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Summary

Compared with most countries the Norwegian system of financing local governments is highly centralized. Grants make up a substantial part of revenues and local taxes are highly regulated by the center. The development of the system was motivated by a desire to equalize service provision throughout the country. The purpose of this paper is to analyze possible consequences of more decentralized financing with local tax discretion. Contrary to the conventional wisdom the analysis indicates that decentralized financing is likely to give more equal provision of local public services. In addition, substantial efficiency gains can be obtained.

Keywords: Centralized financing; Decentralized financing; Tax discretion; Efficiency gains; Equalization

JEL-classification: D61, H71, H72

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1. Introduction

The main economic argument in favor of local discretion to set tax rates is related to the decentralization theorem of Oates (1972, ch. 2). When local tax rates and service provision can adjust to varying spending preferences and cost conditions, a decentralization gain can be achieved compared to a situation with uniform service provision decided at the national level. Although the decentralization theorem has received (and still receives) large attention in the literature, there have been few attempts to measure the welfare gains from fiscal decentralization. I am only aware of the studies by Bradford and Oates (1974) and Greene and Parliament (1980). Both these studies calculate the efficiency loss from consolidation, i.e. the loss by moving from a situation with several local governments with different tax rates and service provision to a situation with a consolidated local government with uniform tax rate and service provision for all (previous) units.

The source of the decentralization gain is variation in tax rates and service provision that reflect variation in demand for local public services and variation in the costs of providing these services. Variation in tax rates and service provision may be of concern in an equity context, and many countries have established fiscal equalization systems to limit the differences. An example is the wave of school finance equalization schemes in the U.S. The wave started in California and many observers consider the Californian system as a move to a fully centralized system of financing where school expenditures are effectively decided at the state level. The Californian case is analyzed empirically by Silva and Sonstelie (1995), Fernández and Rogerson (1999) and Loeb (2001). These studies focus on the trade-off between equalization and the level of school expenditures. The background is that in California the share of share of personal income going to public education fell by more than 10% compared to the U.S. average after the introduction of centralized financing.¹ However, these studies do not analyze the welfare loss associated with uniform expenditure levels.

The studies of consolidation and the studies of the California school finance equalization do all analyze a move from decentralized to centralized financing. Moreover, they make the assumption that fiscal centralization means uniform service provision. There is then a clear trade-off between realization of welfare gains from decentralization and equality of service

¹ However, it is not the case that all school finance equalization schemes in the U.S. states have contributed to lower levels of expenditures, see Murray, Evans and Schwab (1998) and Hoxby (2001).

provision: Decentralized financing leads to an efficiency gain because tax rates and services provision can adjust to variation in preferences and costs, but also to larger variation in service provision. However, the assumption of uniform service provision under centralized financing is questioned in the recent literature on fiscal federalism. A critical discussion of the assumption can be found in Oates (2005, 2006) who considers it as one of the main element in the so called first-generation theory of fiscal federalism. The second-generation theory departs from this assumption by providing explicit modeling of centralized decision making in a political economy context. Seabright (1996), Lockwood (2002) and Besly and Coate (2003) are important contributions in this new tradition. They all emphasize that centralization has the beneficial effect of internalizing externalities, but at the cost of less sensitivity to local preferences (accountability). Although many of the key insights from the first-generation theory go through also in the second-generation models, the comparison of centralized and decentralized systems becomes more complex. In particular the trade-off between realization of decentralization gains and equality of service provision becomes less clear when the assumption of uniformity is relaxed.

The purpose of the present paper is to compare how centralized and decentralized financing performs with respect to efficiency and equality in the context of Norwegian local governments. The Norwegian setting differs from the earlier analyses of decentralization gains (Bradford and Oates, 1974; Greene and Parliament, 1980) and the equalizing effects of centralized school financing (Silva and Sonstelie, 1995; Fernández and Rogerson, 1999; Loeb, 2001) in two important respects. First, the point of departure is not a decentralized system with local tax discretion, but a highly centralized fiscal system. Second, the centralized system is not characterized by uniformity, but by substantial variation in service provision that to a large extent is a result of the centralized system itself. Although I do not attempt to explain the variation within a particular political economy model of centralized decision making, the point of departure is in line with the second-generation understanding of centralized provision.

The rest of the paper is organized as follows. Section 2 provides the necessary institutional and empirical background. I pay particular attention to the evolution and the working of the centralized system of financing, and how the variation in service provision reflects the design of local tax financing and regional policy. The median voter model that is used to simulate a decentralized system with local tax discretion is presented in section 3, while section 4 gives

details about data and calibration. Calculations of the potential decentralization gain and variation in service provision under decentralized financing is presented in section 5. It is evident that decentralized financing may lead to substantial efficiency gains and, contrary to the wisdom from the first-generation theory, more equal provision of local public services. In section 6 I investigate whether the results from section 5 is robust to different assumptions about price and income elasticities for local public services. It appears that more elastic demand (both with respect to price and income) leads to more unequal service provision. However, the finding that decentralization reduces the variation in service provision compared to the present system of centralized financing is very robust. In section 7 I relax two of the assumptions underlying the analyses in sections 5 and 6. To be specific, I analyze how the efficiency gain is affected if decentralization also changes the aggregate level of local public spending and/or the cost of providing local public services. Finally, section 8 offers some concluding remarks.

2. Institutional and empirical background

Norwegian local governments are important providers of welfare services like kindergartens, primary and lower secondary education, primary health-care, care for the elderly, and social services. Other important tasks are culture and infrastructure. The main revenue sources are taxes (45% of current revenues), grants from the central government (33%) and user charges (16%). Interest and other revenues account for the rest.

At first glance the above figures picture a quite decentralized system of financing where local taxes and user charges make up more than 60% of total revenue. In order to get a more correct picture one needs to take a closer look at the tax financing. The data used in this study is from 1996, in which the local governments could choose tax rates within an interval for four different taxes: the personal income tax, the personal wealth tax, the corporate income tax² and the property tax. However, since 1980 all local governments have used the maximum tax rates in income and wealth taxation. The regulated income and wealth taxes amount to more than 95% of local tax revenue.

² The corporate income tax was abolished as a local tax in 1999 and reintroduced in 2005.

Property tax and user charges represent some limited autonomy to influence revenues.³ The property tax is a voluntary and exclusive tax for the local governments. However, it is not available to all since it is restricted to urban areas and certain facilities (first and foremost hydroelectric power plants). The property tax accounts for less than 5% of tax revenues, but is of great importance for individual local governments. In particular small local governments with hydroelectric power plants have very high property tax revenues per capita. User charges are applied for a wide range of services, but are limited to cover costs.

The grant system consists of block grants (56%) and earmarked grants (44%). There are a large number of earmarked grants to promote particular activities, but it is the block grant system that is most important for the distribution of revenues across local governments. The block grant system has two main purposes, to equalize the economic opportunities across local governments and to promote regional policy goals.

Equalization is achieved through tax equalization and spending needs equalization. The role of the tax equalization scheme is to reduce the differences in per capita revenue due to differences in tax bases. The tax equalization scheme that prevailed in 1996 guaranteed all local governments a minimum level of revenue of about 96% of average tax revenue. In addition, half of the tax revenues above 140% of the average were withdrawn to the state. It is also important to notice that only the regulated income and wealth taxes are subject to tax equalization, and that property tax revenues are not taken into account. This peculiarity of great of great advantage to the small local governments that have substantial property tax revenues per capita from hydroelectric power plants.

Spending needs equalization is in place because equalization of per capita revenues is insufficient to equalize the economic opportunities for service provision. Local governments have different costs conditions due to differences in population size and settlement pattern. The age composition of the population affects the demand for important services like child care, education and care for the elderly. And social criteria like unemployment rate and divorce rate influence expenditures in social services like social assistance and child welfare. The spending needs equalization scheme compensates local governments with unfavorable cost conditions, expensive age structure and social problems.

³ User charges and property tax are analyzed empirically by Borge (1995, 2000) and Borge and Rattsø (2004).

While tax and spending needs equalization promotes equality of service provision, the elements motivated by regional policy create new differences. Through the regional policy elements small local governments and local governments in the northern part of the country receive extra grants. The design of the regional policy elements have changed over time. In the first years after the introduction of the block grant system in 1986 the regional policy elements were integrated in the tax and needs equalization, but during the 1990s they were separated out as specific grants and their regional policy purpose was clarified. The justification of the grants is that small local government and local governments in Northern Norway should be able to provide better services than the rest in order to promote employment and population growth. The grants are now named the Regional Grant (for local governments with less than 3000 inhabitants) and the Northern Norway Grant (for local governments in the three most northern counties). The Northern Norway Grant is paid out as a flat per capita amount (differentiated between the three northern counties), while the Regional Grant is a fixed amount per local government (differentiated by regional policy zone). In addition to the regional policy grants, local governments in rural areas benefit from the geographical differentiation of the pay roll tax. In 1996 the pay roll tax varied from 0% to 14.1%.⁴

Table 1: Correlation between gross private income and measures of local government revenue, 1996.

	Taxes	Grants	Total revenue	Service prov.
Coeff. of correlation	0.18	-0.59	-0.28	-0.12

Notes: All variables are measured per capita.

The working of the Norwegian system of financing is broadly summarized in table 1 that shows the correlation between gross private income and several measures of local government revenue. The first thing to notice is the rather weak correlation between gross private income and local government tax revenue. The main explanation for this fact is that some small rural authorities, where private income is not particularly high, have substantial tax revenues (property tax and corporate income tax) from hydroelectric power production. There is a strong negative correlation between grants and private income, which mainly reflects tax equalization, spending needs equalization (small rural authorities have the highest spending needs) and the regional policy grants. When the grant system has done its job, private income and local government revenues (including taxes, grants and other revenues) are negatively

⁴ The intermediate rates were 5.1%, 6.4% and 10.6%.

correlated. This means that local governments where gross private income falls below the average tend to end up with local government revenue above the average.

A high level of local government revenue is to some extent compensation for high spending needs. This is taken into account in last column of table 1, which shows the correlation between gross private income and an indicator of local service provision. The indicator of service provision is obtained by deflating the revenues by a cost index. The point of departure is the cost index used in the needs equalization system, which is based on variables such as population size, settlement pattern, the age composition of the population and social factors. Here the regional variation in the payroll tax is also taken into account. After deflating, there is only a weak negative correlation between gross private income and local government revenue.

Table 2: The cross section variation in private disposable income, provision of local public services, 1996.

	Min	1. quartile	Median	3. quartile	Max	CV
Private disp. income	0.685	0.874	0.931	0.995	1.292	0.109
Local public services	0.722	0.894	0.991	1.143	3.814	0.271

Notes: All figures except the coefficient of variation (CV) is measured as an index where the national average equals 1. The coefficient of variation is the ratio between the standard deviation and the mean. Private disposable income is median income net of taxes to local, county and national government. The unit of observation is local government.

The weak correlation between gross private income and local public services may indicate that the system of financing performs well in terms of equalizing service provision. This is however, not the case. As can be seen from table 2, the coefficient of variation is nearly three times as large for local public services as for private disposable income.⁵ And whereas the max-min ratio is nearly six for local public services, it is less than 2 for private disposable income. When we take a closer look at the distribution, it appears that the higher coefficient of variation first and foremost is driven by a longer tail to the right for local public services.⁶

There are basically three types of local governments that end up with high levels of service provision; small rural communities with substantial tax revenue from hydroelectric power plants, small rural communities that receive regional policy grants, and urban communities

⁵ Private disposable income is median income net of taxes to local, county and national government. Further description is given in section 4.

with high levels of income and wealth taxes. However, in the upper 10% of the distribution we only find local governments of the first two types.

The present system of financing is the result of a gradual development over the last 100 years. The 1911 Tax Law is regarded as an important turning point. Then upper limits on the local tax rates were first introduced. The upper limits was of little importance until the early 1920's when a period of deflation lead to a local government debt crisis. The tax base was reduced in nominal terms, but not the debt, and as a result many local governments were bailed out through grants from the central government. The long term effects of the bailouts were increased reliance on central government grants. The process towards increased centralization accelerated after WWII when the building of the welfare state was combined with local responsibility for important welfare services like education and health care. The substantial differences between local governments, where larger urban communities enjoyed the lowest tax rates and the best services, were considered to be in conflict with the policy goal of equalized provision of welfare services throughout the country. The national policy response was to narrow the interval for the local tax rates and to further increase the share of grants in local government financing. In the 1960s and 1970s most grants were of a matching type where the matching rates were differentiated between local governments on the basis of local spending needs and tax base. In the 1970s the matching rates were also used a mean to increase the tax rate in low-tax authorities. Local governments with tax rates below the maximum were "punished" by lower matching rates.⁷ Finally, all low-tax authorities gave in, and since 1980 all local governments have used the maximum tax rates in income and wealth taxation.

I think this brief historical review is important to understand the present system and to answer the following question: Why do we not observe that even a single local government (in the upper tail of the distribution of local public services) chooses a tax rate below the maximum in income and wealth taxation? A popular explanation by some Norwegian observers is that the local governments are "underfinanced", i.e. all local governments have desired tax rate above the maximum. In my view, the large variation in revenues and services provision across

⁶ The figures in table 2 are normalized by the weighted average. Moreover, private disposable income tends to be highest in larger urban communities. This explains why around 75% of the local governments have private income below the average.

⁷ The information that the matching rates were actively used to punish low tax authorities is based on communication with civil servants that were involved in the process.

local governments documented in table 2 weakens this argument. My favorite argument is rather that local governments with high levels of service provision fear that the central government will respond to lower tax rates by reducing their grants, as it did in the 1970s.⁸ A lower tax rate is partly a signal for good economic conditions, and may thereby be a disadvantage in the “competition” for central government grants. In the short term grants that are distributed on the basis on judgments and/or negotiations may be affected, and in the longer term also the rules of the grant system. The analysis in this paper is based on the understanding that local tax autonomy is negligible, which is in line with the assumption that is often made in empirical studies analyzing the spending behavior of Norwegian local governments (e.g. Borge and Rattsø, 1995).

3. A median voter model of local government tax and spending behavior

Not many studies have attempted to estimate the allocative efficiency loss associated with centralized financing of local governments. The only two exceptions known by me are Bradford and Oates (1974) and Greene and Parliament (1980). Both focus on consolidations, i.e. they estimate the efficiency loss of moving from a situation with several local governments with different tax rates to a situation with a unified local government with uniform tax rate and service provision for all (previous) units. The recent U.S. literature on school finance equalization⁹ compares how centralized and decentralized financing perform with respect to the level of school expenditures and the variation across school districts, but do not calculate the allocative efficiency loss associated with centralized financing.

Following Bradford and Oates (1974) and Greene and Parliament (1980), the counterfactual analysis is based on the median voter model. This is the workhorse of empirical analyses of local government tax and spending behavior and is surveyed by Inman (1979) and Rubinfeld (1987). The present analysis improves upon the earlier contribution by relying on a more stringent microeconomic foundation for the calculation of the efficiency loss. Whereas Bradford and Oates (1974) and Greene and Parliament (1980) calculate the efficiency loss as Harberger triangles based on the (uncompensated) demand curve for local public services, I use the concept of compensating variation.

⁸ Communication with local politicians and bureaucrats confirms this view.

⁹ Examples include the econometric studies by Silva and Sonstelie (1995), Murray, Evans and Schwab (1998) and Hoxby (2001), and the analyses by Fernández and Rogerson (1999) and Loeb (2001) based on calibrated models.

The median voter model builds on strong assumptions. The issue must be one-dimensional, preferences must be single-peaked and the political system must either be direct democracy or two-party competition where the parties are purely office seeking. It can clearly be questioned whether these assumptions are fulfilled in the Norwegian context with multi-task local governments and multi-party competition. However, the studies by Aronsson and Wikström (1996) and Bergström, Dahlberg and Mörk (2004) apply the median voter model to the Swedish context, which is very similar to the Norwegian, and with reasonable results. The choice of the median voter model must nevertheless be considered as an approximation to reality. Moreover, the analysis in section 7 departs from the standard median voter model by allowing for overspending and cost inefficiency.

The point of departure is a generalized¹⁰ CES utility function including private consumption (c) and local public services (q):

$$u(c, q) = \frac{c^\alpha}{\alpha} + A \frac{q^\gamma}{\gamma} \quad (1)$$

Compared to the standard CES utility function, the Engel elasticities are allowed to differ from unity. Fernández and Rogerson (1999) use the same formulation in their simulation study of education finance reform in California. The median voter's budget constraint can be written as

$$c + pq = I \quad (2)$$

where p denotes his tax price for local public services and I total resources available for private consumption and provision of local public services. The median voter's desired allocation is found by maximizing the utility function subject to the budget constraint, an exercise that leads to the following first order condition:

$$A \frac{q^{\gamma-1}}{c^{\alpha-1}} = p \quad (3)$$

¹⁰ Compared to the standard CES utility function, the Engel elasticities are allowed to differ from unity.

The point of departure is the actual allocation without local tax discretion in 1996. The actual allocation (c_a, q_a) and the associated values of the tax price (p_a) and total resources (I_a) satisfy the budget constraint (2), but not the optimality condition (3). The obtained utility level is denoted u_a .

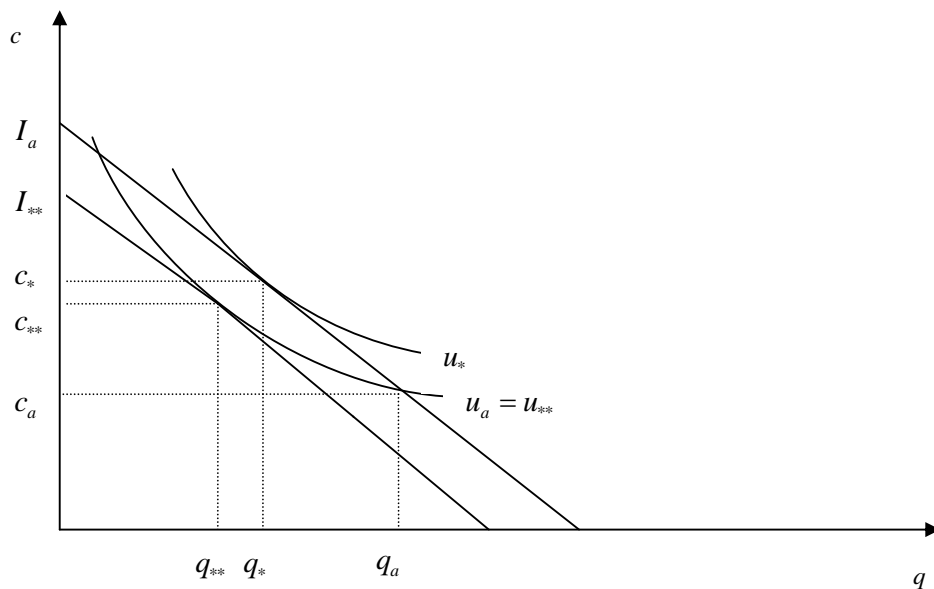


Figure 1: The actual allocation and the simulated allocations under decentralized financing.

Two sets of simulations are carried out, and they are both illustrated in figure 1. First, equations (2) and (3) are used to simulate the median voter's desired levels of private consumption (c_*) and local public services (q_*) given the actual values of the tax price and total resources. More precisely, the following two equations

$$\begin{aligned} c_* + p_a q_* &= I_a \\ A \frac{q_*^{\gamma-1}}{c_*^{\alpha-1}} &= p_a \end{aligned} \tag{4}$$

are solved with respect to c_* and q_* .¹¹ The solution is used to infer how private consumption and provision of local public services are affected by more tax discretion. In the calculation of the local tax rate it is assumed that tax discretion is linked to the main local tax, the personal

¹¹ The calibration of the parameters A , α and γ is discussed in Section 4.

income tax. In 1996 the uniform local income tax rate was 11.5%. The predicted tax rate with tax discretion (t_*) is calculated as follows

$$t_* = 0.115 + \frac{\Delta \bar{G}}{\bar{b}} \quad (5)$$

where $\Delta \bar{G}$ is the change in local public expenditures per taxpayer and \bar{b} is taxable income per taxpayer (see also section 4).

The utility level associated with the desired allocation (u_*) is greater than or equal to the utility level attained in the actual allocation under centralized financing (u_a). Consequently, with local tax discretion the median voter could manage with a lower I and still obtain the utility level u_a . In the second set of simulations I calculate exactly how much I could be reduced. This is done by solving the following equations

$$\begin{aligned} \frac{c_{**}^\alpha}{\alpha} + A \frac{q_{**}^\gamma}{\gamma} &= u_a \\ c_{**} + p_a q_{**} &= I_{**} \\ A \frac{q_{**}^{\gamma-1}}{c_{**}^{\alpha-1}} &= p_a \end{aligned} \quad (6)$$

with respect to c_{**} , q_{**} and I_{**} . Then the efficiency gain by more local tax discretion can be calculated as the difference between I_a and I_{**} .

4. Calibration and data

The simulations must be based on specific values of the parameters of the utility function (A , α and γ). As shown in the Appendix, the Cournot and Engel elasticities for local public services only depend on the parameters α and γ and the budget share for local public services ($\beta = \frac{pq}{I}$). In the first set of simulations it is assumed that decentralized financing does not change the aggregate level of local public spending, but of course spending in

individual local governments are allowed to change. We can then use the aggregate actual budget share as an input in the calibration of α and γ .

There is a large empirical literature that relies on the median voter model in order to estimate elasticities of demand for local public services. The U.S. literature is summarized by Oates (1996). He reports that the representative estimate of the (Cournot) price elasticity is in the range -0.2 to -0.4 , whereas the typical income elasticity is around 0.6 . The U.S. estimates can not necessarily be carried over to the Norwegian institutional context. Since Norwegian and Swedish local governments to a large extent have the same tasks, two recent Swedish studies are of interest. The study by Aronsson and Wikström (1996) use a cross-sectional data set from 1990 and estimates the price elasticity to be around -0.5 and the income elasticity to be around 0.8 . Bergström, Dahlberg and Mörk (1998), who use a panel data set covering the period 1988-1995, reach somewhat different results. They report price elasticities around -0.9 and income elasticities around 0.6 . Based on the U.S. and Swedish evidence I use a price elasticity of -0.4 and an income elasticity of 0.6 as a benchmark. In addition, sensitivity analyses using a wide range of elasticities will be provided.

Given assumptions about price and income elasticities and the budget share for local public services, equations (A1) and (A2) in the appendix are used to calibrate the parameters α and γ . Finally, the parameter A is determined by iteration to ensure that aggregate spending under decentralized financing equals aggregate spending under the present centralized fiscal system.

In the calculations the median voter is assumed to be the voter with median income. Available resources (I_a) are measured as the median voter's private income (y^m) and his share of local government revenue. Local government revenue (R) includes taxes, grants, user charges and other revenue. One challenge in constructing I_a is to avoid double counting of local taxes and user charges paid by residents. Double counting of income and wealth taxes are avoided as they are included in local government revenue, but not in y^m that is measured net of income and wealth taxes to local, county and central government. The remaining problem is property tax and user charges paid by households, which are not available in official statistics. They are not included in the tax statistics, and in the local government accounts they are mixed up with property tax and user charges paid by businesses. We use a survey data set of residential

property tax and user charges paid by households, collected by an organization called Norwegian Household Finances (*Norsk Familieøkonomi*), in order to avoid double counting of property tax and user charges.

In the standard formulation, the median voter's tax price consists of three terms: his tax share, the unit cost of local public services and a congestion term. Moreover, as shown by Bradford and Oates (1974) the share of the population that uses a particular service can be interpreted as a price term. Take education as an example and assume that voters care about expenditures per pupil. Then the share of pupils in the population affects the effective price of educational services, simply because the per capita cost of increasing educational spending per pupil by a certain amount is high when pupils constitute a large share of the population. Similarly, the share of elderly can be interpreted as a price term for care for the elderly. In the simulations we use the per capita cost index from the needs equalization system adjusted for the regional variation in the payroll tax. The cost index (denoted pi) captures differences in unit costs (reflecting population size, settlement pattern, and the regional variation in the payroll tax), the age composition of the population, and social criteria. The tax price is measured as the product of the cost index and the ratio of median to mean income (to take account of variation in tax shares between taxpayers and that tax discretion is assumed to be linked to the personal income tax). Finally, provision of local public services (q_a) is measured as total local government revenue per taxpayer deflated by the cost index.

The operationalization of the variables can be summarized as follows

$$I_a = y^m + \frac{b^m}{\bar{b}} \bar{R}, \quad c_a = y^m, \quad p_a = \frac{b^m}{\bar{b}} pi, \quad q_a = \frac{\bar{R}}{pi} \quad (7)$$

where \bar{R} is local government revenue per taxpayer, b^m is the median voters taxable income and \bar{b} is average taxable income per taxpayer. The number of inhabitants 17 years and above is used as a proxy for the number of taxpayers.¹² The analysis is based on data for 1996 and includes 434 Norwegian local governments. Only the capital Oslo, which is both a local government and a county, is excluded.

¹² The operationalization differs slightly from table 1 where the variables were measured per capita. However, the indicator of service provision q_a is the same as in table 1 since both \bar{R} and pi are measured per taxpayer.

5. Decentralization gain and variation in service provision under decentralized financing

The simulation results for the benchmark case with price elasticity of -0.4 and income elasticity of 0.6 are presented in table 3. The calculated efficiency gain associated with local tax discretion is NOK 958 (USD 150) per taxpayer or NOK 2.9 billion (USD 0.5 billion) in aggregate.¹³ The gain amounts to 2.7% of local government spending. The marginal gain however, is sizeable. For each NOK that is transferred between the private and local public sectors because of tax discretion, there is a gain of NOK 0.32 (32%).

Table 3: The benchmark case with price elasticity of -0.4 and income elasticity of 0.6 .

	Efficiency gain	Coefficient of variation	
		Priv. disp. inc (c_*)	Loc. pub. serv. (q_*)
Present system	-	0.109	0.271
Decentralized financing	958	0.134	0.077

Note: The efficiency gain is measured in NOK per taxpayer.

The simulations also show that decentralized financing may substantially reduce the inequality in provision of local public services. The coefficient of variation is reduced by nearly 20 percentage points, from 0.27 to 0.08. More equal service provision comes as the expense of slightly more variation in private disposable income (2.5 percentage points). The present system is characterized by larger regional variation in provision of local public services than in private disposable income. The simulations clearly indicate that decentralized financing will turn that around.

Table 4: The cross section variation in private disposable income, provision of local public services, and income tax rate under decentralized financing

	Min	1. quart.	Median	3. quart.	Max	CV
Private disp. income (c_*)	0.777	0.897	0.944	1.023	2.075	0.134
Local public services (q_*)	0.805	0.907	0.949	0.993	1.330	0.077
Local tax rate (t_*)	-74.7	3.9	10.1	13.2	16.6	1.400

Notes: For private disposable income and local public services all figures except the coefficient of variation (CV) is measured as an index where the national average equals 1. The local tax rate is measured in %.

Table 4 provides more information on the variation in private consumption and local public services under decentralized financing. For both private consumption and local public

services the bottom is lifted compared to the situation with centralized financing (see table 2). The long tail to the right is reduced for local public services. The tail to the right in available resources is now to a larger extent reflected in private consumption.

The finding that local tax discretion leads to more equal service provision is in contrast to the first-generation theory of fiscal federalism that decentralized financing is associated with larger differences. It also differs from the finding in the school finance equalization literature that more centralized financing reduces the spending difference across school districts. The explanation for our result is that the starting point is not a centralized system that only promotes equalization, but a centralized system with large variation in service provision due to regional policy grants. In this respect it seems to be a fundamental difference between centralized systems initiated by court rulings that emphasize equalization only, and centralized systems that give the politicians discretion to promote other policy objectives also.

Table 5: The correlations between the calculated tax rate (t_*) and other variables, the benchmark case.

	Private disposable income (c_a)	Local government revenue (\bar{R})	Local public services (q_a)
Coeff. of correlation	0.15	-0.98	-0.95

In order to provide a better intuition of the results, it is constructive to discuss how the personal income tax rate will vary with local tax discretion. Table 5 shows how the calculated tax rate correlates with the actual values of private disposable income, total local government revenue and provision of local public services. Calculated tax rates are strongly and negatively correlated with local government revenues and service provision, and weakly and positively correlated with private disposable income. Local governments with high levels of service provision and low private disposable income (within the present system) are expected to reduce their tax rates, whereas local governments with low levels of service provision and high private disposable income increase their tax rates. On the one hand, this explains why decentralization will reduce inequality in provision of local public services. But on the other hand, it also indicates less variation in private disposable income. Why do we then observe an increase in the coefficient of variation for private disposable income? The reason is that the changes in the income tax rate create “new” differences. Some local governments with very

¹³ In the calculation of the aggregate efficiency gain it is assumed that gain to the median voter equals the average gain.

low levels of private disposable income within the present system are predicted to reduce their tax rates by so much that they end up with very high levels private disposable income, c.f. the long tail to the right in table 4.

Table 4 also provides some key statistics on the distribution of the calculated personal income tax rate. It appears that the variation in the tax rate will be substantial, from a minimum of – 75% to a maximum of nearly 17%. The interquartile range is also large, nearly 10 percentage points. As much as 64 local governments come out with a negative tax rate in the calculations. These are all small communities in the periphery that either have high tax revenues from hydroelectric power plants or receive substantial regional policy grants. What type of local governments comes out with high tax rates? The 29 authorities that come out with a tax rate above 15% are medium-sized (13 000 inhabitants on average) urban communities. On average they have private disposable income slightly above the average and local service provision 15% below the average. Under decentralized financing they would increase the tax rates to get a better balance between private disposable income (2% below the average) and local service provision (1% below the average).

Table 6: The impact of decentralized financing for selected local governments.

Local government	Population	Centralized financing		Decentralized financing		
		Pr. disp. inc. (c_a)	Local public serv. (q_a)	Tax rate (t_*)	Pr. disp. inc. (c_*)	Local public services (q_*)
Bykle	846	1.117	3.814	-74.7	2.075	1.330
Hasvik	1 316	1.028	1.780	-14.1	1.255	1.071
Bærum	97 034	1.289	1.348	9.5	1.316	1.222
Røyken	15 143	1.142	0.878	15.7	1.090	1.075

Table 6 provides further exploration of the results by focusing on four selected local governments.¹⁴ The first three of them are examples of the three types of local governments that have high levels of service provision within the present system (see section 2); small rural communities with substantial tax revenue from hydroelectric power plants, small rural communities that receive regional policy grants, and urban communities with high levels of income and wealth taxes.

¹⁴ The same four local governments were singled out by a government commission that proposed changes in the block grant system in 1996 (NOU 1996: 1).

Bykle is an example of a small rural community with substantial tax revenues from a hydroelectric power plant. Within the present system Bykle's service provision is nearly 4 times the national average, whereas private disposable income is 12% above the average. With a tax rate of -74.7% service provision would still be more than 30% above the average, whereas private disposable income would be more than twice the average and the highest in the country.

Hasvik is located in the most northern county (*Finnmark*) and is an example of a small rural community with substantial grant revenue. It receives regional policy grant both because it is small in terms of population size (Regional Grant) and because of its geographical location (Northern-Norway Grant). In the present system Hasvik has service provision nearly 80% above the average and private disposable income slightly above the average.¹⁵ In the simulation of decentralized financing Hasvik comes out with a local income tax rate of -14%, but service provision is still more than 10% above the average.

In my view Bykle and Hasvik illustrates that the levels of local public services and private disposable income are highly reasonable even if the tax rates are negative. The main justification is that both communities still will have service provision above the average. In practice however, negative tax rates will not be allowed. But local governments like Bykle and Hasvik can easily overcome this problem by providing market goods (or close substitutes to market goods) through the local government. By providing lap tops to all students Bykle is already involved in such practice.¹⁶

Bærum exemplifies the third type of local government with high levels of service provision; urban communities with high levels of income and wealth taxes. Bærum is a suburb of Oslo with high-income inhabitants and much industrial activity that generates substantial revenues from the corporate income tax. Both private consumption and provision of local public services are clearly above the average. The tax rate will be somewhat reduced with decentralized financing, but not to the same extent as in Bykle and Hasvik since the initial composition of private consumption and local public services is more balanced.

¹⁵ The rather high level of private disposable income is mainly a result of lower income taxes (to the central government) in the most northern part of the country.

¹⁶ If this practice is widespread, the above calculations may overestimate the efficiency gain associated with decentralized financing.

The last local government singled out in table 6, Røyken, is also located in the Oslo region. It is a typical suburb with a large share of commuters and little industrial activity. Private disposable income is 14% above the average, but the provision of local public services is 12% below. Røyken exemplifies communities that are rich in terms of private income, but poor in terms of local government revenue. With decentralized financing Røyken would increase its tax rate and strike a better balance between private consumption and local public services (both being above the average).

A final remark to table 6 is that the composition of private disposable income and local public services differs significantly between the two rural communities (Bykle and Hasvik) and the two urban communities (Bærum and Røyken) under decentralized financing. The difference is that the provision of local public services is lower relative to private consumption in the two rural communities. The main reason for this difference in composition is that the cost of providing local public services (pi) is substantially higher in Bykle and Hasvik than in Bærum and Røyken.¹⁷

6. Varying the price and income elasticities

The simulation results discussed in section 5 were based on specific assumptions about price and income elasticities of local public services. However, both the efficiency gain and the variation in service provision under decentralized financing will be sensitive to these assumptions. Oates (1997) provides a general discussion of the relationship between the decentralization gain and the price elasticity of demand. He shows that the relationship depends on the source of the gain. More price elastic demand decreases the decentralization gain if the source is variation in demand, but increases the gain if the source is variation in costs. The intuition for the first result is that more price elastic demand implies that private consumption and local public services become closer substitutes, and then the loss by inability to adjust service provision to local demand will be less. The intuition for the second the result is that it becomes more important to be able to increase consumption of a good that becomes relatively less expensive when the goods are close substitutes.

¹⁷ This price effect is exaggerated by the fact that median to mean income is also higher in the two rural communities.

The decentralization gains that are calculated in this paper reflect both variation in demand and variation in costs. It is therefore not obvious how more price elastic demand will affect the decentralization gain. If the variation in demand is the dominating source, more price elastic demand will reduce the decentralization gain. On the other hand, more price elastic demand will increase the decentralization gain if variation in costs is the dominating source. It should be emphasized that in our simulations (based on compensating variation), it is the Slutsky elasticity that is of importance for the size of the decentralization gain. Moreover, the Slutsky elasticity is affected by both the (Cournot) price elasticity and the income elasticity through the Slutsky equation. More price elastic demand will increase the absolute value of the Slutsky elasticity, whereas more income elastic demand will reduce it. No matter whether variation in demand or variation in costs is the dominating source of the decentralization gain, more price elastic demand and more income elastic demand will have opposite effects on the decentralization gain.

Table 7: Varying the price elasticity keeping the income elasticity constant at 0.6.

Price elasticity	Calculated	Coefficient of variation	
	efficiency gain (NOK per taxp.)	Priv. disp. inc (c_*)	Loc. pub. serv. (q_*)
-0.25	1 755	0.133	0.071
-0.3	1 340	0.133	0.072
-0.4	958	0.134	0.077
-0.5	775	0.134	0.084
-0.6	669	0.135	0.092
-0.7	600	0.135	0.100
-0.8	554	0.136	0.110
-0.9	523	0.137	0.120
-1.0	501	0.138	0.130
-1.1	485	0.138	0.141
-1.2	475	0.139	0.151
-1.3	468	0.140	0.162
-1.4	464	0.141	0.174
-1.5	462	0.142	0.185

The impacts of more price and income elastic demand are reported in tables 7 and 8 respectively. It follows from table 7 that more price elastic demand will reduce the calculated decentralization gain, but at a diminishing rate. The interpretation of this finding is that variation in demand is the dominating source of the efficiency gain. Table 8 reveals that higher income elasticity increases the decentralization gain, thereby confirming the above

reasoning that more income elastic demand and more price elastic demand have opposite effects on the decentralization gain.

Table 8: Varying the income elasticity keeping the price elasticity constant at -0.4 .

Income elasticity	Calculated efficiency gain (NOK per taxp.)	Coefficient of variation	
		Priv. disp. inc (c_*)	Loc. pub. serv. (q_*)
0.3	888	0.145	0.055
0.4	902	0.142	0.061
0.5	924	0.138	0.068
0.6	958	0.134	0.077
0.7	1 006	0.130	0.087
0.8	1 072	0.126	0.097
0.9	1 163	0.122	0.108
1.0	1 284	0.118	0.120
1.1	1 447	0.114	0.131
1.2	1 668	0.110	0.143

More elastic demand (both with respect to price and income) seems to increase the differences in service provision across local governments. However, the finding that decentralized financing gives more equal service provision across local governments is very robust, as it holds for all pairs of price and income elasticities reported in tables 7 and 8. The finding (in the benchmark case) that the regional variation in service provision will be less than the variation in private disposable income is less robust.

7. Overspending and cost efficiency

The analyses in the previous sections were based on the assumptions that decentralized financing will not affect the aggregate level of local public spending. However, there is no reason to believe that the two regimes will produce exactly the same level of spending. What guidelines can be derived from existing theories regarding the level of spending? If we go back the first-generation theory, the typical justification for uniform service provision under centralized financing is that the center has imperfect information about local preferences and costs. Because of this information problem, service provision under centralized financing will deviate from the median voter outcome under decentralized financing. In general the center will choose too high levels of service provision in some local governments and too low levels in others. As a consequence, the theory does not provide any clear prediction on whether aggregate spending under decentralized financing will be higher or lower compared to

centralized financing. In this case it is not a bad compromise to assume equal aggregate spending in the two regimes, but the likely consequence is that the decentralization gain is on the conservative side.

Within the second generation theory there are several models that predicts excessive spending under centralized financing. Brennan and Buchanan (1980) assume Leviathan governments that seek to maximize the size of their budgets. There is then a tendency that public spending grows too large, but this tendency is constrained under fiscal federalism and decentralized decision making because the tax base becomes more elastic. Weingast, Shepsle and Johnson (1981) emphasize the role of pork barrel politics under centralized financing. They argue that a norm universalism may develop in assemblies with geographical representation, and that there is a tendency for excessive spending because each representative only takes his district's share of the costs into account. There is also a related literature on soft budget constraints where the basic argument is that local spending and deficits may be too high because local governments are expected to be bailed out by the central government (see Rodden, Eskeland and Litvak 2001).

Not only the level of spending, but also the unit cost of providing local public services may be affected by the system of financing. Hoxby (1999) develop a model to compare centralized financing (social planner) of school districts and decentralized financing with property taxation. She emphasizes how a local property tax helps to solve the underlying information problem (that the effort of the service producing agency can not be verified). With local property taxation the effort of the school district is indirectly made verifiable because it is capitalized into property values and thereby affects the budget of the agency. It is shown that decentralized property taxation can attain about the same level of cost efficiency as a social planner armed with implausibly much information.

Table 9 illustrates the additional gains by decentralized financing if centralized financing leads to overspending or reduced cost efficiency. Overspending is technically modeled by letting the parameter A in the utility function of the median voter be determined such that aggregate spending under decentralization is lower than the aggregate level of spending in the present centralized system (which is kept fixed). The upper part of table 9 reports results for different values of A and different levels of overspending with centralized financing. The simulations confirm the understanding that the baseline assumption of equal aggregate

spending in the two regimes yields a conservative estimate of the decentralization gain. With central overspending of 10% the decentralization gain is increased by nearly 30%, and with overspending of 20% the gain is increased by more than 150%. However, small levels of overspending (less than 5%) seem to have a negligible effect on the decentralization gain.¹⁸

Table 9: Additional gains by decentralized financing, the benchmark case

Source of additional gains	Decentralization gain (NOK per taxpayer)
Overspending with centralized financing	
0 %	958
5 %	966
10 %	1232
15 %	1741
20 %	2473
Increased cost efficiency with decentralization	
0 %	958
1 %	1239
2 %	1507
3 %	1761
4 %	2001
5 %	2227

The lower part of table 9 shows how the decentralization gain increases if decentralized financing also is associated with more cost efficient provision of local public services. Technically, local tax discretion is combined with a reduction in the cost index for provision of local public services (π). It appears that small increases in cost efficiency have large effects on the calculated decentralization gain. A 1% increase in cost efficiency under decentralization will increase the decentralization gain by nearly 30%, and with a 4% increase the gain is more than doubled.

The simulations presented in table 9 emphasize overspending and reduced cost efficiency as additional problems with centralized financing. However, these arguments can easily be reversed. There is a substantial literature that emphasizes beneficial effects of centralized financing and tax limits. The U.S. literature on property tax limits is summarized by McGuire

¹⁸ Although it is likely, it is not necessarily the case that the decentralization gain increases with central government overspending. The reason is that local governments are affected differently. Overspending tends to increase (reduce) the gain for local governments that reduce (increase) the tax rate under decentralized financing. In the case analyzed here small levels of central overspending will actually reduce the decentralization gain compared to the benchmark case. The decentralization gain is minimized when overspending is around 2.5%, and it is then slightly less than 930 NOK per taxpayer.

(1999) who emphasizes that tax limits can be understood as a voter response to Leviathan type governments. She argues that the U.S. evidence is in favor of the Leviathan model, and that tax limits and centralized financing may reduce overspending associated with decentralized financing. It may also be argued that decentralized financing reduces cost efficiency. Toma and Toma (1980) consider a game between a local government and a service producing agency (with preferences for high costs or low effort). They show that local tax discretion softens the budget constraint of the agency and thereby reduces cost efficiency. In a similar type of model Courant and Rubinfeld (1981) show that tax limits may reduce public sector wages and increase voter welfare. Poterba and Rueben (1995) report evidence that tax limits may reduce overspending and costs. They document that U.S. states with effective property tax limits had a slower growth in local public sector wage premium during the 1980s, and also that they to some extent had lower employment growth in the local public sector.

Table 10: Problems with decentralized financing, the benchmark case

Source of additional gains	Decentralization gain (NOK per taxpayer)
Overspending with decentralized financing	
0 %	958
5 %	832
10 %	482
15 %	-57
20 %	-755
Reduced cost efficiency with decentralization	
0 %	958
1 %	670
2 %	384
3 %	98
4 %	-187
5 %	-472

Table 10 shows how the decentralization gain is modified if decentralized financing is combined with overspending and lower cost efficiency. It appears that decentralized overspending of 5% has a negligible effect on the decentralization gain. The net gain is reduced by 50% if excessive spending equals 10%, becomes close to zero at 15%, and is turned into a substantial loss at 20%. Lower cost efficiency has a substantial effect on the decentralization gain. A 1% reduction in cost efficiency will reduce the gain by 30%. And if the reduction in cost efficiency is more than 3%, the decentralization gain is turned into a loss.

8. Concluding remarks

Compared with most countries the Norwegian system of financing local governments is highly centralized. Grants make up a substantial part of revenues and local taxes are highly regulated by the center. The development of the system was motivated by a desire to equalize service provision throughout the country. The paper analyzes possible consequences of more decentralized financing with local tax discretion. The analysis is carried out within a calibrated median voter model. In contrast to the conventional wisdom in the first-generation theory of fiscal federalism, I find that decentralized financing will lead to more equal provision of local public services. The explanation for this finding is that the starting point is not a centralized system that only promotes equalization, but a centralized system that also promotes regional policy goals. In addition substantial efficiency gains can be obtained if service provision and taxes are allowed to adjust to variation in preferences and costs.

In the benchmark case variation in service provision is reduced by two third and the decentralization gain is nearly NOK 1000 per taxpayer. Although the variation in service provision increases with more price and income elastic demand, the finding that decentralization leads to more equal service provision compared to the present centralized system of financing is very robust. The size of the decentralization gain is somewhat sensitive to alternative assumptions about elasticities, overspending and cost efficiency. In particular the simulations indicate that cost efficiency considerations may be of great practical importance to the choice of fiscal system. If decentralization increases cost efficiency by 3%, the efficiency gain is doubled. On the other hand, if decentralization reduces cost efficiency by 3%, the efficiency gain is negligible. It is an important topic for future research in fiscal federalism to analyze how decentralization affects cost efficiency.

The findings of the paper basically reflect the working of the present centralized system of financing, and in particular centrally determined tax and grant design that allow for high levels of revenues and service provision in rural communities. This design is motivated by a desire to promote employment and population growth, and a possible objection to the analysis in this paper is that possible beneficial effects on employment and population growth are not taken into account in the median voter model. However, it is important to notice that the simulations do not redistribute resources between local governments; it only reallocates

resources between the private and the local public sector within each community. And it is not obvious that high levels of local public services promote regional development more efficiently than low taxes.

Appendix

By differentiating equations (2) and (3) the following expressions for the Cournot (ε) and Engel (E) elasticities for local public services can be derived:

$$\varepsilon = \frac{1 - \beta\alpha}{\beta(\alpha - 1) + (1 - \beta)(\gamma - 1)} \quad (\text{A1})$$

$$E = \frac{\alpha - 1}{\beta(\alpha - 1) + (1 - \beta)(\gamma - 1)} \quad (\text{A2})$$

It appears that the elasticities depend on α , γ and β , where $\beta = \frac{P_a Q_a}{I_a}$ is the actual budget share for local public services. The parameters α and γ can be calculated from (A1) and (A2) based on specific assumptions about the elasticities of demand and the actual budget share for local public services ($\frac{P_a Q_a}{I_a}$).

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