non-married inhabitants per capita	-0.15*	-0.14*	0.003	0.03	-0.23*	0.15	0.05	-0.85*	1.01**
Divorced per capita	0.10*	-0.06	-0.02	-0.02	0.09**	-0.14	-0.24**	-0.07	0.04*
Immigrants per capita	-0.11*	0.02	-0.14**	-0.09*	-0.03	-0.09	-0.13**	0.09	0.04
Unemployed per capita	0.06	0.03**	0.05	-0.03	0.04	0.73**	0.38**	-0.59**	-0.99**

**Corresponding regression coefficient in Appendix 1 is significant at 1 per cent level of significance.
*Corresponding regression coefficient in Appendix 1 is significant at 5 per cent level of significance.

For the most part, the results show the same effect as found by Borge et al. (1995): Variables indicating higher demand for welfare services tend to increase the expenditures to the residual sector (“other services”) and reduce the expenditures to the cultural sectors. There are a few exceptions, however. A higher share of 67 to 79 year old inhabitants increases the expenditures to libraries, ceteris paribus. Also, a higher share of divorced people increases the expenditures to children and youth activities and to arts dissemination. The first of these seems rather natural, while the latter result is somewhat harder to explain.

One variable goes in the opposite direction altogether: A higher share of unemployed reduces the expenditures to “other services” and increases the expenditures to three of the cultural services; libraries, sports, and cultural schools. Only other cultural services are negatively affected by the unemployment level.

One qualification is in order regarding the effects of these variables. All the variables (apart from the trend) in Table 7 are included in the cost indices in the General Purpose Grant Scheme. This scheme adjusts for variation in the demands for welfare services among the municipalities, and compensates the municipalities for (involuntary) extra costs from higher demands for welfare services. The results in Table 7 only show the partial effects from higher shares of the various population characteristics in the table, but not effects of higher income. To see the net effect for each sector, one would in principle need to compare the partial effects shown in Table 7 with the effect from increased general income following from a change in the redistribution through the GPGS-scheme. We have not attempted to compute such net effects, since it would be a rather tedious exercise to compute the extra income following from higher population shares.

5.5 Effects of other control variables

Of the all in all 26 control variables we have commented upon effects of eight of them in the previous section. Of the remaining 18 we present the effects of a selection dependent on what we consider the most interesting. The results for all these variables are shown in Appendix Table A1. There are three variables that we have categorized as political variables. These are share of representatives without political party connection (*F*) in the local government, share of left-wing representatives (*L*) and the third is a Herfindahl index (*HERF*) measuring the party concentration in the local government. The effects of the first two are evaluated in relation to the share of liberals/conservatives. The literature on the effects of the right-left dimension on cultural spending is ambiguous, cf. Benito et al. (2013), Getzner (2002). Left-wing politicians tend to favour higher public spending in general, and may also be interested in spending more on culture, thus making culture more affordable to low-income people. On the other hand, people with higher income tend to appreciate culturale experiences more than the average citizen, and therefore support public spending on culture (Schultze and Ursprung (2000), Getzner (2004), Potrafke (2010). We find that municipalities with a large share of representatives without party connection prioritize cultural schools stronger than governments run by conservatives. A large share of left-wing representatives prioritizes activities for children and youth, sports and cultural schools stronger than conservatives/liberals, while they prioritize libraries and arts dissemination slightly weaker. Thus, there is not a clear effect of left or right wing majorities in the municipality board for the cultural spending in general. The results for the coefficients of Herfindahl index suggests that non-fragmented municipal governments tend to prioritize activities for children and youth, libraries, museums and sports stronger than fragmented, while they give less priority to cinemas and cultural schools. Stastna (2009), Getzner (2002) and Werck et al. (2008) find no effect of government fragmentation on cultural spending, and our result with some positive and some negative effects seems to confirm such a lack of a general effect from party fragmentation for cultural spending as a whole.

The population size is assumed to have an impact on budget priorities, particularly in sectors with economies of scale. Big municipalities can of course exploit scale economies to a greater extent than small municipalities. On the one hand this may lead to lower spending per capita in bigger than in smaller municipalities given the same cultural service level for the inhabitants. However, many cultural goods requires such a large scale that the small municipalities simply become too small to offer the full range of cultural services. This effect suggests that important parts of the cultural life become concentrated in the larger cities. The empirical literature suggests that the latter argument dominates, since Wert (2006), Borge et al. (1995), and Werck et al. (2008) find that population size has a significant positive impact on culture. Our results show

that both effects may be at work. Two cultural sectors, libraries and cultural schools, are negatively affected by population size. In a study of English public libraries Hammond (1999) found large economies of scale so it is reasonable to expect the same for Norway. As for the cultural schools, there may also be an effect of better private alternatives in the larger cities, where there are a larger pool of artists, musicians etc. that offer private lessons. In the six remaining cultural sectors (children and youth activities, cinemas, museums, arts dissemination, sports, other culture), we find increased budget share with population size. We believe the main explanation is the mechanism mentioned above from the previous empirical literature, viz. that there is a specialization in cultural services in the larger municipalities and that many of the small municipalities do not have the same expenditure levels per capita on museums, cinemas, exhibitions, etc.

We also include two variables on personal income in the calculations. First it is the median income for the population 17 years and older as well as average income in relation to the median income. The idea behind the latter is a measure on income inequality in the municipalities. If the average income is much higher than median income, this suggests a skewed income distribution. The bigger the inequality measure in magnitude, the bigger is the income inequality in the municipality. Municipalities with higher median income seem to give higher priority to sports, and municipalities with both higher median income and bigger inequalities seem to prioritize cultural schools stronger. Finally, we note that libraries have stronger priority in municipalities with higher median income while they are subject to lower priority in municipalities with large income inequality. This result is somewhat surprising since Løyland and Ringstad (2012), albeit in a quite different analysis and of Swedish data, finds that demand for book borrowing is larger in municipalities with larger income inequality. If the same effect applies to Norway it does not seem to have been followed up by the budget allocations made by the local governments.

We finally come to the trend variable. The trend variable is zero for the year 2002, 1 for 2003 and 8 for 2010. The regression coefficient for the trend variable thus shows the change in budget share for each sector when the trend increases by one year. We have therefore taken the total change for the whole period 2002-2010 predicted by the trend term alone. This is done by multiplying the trend coefficient for each sector by 8, in order to predict a new budget share for 2010 from the base budget share in 2002. We have then computed new expenditure levels for 2010 for each sector, and shown the per cent change from 2002 to 2010-levels according to the change in the trend coefficients.

The results show a positive trend effect for the residual sector ("other services"), while all cultural services have a negative trend – although significant only for four of them. The four sectors with a significant and negative trend are children and youth activities, libraries, arts dissemination, and sports. For all these, the trend effect is quite substantial with a reduction of as much as 47 % for arts dissemination. The overall negative trend for the cultural sectors fits well into the story about an increasing level of national regulations and standardisation of the major welfare services like child care, health services or primary education. The trend variable in the model accounts for factors that are not controlled for by the other variables of the model. The indirect effects of more regulation and standardisation of welfare services will at least partially show up as an increased effect of the trend variable in the model. We therefore see the positive trend for the residual sector and the negative trend for the cultural sectors as a confirmation of the hypothesis that more regulations and standardisation of welfare services leads to negative effects for the cultural sector in the municipalities. The same argument is also often voiced by the municipalities themselves.

6. Discussion and conclusions

The overall situation for the provision of cultural services in Norwegian municipalities during the period we study in this paper – 2002 to 2010 – has been challenging. First of all, the cost index for municipal services has been rising steadily, with an average nominal growth rate of 3.9 % per year. The inflation rate measured by the consumer price index has only been 2 % during the same period. Thus the real cost increase of municipal services has been close to 2 % per year. This may be seen as a telling example of the Baumol cost disease, since the scope for productivity improvements in municipal service production is relatively limited. Because of the rising production costs, the real income growth for the municipalities has been very limited, only 4 % for the whole eight-year period, i.e., 0.49 % per year. This has given little room for more expenditure to services in general and cultural services in particular

In addition to a moderate real income growth, the list of requirements and regulations by the central government for more and better health care, care for the elderly, primary education, child care, and social security is getting longer each year. Furthermore, the demographic development with a rising share of very old inhabitants, also require ever more resources into care for the elderly.

The combination of these circumstances has left sectors for which the needs are less pressing – like most cultural services – in a vulnerable situation. Still the results in this paper seem to tell us that local politicians in fact may be trusted to include cultural services in their plans for the further development of their municipalities. One interpretation of the relatively high income elasticities for cultural services is that these services in fact will be given high priority – if only the municipalities experience a real income growth. The high income elasticity also has another interpretation, viz. that cross-section income variation among the municipalities will give large variation for the cultural service provision between rich and poor municipalities. The results regarding the socio-demographic variables in Table 7 also show the vulnerability for cultural services in the form of crowding out effects of variables indicating higher expenditure on core goods of the welfare state.

Many stakeholders in the cultural sectors therefore argue that the local cultural services need more matching grants or other special arrangements from the central government in order to compete more evenly with the other municipal service sectors. On the other hand, this could easily develop into an "arms race" between the various service sectors. By this we mean that giving more matching grants or issuing more regulations to one particular sector in the next round will lead to more grants or regulations also for others. The official political consensus has for a long time been that sector specific financial arrangements and detailed regulations should be the exception rather than the rule, but this consensus seems to be rather fragile and is under pressure from various sector interest groups.

Given the high income elasticities for most cultural services, the local culture will face a positive future development if the municipalities experience a real income growth. This may be problematic, however, since we find some evidence of rising costs for the municipalities' services in general, probably due to Baumol's cost disease and other cost increasing forces. This development gives only modest leeway for real income growth and thus probably modest growth in the provision of cultural services.

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Appendix 1: Result tables for the regression models.

Table A1. Estimated coefficients for the Tobit models. Standard error in parentheses. N=3654.

Variable	1	2	3	4	5	6	7	8	9
Intercept	-0.00215 (0.00293)	-0.00216 (0.00245)	-0.00127 (0.00177)	-0.00422 (0.00252)	-0.00516* (0.00230)	-0.03073** (0.00540)	0.00319 (0.00283)	0.02717** (0.00594)	1.01266** (0.01076)
G_1	0.00733** (0.00050)	-0.00044 (0.00042)	-0.00019 (0.00043)	-0.00130 (0.00072)	-0.00030 (0.00054)	-0.00037 (0.00094)	-0.00096 (0.00049)	-0.00315** (0.00103)	-0.00202 (0.00188)
G_2	0.00256** (0.00044)	0.01347** (0.00037)	0.00021 (0.00023)	-0.00075* (0.00037)	0.00006 (0.00032)	-0.00234** (0.00082)	0.00050 (0.00043)	0.00171 (0.00090)	-0.01506** (0.00164)
G_3	-0.00633 (0.00374)	-0.00798** (0.00311)	0.01996** (0.00171)	0.00749* (0.00310)	0.00794** (0.00280)	0.00209 (0.00692)	0.00517 (0.00361)	0.04792** (0.00762)	-0.07040** (0.01385)
G_4	-0.00022 (0.00026)	0.00101** (0.00022)	0.00018 (0.00016)	0.00761** (0.00022)	0.00015 (0.00018)	0.00107* (0.00049)	-0.00014 (0.00025)	-0.00030 (0.00054)	-0.00912** (0.00097)
G_5	-0.00006 (0.00094)	0.00273** (0.00079)	0.00141** (0.00045)	0.00274** (0.00079)	0.01331** (0.00066)	0.00141 (0.00176)	0.00295** (0.00091)	-0.00333 (0.00193)	-0.01824** (0.00351)
G_6	-0.00025 (0.00018)	-0.00002 (0.00015)	-0.00001 (0.00009)	0.00027 (0.00015)	0.00012 (0.00014)	0.01401** (0.00033)	0.00013 (0.00017)	-0.00085** (0.00036)	-0.01310** (0.00065)
G_7	-0.00090* (0.00038)	-0.00065* (0.00031)	-0.00064** (0.00024)	0.00008 (0.00032)	0.00067* (0.00028)	-0.00068 (0.00070)	0.01532** (0.00036)	-0.00080 (0.00076)	-0.01286** (0.00139)
G_8	0.00041 (0.00032)	-0.00028 (0.00027)	-0.00014 (0.00017)	-0.00062* (0.00027)	-0.00199** (0.00030)	-0.00123* (0.00060)	-0.00061 (0.00032)	0.01370** (0.00066)	-0.01116** (0.00120)
G_9	0.00003** (0.00001)	-0.00004** (0.00001)	0.00001 (0.00001)	0.00003* (0.00001)	-0.00002 (0.00001)	0.00020** (0.00003)	0.00001 (0.00001)	0.00005* (0.00003)	-0.00028** (0.00005)
I (NOK 10 000)	0.00023** (0.00005)	0.00012** (0.00004)	0.00005 (0.00003)	0.00052** (0.00004)	0.00020** (0.00004)	0.00166** (0.00010)	-0.00007 (0.00005)	0.00197** (0.00011)	-0.00455** (0.00019)
UF_1	0.01269** (0.00068)	0.00010 (0.00057)	-0.00168* (0.00086)	-0.00062 (0.00141)	-0.00004 (0.00077)	0.00018 (0.00126)	0.00059 (0.00066)	0.00275* (0.00139)	-0.01651** (0.00253)
UF_2	0.00144 (0.00343)	0.02676** (0.00287)	-0.00271 (0.00198)	0.00793** (0.00291)	0.00272 (0.00257)	0.01549* (0.00640)	0.00146 (0.00332)	0.00598 (0.00703)	-0.05824** (0.01277)
UF_3	0.00299** (0.00053)	0.00070 (0.00044)	0.02499** (0.00025)	0.00163** (0.00044)	0.00078* (0.00038)	0.00167 (0.00098)	0.00072 (0.00051)	-0.00112 (0.00108)	-0.02987** (0.00196)
UF_4	-0.00158** (0.00058)	-0.00585** (0.00049)	-0.00060 (0.00038)	0.02070** (0.00048)	0.00062 (0.00041)	-0.00163 (0.00108)	-0.00164** (0.00056)	-0.00150 (0.00119)	-0.00867** (0.00216)
UF_5	-0.00170 (0.00104)	-0.00170 (0.00087)	0.00004 (0.00050)	-0.00043 (0.00091)	0.02105** (0.00073)	-0.00624** (0.00194)	-0.00290** (0.00101)	-0.00203 (0.00214)	-0.00488 (0.00388)
UF_6	-0.00141** (0.00038)	0.00000 (0.00031)	0.00004 (0.00019)	-0.00002 (0.00032)	0.00028 (0.00029)	0.02408** (0.00070)	0.00013 (0.00036)	-0.00203** (0.00077)	-0.02120** (0.00139)
UF_7	-0.00265** (0.00067)	0.00116* (0.00056)	0.00048 (0.00036)	-0.00003 (0.00057)	-0.00094 (0.00052)	-0.00164 (0.00124)	0.03581** (0.00065)	-0.00298* (0.00136)	-0.02896** (0.00247)
UF_8	-0.00043 (0.00040)	0.00076* (0.00033)	-0.00014 (0.00021)	0.00081* (0.00034)	-0.00006 (0.00030)	-0.00287** (0.00075)	-0.00168** (0.00039)	0.02937** (0.00082)	-0.02508** (0.00149)
UF_9	0.00007** (0.00002)	-0.00002 (0.00002)	0.00002 (0.00001)	0.00004* (0.00002)	-0.00004** (0.00001)	0.00008* (0.00004)	-0.00002 (0.00002)	0.00017** (0.00004)	-0.00027** (0.00007)
Trend	-0.00020** (0.00004)	-0.00022** (0.00003)	-0.00001 (0.00002)	-0.00002 (0.00003)	-0.00010** (0.00003)	-0.00033** (0.00007)	-0.00004 (0.00004)	-0.00007 (0.00007)	0.00101** (0.00014)
F	0.00053 (0.00032)	-0.00127** (0.00026)	-0.00012 (0.00017)	-0.00041 (0.00027)	-0.00092** (0.00025)	0.00097 (0.00059)	0.00088** (0.00031)	-0.00149* (0.00065)	0.00136 (0.00118)
L	0.00124** (0.00036)	-0.00077** (0.00030)	0.00006 (0.00019)	-0.00040 (0.00031)	-0.00059* (0.00028)	0.00217** (0.00067)	0.00087* (0.00035)	0.00107 (0.00074)	-0.00361** (0.00134)
HERF	0.00178** (0.00058)	0.00333** (0.00049)	-0.00076* (0.00031)	-0.00051 (0.00050)	0.00143** (0.00046)	0.00321** (0.00108)	-0.00128* (0.00056)	0.00119 (0.00119)	-0.00956** (0.00216)
NM	-0.01503* (0.00677)	-0.01407* (0.00562)	0.00034 (0.00352)	0.00316 (0.00571)	-0.02338** (0.00525)	0.01530 (0.01257)	0.00522 (0.00652)	-0.08490* (0.01377)	0.10144** (0.02502)
DIV	0.01019* (0.00439)	-0.00648 (0.00366)	-0.00194 (0.00243)	-0.00231 (0.00373)	0.00918** (0.00332)	-0.01399 (0.00814)	-0.02380** (0.00424)	-0.00752 (0.00894)	0.03588* (0.01624)
IMM	-0.01150* (0.00526)	0.00155 (0.00439)	-0.01445** (0.00284)	-0.00901* (0.00446)	-0.00334 (0.00384)	-0.00929 (0.00978)	-0.01339** (0.00509)	0.00885 (0.01076)	0.03583 (0.01955)
U	0.00640 (0.00715)	0.03107** (0.00596)	0.00508 (0.00370)	-0.00341 (0.00604)	0.00372 (0.00544)	0.07342** (0.01327)	0.03799** (0.00691)	-0.05890** (0.01458)	-0.09988** (0.02648)
MORT	-0.05149 (0.04941)	0.14584** (0.04102)	0.09158** (0.02607)	0.21953** (0.04171)	0.07098 (0.03816)	0.02699 (0.09172)	-0.09969* (0.04769)	0.27918** (0.10058)	-0.53067** (0.18273)
PU_16a	-0.02200 (0.01638)	-0.09284** (0.01365)	0.00814 (0.00858)	-0.06410** (0.01399)	-0.06129** (0.01354)	-0.15468** (0.03041)	-0.07414** (0.01584)	-0.17549** (0.03346)	0.59990** (0.06079)
PU_16u	-0.16525** (0.05259)	-0.13180** (0.04375)	-0.04142 (0.02797)	-0.03815 (0.04480)	-0.04357 (0.04104)	-0.58065** (0.09774)	-0.19261** (0.05072)	-0.56296** (0.10726)	1.67407** (0.19487)
POP80	-0.01131 (0.00727)	0.00796 (0.00604)	0.00715 (0.00385)	-0.00494 (0.00616)	0.02764** (0.00561)	-0.06957** (0.01352)	0.00702 (0.00701)	0.01481 (0.01481)	0.03896 (0.02691)

Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
POP67_79	0.00162 (0.00452)	0.01347** (0.00375)	0.00382 (0.00240)	-0.00408 (0.00382)	0.00508 (0.00346)	-0.02979** (0.00837)	-0.01109* (0.00435)	-0.02185* (0.00919)	0.04324** (0.01670)
POP6_15	0.00294 (0.00407)	0.00029 (0.00339)	0.00018 (0.00217)	-0.00401 (0.00346)	-0.01165** (0.00313)	-0.01574* (0.00757)	0.00166** (0.00394)	-0.07981** (0.00832)	0.10540** (0.01511)
POP0_5	0.00260 (0.00574)	0.00251 (0.00477)	0.00282 (0.00309)	-0.00017 (0.00488)	-0.00634 (0.00450)	-0.01935 (0.01063)	-0.01181* (0.00553)	0.01775 (0.01169)	0.00567 (0.02123)
POP	0.00032** (0.00008)	-0.00028** (0.00007)	0.00010* (0.00005)	0.00029** (0.00007)	0.00078** (0.00006)	0.00163** (0.00015)	-0.00020** (0.00008)	0.00005* (0.00016)	-0.00215** (0.00030)
log(MINC) (NOK 10 000)	-0.00009 (0.00077)	0.00201** (0.00065)	-0.00051 (0.00045)	0.00051 (0.00066)	-0.00028 (0.00059)	0.00462** (0.00142)	0.00178* (0.00075)	-0.00535** (0.00157)	-0.00396 (0.00284)
log(ULIK)	0.00106 (0.00076)	-0.00130* (0.00063)	0.00039 (0.00040)	0.00059 (0.00064)	0.00016 (0.00056)	0.00133 (0.00141)	0.00445** (0.00073)	0.00807** (0.00155)	-0.01524** (0.00282)
ZONE	0.00001 (0.00001)	-0.00002 (0.00001)	-0.00002 (0.00001)	0.00000 (0.00001)	0.00001 (0.00001)	-0.00001 (0.00003)	-0.00010** (0.00001)	0.00000 (0.00003)	0.00013* (0.00005)
TRAVEL	-0.00002 (0.00001)	-0.00001 (0.00001)	-0.00001 (0.00001)	-0.00002 (0.00001)	-0.00001 (0.00001)	-0.00004 (0.00002)	0.00006** (0.00001)	-0.00006* (0.00003)	0.00008 (0.00005)
TETT	0.00037 (0.00025)	0.00029 (0.00021)	0.00099** (0.00013)	-0.00007 (0.00021)	-0.00046* (0.00019)	0.00510** (0.00046)	0.00003 (0.00024)	0.00030 (0.00051)	-0.00607** (0.00092)
EDU_2	0.00292** (0.00107)	0.00332** (0.00089)	-0.00057 (0.00056)	-0.00256** (0.00091)	-0.00005 (0.00081)	0.01848** (0.00198)	-0.00180 (0.00103)	0.00559* (0.00218)	-0.02430** (0.00395)
EDU_3	-0.00596** (0.00203)	0.00309 (0.00169)	-0.00012 (0.00105)	0.00179 (0.00173)	0.00589** (0.00151)	-0.03047** (0.00377)	0.00410* (0.00196)	-0.00455 (0.00414)	0.02266** (0.00752)
EDU_4	0.02378** (0.00391)	0.00940** (0.00326)	-0.00201 (0.00201)	-0.01004** (0.00331)	-0.00291 (0.00284)	0.03233** (0.00725)	-0.00916* (0.00377)	0.00011 (0.00797)	-0.03609* (0.01448)
EDU_5	0.01134** (0.00277)	-0.00080 (0.00231)	0.00193 (0.00143)	-0.00347 (0.00236)	0.00289 (0.00213)	0.01158* (0.00515)	0.00087 (0.00268)	-0.00156 (0.00566)	-0.02025* (0.01028)
Push	0.00028 (0.00015)	0.00010 (0.00013)	0.00019 (0.00008)	0.00002 (0.00013)	0.00012 (0.00011)	0.00055 (0.00028)	0.00028 (0.00015)	0.00102** (0.00031)	-0.00244** (0.00057)
Sigma	0.00216** (0.00003)	0.00181** (0.00002)	0.00097** (0.00002)	0.00179** (0.00002)	0.00150** (0.00002)	0.00402** (0.00005)	0.00209** (0.00003)	0.00443** (0.00005)	0.00805** (0.00009)
Log-likelihood	16691.7	17893.4	9455.9	14316.1	12042.7	14691.1	16835.5	14616.6	12435.0

** Coefficient significant at 1 per cent level of significance.
* Coefficient significant at 5 per cent level of significance.

Appendix 2. Elasticities with respect to free income, matching grants and fee-income.

Derivating (1) with respect to I yields $\frac{\partial S_i}{\partial I} = \beta_i$. From the definition of S_i it follows that

$$\frac{\partial S_i}{\partial I} = \frac{\partial\left(\frac{p_i x_i}{Y}\right)}{\partial I} = \frac{p_i \frac{\partial x_i}{\partial I} - A_i}{Y}. \qquad \text{(A.1)}$$

Combining, $\partial S_i / \partial I = \beta_i$ and (A.1) it follows that

$$\beta_i = \frac{p_i \frac{\partial x_i}{\partial I} - S_i}{Y}. \qquad \text{(A.2)}$$

Rearranging into an elasticity, we find that

$$\varepsilon_{iI} \equiv \frac{\partial x_i}{\partial I}\frac{I}{x_i} = \beta_i \frac{I}{S_i} + \frac{I}{Y}. \qquad \text{(A.3)}$$

The same steps as above also yield the corresponding elasticities with respect to matching grants to sector j (G_j) and user fees/box ticket income to sector j (F_j):

$$\varepsilon_{i,G_j} \equiv \frac{\partial x_i}{\partial G_j}\frac{G_j}{x_i} = \eta_{ij}\frac{G_j}{S_i} + \frac{G_j}{Y} \qquad \text{(A.4)}$$

$$\varepsilon_{i,UF_j} \equiv \frac{\partial x_i}{\partial UF_j}\frac{UF_j}{x_i} = \varphi_{ij}\frac{UF_j}{S_i} + \frac{UF_j}{Y} \qquad \text{(A.5)}$$

Instead of presenting elasticities for the effects of matching grants and user fees/box ticket income per sector, Table 5 and 6 in the paper shows the increase in expenditures per sector following an increase in grants and user fees to the same sector. These table only show «own effects» per sector, omitting the cross-effects. The interpretation becomes the number of NOK in extra expenditures to each sector if the same sector receives an extra NOK in grants or user fees. The marginal increase in expenditures to each sector ($expend_i$) following from an increase in matching grants to that sector (G_i) or user fees (UF_i) is defined from the regression parameters in (1) as follows:

$$\frac{\partial expend_i}{\partial G_i} = \eta_{ii} Y + S_i, \qquad \text{(A.6)}$$

$$\frac{\partial expend_i}{\partial UF_i} = \varphi_{ii} Y + S_i. \qquad \text{(A.7)}$$

However, these derivatives apply only when there are no corner solution outcomes. With corner solution outcomes the Tobit coefficients in the derivatives must be scaled with the predicted probability of having strictly positive outcomes.