

# Spatial Interaction and Local Government Expenditures for Functionally Impaired in Sweden

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*“...usually, that's the way it goes, but don't forget,  
every once in a while, it goes the other way too...”*



## Abstract

The thesis consists of an introductory part and three self-contained papers.

**Paper [I]** studies the determinants of the differences in expenditure on services for functionally impaired individuals among municipalities in Sweden. A spatial autoregressive model is used in order to test whether the decisions on the expenditure level in a neighboring municipality affect the municipality's own expenditure. The results show of spatial interaction among neighbors, possible due to mimicking. However, when controlling for differences among counties there is no evidence of spatial interaction. Therefore, the positive interaction first found can be interpreted either as a result of differences in the way county councils diagnose individuals or due to interaction among the neighbors in the same county.

**Paper [II]** takes advantage of a new intergovernmental grant in two ways. First, the grant is used to study the effect on municipal spending related to the grant. Second, the grant is used to test a hypothesis of spatial interaction among municipalities due to mimicking behavior. The data used pertains to the periods before and after the introduction of the grant. A fixed-effects spatial lag model is used to study the spatial interactions among municipalities. The results show that before the grant, municipalities interact with their neighbors when setting the expenditure level, while there is no evidence of interaction in the second period. This would support the hypothesis that the grants provide information to the municipalities and the need for mimicking diminishes with the grant.

**Paper [III]** examines whether local public expenditures on services to functionally impaired individuals crowd out other local public expenditures in Sweden. The hypothesis is tested on five different spending areas using a two-stage least squares (2SLS) fixed-effects model. While the results give no support for crowding out in the areas of social assistance, culture & leisure, and childcare & preschool, a negative relationship on spending for elderly & disabled care and on spending for education is found, suggesting that crowding out indeed occurs within the municipal sector. The negative relationships are significant both in a statistical and an economic sense.

**Keywords:** Local public expenditures, Spatial econometrics, Intergovernmental grants, Spatial interaction, Intergovernmental grants, Expenditure crowding out, Functionally impaired.



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At last, I want to dedicate this thesis to Arnliot who will always be an inspiration to me, in every way.

To all of you: Thank you!

Stockholm, December 2009

Lena Catharina

This thesis consists of an introductory part and three self-contained papers:

- [I] Birkelöf, Lena (2008) Exploring Differences in Expenditure for the Functionally Impaired: Neighborhood Interaction and the Federal Structure. Forthcoming in *Annals of Regional Science*. Available online at: [www.springerlink.com](http://www.springerlink.com)
- [II] Birkelöf, Lena (2009) Intergovernmental Grants and Local Public Expenditure Decision: Interaction due to Information Spillover. Umeå Economic Studies No. 796.
- [III] Birkelöf, Lena (2009) Do Local Public Expenditures for Functionally Impaired Crowd Out Other Local Public Expenditures? Umeå Economic Studies No. 797.

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## **1. Introduction**

Reforms and decentralization of the public sector (often) originate at the national government level, while being administered and carried out at the local level - which is meant to improve the public services provision and increase the accountability of the local government. One of the main arguments for decentralizing public activities is that the local governments are better informed about individual demands for public services than the national government (Oates, 1972). During the 1990's, Sweden implemented major national reforms affecting the local government, thus expanding the local government areas of responsibility. For example, the authority of school provision was decentralized in 1991, when the responsibility for compulsory and upper secondary school provision was transferred from the national level to the municipalities. In 1992, the Ädel-reform was implemented, which transferred the responsibility for long-term service and care of the elderly and disabled from county councils to municipalities. Moreover, in 1994, the Handicap Reform transferred the responsibility for providing services and care to the functionally impaired from the county councils to the municipalities. When local governments are faced with new areas of responsibilities imposed by the national government, it is important to analyze how these changes affect the service and expenditures of the local government, as well as the allocation of resources, including the interaction among municipalities.

What consequences (or perhaps even problems) are local governments facing when they get additional services and responsibilities? For one, resources to finance the new services and areas are needed. Resources to

finance the new areas could come from, for example, intergovernmental grants, an increased tax rate, or redistribution from other areas of the local government. When the budget is limited, the local government may be forced to prioritize its public service provision in another way than previously in order to finance the new responsibilities. This could then affect other areas of the local government, leading to crowding out of such areas within the local government sector. Another consequence that naturally comes with new areas of responsibility is the lack of experience and the information uncertainty that may follow. There are costs associated with learning and obtaining information; in order to minimize these costs, the local government may interact (mimic for example) with policy makers from other local governments in order to learn from them and avoid the cost of obtaining information themselves. This could lead to local governments' expenditure decisions being positively affected by the level of spending by their neighbors.<sup>1</sup> A third consequence concerns the regional differences in the provision of a public service. Even if the national government policies are intended to be uniform and equally accessible for everyone regardless of location, the provision of the public service is also likely to differ due to the differences that exist among local governments. For example, it can differ due to political ideologies but also due to differences in tax base or population size.

This thesis, which consists of three self-contained papers, studies different aspects of the municipalities' expenditure decisions regarding the provision of services to functionally impaired (which was transferred to the municipalities as part of the handicap reform of 1994). Paper [I]

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<sup>1</sup> Neighbors are not necessarily geographical neighbors; other forms of "neighborhoods" are also possible.

addresses regional differences in expenditure for services to functional impaired. Paper [II] analyzes an unconditional non-matching intergovernmental grant and explores whether this grant has affected spending and the level of interaction among municipalities. Paper [III] examines the effect of the expenditure for services to functionally impaired on other areas within the local government, with regards to the hypothesis of expenditure crowding out.

The rest of this introduction is organized as follows. Section 2 briefly describes the local governments in Sweden, and the background to the reform for functionally impaired. Section 3 gives a short review of the theory and empirical studies of the provision and determinants of local public services relevant to this thesis. Summaries of the papers included in this thesis are given in Section 4.

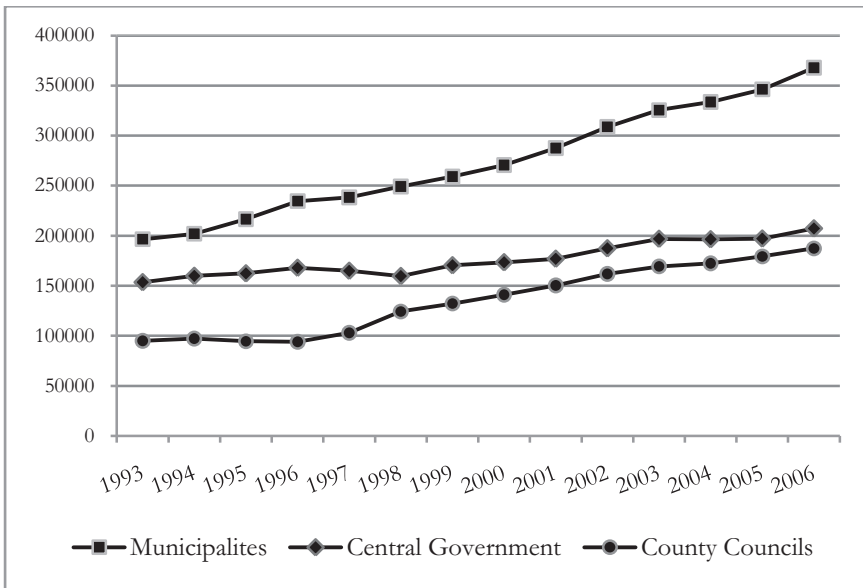
## **2. Background**

### **The local government**

Sweden is divided into 290 municipalities and 21 counties. The municipalities and county councils are responsible for different activities, and they are entitled to levy their own taxes. The municipalities provide services and functions such as elderly care, education and childcare, while county councils are responsible for areas such as health and medical care. Many of the services provided by the local governments are regulated in various laws or have stipulated guidelines (i.e. the Social Services Act, the Education Act, and the Health and Medical Services Act). In many countries, the municipalities' areas of responsibility have been extended

and the municipal public service provisions have expanded over time. Sweden has implemented numerous reforms and decentralizations of public services to the local government level over the last decades, thus expanding the local government sector.<sup>2</sup>

**Figure 1.** Government consumption expenditures in Sweden 1993-2006.



Note: The figure shows the government consumption expenditures for the different levels of government, given in million SEK, current prices, for the years 1993-2006. Transfers are not included in these figures. Source: Statistics Sweden.

In Figure 1, the government consumption expenditures for the three levels of governments are shown (i.e. central government, county council and municipality level). As can be seen in the figure, the municipalities'

<sup>2</sup> The Ädel-reform, the Education Reform, the Handicap Reform and the Maximum-fee Reform for childcare are some examples.

share of total public expenditure has increased over the years, from about 44 percent in 1993 to nearly 50 percent in 2006.

Table 1 shows the average distribution of municipal income and expenditures for the year 2006. Tax revenue is the main source of revenue for the municipalities. Municipalities are entitled to set the local tax rate to finance their provision of public services; however, since income taxes are already high in Sweden, the excess burden of a further increase in the tax rate could be very large for the municipalities.<sup>3</sup> Thus, this makes it harder for municipalities to motivate additional tax increases. This, in turn, also makes them dependent on other sources of revenue, in order to fully finance the public service provision. Other sources of revenue include intergovernmental grants and user fees, which amount to sixteen and seven percent, respectively, in 2006.

**Table 1.** Distribution of municipal income and expenditures, year 2006.

Expenditures		Revenue	
Elderly & disabled	32%	Tax revenue	68%
Education	31%	Grants	16%
Childcare	14%	User fees	7%
Infrastructure	8%	Rent & sales	4%
Social Assistance	7%	Other revenue	5%
Culture & Leisure	5%		
Other	3%		

Source: Statistics Sweden and Swedish Association of Local Authorities and Regions (SALAR).

The distribution of income and expenditures differs among municipalities. Due to the differences, there is a fiscal equalization grant system in place, intended to guarantee that all municipalities have an equivalent economic

<sup>3</sup> Property taxes are set and collected at the national level.

foundation irrespective of their particular structural circumstance. The fiscal equalization grant system includes income equalization, cost equalization, and structural grants.

### *Reform for Services to Functionally Impaired*

The handicap policy of today began in the 1960's and 1970's with an effort at creating equal opportunities for individuals with disabilities, where concepts such as "integrating and normalizing" played a central role. Up until then, the public provision of care and services had mostly been of medical character, and had often been provided in institutional facilities by the county councils. A number of reforms were implemented in order to create conditions that would enable those with a handicap to live their lives in the same way as other members of society (SOU<sup>4</sup> 2008:77).<sup>5</sup> In 1994, there was another Handicap Reform which, among other things, clarified the division of responsibilities between county councils and municipalities for disabled and functionally impaired individuals. For instance, the responsibility for providing services to functionally impaired individuals was transferred to the municipalities. In addition to the transfer, a new law called the LSS-act<sup>6</sup> was implemented. The LSS-act is an entitlement law geared towards individuals with functional impairments; this act extended the rights of the functionally impaired and more people became eligible to receive services.

The transfer of the responsibility for services to functionally impaired was a continuance of the decentralization trend in Sweden: the trend was to

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<sup>4</sup> SOU = Swedish Government Official Report.

<sup>5</sup> For example, the "Provisions and Services Law" (Omsorgslag) from 1967.

<sup>6</sup> LSS-act = Act Concerning Support and Service for Persons with Certain Functional Impairments, LSS (1993:387).

transfer public services provision from the central level to the local level with reforms such as the Education Reform and the Ädel-reform mentioned in the introduction. One reason for transferring the responsibility for services to functionally impaired was that the new LSS-act was designed to be a compliment to other laws, laws for which the municipalities already had responsibility. To ensure that the individuals eligible for the LSS services would not be caught between different levels of government (the county level and municipal level), the LSS service needed to be on the same level as the other laws relevant for the functionally impaired. The main reason for implementing a new law such as the LSS-act was that individuals with severe functional impairments were facing worse living conditions than most other people in the community. The laws and regulations that were in existence prior to the LSS-act were not sufficient to create the good living conditions that other people without functional impairment already had. With the LSS-act, individuals with severe and long-lasting functional impairment became part of their community, which enabled them to get greater control of their own life (SOU 2008:77).

### **The LSS-act**

The LSS-act, section 1, contains provisions relating to measures for special support and services to those with an intellectual disability, autism or a condition resembling autism; or for those with a significant and permanent intellectual impairment that occurred after brain damage in adulthood; or for those with other major and permanent physical or mental impairments not due to normal aging. Individuals who belong to any of the above three groups are entitled to support and services if they

need such assistance in their daily lives and if their needs are not satisfied in some other way. The support and services that eligible individuals can receive, according to the LSS-act, include services such as “counseling and other personal support”<sup>7</sup>, “personal assistance”<sup>8</sup>, “relief service in the home”, “residential arrangement for adults” and “daily activities”.

The LSS-act recognizes that the individuals are different, with different needs and wishes. The LSS-act gives the entitlement and right for individuals to obtain services according to the act, while there is room for individual variation. The possibility of individual variation in the act exists to ensure that each individual gets services according to what suits her and her needs the best (NBHW<sup>9</sup>, 2006). Furthermore, available municipal resources (or lack thereof) is not a valid reason for influencing the decision-making, as under the Social Services Act, which is a more general, goal oriented framework law, leaving room for the municipalities to interpret and implement the goals in accordance with local ambitions (Lewin, Westin, and Lewin, 2008). Another purpose of the LSS-act was to give individuals with functional impairment a stronger position in the welfare system. An explicit purpose of the LSS-act was to overcome local variation in support (Lewin et al., 2008).

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<sup>7</sup> Counseling and other personal support is the one service for which the county council is still responsible (although, by agreements, some municipalities have taken over this service as well).

<sup>8</sup> *Personal Assistance* is the responsibility of the municipalities for the first twenty hours (per week). If an individual's needs call for more than twenty hours per week, then it is the responsibility of the federal government (Social Service Administration) (as regulated in the LASS, *Assistance Benefit Act*).

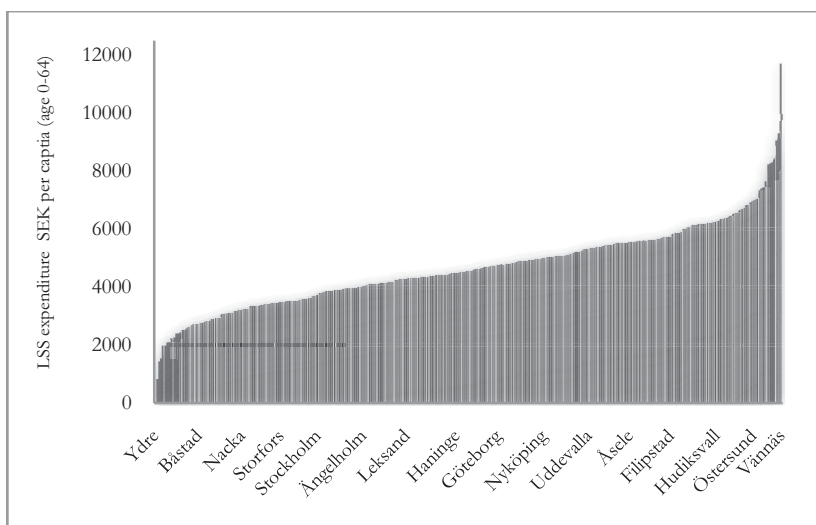
<sup>9</sup> NBHW = The National Board of Health and Welfare.

Since the transfer of responsibility and the implementation of the LSS-act, there has been a considerable increase in the expenditure for services to functionally impaired. In 1998, the per capita expenditure was 2095 SEK, while ten years later, in 2008, it had increased to 4895 SEK per capita.<sup>10</sup> The increase in the municipalities' expenditure for providing the service to functionally impaired can largely be attributed to changes in the LSS-act over the years; more people are included in the act now as compared to when it was first implemented. In 1999, 43991 individuals were granted services; in 2008, this number had increased to 58735 individuals (NBHW). Thus, the number of individuals who received services according to the LSS-act increased with more than 30 percent during 1999-2008. However, there are major regional differences within the country with regards to the number of individuals granted services; from 28 individuals per 10000 inhabitants in the municipality of Vaxholm to 169 individuals per 10000 inhabitants in the municipality of Vännäs (NBHW). There are also great variations in expenditure per capita in the municipalities, which largely contribute to the differences in the number of individuals who are granted services. In Figure 2, the distribution of LSS expenditure per capita (age 0-64) for all municipalities for the year 2008 is illustrated. In 2008, the average expenditure for LSS-services ranges from 655 SEK per capita for the municipality of Ydre, to 11646 SEK in the municipality of Vännäs. The average spending for the country was 4594 SEK per capita at this point in time.

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<sup>10</sup> Current prices, source: [www.WebOr.se](http://www.WebOr.se) (WebOr is an online database with data from Statistics Sweden provided by the Swedish Association of Local Authorities and Regions).

**Figure 2.** Distribution of LSS expenditure per capita (age 0-64) for municipalities, year 2008.



Note: The LSS expenditure for all municipalities is included in the figure; however, due to lack of space, only the name of every twentieth municipality is written on the axis. The municipalities are sorted in the order of minimum to maximum LSS expenditure per capita (age 0-64). Source: WebOr.

In 2004, a new expenditure equalization system with regards to LSS-expenditure was implemented (SFS 2003:886). The expenditure equalization for LSS is not part of the regular intergovernmental grant system. The purpose of the LSS expenditure equalization system is to create the same basic economic conditions for the municipalities to provide services to functionally impaired according to the LSS-act.

### 3. Provision and Determinants of Local Public Services

The purpose of this section is to describe the parts of the research tradition in local public economics that intersect with this thesis. There are mainly two strands of the literature that are of particular interest for the present thesis. One is the literature on the determinants of public expenditures. This literature tries to answer questions such as what factors are important in explaining the variation in expenditures among local governments, and how do local governments (or their decision-makers) react to economic incentives. The other part concerns the (economic) relations between the municipalities and between the municipalities and the other levels of government in a nation, commonly known as *fiscal federalism*. Questions typical for the field of fiscal federalism are how should the responsibilities between the different levels of the public sector be assigned in a nation? What are the effects of decentralization of decision-making from the central to the local level? Do local governments interact with one another in their decision-making and, if so, how?

Since the seminal work by Borchering and Deacon (1972) and Bergstrom and Goodman (1973), the determinants of public expenditure at decentralized levels of government are often analyzed with the median voter model. The local decision is then regarded as a function of the characteristics of the median voter. In empirical applications, determinants also include economic, demographic and geographical characteristics of the local government, for example tax base, population, intergovernmental grants, as well as other institutional and socio-economic factors. It is important to include intergovernmental grants in local governmental expenditure studies. Due to *vertical fiscal imbalances*

many local governments are dependent on the grants in order to fulfill their responsibilities. A vertical fiscal imbalance arises when expenditure responsibilities are decentralized to a lower level, but not the equivalent increase in revenue raising responsibilities (Boadway, 2001). How do municipalities react to grants from the central government? For one thing, empirical work often finds that public spending from grants exceeds that from equivalent increases in income, which is contrary to the theory of intergovernmental grants.<sup>11,12</sup> This empirical finding was labeled “the flypaper effect” by Courant, Gramlich, and Rubinfeld (1979); since “money sticks where it hits”. However, empirical estimation may face problems of, for example, endogeneity or omitted variables. Dahlberg, Mörk, Rattsø and Ågen (2008a) account for endogeneity of grants by using a discontinuity in the grant provision in Sweden to identify the effect of the grant. They find that the grant is used to increase spending (by more than with a similar increase in the tax base), while the grant is not used to reduce tax rates. Witterblad (2008) studies the determinants of local expenditures and the existence of a flypaper effect by using a political model that includes income distribution (low and high income earners) in the municipalities. His results show that the income distribution in the municipality explains the flypaper effect and the differences in expenditure among regions; municipalities with a higher share of low income earners show a greater flypaper effect.

Empirical evidence also shows that political party variables are of great importance in the decisions making. In a study on Spanish regions, Solé-

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<sup>11</sup> Theory predicts that an increase in grants should have the same effect as an equivalent increase in income (Bradford and Oates, 1971 a,b).

<sup>12</sup> There is a large literature considering intergovernmental grants; see e.g. Hines and Thaler (1995) and Oates (1999).

Ollé (2006) found that left-wing governments increase taxes, debts and spending when their electoral margin increases; while right-wing governments, on the other hand, decrease taxes, debts and spending when their electoral margin increases. The incentives of the local policy or decisions-makers may be to support his or their own goals or ideologies. Dahlberg, Lindquist, and Mörk (2008b) use the same discontinuity rule in the grants in Sweden as Dahlberg et al. (2008a), but it is now used to study the incentives of bureaucrats, and how they reacts to grants. They find that the number of bureaucrats increases when there is an increase in grants, while the number of other personnel in the local government is unaffected by the grant. This adds to the explanation of variation in expenditure due to the fact that the local bureaucrats may let their own goals influence the spending decisions regarding grants.

Public services are usually provided by different levels of government, in Sweden as well as in other countries. Via new laws, reforms, decentralizations and other factors, such as an increasing elderly population, the responsibility and the extent of the public provision of a service can change, both by size and by what level that is obligated to provide the service (transfer from the county to the municipality level, for example). Although there are benefits from providing certain types of services at the central level, such as defense, many other services and functions are best provided at the local government level. One reason for the decentralization of public services to the local government level is of normative character; it may be desirable that public services that help and enable citizens in their daily life should be provided at the same level as other daily public services, such as elderly care, education and daycare, in order to integrate all individuals into their own community. This is one of

the reasons why services to functionally impaired was transferred to the municipalities, to make them part of their own municipality as well as to normalize functional impairments in society. Another argument for decentralization is that communities differ from one another, and services to citizens should be provided at the local level, because the local level is in a better position to account for their preferences and other local characteristics, as compared to the central government. The local variation in provision would thus improve efficiency, rather than the uniform provision that the central government is assumed to provide (Boadway, 2001). This is the classical argument for decentralization (Oates, 1972).

With decentralization, local variations in tax rate, service level, as well as the performance of the local policy-makers and politicians are more visible to the inhabitants of the jurisdictions. With free mobility, inhabitants can move to (or stay in) the region that best suits their needs and preferences. Since municipalities collect taxes from the inhabitants' income, the decision to move to another jurisdiction will directly affect the resources of the local government.<sup>13</sup> For this reason, local governments are interdependent when making their tax policy or expenditure level decisions; they must also take other jurisdictions' decisions into account; giving rise to fiscal interaction. One aspect of fiscal interaction is the theory of tax competition. Tax competition is when the local governments compete for a mobile tax base (see Wilson, 1999, for an overview); where the tax rate in one region depends on the tax rate in neighboring regions. Positive spatial autocorrelation is found when a jurisdiction responds to neighbors' policy or expenditure level in similar

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<sup>13</sup> The same reasoning also applies to property tax and corporation tax. However, contrary to many other countries, in Sweden, the local government can only levy taxes on income, not capital or properties.

way; while negative spatial autocorrelation occurs when they respond in the opposite way.

Another aspect of fiscal interaction is the yardstick competition model. In the yardstick competition model, due to lack of information on its own local government, voters can use the performances of other jurisdictions as a benchmark to compare it to the performance of its own jurisdiction. Besley and Case (1995) develop and test a model of yardstick competition where voters in a local jurisdiction compare the performance of neighboring jurisdiction in order to evaluate the performance of its own politicians and policy-makers with regards to local tax setting. Since politicians (are assumed to) care about being reelected, they will take neighboring jurisdiction decisions into account before deciding on their own policy, which would lead to positive spatial autocorrelation. The result from Besley and Case's study supports their hypothesis that yardstick competition indeed influences the decision-making. Along with tax competition and yardstick competition, there are other possible sources of interaction among local governments as well: expenditure spillover, mimicking, and welfare competition for example (see Brueckner, 2003 and Revelli, 2005).

When estimating the models of fiscal interaction, findings of positive spatial autocorrelation (i.e. the slope of the reaction function is non-negative) are consistent with yardstick competition, tax competition, mimicking and welfare competition models. Therefore, additional evidence is needed to discriminate between the models (Brueckner, 2003). Recently, there have been a number of empirical studies that make an effort to separate the sources of interaction. In a study on local property

tax rates in Italian cities, Bordignon, Cerniglia and Revelli (2003) try to discriminate between the tax competition and the yardstick competition hypothesis. They found a positive interdependence in the tax rate only in those cases where a strong majority did not back them up. The result points toward the source of interaction coming from yardstick competition.<sup>14</sup> In a study on Swedish local income tax policies, Edmark and Ågren (2007) use a governmental reform that changed the system of tax base equalization to test for tax competition and yardstick competition. While they found weak evidence of tax competition, which is consistent with attracting mobile taxpayers, they found no evidence of support for the yardstick competition model.

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<sup>14</sup> Other studies that try to separate tax competition from yardstick competition are those of Solé-Ollé (2003), Allers and Elhorst (2005), and Rattsö and Fiva (2007). They are all using the property tax rate (in Spain, the Netherlands, and Norway, respectively); the results all point toward yardstick competition.

#### **4. Summary of Paper [I], [II], and [III]**

##### **Paper [I]: Exploring Differences in Expenditure for the Functionally Impaired: Neighborhood Interaction and the Federal Structure**

One of the reasons for the reform that implemented the LSS-act and transferred the responsibility for services of functionally impaired to the municipalities was to overcome regional differences in the provision of these services. However, both the number of individuals receiving services and the expenditure per capita differ greatly among municipalities. The purpose of this paper is to study the differences in expenditure for services to functionally impaired individuals among municipalities in Sweden.

Besides traditional explanations such as differences in the number of disabled persons in the community, or economies of scale, other explanations are also studied here. Since the provision of LSS services is relatively new for the municipalities, the uncertainty at the service and expenditure level may be great. In line with this, a social interaction hypothesis is studied. It is hypothesized that the municipalities interact or mimic each other to minimize the cost of obtaining information on the “right” services or the expenditure level and, by mimicking, they can learn from their neighbors. In addition to the social interaction hypothesis, the influence of the former caregiver (county councils) is also taken into account.

The empirical analysis is based on a dataset of 288 Swedish municipalities for the year 2003. The hypothesis of mimicking (and social) interaction among neighboring municipalities is studied by means of a spatial

autoregressive model, where the spending of one municipality depends on its own characteristics but also on the level of spending by its neighbors. To account for the possible influence of the county councils, the spatial autoregressive model is specified with and without explanatory variables for county councils.

The results show a positive and significant spatial interaction term for model-specification without explanatory variables for county council, supporting that cooperation or mimicking among municipalities exists with regards to the expenditure level for functionally impaired. However, for the specification with county-council effects, the results show a non-significant spatial interaction term. Therefore, it is not possible to determine if the positive spatial interaction first found is due to municipalities belonging to the same county council, or if it is because municipalities in the same county cooperate or mimic each other. The similarities among neighboring municipalities may be due the fact that the county councils used to be caregivers for individuals with functional impairments, and that the county councils are still those diagnosing individuals receiving LSS services.

### **Paper [II]: Intergovernmental Grants and Local Public Expenditure Decision: Interaction due to Information Spillover**

This paper analyzes the effect of a new unconditional intergovernmental grant distributed to Swedish municipalities. The grant was implemented in 2004 and is associated with expenditures for services to functionally impaired individuals. The grant is not based upon actual costs incurred by the municipalities; instead, it is based on nationally set standardized costs. Two main hypotheses are tested in this paper. First, similar to previous

studies on intergovernmental grants, the effect of the grant on related public expenditure is studied. Is this grant used to increase expenditures for functionally impaired?

Second, and unlike other studies on intergovernmental grants, this study focus on the information on standardized costs associated with this grant, and study whether it causes municipalities to change their level of interaction among each other. It is hypothesized that the standardized costs may be viewed as a signal from the national government to the municipalities on what the right expenditure level should be. Here, it is argued that prior to the implementation of the grant, municipalities used the expenditure levels of other municipalities as information sources, and mimicked their neighbors in order to get the “right” service or expenditure level. After the implementation of the grant, and its associated information on standardized costs, the need to mimic should have decreased (or diminished), since the information could instead be obtained through the grant.

The empirical analysis is based on 288 municipalities for the years 2001-2007. The hypotheses are tested using a spatial panel autoregressive (SAR) model including fixed effects for time and municipalities. In the SAR model, the spatial autoregressive parameter measures the interaction among neighbors.<sup>15</sup> The data set is divided into two time periods: 2001-2003, corresponding to the period before the grant, and 2004-2007, corresponding to the period after the implementation of the grant. In order to support the hypothesis that the grant provides information that

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<sup>15</sup> In this study, the neighbors are defined as a municipality’s neighbors and its neighbors’ neighbors.

causes the municipalities to mimic less, the interaction parameter should be positive in the first period, and zero (or decrease) in the second period.

With regards to the first hypothesis, the result in this study is in line with other empirical studies; it shows that spending on services from grants exceeds that from a corresponding increase in income. With regards to the second hypothesis, the result supports the hypothesis of interaction among neighboring municipalities due to information spillover. In the first period, the interaction parameter is positive and significant, indicating spatial interaction among municipalities, which could be due to mimicking. In the second period, the interaction parameter is insignificant, which supports the hypothesis that the grant provides information and there is no need to mimic each other after the implementation of the grant. This result is interesting, since it shows that the source of spatial interactions among local governments can be due to information uncertainty. The information uncertainty aspect is important to take into account when implementing new services or decentralizing existing services to local governments, for example.

### **Paper [III]: Do Local Public Expenditures for Functionally Impaired Crowd Out Other Local Public Expenditures?**

This paper examines the effect of the increasing expenditure for services to functionally impaired on other areas within the local government, with regards to the hypothesis of expenditure crowding out. To support the crowding out hypothesis, increases in expenditure for functionally impaired must have negative effects on other expenditures in such a way that it cannot be explained by other factors determining the expenditures. Although the local government has the autonomy to set its own local tax

rates, the income from taxes does not fully cover the municipal service provision. Therefore, when an expenditure program within the municipality is forced to redistribute its resources, other areas within the municipality are also likely to be affected. It is unlikely that every area will be affected in the same way, though. Areas that are heavily regulated by laws or for which strict guidelines are provided are not likely to be as affected as other areas. Furthermore, since it may be less noticeable to decrease resources in a large service area than in a small area, larger areas are likely to be affected to a greater extent than smaller areas.

The empirical analysis is based on 288 municipalities for the years 1998-2007. The crowding out hypothesis is tested on five spending categories: elderly & disabled care; education; social assistance, childcare & preschool; and culture & leisure, together constituting 90 percent of the total expenditures of the municipalities. The hypothesis is tested with an ordinary least squares (OLS) model and a two-stage least squares (2SLS) model; both models including time and municipal fixed effects. It is possible that some spending categories may be simultaneously decided with the spending for LSS services; in such a case, the LSS expenditure is endogenous, making OLS estimates biased and inconsistent (Baltagi, 2002; Green, 2003). Therefore, to account for the bias in this case, instrumental variables must be used.

The results from the empirical analysis show that the LSS expenditure variable is endogenous in the models for elderly & disabled care spending and education spending. The instruments used in the 2SLS estimation are the three most important determining factors for LSS expenditure. The tests confirm that the instruments are both valid and relevant here. For

the other three spending categories, LSS expenditure is not endogenous, thus making OLS sufficient. While the findings of this study do not support the existence of crowding out for the spending category of social assistance, childcare & preschool, and culture & leisure spending, it strongly supports crowding out of expenditures on elderly & disabled care and expenditures on education, both in a statistical and an economic sense. The results are credible, since both the elderly & disabled care and the education areas are large areas within the municipality sector and although regulated by law, it is not as strict as the LSS-act.

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# Exploring differences in expenditure for the functionally impaired: neighborhood interaction and the federal structure

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**Abstract** The purpose of this paper is to study the determinants of the differences in expenditure on services for functionally impaired individuals among municipalities in Sweden. Expenditure per capita differs greatly across municipalities, even when accounting for the nature of the service. A spatial autoregressive model is used to test whether the decisions on the expenditure level in a neighboring municipality affect the municipality's own expenditure. The results show that a positive spatial interaction exists among neighbors. However, when controlling for level differences among counties the spatial interaction coefficient becomes negative although not significantly determined. Therefore, the positive interaction first found can be interpreted either as a result of differences in the way county councils diagnose individuals or due to interaction or mimicking among the neighbors belonging to the same county council.

**JEL Classification** I18 · H72 · R12

## 1 Introduction

“The Act Concerning Support and Service for Persons with Certain Functional Impairments”<sup>1</sup> (LSS)<sup>2</sup> is an entitlement-law that was established as part of the 1993 Handicap Reform in Sweden. The LSS act is for individuals with “major and long-term functional disability”. The purpose of the act is to enable these individuals to obtain equal opportunities in living conditions and full participation in the community. The LSS-act is a complement to other laws; it gives individuals rights to obtain support

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<sup>1</sup> SFS 1993:387.

<sup>2</sup> In Swedish: *Lag om stöd och service till vissa funktionshindrade*.

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and services that they might need in addition to other legislation. The responsibility for providing LSS measures mainly lies with the municipalities.

The LSS activity is the fastest growing expenditure program of the municipalities. Since it was first implemented in 1994, the LSS act has expanded a number of times—which is the main reason for the increase in the LSS activity. While only about 0.5% of the population is receiving any LSS assistance, the LSS provision consumes almost 19% of the municipalities' total social service expenditures (NBHW 2004)<sup>3</sup>. However, the expenditure per capita differs greatly across municipalities; it ranges from 400 to 6,000 SEK per capita (SOU 2002:103). This variation in expenditures can largely be explained by the nature of the LSS provision where, for example, each person's individual needs differ from those of others. Nevertheless, even accounting for the nature of the LSS provision, there are large differences that remain to be explained.

The purpose of this paper is to study the determinants of the differences in the municipalities' expenditures on LSS. Besides traditional explanations such as differences in the number of disabled persons in the community, or economies of scale, other explanations are studied. In particular, the focus will be on the explanation that municipalities interact in their expenditure behavior so as to avoid costs associated with LSS or otherwise engage in social interaction with each other. For example, since the LSS act is a relatively new law, the municipalities may be uncertain about some of its implications—and they may therefore consider other municipalities as being superior in their actions with regards to LSS. For this reason, the municipalities may mimic each other so as to act in a similar way. Mimicking here implies that there is a positive dependence between different municipalities' expenditures. Another reason for differences in the expenditure of LSS may be that the municipalities are engaging in a "race to the bottom"<sup>4</sup> with each another. However, since both the scope of the LSS production as well as its expenditure per capita increases for every year, this explanation may not be very plausible. A third explanation is related to the fact that the county councils are responsible for diagnosing those who may be eligible for LSS, implying that the expenditure levels may differ regionally. Prior to the handicap reform of 1993, the county councils were the sole providers of the LSS activity. If the differences are *only* due to this fact—there should not be any remaining interaction when controlling for the county council level.

The idea that the municipalities may affect each other in their decision making can be referred to as spatial (or social) interaction, and it can be studied via spatial spillover models, for example. Studying the reasons for differences in LSS expenditure among municipalities is both interesting and important. First, it is an interesting area to study since LSS is relatively new and is therefore to a large extent unexplored. Second, the results may have important policy implications depending on the reasons for the differences among the municipalities.

There are several studies on spatial spillover in the literature. One of the first papers is the study of Case et al. (1993), in which they used a spillover model to study the budget spillover among US states. They found that a state's level of per capita expenditure is

<sup>3</sup> The National Board of Health and Welfare.

<sup>4</sup> A "race to the bottom" scenario is here interpreted as competition between municipalities leading to progressive dismantling of LSS service production.

positively and significantly affected by the expenditure levels of its neighbors. Another example of a study of spatial interaction is [Murdoch et al. \(1993\)](#) article where they studied recreation spillovers among municipalities in the Los Angeles area. They found that the municipalities responded positively to spillover from recreation expenditures in neighboring municipalities, and that municipalities with relatively high incomes and air pollution spend relatively less on local recreation. Since strategic interaction can be studied via spillover models, the spillover model should be an appropriate tool for testing whether municipalities do interact and influence each other when determining the level of the LSS expenditure per capita.

In this paper, a spatial autoregressive model is used to test whether a neighboring municipality's decision on LSS expenditures affects the municipality's own LSS expenditure. In order to study neighborhood interaction, neighbors must be specified in advance. The neighborhood weight matrix will be constructed in such a way that every municipality in a reference group has equal weight regardless of size, population or location of the municipality. The municipalities studied here are grouped in different sets of neighborhood specifications. For example, in one specification, neighbors are defined to be those who share a common border. In another specification, neighbors are those who belong to the same functional urban region (FUR). In all, four different neighborhood specifications are used. Using a spatial autoregressive model, it can be determined whether the level of expenditure per capita for the LSS activity may be influenced by interaction among municipalities.

The rest of the paper is organized as follows. Section 2 describes the LSS-Act, its background and its development. Section 3 presents theory, neighborhood matrix, and an empirical model which estimates spatial interaction among municipalities. Section 4 presents data and empirical findings, while concluding remarks can be found in Sect. 5.

## 2 LSS ACT

“The Act Concerning Support and Service for Persons with Certain Functional Impairments” (LSS) is a law to guarantee individuals with major and long-term functional disability equality in living conditions and full participation in the community. The LSS Act contains provisions relating to measures for special support and special services for those with an intellectual disability, autism or a condition resembling autism; or for those with a significant and permanent intellectual impairment that occurred after brain damage in adulthood, or for those with other major and permanent physical or mental impairments not due to normal aging. Individuals who belong to any of the above groups are entitled to support and services if they need such assistance in their daily lives and if their needs are not satisfied in some other way.

The measures included in the LSS act are designed to ensure that individuals entitled to LSS will have good living conditions. The measure(s) should be lasting and adapted to the individual needs of the recipient and be framed in such a way that they are easily accessible for those who need them and enhance the ability of the latter to live an independent life ([www.independentliving.org](http://www.independentliving.org)). The LSS act consists of ten measures which include Counseling and other personal support; Personal assistance;

**Table 1** Total expenditures on LSS activity (NBHW 2001–2004)

LSS/LASS	2001	2002	2003	2004
Billion SEK	20.4	22.5	25.1	26.5
Increase from previous year	6.80%	10.30%	11.60%	5.60%

In the year 2000, total expenditures less LASS compensation amounted to 19.1 billion SEK, *current prices*

Daily activities; Relief service in the home; and Living in family homes or homes with special services for children and young people (SFS 1993:387).

The responsibility for the LSS activity mostly resides with the municipality. While the municipalities are responsible for nine of the ten LSS measures, the county council is responsible for the measure “Counseling and other personal support”. However, some municipalities have, by agreement, taken over the responsibility also for this measure. In connection with the Handicap reform of 1993, the “*Assistance Benefit Act*” (LASS) was also established. The LASS act is where the Social Security Administration assists LSS individuals in need of personal assistance more than 20 hours per week. Thus, the municipalities have the financial responsibility for the first 20 hours and the Social Security Administration for the exceeding hours (NBHW 2006a,b).

There has been a steady increase in the LSS expenditure. During 1997–2001, the municipalities’ share of LSS expenditures increased with a yearly average of 11.3% (SOU 2002:103),<sup>5</sup> and it is also the fastest growing activity of the municipalities. The share of the municipalities’ resources for the disabled was about 11% in 2004, as compared to 9% in 2000 (NBHW 2006).

In 2001, the number of individuals receiving at least one LSS measure was 47,283 (NBHW 2001). This corresponds to approximately 0.6% of the population aged 0–64,<sup>6</sup> or 0.5% of the whole population. In 2004, the number of individuals receiving at least one measure had increased to 52,995 (NBHW 2004). The percentage increase over the 4 years was 12.8%. The costs of the LSS activities are substantial; Table 1 presents an overview of the municipalities’ total expenditure on LSS for the years 2001–2004.

The net expenditures<sup>7</sup> for LSS in 2001 amounted to 20.4 billion SEK—which is about 20% of the total municipal expenditures of the “Care of the Elderly and Disabled”, and 17% of the total Social Services expenditure in that year (NBHW 2001). In 2004, the corresponding numbers had increased to 26.5 billion SEK for the LSS activity, which is 23.5% of “Care of the Elderly and Disabled” and 18.9% of the total expenditures of the Social Services (NBHW 2004). Table 2 shows the average LSS expenditure per capita for the whole country.

There are major differences among the municipalities in their LSS expenditure per capita. As mentioned, the expenditures range from approximately 400–6,000 SEK per capita. To a great extent, this variation in expenditures can be explained by the nature

<sup>5</sup> Statens Offentliga Utredningar, SOU.

<sup>6</sup> LSS measures are granted to individuals aged 0–64.

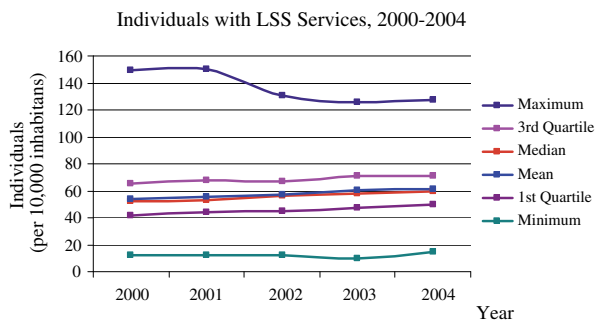
<sup>7</sup> Net expenditure refers to gross expenditure minus internal revenue; minus sale-revenues from other municipalities and county councils; exclusive compensations from Swedish Social Insurance Agency for LASS services, and exclusive expenditure for preventive activities and revenues from rent.

**Table 2** Average expenditure on LSS per capita in SEK, current prices

Year	Expenditure per capita, age 0–64	Expenditure per capita	Expenditure per person receiving LSS
2001	2,899	2,333	423,627
2002	2,949	2,360	417,981
2003	3,211	2,587	438,875
2004	3,371	2,708	445,106

of the LSS production. While LSS naturally depends on the specific needs of the individuals and the number of measures required, it also depends on the concentration of individuals with a need for LSS services in the municipalities. Before the handicap reform of 1993, the county councils were responsible for the care that later became defined as LSS-care. As part of the handicap reform, the responsibility for what became the LSS care was transferred to the municipalities. The care that was transferred from the county councils to municipalities' regime included *resident homes for adults* and *resident homes for children*. Thus, the municipalities where these resident homes were located received a higher share of individuals with LSS needs (SOU 2002:103). Consequently, those municipalities where the county councils' activities were previously located also have a higher per capita LSS expenditure. However, even accounting for the nature of the LSS provision, there are large differences that remain to be explained. Descriptive statistics for individuals (per 10,000 inhabitants) with LSS services in the municipalities for the years 2000–2004 are presented in Fig. 1. In addition, a map of the distribution of the number of individuals (per 10,000 inhabitants) with LSS services in the municipalities in the year 2003 is presented in Fig. 2 in Appendix A.

The differences among municipalities are also clear when comparing the average expenditure on LSS per person receiving LSS. The average municipality expenditure per person receiving LSS-measure ranges from 103,711 to 791,132 SEK in 2001. Furthermore, the expenditure also increases every year. The following years, 2002–2004, show a similar trend (NBHW 2001, 2002, 2003, 2004). Moreover, the differences



**Fig. 1** Individuals with LSS Services in the Municipalities (per 10,000 inhabitants) 2000–2004 (NBHW 2001, NBHW 2002, NBHW 2003, NBHW 2004, NBHW 2005a). Note: For the years 2000–2002 data for a few municipalities is missing. In these cases, the missing data has been replaced by data for the next available year. For the year 2000, the municipalities Ljusnarsberg, Sorsele, Ydre, Älmhult and Ödeshög have missing data. For the year 2001, the municipalities Ljusnarsberg, Ydre, Åsle, and Överkalix have missing data. Finally, for the year 2002, Ljusnarsberg and Nora have missing data

in LSS expenditures are not limited to be just among municipalities, they are also evident among counties. For example, for the year 2003 the per capita expenditure for LSS ranges between 3,142 and 4,037 SKR among the counties in the country.

The expenditures on LSS activities constitute a substantial part of the municipalities' service production; however, the resources are limited and many of the municipalities have not fulfilled their obligations according to the LSS Act. For example, one problem has been that municipalities are denying applications and/or are not carrying out the approved applications or the verdict according to LSS in time. The National Board of Health and Welfare has examined this issue in cooperation with the County Boards. They reported that there are large regional differences, and that some municipalities systematically deny certain LSS applications that they are not able to fulfill within reasonable time (NBHW 2005a,b).

### 3 Theory and empirical model

In economics, social interaction models describe the behavior of agents as affected by the characteristics or behavior of other agents; agents interact through their chosen action (Manski 1993, 2000). The cause of interaction among economic agents is distinguished to three hypotheses: endogenous interaction, contextual interaction and correlated effects. According to the endogenous interaction hypothesis, the propensity of an agent to behave varies with the behavior of the group. The contextual (or exogenous) interaction states that individual action varies with the exogenous characteristics of the group members. The correlated effect is that agents in the same group behave similarly because they have similar individual characteristics or face similar institutional environments. Endogenous and exogenous interaction state ways in which agents might be influenced by their social environment, while correlated effects express a non-social occurrence (Manski 2000).

Strategic (and social) interaction among governments can be studied via spillover models, where the spending of one jurisdiction depends on its own characteristics but also on the level of spending by its neighbors. Case et al. (1993) used a spillover model to study the budget spillover among US states. Murdoch et al. (1993) studied recreation spillovers among municipalities in the Los Angeles area. Since the direct effect of strategic interaction can be studied using the means of a spillover model, this model can be used to test whether municipalities influence each other when determining the level of LSS expenditure per capita.

As stated, in spillover models, one jurisdiction is directly affected by the decision(s) of jurisdictions elsewhere. Applied to the LSS expenditure problem, one municipality decides its own level of LSS expenditure per capita, but is also directly affected by the level of LSS expenditures per capita of other municipalities.

#### 3.1 A spatial autoregressive model for local interaction

The municipality  $i$ 's per capita expenditures of LSS (log),  $L_i$ , depend on the municipality's own characteristics,  $X_i$ , as well as its neighbors' per capita LSS expenditures (log),  $L_j$ .

The estimating equation can be written as:

$$L_i = \phi \sum_{j \neq i} w_{ij} L_j + X_i \beta + \varepsilon_i \quad (1)$$

In matrix form, the model is written as:

$$L = \phi \mathbf{W}L + \mathbf{X}\beta + \varepsilon \quad (2)$$

where  $L$  is a  $(n \times 1)$  vector of LSS expenditures per capita;  $\phi$  is the parameter for “local interaction”;  $\mathbf{W}$  is a  $(n \times n)$  weight matrix with elements  $w_{ij}$ ;  $\mathbf{X}$  is a  $(n \times k)$  matrix of explanatory variables for the municipalities;  $\beta$  is a  $(k \times 1)$  vector of parameters; and  $\varepsilon$  is a  $(n \times 1)$  vector of error terms. Here, the error terms are assumed to be independent and normally distributed with a constant variance.<sup>8</sup>

### 3.2 Econometric issues

With spatial interaction, multidirectional dependence may be present; errors for one observation are likely to be related to the errors in neighboring observations, i.e., spatial dependence (Anselin 1988). Since  $L$  appears on both sides of the equation, multidirectional dependence between the dependent variables exists. The resulting correlation means that ordinary least squares (OLS) estimates of the parameters of Eq. (2) are biased and inconsistent. Therefore, to account for multidirectional dependence, a spatial lag model is used to make the error term uncorrelated between the neighbors.

Spatial error dependence arises when  $\varepsilon$  includes omitted variables that are themselves spatially dependent. When spatial error dependence is ignored, estimation of the model can present false evidence for spatial interaction. One way of dealing with this is to estimate the equation by Maximum Likelihood under the assumption that spatial error dependence is absent, and then test to verify the absence. The robust test of Anselin et al. (1996) can then be used to test if spatial dependence is present (Brueckner 2003). In this paper, this is the method used; a reduced form<sup>9</sup> of Eq. (2) will be estimated using the maximum likelihood method.

### 3.3 The weight matrix

The weight matrix must be specified in advance since it is not possible to estimate neighborhood pattern on cross-sectional data. The weight matrix consists of 288 municipalities. In this paper, neighbors have been defined in four different ways. In the specification “GEO”, it is assumed that the neighbors are all those municipalities

<sup>8</sup> An alternative way of specifying the spatial process, rather than specifying it as in Eqs. (1) and (2), is to specify it in the error term (Anselin 2003). Formally:  $L = X\beta + U$  and  $U = \gamma WU + \varepsilon$ . However, since the hypothesis in this paper is that the municipalities interact with each other in order to decide on their own expenditure level, the model specified in Eqs. (1) and (2) is used, and I will later on test for error dependence.

<sup>9</sup> The reduced form is obtained by solving (2) for  $L$ :  $L = (I - \phi W)^{-1} X\beta + (I - \phi W)^{-1} \varepsilon$ .

that share a common border. The neighbors in the specification “GEOLAN” are the municipalities within a county council that share a common border. In the “FUR” specification, neighbors are based on a functional urban regional area, where each region consists of up to four adjacent municipalities cooperating with regard to industry, employment and communication (SCB, MIS 2003:1). Following Case et al. (1993), the fourth specification, “ALPHA”, is specified as an intentionally absurd matrix. Here, the neighbors are based upon an alphabetical index, where neighbors are divided into groups of four according to alphabetical order (i.e. the first four municipalities are one region of neighbors, and the next four municipalities are another region of neighbors etc). The “ALPHA” specification is only used for comparison.

The weight matrix is row-standardized, i.e. each element is divided by the row sum. Thus, each row will sum to one. The neighboring municipalities’ expenditure on LSS is assumed to affect the expenditures in municipality  $i$  with a weighted average of the neighboring municipalities’ expenditures. The four different specifications of the weight matrix are based upon contiguity. Let  $w_{ij} = 1/M_i$  for municipalities  $j$  defined to be neighbors to  $i$  and  $w_{ij} = 0$  otherwise; where  $M_i$  is the number of neighbors to municipality  $i$ . Then, the total “spillin” can be written as:  $\sum_{j \neq i} w_{ij} L_j$ .

#### 4 Data and empirical findings

The data set used in the present study has been collected from Statistics Sweden and The National Board of Health and Welfare. Data refers to the year 2003 and it includes the number of individuals receiving any LSS measure and the number of individuals receiving each measure. The dependent variable used in the analysis is the logarithm of *LSS expenditure per capita age 0–64*. This is the cost for measures according to LSS excluding the LASS compensation from Social Administration. A small part of the total expenditures is expenditures on measures for individuals older than 65.<sup>10</sup>

##### 4.1 Explanatory variables

The LSS measure variables are defined as “Individuals receiving a particular measure per total number of individuals receiving any LSS measure”. Explanatory variables are included for §17-agreements<sup>11</sup> between municipalities. Using §17-agreements, a municipality can retain the cost responsibility for persons living in another municipality and thus does not have to execute the measure itself. This is used by, for example, small municipalities that do not have the suitable measure for some individuals, for example, special resident homes. Instead, by agreement, the LSS individual moves to a resident home in another municipality that can provide the proper care, while the original municipality retains the responsibility for the cost. That is, the submitting municipality is accountable for the cost incurred by the treating municipality. The §17 variables are defined as a percentage of the number of agreements per total number of individuals receiving any LSS measure. The idea of using these as

<sup>10</sup> LSS measures are not approved after the age of 64; however, measures approved prior to the age of 65 can be continued after the age of 65.

<sup>11</sup> §17 refers to a section in the LSS act (SFS 1993:387)

explanatory variables is to account for economies of scale; both the “receiving” and the “transmitting” municipalities get a lower LSS expenditure per capita with the §17-agreements. Moreover, an explanatory variable for a 350 million SEK LSS-specific grant is included. This was a grant that was divided among a number of municipalities that had extraordinarily high costs for their LSS production in the years 2001–2003. The year 2003 is the first (and only) year where both data for the specific LSS grant and for the §17-agreements is available, and since these are important variables for the determinants of LSS expenditure—it makes the year 2003 ideal to study.

Additional explanatory variables are used for municipal characteristics such as population density and tax base per capita. The population density variable is included to capture, for example, economics of scale. As the population increases in one specific area, the expenditure per capita is expected to decrease. General grants per capita of income equalization and cost equalization are also included among the explanatory variables. The general grant is expected to have a positive effect on the dependent variable. If a municipality receives general grants, they may choose to use it for their LSS services production, therefore, in that case, the LSS expenditure per capita increases with general grants. Finally, in the analysis, the natural logarithm of population is used since the effect of population is likely to be nonlinear. Descriptive statistics including minimum and maximum values for the relevant variables are presented in Table 3.

There are 290 municipalities and 21 county councils in Sweden. All municipalities except two are included in the analysis. Ydre is excluded due to missing data and Gotland is excluded due to the fact that the municipality and the county council coincide. Therefore, the analysis consists of twenty county councils with a varying number of municipalities. Since county councils may play a significant role in the determinants of LSS expenditures per capita, dummy variables indicating whether municipalities belong to the same county council level will be included in some of the model specifications tested.

#### 4.2 Empirical findings

In this subsection, and the following, the results from the empirical analysis are presented and discussed. There are three neighborhood specifications tested with and without county council specific effects, making it a total of six model specifications.<sup>12</sup> For the specifications without controlling variables for county councils, the result indicates that interaction among municipalities exists, possibly pointing toward mimicking or interaction. The estimate of the interaction term is positive and significant for the three specifications without explanatory variables for county councils. However, for the specifications with explanatory variables for county councils, the interaction term is now negative and non significant, indicating that there is no mimicking or interaction among municipalities with regards to LSS expenditure levels. Since the negative interaction term is not significantly different from zero, there is no statistical evidence that - for the three model specifications with explanatory variables for county councils - the municipalities interact with each other in determining the LSS expenditure levels.

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<sup>12</sup> Not counting the Alpha-specifications (which are just for comparison).

**Table 3** Descriptive statistics

Variable	Mean	SD	Min	Max
<i>Type of LSS-measure;</i>				
Companion service, percent	17.32	12.81	0	61.26
Counseling and other personal support, percent	23.14	32.59	0	145.00
Daily activities, percent	44.01	11.72	0	73.08
Personal assistance, percent	9.17	9.62	0	45.16
Personal contact, percent	30.52	13.34	0	73.68
Relief service in the home, percent	4.28	5.06	0	20.59
Residential arrangements with special service for adults, percent	34.29	12.34	0	65.59
Living in family homes or homes with special service for children and young persons, percent	2.01	3.68	0	20.59
Short period of supervision for schoolchildren aged above 12, percent	6.92	6.21	0	35.00
<i>LSS-specific variables</i>				
Expenditure for LSS-activity per capita age 0–64, SEK	3218	1056	835	7975
Expenditure for LSS per Individual receiving any LSS assistance, SEK	438781	111476	177415	973034
Expenditure for LSS-activity per capita age 0–64, SEK (log)	3.48	0.15	2.92	3.90
Expenditure for LSS-per Individual receiving any LSS assistance, SEK (log)	5.63	0.11	5.25	5.99
LSS-grant, grant per person receiving any LSS activity, SEK	6727	20965	0	192683
Individuals receiving any LSS measure per capita age 0–64, percent	0.75	0.23	0.26	1.64
Number of measures per capita age 0–64, percent	1.47	0.65	0.22	5.49
§17-agreements of cost responsibility, agreements as a percentage of total number of individuals receiving any LSS measure	4.46	6.09	0	41.38
§17-agreements of measure responsibility with municipality agreements as a percentage of total number of individuals receiving any LSS measure	1.14	3.15	0	26.14
<i>Municipality-specific characteristics</i>				
Grant-income, SEK per capita	6758	5183	–15698	22144
Population density, population per km <sup>2</sup>	128	422	0	4058
Population size (log), age 0–64	4.17	0.40	3.26	5.81
Tax base per capita	122491	17184	99291	250576

“The Type of LSS-measure” variables are measured as the number of individuals receiving each measure as a percentage of the total number of individuals receiving any LSS measure

### 4.3 Spatial dependence test

In this paper, two different tests have been used in order to determine the spatial dependence of the models: Likelihood Ratio (LR) test and Lagrange Multiplier (LM) test. Here, the LR test is a test on the spatial lag coefficient  $\phi$ . It tests the specified spatial lag model against a standard regression model with the same set of explanatory

**Table 4** Spatial error and spatial lag dependence tests

	GEO		GEOLAN		FUR		ALPHA	
	Value	Prob	Value	Prob	Value	Prob	Value	Prob
Models <i>excluding</i> county councils as explanatory variables								
<i>Test for Spatial Lag Dependence</i>								
Likelihood Ratio Test	7.60	0.01	11.93	0.00	7.96	0.01	0.04	0.84
<i>Test for Spatial Error Dependence</i>								
Lagrange Multiplier Test	0.11	0.92	0.22	0.64	1.49	0.22	0.57	0.45
Models <i>including</i> county councils as explanatory variables								
<i>Test for Spatial Lag Dependence</i>								
Likelihood Ratio Test	0.48	0.49	0.52	0.47	0.80	0.37	0.38	0.54
<i>Test for Spatial Error Dependence</i>								
Lagrange Multiplier Test	1.28	0.26	1.58	0.21	0.12	0.73	0.10	0.75

variables with  $\phi$  set to zero (Anselin 1995). The second test, the LM test, is to test if spatial error dependence remains in the residuals. Test statistics for the two tests are presented in Table 4.

For the model-specifications without controlling variables for county councils, the significance test of the LR test statistic indicates that there is spatial interaction among municipalities. However, for the model-specifications with controlling variables for county councils, the non-significance test of the LR test statistic indicates that there is *no* spatial dependence among municipalities.

As mentioned, the next test, the Lagrange Multiplier test, is to test if spatial dependence remains in the residuals. If the spatial lag model specified is the correct one, no spatial dependence should remain in the residuals (Anselin 1995). The test statistics for all six specifications are non-significant, which is an indication of there being no spatial dependence remaining in the residual. Consequently, taking both the LR and the LM tests into account, this could then be interpreted as the spatial lag models that exclude explanatory variables for county councils being correctly specified. However, as discussed in the LSS-section, county councils used to be the providers of the services that later became defined as LSS services—this could mean that the interaction result just obtained is not “true” interaction, but a result of the underlying federal structure. Therefore, to determine which set of model-specification is the best, a likelihood ratio test is performed.

#### 4.4 Should explanatory variables for county councils be included in the model-specification?

Since the test on spatial dependence in the error term was non-significant for both types of specifications (with and without explanatory variables for county councils) the next step is to determine which of the spatial lag model specifications is the right one, the one without explanatory variables for county councils or the one with explanatory variables for county councils. A likelihood ratio test is performed to determine if the

**Table 5** Likelihood ratio test statistics

<i>Model</i>	Log likelihood	Likelihood ratio test	<i>P</i> value
GEO <i>excl</i> variables for county councils	315.08	66.06	0.00
GEO <i>incl</i> variables for county councils	348.11		
GEOLAN <i>excl</i> variables for county councils	317.25	61.76	0.00
GEOLAN <i>incl</i> variables for county councils	348.13		
FUR <i>excl</i> variables for county councils	309.32	67.02	0.00
FUR <i>incl</i> variables for county councils	342.83		

two types of specifications differ from each other and if the specification for the county council type can explain the reasons for differences in the LSS expenditure among the municipalities to a higher degree. The likelihood ratio test is a statistical test of the goodness-of-fit between two models (specifications). Table 5 presents the results from the likelihood ratio test between the two specifications.

The likelihood ratio statistic is

$$\lambda = -2(\ln L_R - \ln L_U)$$

where  $L_U$  is the unconstrained value of the likelihood function and  $L_R$  is the value of the restricted likelihood function (Green 2003).

From the test statistic in Table 5, it is evident that the specifications that include explanatory variables for county councils are more suitable. Even though the Lagrange Multiplier test showed no spatial dependence in the error term for either of the specifications, the Likelihood Ratio Test indicates that it is the specifications with explanatory variables for county councils that to a higher degree explain the reasons for differences in the LSS expenditure among the municipalities. The result in Table 5 confirms the inclusion of county council variables in the specifications.

#### 4.5 Determinants of LSS-services expenditure

Table 6 present the results of estimating the municipalities' LSS expenditure per capita (log) as the dependent variable.<sup>13</sup> Since the specifications that include explanatory variables for county councils are superior to those that do not, these are the only results presented in the paper.<sup>14, 15</sup> Here, geographic border (GEO); geographic border within

<sup>13</sup> Since the LSS services production is likely to exhibit economics of scale, an analysis with the dependent variable *LSS expenditure per individual receiving LSS services* has also been performed. The results of the analysis are presented in Table 7 in Appendix B, along with a brief discussion. The results are similar to the results obtained for the dependent variable *LSS expenditure per capita* (0–64) which are presented in Table 6 here in the result section.

<sup>14</sup> The estimates for the spatial lag model specification without explanatory variables for county councils can be obtained from the author upon request.

<sup>15</sup> The estimates for the county council dummies are not presented here, but can be found in Table 8, Appendix C along with a brief discussion.

**Table 6** Estimation results for LSS expenditure per capita age 0–64, models include dummy variables for county councils

Variable	GEO		GEOLAN		FUR <sup>a</sup>		ALPHA	
	Estimate	z value	Estimate	z value	Estimate	z value	Estimate	z value
W_LSSEXP neighboring municipalities	-0.0487	-0.73	-0.0442	-0.77	-0.0448	-0.88	-0.0319	-0.63
Constant	2.5511	8.82	2.5394	9.45	2.571	10.19	2.4884	10.06
<i>LSS-measure variables</i>								
Companion service	4.27E-04	0.77	4.05E-04	0.73	3.46E-04	0.62	4.41E-04	0.80
Counseling and other personal support	1.09E-03	2.70	1.09E-03	2.69	1.08E-03	2.66	1.08E-03	2.67
Daily activities	2.98E-03	4.58	2.99E-03	4.59	2.98E-03	4.54	3.01E-03	4.61
Personal assistance	8.13E-04	1.30	8.16E-04	1.31	7.87E-04	1.26	8.06E-04	1.29
Personal contact	5.73E-04	1.09	5.59E-04	1.07	4.85E-04	0.92	5.45E-04	1.04
Relief service in the home	1.64E-03	1.30	1.61E-03	1.28	1.70E-03	1.35	1.60E-03	1.28
Living in family homes or homes with special service for children and young persons	-7.76E-04	-0.53	-7.96E-04	-0.55	-9.84E-04	-0.68	-8.78E-04	-0.61
Residential arrangements with special service for adults	2.50E-03	3.98	2.50E-03	3.98	2.46E-03	3.92	2.43E-03	3.84
Short stay away from the home	1.07E-03	1.64	1.07E-03	1.64	1.09E-03	1.66	1.08E-03	1.64
Short period of supervision for schoolchildren aged above 12	1.11E-03	1.21	1.12E-03	1.22	1.02E-03	1.11	1.12E-03	1.22
Individuals receiving any LSS measure per capita age 0–64	5.45E-01	6.24	5.46E-01	6.25	5.42E-01	6.19	5.42E-01	6.21
Number of measures per capita age 0–64	-8.34E-02	-1.99	-8.34E-02	-1.99	-8.14E-02	-1.94	-8.14E-02	-1.94
§17-agreements of cost responsibility	4.83E-03	5.17	4.84E-03	5.18	4.86E-03	5.19	4.86E-03	5.21
§17-agreements of measure responsibility with municipality	-4.69E-03	-2.88	-4.75E-03	-2.91	-4.86E-03	-2.96	-4.71E-03	-2.88
<i>Municipal income variables</i>								
Grant-income SEK per capita	8.66E-06	2.88	8.57E-06	2.84	8.34E-06	2.74	8.64E-06	2.87
LSS-grant	1.33E-06	5.43	1.33E-06	5.44	1.34E-06	5.45	1.32E-06	5.39
Tax base per capita	1.61E-06	2.04	1.59E-06	2.01	1.45E-06	1.81	1.62E-06	2.04
<i>Municipal characteristics</i>								
Population density, inv per km <sup>2</sup>	-2.90E-05	-2.16	-2.92E-05	-2.17	-3.02E-05	-2.24	-2.91E-05	-2.16
Population size (log), age 0–64	7.12E-02	4.26	7.13E-02	4.27	7.17E-02	4.25	7.26E-02	4.34
Log Likelihood	348.108		348.128		342.828		348.057	
Nobs	288		288		284		288	

For computational reasons the municipalities of Norrtälje, Västervik, Sollefteå and Örnköldsvik are excluded from the analysis of the FUR neighborhood matrix, leaving 284 municipalities to be analyzed (these municipalities have no neighbors as neighbor is defined in the functional urban region neighborhood matrix)

<sup>a</sup> The estimates for the dummy variables for county councils are presented in Table 8, Appendix C

a county (GEOLAN); and functional urban regions (FUR); respectively, are used to define neighbors.<sup>16</sup>

In most cases, the sign and significance do not change between the two sets of specifications (i.e. when county council variables are included), except for the *Interaction term*, the *Counseling and other personal support* term and the *Residential Arrangements with special services for adults* term. In the model-specifications without explanatory variables for county councils, the term for Counseling and other personal support was positive but non significant. When controlling for county councils, the term is still positive, but now it is significant. The Residential Arrangements with special services for adults and the previously mentioned Interaction term have changed to negative; however, neither estimate is significant, which makes it impossible to draw any conclusions from this.

As mentioned in the data section, the LSS measure variables are measured as “Individuals with the (*measure*) per total number of individuals receiving any LSS measure”. Therefore, the result can be understood as when the shares of individuals with the measure *Daily Activities* increases, this has a positive effect on the LSS expenditures per capita (log), i.e., the LSS expenditure per capita increases. In the same way, when the share of individuals with the measure *Living in family homes or homes with special service for adults* increases, so does the expenditures per capita (log). The results also indicate that municipalities with §17 cost responsibility agreements have higher expenditures per capita, and municipalities with §17-agreements of performing the service have lower LSS expenditures per capita. Both these results are as expected, since §17-agreements only involve individuals with extensive needs. The share of “Individuals receiving any LSS measure per capita age 0–64” is also positive and significant as expected. The number of measures granted in a municipality does not, however, have any significant effect on the expenditure level of LSS.<sup>17</sup>

The population coefficient is positive and significant, indicating that with an increased population, LSS expenditure per capita (log) in a municipality increases. This is due to the fact that larger municipalities have a greater share of individuals with need of LSS services. The coefficient for population density is negative and significant; as the population increases in one specific area, due to economics of scale, expenditure decreases.

As expected, the coefficients for tax base, grant income and LSS grant all have a positive and significant impact on municipalities’ expenditure level on LSS per capita. Moreover, the coefficient for grant income is greater than the coefficient for tax base, which can be taken as evidence of the flypaper effect.<sup>18</sup> The flypaper effect refers to the occurrence where expenditure increases more from grants than from an

<sup>16</sup> As is evident in Table 6, the spatial interaction (lag) coefficient is negative and non significant for all specifications that includes explanatory variables for county councils. Furthermore, the ALPHA neighborhood specification does not differ much from GEO, GEOLAN, and FUR neighborhood specification. For that reason, an analysis without the spatial specification (OLS) was performed. Even though the quantitative results differ somewhat between the Spatial Lag Models and the OLS model, the qualitative results are the same. The OLS results can be obtained from the author upon requests.

<sup>17</sup> However, this term is significant at the 10% level for the model specifications with explanatory variables for county councils.

<sup>18</sup> Courant et al. (1979) coined the term “flypaper effect” as a result of Arthur Okun’s observation “money sticks where it hits”.

equivalent increase in income. However, when comparing the LSS grant and the tax base coefficients, there is no evidence of the flypaper effect, thus implying that the LSS grant is treated as any other tax income. Here, the municipalities may use the LSS grant to decrease the level of taxes in their municipalities.

## 5 Concluding remarks

The LSS services is the fastest growing activity of the municipalities and its expenditure has steadily increased over the years, even though the expenditure per capita varies greatly across municipalities. This variation in expenditures can to a great extent be explained by the nature of the LSS provision—where each person's individual needs differs from others'—but even accounting for this, large differences remain. In this paper, the determinants of differences in the municipalities' expenditures on LSS have been studied. By constructing different neighborhood specifications, social interaction among neighbors was studied as one explanation. Another explanation studied is related to the fact that county councils used to be the primary care givers of what later became the municipalities LSS service. In an effort to account for differences due to county councils, the model was specified with and without explanatory variables for county councils.

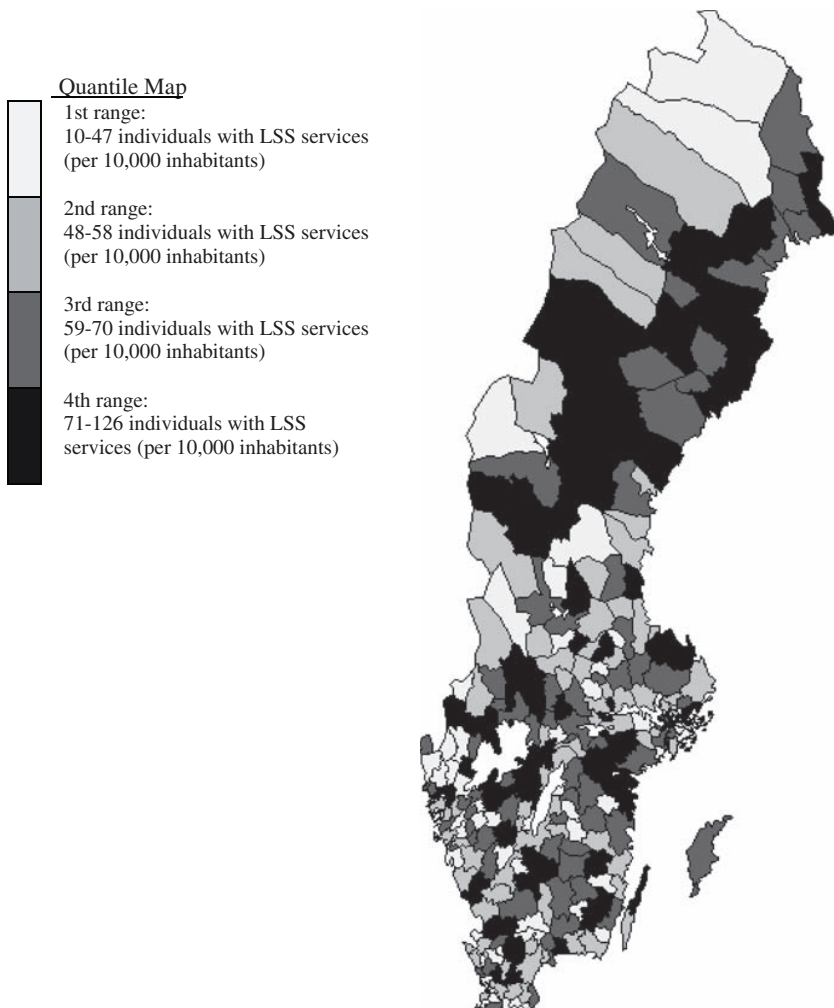
The results show a positive and significant interaction term for model-specification without explanatory variables for county council, indicating cooperation or mimicking among municipalities. However, due to the potential influence of county councils, specifications without explanatory variables for county council may not be satisfactory. The model was therefore specified with explanatory variable for county councils, and the results show a (negative) non significant interaction term. Since the interaction term is non-significant, this may indicate that for LSS-services, the municipalities does not engage in mimicking or interaction when determining their LSS level. However, it is not possible to determine if the positive interaction among municipalities found in the specifications without county councils explanatory variables are caused by municipalities belonging to the same county council, or if it is due to the fact that the municipalities in the same county cooperates or mimic each other. For example, the interaction may be due to county councils' differences in the level of diagnosis for individuals with LSS services, which would affect the municipalities differently. The similarities among neighboring municipalities may instead be due the fact that the county councils used to be caregivers for individuals with functional impairments, and that the county councils are still the ones diagnosing individuals receiving LSS services. It is clear, however, that the county councils play a large role when explaining the differences in the LSS expenditures among municipalities.

The differences in LSS expenditure per capita among the municipalities as well as the steady increase in LSS production have advocated a change in the system. After several investigations on how to best change the system, the parliament decided to implement "*The Act of LSS expenditure equalization system*" starting in 2004 (SFS 2003:386–387). The purpose of the system is to equalize and see to it that all municipalities have the same basic conditions in their LSS activity. Further studies are needed to determine the effect of the "*LSS expenditure equalization system*" and what the implications for the municipalities are. Therefore, one study could be to incorporate

the LSS expenditure system into the models to study if the municipalities' behavior has changed since the system was implemented. Furthermore, in order to determine if interaction among municipalities exists with regards to LSS expenditure, it would be vital to study if the municipalities have changed their behavior according to their neighborhood group after the implementation of the LSS expenditure equalization system.

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### Appendix A: Map of the number of individuals with LSS services per municipality in Sweden 2003



**Fig. 2** Individuals with LSS Services in the Municipalities (per 10,000 inhabitants), (NBHW 2003)

## Appendix B: Estimation results for the dependent variable *LSS expenditure per individual receiving LSS services*

Since the LSS services production is likely to exhibit economics of scale, an analysis with the dependent variable *LSS expenditure per individual receiving LSS services* has also been performed in an effort to capture it. The results of the analysis are presented

**Table 7** Estimation result for (log) *LSS expenditure per LSS individual* and for (log) *LSS expenditure per capita* (0–64), both models include dummy variables for county councils

Dependent Variable Explanatory Variables	log LSSexp/LSSind		logLSSexp/cap0–64	
	Estimate	z value	Estimate	z value
W_LSSEXP neighboring municipalities	–0.04896	–0.71	–0.0442	–0.77
Constant	5.46142	13.14	2.5394	9.45
<i>LSS specific variables</i>				
Companion service	–4.17E–04	–0.79	4.05E–04	0.73
Counseling and other personal support	4.30E–04	1.11	1.09E–03	2.69
Daily activities	2.11E–03	3.37	2.99E–03	4.59
Personal assistance	–3.72E–05	–0.06	8.16E–04	1.31
Personal contact	–3.50E–04	–0.70	5.59E–04	1.07
Relief service in the home	1.39E–03	1.15	1.61E–03	1.28
Living in family homes or homes with special service for children and young persons	–1.88E–03	–1.36	–7.96E–04	–0.55
Residential arrangements with special service for adults	1.67E–03	2.77	2.50E–03	3.98
Short stay away from the home	1.75E–04	0.28	1.07E–03	1.64
Short period of supervision for schoolchildren aged above 12	9.54E–05	0.11	1.12E–03	1.22
Individuals receiving any LSS measure per capita age 0–64	–2.04E–01	–2.43	5.46E–01	6.25
Number of measures per capita age 0–64	1.54E–02	0.38	–8.34E–02	–1.99
§17-agreements of cost responsibility	5.10E–03	5.70	4.84E–03	5.18
§17-agreements of measure responsibility with municipality	–4.23E–03	–2.69	–4.75E–03	–2.91
<i>Municipal income variables</i>				
Grant-income SEK per capita	7.22E–06	2.51	8.57E–06	2.84
LSS-grant	1.35E–06	5.76	1.33E–06	5.44
Tax base per capita	1.78E–06	2.36	1.59E–06	2.01
<i>Municipal characteristics variables</i>				
Population density, inv per km <sup>2</sup>	–1.84E–05	–1.43	–2.92E–05	–2.17
Population size (log), age 0–64	4.87E–02	3.04	7.13E–02	4.27
Log Likelihood	360.094		348.128	
Nobs	288		288	

The results for the dependent variable *LSS expenditure per capita* (0–64) are presented in the table for comparison. Both these models are estimated using the GEOLAN matrix (neighbors that are geographical neighbors within the same county council)

in Table 7. However, as mentioned, the results are almost identical to the results for the dependent variable *LSS expenditure per capita (0–64) already* presented.

All significant estimates continue to be significant with the same sign when analyzed with the dependent variable *LSS expenditure per individual receiving LSS services* except the estimate for the explanatory variable “Individuals with LSS services” (which is the share of individuals with LSS services in a municipality). The estimate for this variable is now negative and significant. However, this is as expected, since this variable captures the economics of scale of the LSS production. In this analysis, it can also be evident that the effect of the §17-agreements between the municipalities further indicates that the LSS production creates economics of scale. The municipalities with §17 cost responsibility agreements have higher expenditures per individual receiving LSS services, and municipalities with §17-agreements for performing the service have a lower LSS expenditure per individual receiving LSS services.

### Appendix C: Estimation results for the explanatory variables for county council (dependent variable *log LSS expenditure per capita*)

The explanatory variables for the county councils are dummy variables. The dummy variables takes the value “one” if the municipalities belong to the same county councils, otherwise it takes the value “zero”. As mentioned in the data section, there are 20 county councils in this study (the county council of Gotland is excluded).

**Table 8** Estimation results: Explanatory variables for county council (*dependent variable log LSSexp/cap 0–64*)

Variable	GEO		GEOLAN		FUR <sup>a</sup>		ALPHA	
	Estimate	z value	Estimate	z value	Estimate	z value	Estimate	z value
<i>County Councils<sup>b</sup></i>								
Uppsala	-4.62E - 02	-1.34	-4.65E - 02	-1.35	-5.46E - 02	-1.56	-4.53E - 02	-1.32
Södermanland	-4.48E - 02	-1.40	-4.70E - 02	-1.46	-5.68E - 02	-1.73	-4.72E - 02	-1.46
Östergötland	-1.38E - 01	-3.84	-1.40E - 01	-3.87	-1.48E - 01	-4.06	-1.35E - 01	-3.78
Jönköping	-1.20E - 01	-3.86	-1.22E - 01	-3.89	-1.31E - 01	-4.10	-1.20E - 01	-3.84
Kronoberg	-6.02E - 02	-1.78	-6.23E - 02	-1.83	-6.93E - 02	-2.01	-6.23E - 02	-1.84
Kalmar	-3.36E - 02	-1.00	-3.42E - 02	-1.02	-4.27E - 02	-1.22	-3.74E - 02	-1.11
Blekinge	-1.78E - 02	-0.45	-1.74E - 02	-0.44	-2.54E - 02	-0.63	-1.90E - 02	-0.48
Skåne	-1.41E - 01	-5.21	-1.41E - 01	-5.19	-1.50E - 01	-5.47	-1.37E - 01	-5.26
Halland	-9.85E - 02	-2.65	-9.96E - 02	-2.67	-1.08E - 01	-2.85	-9.86E - 02	-2.64
Västra Götaland	-5.38E - 02	-2.17	-5.40E - 02	-2.18	-6.16E - 02	-2.43	-5.50E - 02	-2.20
Värmland	-6.29E - 02	-2.13	-6.46E - 02	-2.18	-7.14E - 02	-2.37	-6.44E - 02	-2.16
Örebro	-6.84E - 02	-2.03	-6.88E - 02	-2.05	-7.65E - 02	-2.23	-6.97E - 02	-2.06
Västmanland	-1.43E - 01	-4.19	-1.45E - 01	-4.20	-1.52E - 01	-4.40	-1.40E - 01	-4.13
Dalarna	7.50E - 03	0.25	8.56E - 03	0.29	9.08E - 04	0.03	6.03E - 03	0.20
Gävleborg	8.69E - 03	0.27	7.83E - 03	0.24	5.74E - 04	0.02	6.00E - 03	0.19
Västernorrland	-6.71E - 02	-1.74	-6.83E - 02	-1.78	-8.60E - 02	-1.98	-7.44E - 02	-1.96

**Table 8** continued

Variable	GEO		GEOLAN		FUR <sup>a</sup>		ALPHA	
	Estimate	z value	Estimate	z value	Estimate	z value	Estimate	z value
Jämtland	-6.07E - 02	-1.57	-6.11E - 02	-1.60	-6.77E - 02	-1.72	-6.72E - 02	-1.76
Västerbotten	-1.03E - 01	-1.86	-1.04E - 01	-1.88	-1.12E - 01	-1.99	-1.09E - 01	-1.99
Norrbottn	-7.19E - 02	-1.76	-7.25E - 02	-1.78	-7.98E - 02	-1.92	-7.82E - 02	-1.95
Log Likelihood	348.108		348.128		342.828		348.057	
Nobs	288		288		284 <sup>a</sup>		288	

<sup>a</sup> For computational reasons, the municipalities of Norrtälje, Västervik, Sollefteå and Örnsköldsvik are excluded from the analysis of the FUR neighborhood matrix, leaving 284 municipalities to be analyzed (these municipalities have no neighbors as neighbor is defined in the functional urban region neighborhood matrix)

<sup>b</sup> The county of Stockholm is used as the reference county

From the estimates, it is evident that most of the county councils have significantly lower expenditure per capita than Stockholm county. Also, the estimates are similar between the different neighborhood matrices.

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II



# Intergovernmental Grants and Local Public Expenditure: Spending Decisions and Information Spillover Effects

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## **Abstract:**

This empirical study takes advantage of a new intergovernmental grant in order to investigate the expenditure behavior of the municipalities in Sweden in two ways. First, the grant is used to study the effect on municipal spending related to the grant. Second, the grant is used to test a hypothesis of spatial interaction among municipalities due to mimicking behavior. The grant and expenditures studied here pertain to one specific service area of the Swedish municipalities; services to functionally impaired individuals. The grant was introduced in 2004. The data used pertains to the period before (2001-2003) and after (2004-2007) the introduction of the grant. A fixed-effects spatial lag model is used to study the (possible) spatial interactions among municipalities. Interestingly, the results show that during the first time period, the municipalities interact with their neighbors when setting the expenditure level, possibly due to mimicking. In the second time period, after the introduction of the grant, there is no evidence of interaction. This would support the hypothesis that the governmental grants provide information to the municipalities and the need for mimicking diminishes with the grant.

**Keywords:** Local public expenditures, Intergovernmental grants, Spatial Interaction

**JEL classification:** H72, H77, R12



## 1. Introduction

The aim of this paper is to study the effect of a new intergovernmental grant distributed to Swedish municipalities. Two channels through which grants can affect public spending are hypothesized. First, similar to previous studies on intergovernmental grants, the effect of the grant on related public expenditure is studied. Second, and unlike other studies on intergovernmental grants, this study will also focus on the information and design of this particular grant and study if it makes municipalities change their level of interaction among each other.

Studies on intergovernmental grants usually address the effects on local public expenditures of the grant. While economic theory predicts that an increase in unconditional grants to a local jurisdiction should have the same effect as an equivalent increase in income (Bradford and Oates, 1971 a,b), empirical work on intergovernmental grants usually find that public spending from grants exceeds that from equivalent increases in income. This empirical phenomenon is labeled the *flypaper effect* since “money sticks where it hits”.<sup>1</sup> There are several studies on federal grants and local public expenditures in the literature. In a study on American data, Knight (2002) incorporates the political determination of federal grants and the effects of these grants on state policies, and finds that federal highway grants decrease state highway spending. Swedish studies include Dahlberg, Mörk, Rattsö, Ågren (2007) who study the effect of federal grants on the behavior of lower level governments. They find evidence of federal grants being used to increase local spending, but not to reduce the local tax rate.

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<sup>1</sup> Arthur Okun’s observation “money sticks where it hits” was named “flypaper effect” by Courant, Gramlich and Rubinfeld’s (1979).

On the other hand, Wikström (2007) finds that an intergovernmental grant toward public childcare did not affect the per-child expenditure, but it did affect the municipal tax rate. For surveys of the literature on intergovernmental grants, see e.g. Hines and Thaler (1995), and Oates (1999).

There are reasons to believe that local governments, such as municipalities, are interdependent when making expenditure decisions, deciding on the tax policy, or setting welfare levels. The interaction arising from the interdependence among the municipalities could be due to, for example, mimicking, competition, or spillover among the municipalities. This interaction could also have a spatial dimension. For one thing, the decisions made by a local government can also have consequences for surrounding jurisdictions, not only the own jurisdiction.<sup>2</sup> However, the spatial interaction must not necessarily be specific in a geographical context; other forms of closeness are also possible.<sup>3</sup> One of the first papers of spatial interaction is the study by Case, Hines and Rosen (1993), where they use a spillover model to study the budget spillover among U.S. states. Their results indicate that a state's government level of per capita expenditure is positively and significantly affected by the expenditure levels of its neighbors. Since the study by Case et al., there have been an increasing number of studies that include spatial interaction. For example, Dahlberg and Edmark (2008) find that there exists a "race-to-the-bottom" among neighboring municipalities regarding the welfare level; a

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<sup>2</sup> See e.g. Wilson (1999) for a review of the literature on tax competition and Brueckner (2003) for a description of the theoretical frameworks for strategic interaction among local governments.

<sup>3</sup> For example, spatial interaction could be modeled as political or economical closeness.

municipality's welfare level is positively and significantly affected by the welfare level in neighboring municipalities. For other studies on welfare and tax competition, see e.g. Revelli (2005) and Allers and Elhorst (2005). In a study on local public expenditure in the Czech Republic, Stastna (2009) finds a positive spatial autocorrelation for expenditure on housing and culture, possibly due to mimicking; while negative spatial autocorrelation is found for the expenditure on industry, infrastructure and environmental protection, which is consistent with the spillover hypothesis. For other studies on spatial spillover, see e.g. Murdoch, Rahmatian and Thayer (1993), Hanes (2002), and Lundberg (2006).

National governments sometimes impose new duties and responsibilities on local governments. One way of financing these new duties is by intergovernmental grants to the local governments. In this paper, one such intergovernmental grant is studied. This grant is associated with expenditures for one specific service area of the Swedish municipalities; services to functionally impaired individuals. The responsibility for these services, called LSS-services, was transferred to the municipalities in 1994 via a government reform (LSS-act 1993:387).<sup>4,5</sup> The LSS-act is an entitlement law that gives individuals with functional impairments the right to obtain support and services to obtain equal opportunities in living conditions and full participation in the community. Ever since the introduction of the LSS-act, there has been an increase in the expenditure for the services. The intergovernmental grant studied in this paper was

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<sup>4</sup> The LSS-act stands for "The Act Concerning Support and Service for Persons with Certain Functional Impairments" (*in Swedish: Lag om stöd och service till vissa funktionshindrade*).

<sup>5</sup> See Birkelöf (2008) and for a more detailed description of the services to functional impaired.

introduced in 2004 as a response to the increased expenditure for the LSS services. In this paper, it is studied how the grant affects the local governments' decisions with regard to LSS services. Is the grant used to increase spending on LSS services? If so, is the increase greater than a similar sized increase from other income, contrary to theory? In addition, is the intergovernmental grant associated with information to the municipalities? Here, it is hypothesized that the interaction among municipalities arises from mimicking and/or cooperation among the municipalities. The grant is based upon a nationally determined standardized cost, and since this information is transparent in the grant, these standardized costs could be used by the municipalities that seek information (at the expenditure/service level), rather than mimicking each other. In order to study the effect of this grant, two separate time periods are used. The first time period, 2001-2003, corresponds to the time before the introduction of the grant, and the second time period, 2004-2007, corresponds to the time period after the introduction of the grant. To support the hypothesis that, via the information on standardized costs, the intergovernmental grant decreases the need for information mimicking, the level of interaction among municipalities should decrease in the second time period.<sup>6</sup>

The contribution of this paper is twofold. First, it adds to the public expenditure literature by analyzing the behavior of municipalities with regard to a new intergovernmental grant. The grant is directed toward an area that has experienced high increases in expenditure due to an earlier

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<sup>6</sup> It cannot be ruled out that earlier cooperation among municipalities also affects the level of interaction. However, as will be described later in this paper, the cooperation agreements were only applicable for two of the nine LSS services studied here.

governmental reform of this particular service area. Second, it adds to the spatial interaction literature by showing that spatial interaction could be due to lack of information and the municipalities thus mimicking in order to avoid information costs. Although this study pertains to expenditures in Sweden, it may still be of interest to other countries, especially since the social support system continues to develop throughout the world. With the increasing social support sector, as well as the growing elderly population, many countries are currently experiencing an increasing expenditure burden.

The rest of the paper is organized as follows. Section 2 describes institutional characteristics of the LSS-act and section 3 discusses theory and the empirical model. Section 4 describes the data and section 5 presents the empirical findings, while concluding remarks can be found in section 6.

## **2. Institutional Characteristics**

The Act Concerning Support and Service for Persons with Certain Functional Impairments (LSS) is an entitlement law to guarantee individuals with major and long-term functional disability equality in living conditions and full participation in the community.<sup>7</sup> The responsibility for the LSS service provision largely resides with the municipalities that are responsible for nine of the ten LSS services; while the county council is

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<sup>7</sup> The LSS-act contains provisions relating to measures for special support and special services for those with an intellectual disability, autism or a condition resembling autism; or for those with a significant and permanent intellectual impairment that occurred after brain damage in adulthood, or for those with other major and permanent physical or mental impairments not due to normal aging.

responsible for the remaining service.<sup>8</sup> There has been a significant increase in the expenditures for LSS services over the years and there are also large differences among municipalities.<sup>9</sup> To a great extent, this variation in expenditures can be explained by the nature of the LSS service production. While LSS naturally depends on the specific needs of the individuals and the number of services required, it also depends on the concentration of individuals with a need for LSS services in the municipalities.

The expenditures on LSS services constitute a substantial<sup>10</sup> part of the spending on services in the municipalities; however, the resources are limited and many of the municipalities have not fulfilled their obligations according to the LSS-act (The National Board of Health and Welfare, NBHW, 2005). Table 1 shows the total number of individuals with LSS services in Sweden, as well as the total number of LSS services provided (each individual can get more than one LSS service). As shown by Table 1, there has been a steady increase in both the number of individuals and the expenditure per person during the period 2001-2007. For example, during 2001-2007, the number of individuals receiving LSS has increased by more

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<sup>8</sup> The ten services are: relief service in the home; children in residential homes; adults in residential homes; daily activity; personal contact; after school supervision; short stay away from home; companion service; personal assistance, and counseling and other personal support (which is the responsibility of the county councils).

<sup>9</sup> The expenditure studied in this paper only pertains to the nine services performed by the municipalities since they are the only ones included in the LSS expenditure equalization system. One of the LSS services, *Personal Assistance*, is the responsibility of the municipalities for the first twenty hours (per week). If a person's needs call for more than twenty hours per week, this is a federal government (Social Service Administration) responsibility (as regulated in the LASS, *Assistance Benefit Act*).

<sup>10</sup> For example, the expenditures for LSS are 24-28 percent of the total expenditures for the whole "Elderly and Disabled" sector (calculated by using expenditures available at [www.WebOr.se](http://www.WebOr.se); provided by the Swedish Association of Local Authorities and Regions).

than 20 percent. For a more thorough review of the LSS-act and its development, see Birkelöf (2008) and Lewin, Westin and Lewin (2008).

**Table 1.** Descriptive statistics, LSS characteristic.

	2001	2002	2003	2004	2005	2006	2007	Increase 2001-07
Individuals with LSS services*	47330	48863	51662	52994	54360	54824	56880	20.2%
Number of LSS Services granted*	82464	85462	90352	93083	95254	97712	99457	20.6%
Avg. expenditure per individual receiving LSS service, SEK**	424300	414646	420680	424737	428720	447371	447388	5.5%

\*LSS services here only refer to the nine services performed by the municipalities.

\*\*Prices adjusted to 2001 year prices.

### *LSS Expenditure Equalization Grant*

The financing of municipalities' LSS services has been subject to controversy ever since the LSS-act was implemented. For example, the Swedish Association of Local Authorities and Regions (SALAR)<sup>11</sup> believes that a federal financing of LSS services would be the best way of creating equal conditions for the municipalities as well as helping the municipalities operate a well functioning service. In 2000, the government appointed a group to investigate how to best equalize the expenditure for the LSS services among municipalities (SOU 2002:103). While the investigations took place, the government distributed a 350 million SEK grant to municipalities with extraordinarily high costs for their LSS services. Certain criteria had to be met to receive the grant; however, the grant itself was unconditional, meaning that there were no restrictions on how

<sup>11</sup> In Swedish: Sveriges Kommuner och Landsting (SKL).

to spend it. The eligible municipalities, each year approximately 50 out of 290, received the grant for the years 2001-2003.<sup>12</sup> Then, in November 2003, the government decided to implement the new expenditure equalization system for LSS expenditure starting in 2004.<sup>13</sup> The purpose of the new grant was to equalize the cost for LSS services among municipalities via an intra-municipality system.

The *LSS expenditure equalization grant* (LSS-EQ grant) is separate from the ordinary *General grant* system for income and cost equalization (where, for example, the structural cost difference for the mandatory services of municipality and county councils is accounted for). However, similar to the general grant and the temporary LSS grant (2001-2003), the LSS-EQ is also an unconditional grant. To determine the size of a municipality's grant (or fee), the standardized cost for the municipality's LSS service is calculated and compared to the calculated standardized cost of the whole country. The calculation of the standardized costs is transparent and to some extent publicly available (at Statistic Sweden's website, [www.scb.se](http://www.scb.se)). The standardized cost is calculated by multiplying the number of LSS services by a national average cost for each service. The cost is also adjusted by a *concentration index* and a *personnel cost index*. The purpose of the concentration index is to reduce/compensate for *economies of scale*. The purpose of the personnel cost index is to adjust for differences in the

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<sup>12</sup> Each year, the municipalities had to meet the criteria (i.e. the expenditure had to be at a certain level). Most of the municipalities that received the grant one year also received it for the two other years, although there were some municipalities that received it only once or twice.

<sup>13</sup> The decisions were based on the Legislative Proposal 2002/03:151 "Equalization of certain costs for special support to individuals with functional impairments" (*In Swedish: Utjämning av vissa kostnader för stöd och service till funktionshindrade*), and from a federal report "Equalization of costs for LSS" (*In Swedish: Utjämning av LSS-kostnader*), SOU 2002:103.

requirement of support (some LSS services require more personnel than others). Then, finally, the standardized cost is adjusted by *Net Price Index*. Unlike the temporary grant of 2001-2003, the size of the LSS-EQ grant is known to the municipalities in advance. For a more thorough review of how the LSS-EQ grant is calculated, see Appendix A.

**Table 2.** Standardized Cost\* for municipalities and the nation.

Year	Calculated Standardized Cost for Municipalities				National
	Mean	Std.Dev	Min	Max	Mean
2004	2334 (2544)	684 (817)	564 (357)	4841 (5775)	2293
2005	2582 (2659)	806 (839)	487 (501)	5858 (6262)	2546
2006	2713 (2841)	769 (877)	814 (607)	5137 (6132)	2681

\*The values are shown in SEK per capita, adjusted to 2001 year prices.

Note: the values within parenthesis are the actual expenditures for LSS as reported by the municipalities.

The standardized cost, per capita, is computed for every municipality and for the whole nation. If a municipality's calculated standardized cost is higher than the national standardized cost, the municipality receives a grant. On the other hand, if a municipality's standardized cost is lower than the national standardized cost, the municipality must pay a fee.<sup>14</sup> The grant (or fee) that a municipality is to receive (pay) is multiplied by the population of the municipality. For comparison, Table 2 shows the calculated standardized cost for the municipalities and the country's standardized cost. The municipalities' actual expenditures for the LSS services are shown within parentheses. Between 2004 and 2008, certain transition rules consisting of a *maximum fee* and a *maximum grant* apply. During the transition period, the difference between the total grant and

<sup>14</sup> The equalization system is regulated in two laws; the law of equalization-fees (SFS 2003:886) and the law of equalization-grants (SFS 2003:887).

the total fee (from all municipalities) is financed by the federal government. Therefore, the equalization system will not be fully implemented until the year 2009.

*Cooperation/agreements among municipalities*

The municipalities are responsible for providing LSS services to their citizens. However, if a municipality is not able to provide the service itself, then (as regulated by §17 in the LSS-act) cooperation among municipalities is possible for two of the LSS services: *children in residential homes* and *adults in residential homes*. Municipalities can enter into agreements with one another where one municipality retains the cost responsibility for its residents living in special residential homes in another municipality, while the other municipality provides the services. The §17-agreements are used by, for example, small municipalities which do not have the ability to provide the service themselves. Municipalities entering into §17 agreements get a lower LSS expenditure per capita than they otherwise would (Birkelöf, 2008). However, due to the introduction of the LSS expenditure equalization grant in 2004, many municipalities have canceled the §17-agreements. The individuals living in the residential homes are now registered citizens of the municipalities where the residential homes are located, and their costs are instead included in the expenditure equalization system.

### **3. Theoretical Framework and Empirical Strategy**

This section will start with a brief discussion on the theory of intergovernmental grants and the theoretical backgrounds of the different fiscal interaction models. This is followed by a discussion of how the *LSS expenditure equalization grant* and the (possible) fiscal interaction with regard to services for functionally impaired are linked.

#### **Theoretical Background**

##### *Theory of Intergovernmental grants*

In the theory of intergovernmental grants and the basic median voter model, the source of income is of no importance for the local government. Therefore, grants and local income have similar effects on local spending as long as the grants are given lump-sum (Bradford and Oates, 1971 a,b). Grants to the local government should be treated as any other income, i.e. they should be allocated according to the income elasticities of the median voter. However, contrary to theory, the empirical literature on public expenditures usually finds that public spending is increased more by (lump-sum) grants than by local income. This is the so-called flypaper effect, since “money sticks where it hits”. For surveys of the literature on intergovernmental grants, see e.g. Hines and Thaler (1995) and Oates (1999).

There are two groups of intergovernmental grants: unconditional grants and conditional grants. Unconditional grants are free to be spent in any way, and the way in which they are usually designed implies that income from unconditional grants should have the same impact on local spending as the same size increase in local residents’ income. Conditional grants, on

the other hand, are grants given for specific purposes; for example, the national government can use these to compensate the local government for carrying out a specific program. Their use is normally restricted; the money cannot be spent on other expenditure programs or be used to cut taxes. In addition to the two groups of grants, there is also a second dimension to the grants; they can either be matching or non-matching grants. Non-matching grants are often used to increase equality among jurisdictions, in terms of income/spending. Matching grants are designed as price subsidies; these grants have an income effect as well as a substitution effect. The grant decreases the relative price of the service/expenditure. Therefore, matching grants should have a flypaper effect since they affect the slope of the budget line, while non-matching grants only have an income effect and should not have a flypaper effect. However, studies of non-matching grants usually find a flypaper effect; contrary to theory. For an extensive review of intergovernmental transfers; see *Intergovernmental Fiscal Transfers: Principles and Practice* Boadway and Shah (eds.) (2007). Both the temporary LSS grant and the permanent LSS expenditure equalization grant studied in this paper are unconditional non-matching grants. Although designed for a specific purpose, there is no restriction on how municipalities spend them. Since there are no restrictions, the effect of the grants can be in the form of higher quality on the services for LSS (due to increased spending on LSS services); lower tax rates in the municipalities; or increased spending on other municipality services. Naturally, a mixture of these three outcomes is also possible.

#### *Theory of Fiscal Interaction*

There are several reasons to believe that local jurisdictions, such as municipalities, are interdependent when making tax policy, welfare level or

expenditure decisions. One reason why municipalities are interdependent is that the benefits of public spending in one jurisdiction can spill over to neighboring jurisdictions. The interdependence among local governments could then cause a strategic interaction among jurisdictions. For example, infrastructure, environmental protection, and parks in one jurisdiction can increase the welfare of residents in a neighboring jurisdiction. The neighboring jurisdiction can then “free-ride” and decrease its own spending on these services. In this sense, public expenditure from one jurisdiction enters the welfare function of other jurisdictions, *directly affecting* the jurisdiction. Local jurisdictions can also be *indirectly affected* by the fiscal policies of other jurisdictions (Brueckner, 2003). In order to attract a mobile tax base, a local jurisdiction can compete with lower tax rates as compared to nearby jurisdictions. This is due to the idea that individuals “vote with their feet” and move to a community that provides the desired level of a public good/tax rate.<sup>15</sup> Interaction of this type can also be applied to welfare benefits. However, here the jurisdictions compete with low levels of welfare benefits in order *not* to attract welfare recipients (Brueckner 2000). This is the so-called race-to-the-bottom behavior.

The interdependence among local governments could also arise from yardstick competition (performance comparison). The interaction comes from the existence of an informational externality among neighboring jurisdictions due to imperfect information, and the cost of obtaining information (Besley and Case, 1995). Imperfectly informed voters can use the performance of other jurisdictions as a yardstick when evaluating their

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<sup>15</sup> This is the so-called “Tiebout migration” where migration to other regions is motivated by fiscal gains. This argument was originally presented by Tiebout (1956).

own politicians' performance. In their study, Besley and Case conclude that politicians in office need to look at other local politicians and their decision making before making their own decisions (to avoid the risk of not being reelected). The yardstick model can also be applied to local governments themselves, i.e. local governments can also be incompletely informed. The yardstick model is commonly used for comparison of performance among local governments, so-called benchmarking. A local government can – when deciding on the best policy or expenditure level – use nearby jurisdictions as a yardstick/benchmark and mimic their policy or expenditure level in order to avoid an information cost associated with obtaining the information themselves. Yardstick competition could be used to study local governments' decision making, for example, what service level to provide. For a survey of the empirical literature on strategic and fiscal interaction, see Brueckner (2003) and Revelli (2005).

#### *LSS-EQ Grant and Fiscal Interaction*

The hypothesis in this paper is that municipalities interact with one another when setting their LSS expenditure level. Since LSS services constitute a type of social service provisions, the expected source of fiscal interaction might be consistent with the theory of fiscal competition, in particular race-to-the-bottom. However, in this paper, it is argued that the source of interaction among nearby municipalities is due to lack of information on the municipalities' side. Therefore, the source of fiscal interaction in municipalities comes from the yardstick model, in particular mimicking. As previously mentioned, the LSS-act is an entitlement law, which gives eligible individuals the right to obtain services in accordance with the act. Since it is an entitlement law, the usual goals of the local government are not applicable in the same way here (quantitative goal, for

example). There are at least three reasons why the yardstick model is the most likely source of interaction in the present case. First, the LSS service provision became the responsibility of the municipalities via a reform in 1994 and the entire new LSS-act was implemented at the same time. The LSS-act extended the number of people eligible to receive services, as well as the number of services offered (as compared to when the county council was responsible for providing the service). Only general guidelines for the provision of LSS services were provided for the municipalities and therefore, the uncertainty was great. Thus, in order to get information, while minimizing the information costs, the municipalities may mimic each other in their effort to provide the service. Second, only about 0.5 percent of the population receives services according to the LSS-act and, as a group, they are not very mobile. Furthermore, many of individuals who receive LSS services are dependent on having friends and family nearby, thus making them even less mobile. Third, one of the reasons for the LSS reform (the transfer of responsibility from the county level to the municipality level) was the aim of not having any differences in the provision due to geographical location. Since there are still differences among municipalities, this may point to a lack of information on what the service level should be rather than believing that some municipalities deliberately set their own LSS service/expenditure level below that of others.

With regard to the theory of intergovernmental grants, the LSS-EQ grant is known to the municipalities in advance and, as mentioned, the grant is an unconditional non-matching grant. The municipalities will therefore take the LSS-EQ grant into account when allocating their budget for the coming year. If municipalities increased their spending on LSS services by

more than a similar increase in income, it would be consistent with the flypaper effect; i.e. intergovernmental grants increase local expenditures. The temporary grant, on the contrary, was associated with great insecurity, and it is likely that the municipalities would not expect or include it when budgeting their LSS service provision for the coming year. If that is true, then municipalities receiving the (unconditional) temporary grant would view this as any other income, i.e. they would not increase (or decrease) their spending on LSS services as a result of an increase in the grant.

### **Empirical Model**

Spatial interaction among governments arises when the spending decision in one jurisdiction does not only depend on its own characteristics but also on the level of spending by other jurisdictions. The dependence could either be directly, such as in the spillover model, or indirectly, as in the tax- or yardstick competition models. Spatial interaction can be modeled either in the *spatial lag model* or the *spatial error model*. In the spatial lag model, the interaction is specified by including a spatially lagged dependent variable; in the spatial error model, the spatial dependence is in the error term.<sup>16</sup> When spatial dependence is due to strategic interaction, it is theoretically consistent with including a spatially lagged dependent variable in the model. Since the hypothesis in this paper is that the municipalities mimic/interact with nearby municipalities, spatial interaction will be modeled according to the lag model.<sup>17</sup>

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<sup>16</sup> In the spatial error model, the dependence could be due to omitted variables or shocks that are spatially dependent themselves.

<sup>17</sup> However, in the results section, a Lagrange Multiplier test is presented to discriminate between the two models. The LM tests points toward the spatial lag model being the correct way of specifying the spatial dependence in this case.

In general, the spatial lag model can be specified as (in matrix form)

$$Y = \delta WY + X\beta + \varepsilon \quad (1)$$

where  $Y$  is a vector of spending,  $W$  is a weight matrix that describes the neighborhood relationship,  $X$  is a matrix of explanatory variables for the jurisdictions,  $\varepsilon$  is a vector of errors; and  $\delta$  and vector  $\beta$  are parameters to be estimated, where  $\delta$  is the spatial interaction parameter. One major issue in the estimation of the spatial lag model is the endogeneity of  $Y$ . Since  $Y$  appears on both sides of the equation, multidirectional dependence between the dependent variables exists, and errors for one observation are likely to be related to the errors in neighboring observations, i.e. spatial dependence (Anselin, 1988). The resulting correlation means that ordinary least squares (OLS) estimates of the parameters of the equation are biased and inconsistent. This requires the use of alternative methods for estimating the model; either by using instrument variables (IV) or using maximum likelihood (ML) estimator.

In this paper, panel data is used in order to study the effects of the LSS intergovernmental grants during different time periods. Panel data will generally be more informative, with more variation and less collinearity among variables (Elhorst, 2003). Panel data also allows for the specification of more complicated behavioral hypotheses including effects that cannot be addressed using pure cross-sectional or time-series data (Hsiao 1986, Baltagi 2001). The traditional fixed effects model has been extended to include a spatial lag dependence specification<sup>18</sup> (Anselin and

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<sup>18</sup> The traditional fixed effects model has also been extended to include a spatial error specification; see Anselin and Hudak (1992).

Hudak, 1992). Following Elhorst (2003), the spatial lag model extended to include fixed effects for space and time can be specified as:

$$Y_{it} = \delta W Y_{it} + X_{it} \beta + \alpha_i + \mu_{it} + \varepsilon_{it}, \quad (2)$$

where  $i = 1, \dots, N$  is for spatial units (municipalities), and  $t = 1, \dots, T$  is for time dimension.  $\delta$  is the spatial interaction parameter to be estimated;  $\alpha_i$  and  $\mu_{it}$  are the variable intercept treated as fixed, representing the effect of the omitted variables that are unique for each municipality and year. The weight matrix,  $W$ , describes the relationship between the neighboring units,  $\omega_{ij}$ <sup>19</sup>. To estimate the model, the weight matrix  $W$  must be defined in advance. In the literature, it is common to define neighbors based on geographical contiguity or distance.<sup>20</sup> The hypothesis in this paper, with regard to spatial interaction, is that nearby municipalities mimic and interacts with one another in order to obtain information (on the expenditure level for LSS). To not only include the closest neighbor, the neighborhood weight matrix is based on a second-order binary contiguity matrix for Swedish municipalities.<sup>21</sup> Both a municipality's neighbor and its neighbor's neighbor are considered to be neighbors in the second-order contiguity matrix. If the spatial interaction parameter is significantly different from zero, the hypothesis of no spatial interaction can be

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<sup>19</sup>  $\omega_{ij}$  takes the value of one if municipalities  $i$  and  $j$  are neighbors, and zero otherwise. The diagonal in  $W$  (the municipality's own spending:  $\omega_{ii}$ ) is always zero. Furthermore, the weight-matrix is row standardized, so that each row sums to one.

<sup>20</sup> Other definitions are also possible, such as political or economic closeness.

<sup>21</sup> Other definitions of neighbors are also possible. For example, "neighbors" could be based on the size of the municipalities or defined as commuting regions. In Birkelöf (2008), a set of different neighborhood matrixes was tested with regard to expenditures for LSS services, and the interaction among municipalities seems to be in geographically close municipalities.

rejected and it can be interpreted as an indication of the neighboring municipalities interacting with each other.

To get consistent estimates for the  $\beta$  coefficients, the use of demeaned spatial regression may be appropriate (Anselin, Le Gallo, and Jayet 2008, Elhorst 2003).<sup>22</sup> The demeaned equation is obtained by subtracting the average for each cross-sectional unit computed over the time dimension – which eliminates the individual fixed effects as well as the constant term (Anselin et al. 2008).<sup>23</sup> To address the endogeneity issue of  $Y$ , the model will be estimated using maximum likelihood method.<sup>24</sup>

To study the hypothesis of interaction due to information spillover, the data in this study is divided into two data sets in order to study the effect of the *LSS expenditure equalization grant*, implemented in 2004. The hypothesis is that the spatial interaction parameter in the two time periods differs from one another due to the LSS-EQ grant. Both the temporary *LSS grant* and the permanent *LSS expenditure equalization grant* are included in this study; the temporary grant is included in the first time period, while the permanent grant is included in the second time period. The temporary

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<sup>22</sup> In Elhorst models, the log-likelihood uses  $\sigma^2 I$  as the error variance, not  $\sigma^2 Q_{NT}$  (in Anselin et al. 2008, p 641).

<sup>23</sup> The dependent and explanatory variables for every spatial unit (municipality) are taken in deviations of their average over time. For example, the dependent variable is defined as (Elhorst, 2003):

$$Y_{it} - \bar{Y}_i \text{ where } \bar{Y}_i = \frac{1}{T} \sum_{t=1}^T Y_{it}$$

<sup>24</sup>All computations are performed using the standard Matlab software packages (v.7.0) plus the freely available spatial panel routine toolbox downloaded from James P. LeSage's website at [www.spatial-econometrics.com](http://www.spatial-econometrics.com). Furthermore, the code for fixed effect spatial panel models is downloadable from the J.P. Elhorst website at [www.rug.nl/staff/j.p.elhorst/projects](http://www.rug.nl/staff/j.p.elhorst/projects)

grant is not expected to have any effect on the dependent variable *LSS expenditure* or affect the level of mimicking. That is, municipalities are still expected to mimic each other since this grant did not provide any information; i.e. the spatial interaction coefficient is expected to be positive. The LSS-EQ grant, on the other hand, is expected to affect both the dependent variable and the lag parameter. If the LSS-EQ grant provides the municipalities with information about the expenditure level, as is the hypothesis, the need to mimic its neighbors should decrease or diminish; therefore, the coefficient should not differ from zero. In the second period, municipalities are expected to use part of the grant to increase their expenditures for LSS services since the grant is known to the municipalities in advance.

#### **4. Data**

This study uses a seven year panel data set for Swedish municipalities, divided into two datasets; 2001-2003 and 2004-2007. There are 290 municipalities and 21 county councils in Sweden. All municipalities except one, Gotland, are included in the analysis. Gotland is excluded because the municipality and the county council coincide and therefore have a different role than the other municipalities. All the data in this study is collected from Statistics Sweden (SCB), except the LSS service variables that are collected from the National Board of Health and Welfare (NBHW). Descriptive statistics – including mean, minimum and maximum values – for all variables are presented in Table 3 and Table 4, for the years 2001-2003 and 2004-2007, respectively.

*Dependent variable*

The dependent variable in this study is *LSS expenditure per capita* (measured in SEK). All monetary variables in this study are adjusted to 2001 SEK using the Consumer Price Index (CPI) from Statistics Sweden. The dependent variable is chosen to study the effect of the grants on the LSS expenditure, but it is also chosen to reflect changes in quality of the LSS service (for example, increased expenditure may be a sign of higher spending on personnel).

*Explanatory variables*

In addition to the explanatory variables for the two LSS grants, explanatory variables for the different LSS services are also included in the analysis. The *LSS expenditure per capita* consists of the expenditures from all nine LSS services. However, the nine services are not equally cost intensive. To control for this, there are two alternative ways of measuring the impact of the different services on the expenditures. One way is to construct an index of how cost intensive each service is. Another way is to use the number of individuals that is granted each service in the analysis. Since the expenditures for the services are not reported individually, it is not possible to construct an index. Instead, to account for the differences in cost-intensity, the second option is used.<sup>25</sup> Specifically, the LSS services variables are reported as “the number of individuals in a municipality with LSS service (daily activity for example), as a share of all individuals receiving any LSS service in that municipality”.

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<sup>25</sup> Seven of the LSS services provided by the municipalities are included as explanatory variables in this study. The two services that are excluded, children living in residential homes and relief service in the home are only granted to a few individuals and thus, there is no variation in the data over the years.

**Table 3.** Descriptive statistics 2001-2003.

Variable	Mean	Std.Dev	Min	Max
LSS expenditure, per capita, SEK	2380	809	432	6080
LSS temporary grant, per capita, SEK	53	156	0	1380
Tax base, per capita, SEK	113094	15782	87300	240300
General Grant, per capita, SEK	8060	4773	-15052	22699
Population (log)	4.26	0.39	3.41	5.88
Share of population age 75+, percent	9.74	2.25	3.21	15.45
Share of population age 7-16, percent	13.95	1.24	7.99	17.61
LSS service variable*:				
- Daily activity	44.11	11.87	0	88.00
- Personal Assistance	10.60	10.10	0	80.00
- Companion Service	17.16	12.24	0	61.33
- Personal Contact	30.37	13.23	0	73.68
- Short stay away from home	20.74	8.76	0	54.55
- After school supervision	6.93	5.28	0	35.00
- Adults in residential home	34.90	12.15	0	72.37
Individuals with LSS services per 10000 inhabitants (0-64)	57.69	17.40	10.14	150.31

\*the share of the individuals in a municipality with (a specific) LSS service of all individuals receiving any LSS service in that municipality.

For example, from Table 3, 44 percent of those who receive any LSS service receive the service *Daily activity*. This makes it the most common service. The service *Adults in residential homes* is the most expensive service and about 35 percent receive this. In a comparison between the two time periods, we can see that the percentage distribution of the share of individuals with each service is similar. However, the number of individuals receiving LSS services has increased from 57 to 63 (per 10000 inhabitants). Moreover, the average LSS expenditure per capita has increased over the two time periods, from 2380 to 2720 SEK.

**Table 4.** Descriptive statistics 2004-2007.

Variable	Mean	Std.Dev	Min	Max
LSS expenditure, per capita, SEK	2720	854	363	6769
LSS-EQ grant, per capita, SEK	71	675	-1150	3407
Tax base, per capita, SEK	128004	15652	101200	245400
General Grant, per capita, SEK	7112	4657	-14367	22267
Population (log)	4.26	0.40	3.41	5.90
Share of population age 75+, percent	9.84	2.23	3.43	16.17
Share of population age 7-16, percent	12.90	1.27	7.11	17.23
LSS service variable*:				
- Daily activity	45.27	11.12	0	85.19
- Personal Assistance	7.96	7.22	0	51.94
- Companion Service	17.81	11.94	0	67.54
- Personal Contact	32.48	13.13	0	78.95
- Short stay away from home	19.50	8.25	0	54.55
- After school supervision	8.35	5.11	0	33.33
- Adults in residential home	34.96	11.45	0	64.47
Individuals with LSS services per 10000 inhabitants (0-64)	62.89	17.05	15.41	160.46

\*the share of the individuals in a municipality with (a specific) LSS service of all individuals receiving any LSS service in that municipality.

Along with the two *LSS grant* variables, *General grant* is also included in the analysis. As mentioned in the theoretical discussion in section 3.1, in the basic median voter model of public finance, grant revenue is treated as any other income. However, contrary to theory, the empirical literature often finds that local public expenditures increase more with grants from the central government than with an equivalent increase in private income. To verify if the flypaper effect is evident here, the effect on LSS expenditure of an increase in *LSS-EQ grant* and the effect on LSS expenditure of an increase in *General grants* should be greater than the effect on LSS expenditure of revenue steaming from an increase in the *Tax base*.

Additional explanatory variables are used to control for municipal characteristics that may affect the composition of expenditures in different municipalities. The age structure is measured by the *share of the population aged 75 or older* and *the share of the population between the ages 7-16*. These two variables are used in order to account for municipalities with a high share of elderly people or individuals of school age. Since the LSS-EQ grant is unconditional, if a municipality has a high share of elderly people, for example, the municipality may choose to spend the grant on elderly care. Finally, the natural logarithm of the total population is also included as a variable to control for population size effects on LSS expenditure.

#### *Merged data and missing observations*

In 2003, the municipality of Uppsala was split into two municipalities, Uppsala and Knivsta. In this analysis, these two municipalities are added together for the years 2004-2007 (values weighted by population). The data for the LSS service variables is available as the number of individuals granted each LSS service. As mentioned in section 2, the service *Personal assistance* is regulated by both the LSS-act (up to twenty hours per week) and the LASS-act (for more than twenty hours per week). Prior to 2004, many municipalities over-reported the number of individuals with *Personal assistance*; they also included individuals with services granted by the LASS-act (which is the responsibility of the Social Service Administration). This was clarified in 2004, causing the reported number of individuals with *Personal assistance* to decrease to a more correct value (NBHW, 2005). Due to the sensitive nature of the LSS data, values for municipalities that only have one, two, or three individuals with a particular LSS service are not available. Therefore, the value *two* is used in lieu of the non-available data.

Nine municipalities<sup>26</sup> have missing values for the *LSS expenditure per capita* variable for the year 2001. Instead, the values for 2002 are used. The municipalities Härjedalen and Simrishamn have missing values for *LSS expenditure per capita* for the year 2002. Here, the mean values of 2001 and 2003 are used.

## 5. Empirical Findings

In this section, the results for the model discussed in section 3 are presented. As previously mentioned, the data is divided into two separate periods, 2001-2003 and 2004-2007, in order to study the effect of the temporary and permanent LSS grants. The determinants of LSS expenditure per capita are first estimated with Ordinary Least Square (OLS) and then with the Spatial Lag Model (SAR), including municipality-specific and time-specific fixed effects.<sup>27</sup> The results are presented in Table 5.

The spatial lag model is theoretically consistent with spatial interaction among municipalities studied in this paper; even so, we must test to decide which spatial model to use: the spatial error model or the spatial lag model. In the search for the right specification, “the classical approach” is

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<sup>26</sup> The nine municipalities are: Bollebygd, Finspång, Gislaved, Herrljunga, Svedala, Svenljunga, Torsby, Varberg, and Vindeln.

<sup>27</sup> In addition, three other specifications of the models were tested. One specification did not include any fixed effects; another specification included fixed effects for time only. However, both these specifications were outperformed by the specification presented in this paper. The third specification included fixed effects for municipalities only; since it is important to include time trends in this study, the model with fixed effects for both municipalities and time was chosen. The results from the above specifications can be obtained from the author upon request.

used.<sup>28</sup> First, an OLS model is estimated. Then, a hypothesis of no spatial dependence is tested using a Lagrange Multiplier test (denoted LM test). Anselin et al. (1996) have developed an LM test to test for spatial dependence in the dependent variable or the error term for cross-sectional settings. Recently, Anselin et al. (2008) also specified the LM tests for spatial panels.<sup>29</sup> The LM test statistic is used to test the null hypothesis that the spatial dependence parameter is equal to zero. A rejection of the null hypothesis indicates that there is spatial dependence among neighboring regions, due to, for example, mimicking. If the hypothesis of no spatial dependence is rejected, then the LM tests are used to select between the lag and the error model. If the LM tests for both specifications are significant, the one with the highest test statistic is chosen (since the one with the higher value must be at least as good as the other).

As can be seen in Table 5, for the first period, the LM test statistic is significant for both the spatial error and the spatial lag model. Since the LM test statistic is slightly higher for the spatial lag model, it indicates that the spatial lag model is the appropriate model to use here. This is also consistent with both theory and earlier empirical studies on spatial interaction among governments. For the second time period, however, the null hypothesis cannot be rejected, i.e. there is no evidence of spatial

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<sup>28</sup> For testing and discriminating between the spatial lag and the spatial error specification, see e.g. Anselin, Bera, Florax and Yoon (1996), Florax and Folmer (1992), and Florax, Folmer and Rey (2003).

<sup>29</sup> If significant spatial autocorrelation for both the spatial error and the spatial lag models occurs, a robust version of the LM test is used to select between the two models. This latter LM test is robust for non-normality of the error terms (Anselin et al., 1996). The robust version tests if the spatial dependence is in the error term, controlling for spatial lag dependence, and vice versa.

interaction among municipalities. Therefore, OLS is preferred over the spatial lag model for the years 2004-2007. Finally, a Hausman test is performed to discriminate between a random effects model and a fixed effects model, and the test strongly indicates that the fixed effects model outperforms the random effects model. Therefore, fixed effects for a region (municipality) and time (year) are included in the regression.

#### *Regression results*

Interestingly, the results from the regressions, shown in Table 5, support the hypothesis that municipalities mimic each other before the introduction of the *LSS-EQ grant*. In the first time period, there is evidence of spatial interaction among neighboring municipalities, which could be due to mimicking. The spatial lag coefficient of 0.13 can be interpreted as for every 100 SEK increase in neighbors' spending of LSS, a municipality increases its own spending on LSS with 13 SEK. In the second time period, in contrast, there is no longer any evidence of spatial interaction among neighboring municipalities. This result supports the hypothesis that the transparency of the national set standardized cost level decreases the interaction (mimicking) among municipalities. In fact, since the "standardized cost" for each LSS service is provided with the LSS-EQ grant, this may be sufficient information for the municipalities to use in order to decide on the LSS service/expenditure level.

**Table 5.** Estimation results for 2001-2003 and 2004-2007.

Variable	2001-2003				2004-2007			
	I - OLS		II - SAR		III - OLS		IV - SAR	
	Estim.	t-stat	Estim.	t-stat*	Estim.	t-stat	Estim.	t-stat*
Spatial Lag Coefficient			0.13	1.68			0.08	1.11
LSS-EQ Grant, SEK					0.086	3.99	0.086	4.01
LSS temporary Grant, SEK	0.058	0.70	0.056	0.67				
General Grant, SEK	-0.029	-1.02	-0.027	-0.94	0.021	1.11	0.021	1.17
Tax base, SEK	-0.002	-0.30	-0.002	-0.28	-0.0002	-0.03	-0.0001	-0.08
Population (log)	312.86	0.19	420.06	0.25	-1479.8	-1.28	-1470.5	-1.28
Share population age 7-16	-48.08	-1.11	-47.52	-1.11	-39.76	-1.28	-41.04	-1.33
Share population age 75+	-57.83	-1.06	-64.34	-1.2	-144.35	-3.76	-144.58	-3.79
Individuals with LSS services per 10000 inhabitants	1.05	0.72	1.00	0.69	9.94	6.61	9.96	6.68
Daily activity	-1.56	-1.06	-1.5	-1.03	-2.35	-1.54	-2.35	-1.55
Personal Assistance	3.81	2.89	3.85	2.95	0.22	0.12	0.27	0.15
Companion Service	4.41	2.75	4.47	2.82	2.71	1.88	2.59	1.81
Personal Contact	-0.87	-0.62	-0.78	-0.56	-0.48	-0.39	-0.51	-0.42
Short stay away from home	3.31	2.01	3.27	2.01	-0.49	-0.29	-0.53	-0.31
After school supervision	3.00	1.24	2.95	1.23	2.16	0.94	2.25	0.99
Adults in residential home	2.78	1.46	2.74	1.45	4.2	2.25	4.24	2.29
Log-likelihood			-5611.12				-7491.51	
R-squared	0.0337				0.0737			
Number of Observations	864		864		1152		1152	
Spatial fixed effect	yes		yes		yes		yes	
Time period fixed effect	yes		yes		yes		yes	
Hausman test FE vs. RE	87.65	0.00			64.02	0.00		
LM (lag)			3.18	0.07			1.56	0.21
Robust LM (lag)			0.10	0.75			0.77	0.38
LM (error)			3.09	0.08			2.13	0.15
Robust LM (error)			0.01	0.91			1.33	0.25

\*Note: for the spatial lag model, these are asymptotic t-statistics.

To study if there are differences in how the temporary LSS grant (2001-2003) and the permanent LSS expenditure equalization grant (2004-2007) affect *LSS expenditure per capita*, the data is divided into two different periods corresponding to each time period. The results imply that the two grants do not have the same effect. Specifically, during the first period, the temporary grant did not affect the LSS expenditure at all. This is just as expected, since the way in which the temporary grant was distributed can be viewed as a way of compensating the municipalities after the cost has occurred. However, the interpretation of this effect could be problematic since the LSS grant may be endogenous here (those who received the grant are those municipalities with high expenditures). The permanent grant distributed during the second period, on the other hand, has a positive effect on the LSS expenditures. For every 100 SEK received in LSS-EQ grant, municipalities use 9 SEK to increase the LSS expenditures. This effect of the grant is consistent with the hypothesis that the grant increases local public expenditures. The result is plausible since the grant is known to the municipalities; they know how much they will receive (pay) in grant (fee) for the current year and, therefore, they can take this into account when setting their LSS service level.

With regard to the municipality variables for the general grant and tax base, neither shows significant coefficients for either time period. An increase in either the general grant or the tax base does not increase the spending on LSS services. This also means that there is no evidence of a flypaper effect with regard to the general grant and tax base variables. Nevertheless, since the LSS-EQ grant has a positive effect on LSS expenditure, while the tax base does not have any effect, it could be regarded as a flypaper effect (money sticks where it hits). However, since

only nine percent of the LSS-EQ grant go toward the LSS service, the flypaper effect is not particularly strong here.<sup>30</sup> The flypaper effect found here is not strong compared to other studies either. Hines and Thaler (1995) list ten commonly cited studies that include the flypaper effect; all of which show some degree of flypaper effect: the flypaper effect in these studies ranges from 0.25 to 1.00 (as compared to the 0.09 found in this study).

When studying the other control variables, one major difference between the two time periods is that while the share of elderly people in a municipality does not have any effect on the LSS expenditure in the first period, it has a negative effect in the second period. This could be interpreted as the LSS expenditure increasing when the share of elderly decreases in a municipality; which could be due to a redistribution of the budget allocation within the elderly and disabled sector, of which both services to the elderly and the functionally impaired are part. The estimates for the LSS service *Personal assistance* also differ greatly between the two periods. The reason for this is most likely that the municipalities over-reported the number of individuals with personal assistance during the first period, while it is corrected from 2004 and onwards. Another coefficient that differs greatly between the two time periods is the LSS service *Adults in residential home*. As mentioned in the data description section, this is a service that is very cost intensive. While the coefficient is not significant in the first period, it is both greater and significant in the second period. The reason for this is most likely that the municipalities,

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<sup>30</sup> When estimating a model where grants are introduced as:  $\alpha * \text{LSS grant} + \beta * (\text{LSS grant} + \text{General Grant})$ , the  $\alpha$  parameter is significant, while the  $\beta$  parameter is non-significant, indicating the presence of a flypaper effect.

from the year 2004, no longer use §17 agreements of cost responsibility between municipalities. The use of §17 agreements helped the municipalities achieve economies of scale; however, after the implementation of the LSS-EQ grant in 2004, the agreements are no longer in use, therefore both “receiving” and the “transmitting” municipalities get a higher LSS expenditure per capita.

## **6. Conclusion**

In this paper, the effect of a new intergovernmental grant, introduced in 2004, with regard to the expenditure behavior of the municipalities, was studied. Two main questions were asked. First, did the grant increase the municipal expenditure for services to functionally impaired? Second, did the information associated with the grant (standardized cost) change the spatial interaction among neighboring municipalities? To answer these questions, the data was divided into two time periods: before and after the introduction of the LSS expenditure equalization grant. The results show that when municipalities received the grant in the second period, the expenditure increased for the LSS services by approximately nine percent. While the effect of the LSS grant on expenditures is positive, neither the general grant nor the tax base seems to have any effect on the expenditures. But given that the effect of the LSS grant is greater than the no-effect of the tax base, it can be interpreted as evidence of the flypaper effect, i.e. expenditures are increased by grants.

There is evidence of significant spatial interaction among the municipalities when setting their LSS expenditure level in the first time period. Although it is difficult to distinguish the cause of the spatial

interaction, it is argued that in this case, the spatial interaction is due to mimicking. This is reasonable since the LSS service provision is relatively new to the municipalities, and the municipalities may not have full information on how to provide the service or what the level of expenditure should be. Thus, the information spillover from neighboring municipalities is used when setting their own expenditure level. With the introduction of the grant in 2004, the result shows that the spatial interaction is no longer evident, which supports the hypothesis that the standardized costs information provided by the grant may be viewed as a signal of what the actual expenditure level ought to be. This further supports the hypothesis that municipalities did mimic their neighbors to get information. Moreover, the lack of evidence for the spatial interaction after the implementation of the LSS-EQ grant could also to some extent be due to the decreased use of cooperation agreements. The source of spatial interactions among local governments can help provide important patterns and behaviors of government reforms and decentralization, such as the LSS-act.

Since the LSS service is regulated by an entitlement law, municipalities must grant LSS services to those eligible, even if it is expensive for the municipalities. Therefore, it must be noted that, on the margin, only 9 SEK per 100 SEK of the LSS expenditure equalization grant are used toward the LSS service. Since municipalities have a limited budget, increases in the expenditure – due to an increase in the number of individuals granted LSS service or an extension of the LSS-act – may instead affect other areas of the municipal service, for example, education or elderly care, i.e. areas where it may be easier to save.

Finally, the model studied here measures the average effects on LSS expenditure of an increase in intergovernmental grants and the tax base. However, it is likely that every municipality is not affected in the same way; there is almost certainly heterogeneity among the municipalities. The standard deviation for the grant variables is large in most cases as well, indicating heterogeneity. While some municipalities would probably have been greatly affected by the grant, others would probably show a much smaller effect. Therefore, future studies on this issue may find it worthwhile to take this heterogeneity into account when studying the effect of the grants on the municipalities' LSS expenditures.

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## **Appendix A.** Description of the two LSS Grants

### **LSS temporary grant 2001 – 2003**

During 2001-2003, the government distributed an LSS grant to municipalities with extraordinarily high costs for their LSS service, based on the Legislative Proposal 1999/2000:115. The grant was functioning as “high cost protection” (*bögekostnadskydd*) for the municipalities. The grant was temporary; the intention was to distribute the grant for two years only, 2001-2002, until the new LSS expenditure equalization grant system would be implemented. The temporary grant was later extended to also include 2003.

### **LSS expenditure equalization, 2004-present**

The *LSS expenditure equalization* (LSS-EQ) is a national equalization system<sup>31</sup>, completely separate from the ordinary *General grant* system for income and cost equalization. The purpose of the LSS-EQ system is to equalize the cost for LSS among municipalities via an intra-municipality system. The decision to implement the LSS expenditure equalization system was based on the Legislative Proposal 2002/03:151. Below is a description of how the LSS equalization grant/fee is calculated.

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<sup>31</sup> The LSS-EQ system is based on the Legislative Proposal “Equalization of certain costs for special support to persons with functional impairments” (2002/03:151) and the federal report “Equalization of costs for LSS” (SOU 2002:103).

**Calculation of the LSS Equalization grant/fee for the year 2004<sup>32,33</sup>**

The equalization is based on three different sources: standardized cost for LSS services; differences in concentration of LSS activity; and differences in the need of care for individuals with LSS services. However, between 2004 and 2008, certain transition rules apply; therefore, the system will not be fully implemented until the year 2009. The transition rule consists of a *maximum fee amount*, as well as a *maximum grant amount*. For municipalities receiving the grant, the received grant amount will be reduced by 270, 70, 15 SEK for the years 2004, 2005 and 2006, respectively (per capita). Similarly, for municipalities paying the fee, the maximum fee cannot exceed 250, 550, 850, 1150 and 1450 SEK for the years 2004, 2005, 2006, 2007 and 2008, respectively (per capita). During the transition period, the federal government covers the difference between the grant and the fee.

*A. Calculation of Standardized-cost for LSS-services*

The calculation for standardized cost is based on the number of LSS services granted according to the LSS-act 1993:387 and a national average cost per type of LSS service.<sup>34</sup> The information on the number of LSS services was provided by the National Board of Health and Welfare (NBHW), and it was measured on September 1, 2002. The national average cost per type of LSS services is based on the municipalities' annual accounts. The standardized cost is then calculated by multiplying the number of services with the national average cost.

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<sup>32</sup> The information is based on Statistics Sweden's description "*Economic equalization for local government and equalization of municipal costs for support and service for persons with certain functional impairments*" at [www.scb.se](http://www.scb.se)

<sup>33</sup> The calculations for the years 2005, 2006 and 2007 are similar to this.

<sup>34</sup> The compensation for personal assistance according to LASS is provided by the Social Security Agency.

*B. Differences in cost due to some activity are concentrated to certain municipalities*

The standardized-cost from A is multiplied with the so-called *concentration-index*. The concentration-index is based on how the average-cost per LSS service is affected by the share of individuals with impairments in a municipality. The purpose of this calculation is to reduce the economies of scale and compensate for “small scale economies”. To minimize the risk of “strategic planning” by the municipalities, this index is not updated yearly, nor does it have any fixed schedule for when it will be updated. It is the government that decides when the indexes should be updated.

The number of individuals in a municipality that are entitled to LSS services is set in relation to the municipality’s population. The share for the municipality is then divided by the calculated share of individuals with LSS services for the whole nation. Moreover, that result is then raised to the power of -0.16, which will then be the municipality’s concentration-index. The value of the exponent explains the strength of the index. Municipalities with a higher share than the national average get to deduct an amount when calculating the standardized cost, and municipalities with a lower share than the national average must add an amount when calculating the standardized cost. The information about the number of individuals receiving LSS services was provided by the National Board of Health and Welfare and was measured on September 1, 2002.

*C. Differences in cost due to differences in the need (level) of support and services*

To measure the differences in cost that are due to differences in the level of support needed, a *personnel-cost index* is used. The index measures the “level of care” for the individuals that get services according to the LSS-

act. The calculation is based on information from a number of municipalities' annual accounts for the year 2002. The index corresponds to 70 percent of the difference between the municipality's own reported personnel cost and the personnel cost that is the basic standardized cost as described in point A above. The reason for only compensating 70 percent of the difference is to reduce the risk that the compensation will compensate for the differences in efficiency and political ambitions and not the intended level of need.



III



# Do Local Public Expenditures on Functionally Impaired Crowd Out Other Local Public Expenditures?

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## Abstract

This paper examines whether local public expenditures on services to functionally impaired individuals crowd out other local public expenditures in Sweden. Over the last ten years, these expenditures have increased by more than 90 percent while other municipal expenditures have experienced increases of up to 30 percent. The impact of expenditures on functionally impaired individuals is tested on five different spending areas using a two-stage least squares (2SLS) fixed-effects model. While the results give no support for crowding out in the areas of social assistance, culture & leisure, and childcare & preschool, a negative relationship on spending for elderly & disabled care and education is found, suggesting that crowding out indeed occurs within the municipal sector. The negative relationships are significant both in a statistical and an economic sense.

**Keywords:** Local public expenditures, Functionally impaired, Expenditure crowding out

**JEL classification:** H72, J14, R50



## **1. Introduction**

This paper examines whether local public expenditures on one particular service tend to crowd out other local public expenditures. The specific service studied here, services to functionally impaired individuals, became the responsibility of the municipalities via a reform in 1994. At the same time, a new law imposed by the national government was implemented. The law, called the LSS-act<sup>1</sup>, is an entitlement law geared towards individuals with functional impairments.<sup>2</sup> Since the reform and the implementation of the LSS-act, there has been a considerable increase in the expenditures on services to functionally impaired individuals. Reforms and decentralization of public activities are meant to increase efficiency and accountability to the local government. This is one of the main theoretical arguments for decentralizing public activities; the local governments are in a better position to provide basic services because they are better informed about individual demands than the national government (Oates, 1972). When a national government imposes new services and responsibility on the local governments, appropriate funding is not always provided. If not, this could also affect other areas of the local government. With new responsibilities and with a limited budget, the local government must prioritize its public service provision in other ways than previously. In such cases, expenditures on one type of service could crowd out expenditures on other services; thereby affecting the level of services provided in the other areas. Naturally, this could happen without new

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<sup>1</sup> LSS-act = Act on Support and Services for Certain Disabled Persons, LSS 1993:387.

<sup>2</sup> Throughout this paper, the terms “services for functional impaired” and “LSS services” are used interchangeably. Similarly, “LSS expenditures” and “expenditure on services to functionally impaired” are also used interchangeably.

regulations or decentralization – for example, expenditures on health care continue to increase throughout the world, which puts a burden on government budget and spending allocation. Similarly, the elderly population is growing larger, which also puts a burden on government budgets.

It is important to study what are the effects of reforms and new services on how expenditures are determined within the local government. First, it is important in order to identify the area(s) within the local governments that are affected by new national government policies, such as decentralization or reforms of public service provision, especially areas that may not be directly associated with the reform or policy. Second, if some categories of public service provision are strongly regulated, will this cause expenditure in other areas to be crowded out? That is, are certain categories of spending more prone to expenditure crowding out than others? It would be important to identify these areas when implementing reforms or nationally imposed services.

Empirical research on public expenditure is usually based on the seminal work of Borcharding and Deacon (1972) and Bergstrom and Goodman (1973), where the demand for local public services is regarded as a function of the characteristics of the median voter. The expenditure problem for the local government is then treated in a similar way as consumer choices in the private sector. In empirical applications, determinants also include economic, demographic and geographical characteristics of the local government, for example tax base, population size, age structure, intergovernmental grants, as well as other institutional and socio-economic factors. This work was later extended by Deacon

(1978) to include the composition of public expenditure. Local expenditures (and services) can also be related to other tiers of the government. Aronsson, Lundberg and Wikström (2000) show that local public expenditure is not only explained by local government characteristics but could also be explained by the service provision/expenditures of the regional level government; the expenditure decisions at different levels are interdependent. These studies, among others, show that an expenditure decision in one area affects expenditure decisions in other areas, either within the local government or among different tiers of governments.

Previous studies dealing with expenditure crowding out have found no or only limited support for the crowding out hypothesis. For example, Fossett and Wyckoff (1996) studied the impact on spending on public education of increasing spending on Medicaid. Their results show no significant effect on educational expenditures. Instead, their findings indicate that changes in educational spending respond to changes in the states' own-source revenue rather than increases in Medicaid spending. McCarty and Schmidt (1997) use a vector autoregressive framework to study whether interaction in expenditures from six government spending categories shows any evidence of crowding out; they find no support for the crowding out hypothesis. Rather, increases in spending in one category are paid for by increases in tax revenue rather than being due to crowding out of other expenditures. Finally, the most recent study (to my knowledge), Landon, McMillan, Muralidharan and Parsons (2006), uses a panel of Canadian data and examines whether health care spending

crowds out other provisional government spending and, as in the previous studies, it finds no support for the crowding out hypothesis.<sup>3</sup>

The hypothesis to be investigated in this paper is whether increased expenditures – due to a nationally imposed reform – in one area affect other expenditure areas within the local government. More specifically, does the expenditure on services to functionally impaired individuals crowd out other municipal expenditures? Although the local government has the autonomy to set its own local tax rates, the income from taxes does not fully cover the municipal service provision.<sup>4</sup> Moreover, the excess burden of an increase in the tax rate is greater with higher tax rates; therefore, it could be very costly if municipalities would further increase the local tax rate (since the tax rates already are high in Sweden). This is why municipalities are reluctant to increase the tax rates. Consequently, when an area within the local government experiences high increases in expenditures, other areas are likely to be affected. In that sense, this study differs from previous studies on expenditure crowding out.

The crowding out hypothesis will be tested on five spending categories of the municipalities: elderly & disabled care; education; social assistance, childcare & preschool; and culture & leisure. These five categories make up the majority of municipal spending (about 90 percent); where the total expenditures of the municipalities in Sweden amounted to 423 billion

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<sup>3</sup> See also the studies of Brazer and McCarty (1986) and Marlow and Shiers (1999); the first is a study of the “municipal overburden” hypothesis and the second concerns the effect of law enforcement spending on education spending. Neither of the studies finds support for expenditure crowding out.

<sup>4</sup> Income from taxes covered about 68 percent of the municipal service provision in 2007. Source: Swedish Association of Local Authorities and Regions (SALAR).

SEK in 2007. The responsibility to perform care and services for individuals with functional impairment became the responsibility of the municipalities (transferred from the county councils) via a reform in 1994. Ever since this reform, there has been a significant increase in the expenditures for services to functionally impaired, and the burden of the rise in the expenditure has had a considerable effect on municipalities. Over the last ten years, the expenditures for functionally impaired have increased by more than 90 percent while other municipal expenditures have experienced increases of between 15 and 30 percent. However, this does not constitute any evidence of expenditure crowding out; it could just reflect other reasons for why there has been an increase in this expenditure. To support the crowding out hypothesis, increases in expenditure for functionally impaired must have negative effects on other expenditures in such a way that this cannot be explained by other factors determining the expenditures.

Following earlier literature on expenditure crowding out, this paper aims at empirically examining the crowding out hypothesis on Swedish municipal expenditure data. The contribution of this paper is twofold; first, it adds to the literature on local public expenditure by analyzing the effect of a nationally imposed reform on local public expenditures in Sweden. Second, the increased demand for publicly provided services (due to the growing share of elderly and increasing health care expenditures, for example) increases the pressure on the public service budget. So, this topic is indeed important with regards to expenditures and public policy in Sweden. It could also be important in other countries experiencing an increased demand for public services.

The rest of the paper is organized as follows: Section 2 describes municipal characteristics and expenditure patterns in Sweden; Section 3 describes and discusses the hypotheses and the data. Section 4 describes and discusses the empirical specification and the method. Section 5 presents the empirical findings, while concluding remarks can be found in section 6.

## **2. Municipality Services and Expenditures**

Sweden is divided into 290 municipalities and 21 counties. Municipalities are responsible for public activities such as social services, elderly care, education and infrastructure. The main task of the counties is to provide healthcare. There is no hierarchical relation between municipalities and counties since they are responsible for different activities.<sup>5</sup> Some of the municipality activities are regulated by law or have guidelines; while other municipality activities are provided for on a voluntary basis. For example, the municipalities are legally responsible for providing social services, elderly care, support for disabled, primary and secondary education, and water and sewerage. Although legally responsible, the municipalities have some flexibility to decide themselves how to perform their duties and distribute the resources. Leisure activities, cultural activities<sup>6</sup> and industrial and commercial services are examples of activities that the municipalities provide on a voluntary basis without any regulations.

In Figure 1, the distribution of all municipal expenditures for the year 2004 is presented. The year is chosen to represent an average year within

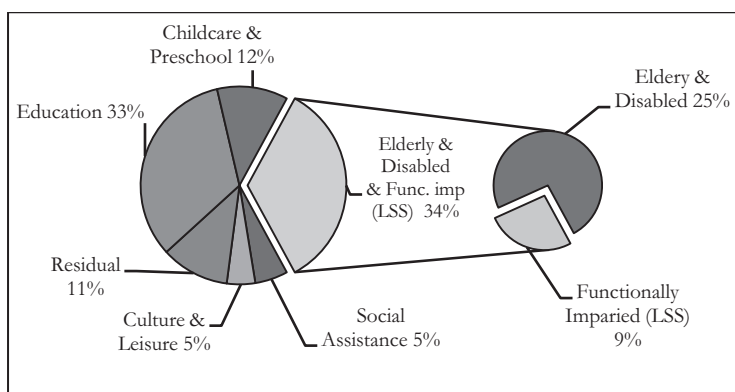
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<sup>5</sup> The only exception is Gotland, where the municipality also has the responsibilities normally associated with a county council.

<sup>6</sup> Except for the provision of libraries in the municipalities.

the time frame of the study. The municipal service expenditure is divided into six main categories: care and service for elderly & disabled and functionally impaired; education; childcare & preschool; social assistance; culture & leisure; and a residual category. The five first categories constitute 90 percent of the total spending of municipalities. The residual category consists of various expenditures grouped together (e.g. infrastructure, environmental protection, tourism), which makes up about ten percent of municipalities' total spending.

**Figure 1.** Average per Capita Municipal Spending in 2004



As can be seen in the figure, expenditures on education and expenditures on elderly & disabled and functionally impaired individuals are the two largest service areas within municipalities; each constitutes one third of the total spending of the municipalities.<sup>7</sup> The social service sector of the municipalities includes care and services for elderly & disabled and

<sup>7</sup> Services to elderly & disabled and services to functionally impaired belong to the same overall service area; however, the municipal expenditure data differentiate between the two groups which makes it possible to study the effect of expenditure on services to functionally impaired individuals.

functionally impaired; but it also contains social assistance for individuals and families. The latter includes, for example, welfare assistance, help and services for children and young people, families, individuals abusing drugs or alcohol, and women who have been subjected to violence.<sup>8</sup>

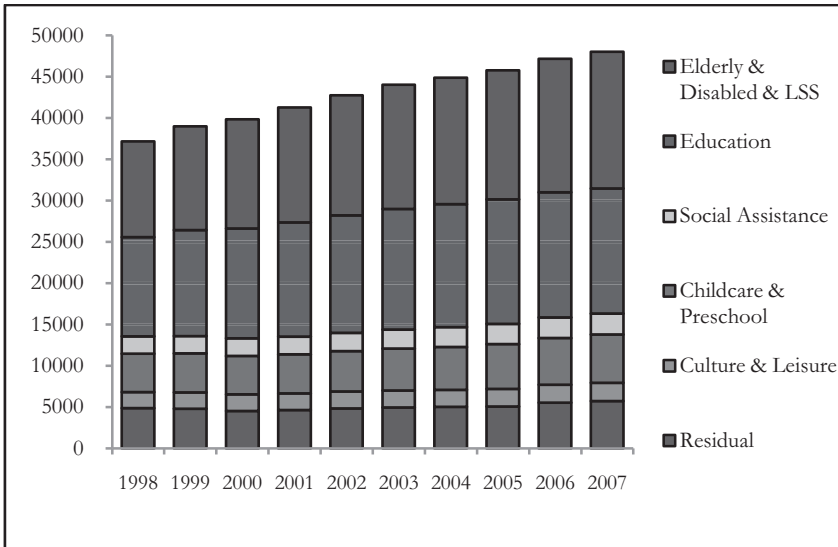
Service and care for elderly & disabled includes accommodations for those in need of special support. For example, the municipalities must arrange housing for people who, for physical or mental reasons, encounter considerable difficulties in their daily lives and need special accommodation. Services to individuals with functional impairments are regulated in an entitlement law, the LSS-act. Included in the LSS-act are services such as personal assistance, special housing accommodation, contact persons and daily activities (National Board of Health and Welfare, NBHW).

The expenditure on services to functionally impaired amounts to almost one third of the total spending on elderly & disabled and functionally impaired. To put this into a context, about 0.6 percent of the Swedish population received services according to the LSS-act, while the number of potential users of elderly care (individuals aged above 75) amounted to about 8.7 percent; this can give us an idea of how expensive the LSS service provision is for the municipalities. As already mentioned, there has been a sharp increase in the expenditure on LSS over the years since it was first implemented.

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<sup>8</sup> The measures may be advice, financial aid, family law or family counseling. In special cases, certain measures can be implemented without the individual's consent. This applies to care of children and young people and care of adult drug and alcohol abusers.

**Figure 2.** Average per Capita Municipal Spending in 1998-2007, SEK

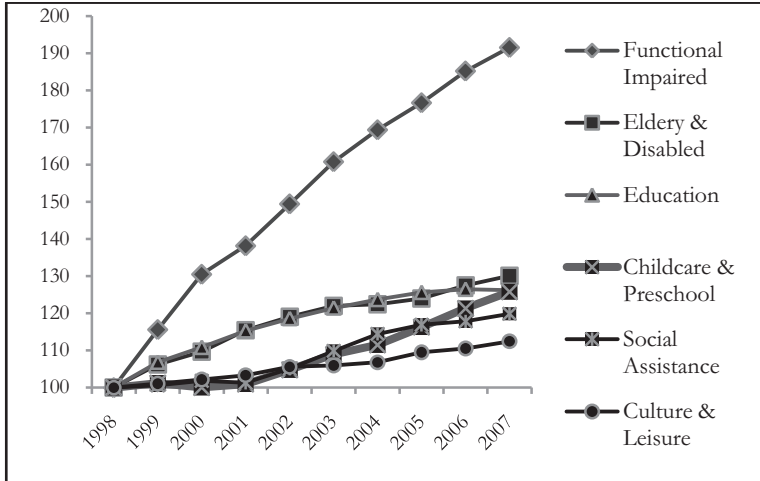


In Figures 2 and 3, the municipal expenditure for each sector is presented (in real terms). While Figure 2 shows the composition of expenditures during 1998-2007, Figure 3 shows the development in expenditures as compared to the year 1998. LSS expenditure is separated from spending on the elderly & disabled for illustrative purposes, in order to see exactly how much more LSS expenditure has increased as compared to all other expenditure in the municipalities.

As is evident in the figures, not only does care for elderly & disabled and functionally impaired have the highest spending, it is also the area within the municipality experiencing the highest increase in its expenditure. While the expenditures for elderly & disabled care increased by 30 percent during the period 1998-2007, LSS expenditure increased by more than 90

percent.<sup>9</sup> As a reference, it can be mentioned that during the same period, there was an increase in the tax base of 32 percent.

**Figure 3.** Average Municipal Spending, Index 1998 = 100



Although it is evident that there has been a considerable increase in spending on LSS services and they are taking a larger share of the municipal budget, this could just be the result of spending readjustments, reflecting changes in demand for different public services. Since both the expenditure for the elderly & disabled and expenditure for the functionally impaired have increased, this may just reflect that there has been an increase in the elderly population. Therefore, to support the crowding out hypothesis, the distribution of expenditures must be such that the areas on which there is a negative impact of LSS expenditure would have received more resources and a higher level of spending had it not been for the potential burden of the LSS expenditure.

<sup>9</sup> In real terms: all prices in this paper are adjusted to 2007 year prices.

### **3. Hypothesis and Data**

The crowding out hypothesis will be tested on five broad spending areas: spending on elderly & disabled care; education; childcare & preschool; social assistance; and culture & leisure. This section starts out with a discussion of the crowding out hypothesis, and why increased expenditures on services to functionally impaired could affect each of the five spending areas. The section ends with a presentation of the data.

#### **Crowding out hypothesis**

The hypothesis to be tested in this paper is if expenditures on services to functionally impaired crowd out other municipality spending. When the local government is faced with increasing expenditure in one area, due to a national reform, decentralization of public services, new laws, or just an increasing share of demand for some services, the municipality must redistribute the given resources within their set budget. The municipal budget is limited in the sense that the municipality's own source of income, taxes, does not fully cover the municipal service provision.<sup>10</sup> And although the local governments in Sweden have the autonomy to set their own local tax rates, the excess burden of an increase in the tax rate could be very high for the municipalities, thus making it difficult to motivate further tax increases.<sup>11</sup> Therefore, with new areas of responsibilities and with a limited budget, the municipalities may be forced to redistribute their resources from one area to another.

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<sup>10</sup> Municipal income also consists of governmental grants, tax equalization, and fees.

<sup>11</sup> Moreover, different measures for restricting the municipalities in increasing their own tax rate have been in place during the 1990's. During 1991-1993, it was prohibited to increase the tax rate. In 1994, municipalities that did not increase their tax rate received economic compensation. During 1997-1999, municipalities that increased the tax rate received less governmental grants (Halápi, 2008).

When municipalities redistribute their resources, it is not likely that every area will be affected in the same way. One reason why the effect will not be the same is that the cost associated with decreasing resources is different in different areas. As discussed in the previous section, most of the municipalities' duties are regulated by law or there are guidelines; therefore, if a service is strictly regulated, the cost of not providing the service could be very high. First, not providing the service could lead to lawsuits and fines. Second, deviating from a given norm could also be costly; this would send a negative signal to both voters (perhaps not to reelect the politicians) and potential individuals moving to this municipality. Individuals have preferences on what they want their local governments to provide, such as level of education and recreational services. Individuals choose to migrate and live in areas whose local government best satisfy their preferences. This argument was originally presented by Tiebout (1956). In a migration study on Swedish data, Dahlberg, Eklöf, Fredriksson and Jofre-Monseny (2008) examine the impact of local public services on migration behavior. They find that given taxes, high spending on child care and "other" expenditures (i.e. culture, parks and recreations, welfare assistance, and administration) attract migrants, while they do not find any conclusive result on elderly care and education.

The size of a service area is another reason that determines if an area will be affected by the increased expenditure. It may be less noticeable to decrease resources in a large service area than in a small area. The marginal disutility of a decrease in total expenditure in a large area is likely to be less than in smaller area. Therefore, it is likely that the resource allocation (and/or crowding out) would be from a larger area where it may

be easier to decrease spending without greatly affecting the service provision. A third reason why different areas can be differently affected is that expenditure decisions within the local government or between different tiers of governments (for example, local and regional level) are interdependent (Aronsson et al., 2000).<sup>12</sup> When there is an issue of non-separability between two publicly provided services, they can either be substitutes or compliments to each other. If the services are substitutes, an increase in the expenditure in one area will then decrease the expenditure in the other area, via reduced demand. On the other hand, if the services are complementary, then increased demand for one service will also increase the demand for the other service, thus increasing the expenditure in both areas.

### *Elderly & disabled*

There are at least three reasons why the first spending area – elderly & disabled – may be crowded out by LSS expenditure. First, services to elderly & disabled belong to the same service area as services to the functionally impaired; and people eligible for services according to the LSS-act may have had services covered by the elderly & disabled area, but are now instead receiving services according to the LSS-act. In such cases, the services to functionally impaired individuals may be viewed as a substitute for the care to elderly & disabled. Second, the care for elderly & disabled is regulated by the Social Service Act (SoL 2001:453), which is a

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<sup>12</sup>Aronsson et al. (2000) study if county (regional) expenditures affect municipal (local) expenditures. In their model, county expenditure can affect municipal expenditures via a tax base effect (using the same source of revenue) and a direct effect (in the cases where the expenditures at the county level and the municipal level are non-separable). Their result suggests a positive correlation between county and municipal expenditures. This implies that municipal and county expenditures are complements in the utility function and/or that county expenditures and private consumption are substitutes.

law, but not as strong as the LSS-act. Third, the elderly & disabled area is the largest sector of the municipalities. For these reasons, some resources from the elderly & disabled service area are likely to be allocated to services to functionally impaired.

#### *Education*

For the second spending area, education, LSS expenditure may also crowd out spending. Education is the second largest sector of the municipal service provision, and although this is an area that affects a group of individuals having strong preferences for school quality, education may still be an area affected by the high LSS expenditures. Since this is a large spending area, it may not be very noticeable when there are decreases in total expenditure for education. Therefore, it is likely that the education sector is affected when resources are to be redistributed within the municipality.

#### *Social assistance*

The third spending area, social assistance, is part of the same large social sector as elderly & disabled and functionally impaired. Therefore, if the LSS service area requires more resources, some of the resources may be redistributed from social assistance. On the other hand, social assistance is regulated in the Social Service Act and there is a strict lower limit on the level of welfare and assistance. Therefore, it may not be possible for municipalities to crowd out social assistance resources. In addition, social assistance represents a minor part of the budget; it may be difficult to decrease the resources without greatly affecting the provision.

*Childcare & preschool*

Childcare & preschool may or may not be affected by the LSS expenditure; the spending does not constitute a large share of the total municipal budget. Similar to the education area, childcare & preschool is also an area where there might be strong preferences in the community for a high quality of services. However, contrary to the education area though, childcare & preschool only constitute a smaller share of the total municipal budget, therefore, it may be more difficult to redistribute resources without affecting the quality of this services too much.

*Culture & leisure*

The last spending area, culture & leisure, is the only area in which provision is unregulated. If municipalities are short of resources, they could use money allocated to culture & leisure, since there is no law regulating this provision. However, the budget share for culture and leisure is rather modest, and municipalities may not want to decrease this level in order to allocate resources to other areas. Culture & leisure is an area that is highly visible in a municipality, besides being an area that many people care about; therefore, municipalities may be reluctant to decrease spending here. If spending on culture & leisure were to decrease, it may send a signal to the inhabitants about the performance of the municipality, which may not be viewed as favorable. Furthermore, for those inhabitants with strong preference for culture & leisure, with a decrease in the spending area they may choose to migrate to other regions providing culture & leisure that better satisfy their preference instead.

### **Data and descriptive statistics**

The data set consists of 288 municipalities over the time period 1998-2007. The public expenditure variables are expressed as expenditure per capita, measured in Swedish kronor (SEK). All monetary variables are adjusted to the 2007 year price level using the consumer price index, CPI.

To make comparisons of the impact of LSS expenditures, the dependent variable is defined in the same way for all five categories. The explanatory variables include municipality-level variables in order to control for differences in basic economic conditions among the municipalities. The explanatory variables included in the study are standard in studies of local public expenditure, i.e. tax base, intergovernmental grants<sup>13</sup> and long-term debt. The percent of unemployed and the share of the population on welfare benefits are also included, as are the population shares of different age groups. The local budget for a particular year is decided in November the previous year and thus, all municipal characteristics' are lagged one time period, since this is the information that contains economic and demographic conditions for the previous years. For the elderly & disabled spending equation, two additional explanatory variables are included. These two variables are included to capture the difference in cost for the services and care (it is significantly more costly to provide special residence for elderly, than to provide care and service to elderly in their own home). Descriptive statistics for all variables are presented in Table 1,

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<sup>13</sup> The grant variable is defined as the total sum of grants, per capita. The composition of grants to the municipalities changed during the time period studied. Until 2004, the grants consisted of general grants and intramunicipal equalization. From 2005, the general grant is part of the income equalization grant/fee.

and variable definition and data sources for the variables are presented in Table A1 in the Appendix.

**Table 1.** Descriptive Statistics 1999-2007

Variable	1999-2007				1999	2007
	Mean	Std.Dev	Min	Max	Mean	Mean
<i>Dependent variable(s)</i>						
Elderly & Disabled care spending	10696	3023	2723	24599	9462	11650
Childcare & Preschool spending	5121	1032	2855	9730	4714	5847
Education spending	14336	1727	7682	21924	12832	15144
Social Assistance spending	2310	805	559	5880	2118	2521
Culture & Leisure spending	2081	533	537	4944	1977	2200
<i>Explanatory variables</i>						
Expenditures for services for functionally impaired (LSS)	3725	1334	223	9658	2730	4538
Home service (Elderly care) percent	8.3	2.4	0	30	7.8	11.9
Special residence (Elderly care) percent	7.1	1.8	1.4	14.9	7.9	5.9
<i>Municipal and Socioeconomic explanatory variables 1998-2006</i>						
Tax base	124229	19717	83755	267155	108089	141718
Grants	8524	4891	-16399	24700	9054	7808
Debt (long-term)	11103	11166	0	78252	9743	11450
Population, log	4.3	0.4	3.4	5.9	4.3	4.3
Welfare, percent	4.5	1.9	0	15.8	6.3	3.8
Unemployment, percent	3.9	1.4	0.9	11	4.9	3.4
Population age 0-6, percent	7.3	1.1	4.7	11.8	8.1	7.2
Population age 7-15, percent	12.2	1.2	6.5	16.4	12.2	11.2
Population age 75+, percent	9.7	2.2	2.8	16	9.5	9.9
<i>Instruments for LSS expenditure</i>						
LSS Daily Activity, percent	44.7	12	0	100	44.7	46.6
LSS Adult Residential home, percent	35.1	12	0	72	35.6	35.4
LSS individuals per 10000 inhabitants	59.1	18	10	160	52.6	64.4

Note: All monetary units are measured in *Swedish kronor* (SEK) and adjusted to the 2007 price level using CPI. Each dependent variable as well as the LSS expenditure is measured in per capita terms. The variables tax base, grants, and debt are also measured in per capita terms.

As will be discussed section IV, to account for simultaneity and endogeneity when testing the hypothesis of LSS expenditure crowding out other municipal spending, instrumental variables are needed that directly affect LSS expenditure but not expenditure for the dependent variable(s). The instruments that will be used are the three most important determining factors for LSS expenditure. The three instruments are: the number of individuals in a municipality that receive LSS services (per 10000 inhabitants), the share of individuals receiving LSS services that lives in “adult residential homes” (the most expensive service), and the share of individuals receiving LSS services that gets the service “daily activity” (the most common service). The properties of the instruments will also be discussed in section IV.

#### *Merged data and missing observations*

Today, Sweden consists of 290 municipalities; however, during the time period studied in this paper, two municipalities have seceded (Nykvarn in 1999 and Knivsta in 2003) from two other municipalities. In order not to lose observations or geographical data, the seceded municipalities have been merged back with their respective “original” municipalities in this study. Expenditure data are missing for a few observations (approximately 20 observations out of a total of 17280 observations). In lieu of the missing values, I have used the mean of the previous and following year; i.e. when the missing value was for the year 1998, I used the value for 1999. The result of the estimation is unaffected whether I include or exclude these observations. Due to the sensitive nature of the LSS data, values for municipalities that only have one, two, or three individuals with a particular LSS service are not available. Therefore, the value *two* is used

in lieu of the non-available data. For a detailed description of LSS services and expenditure, see Birkelöf (2008).

#### 4. Empirical specification and method

A standard empirical model for determining government expenditure is usually expressed in a linear specification. Following this approach, a fixed-effects model of municipal spending that accounts for time and municipal individual effects can be estimated by the equation<sup>14</sup>:

$$C_{it}^{EXP} = \beta_1 X_{it-1}^{SocMun} + \beta_2 L_{it}^{EXP} + year + municipal + \varepsilon_{it} \quad (1)$$

where  $L^{EXP} = f(L^{IND}, L^{HOME}, L^{DAY})$

where:

$C_{it}^{EXP}$  is per capita spending for the five spending categories

$X_{it-1}^{SocMun}$  is a vector of socioeconomic and municipal characteristics<sup>15</sup>

$L_{it}^{EXP}$  is per capita expenditure for services to functionally impaired

$L^{IND}, L^{HOME}, L^{DAY}$  are variables determining the LSS expenditure.

The inclusion of L in equation (1) allows LSS spending to have a direct impact on expenditures for the spending category studied, while holding other factors determining that category constant, as would be suggested by the crowding out hypothesis. However, since all five categories studied here are services provided by the municipalities, the resources are allocated from the same overall budget. That is, the expenditure for some

<sup>14</sup> The results are robust to the choice between a linear and a log-linear empirical model: a logarithm version of the equation yields the same sign and significance of the coefficients.

<sup>15</sup> Additional explanatory variables for elderly care are included for the spending category “Elderly & disabled care spending” (the variables are measured at time  $t$  for municipality  $i$ ).

or all of the spending categories may be simultaneously decided with the expenditure for LSS. In such a case, LSS spending is endogenous and it is correlated with the error term in equation (1). When a right-hand side variable is correlated with the error term, it implies that using OLS yields biased and inconsistent estimates (Baltagi, 2002; Green, 2003). If the LSS expenditure is endogenous in the expenditure equation(s), the OLS will underestimate the impact of LSS expenditure (in absolute terms); i.e. the estimated effect will be too modest. Therefore, to correct for the simultaneity bias in the equation, the endogenous variable, LSS expenditure, must be replaced with variables that are highly correlated with the LSS expenditure but not correlated with the error term in equation (1).

One way of correcting for the simultaneity bias is to use instrumental variables for the endogenous explanatory variable and then using the two-stage-least-squares (2SLS) estimation method. The instruments used in this study are the three most important determining factors for LSS expenditure; the number of individuals with LSS services and two of the services provided. The LSS variables are argued to be exogenous to the spending category studied, for example, spending on elderly & disabled. However, one might ask why LSS expenditure is endogenous, while factors determining LSS expenditures are exogenous? This is due to the characteristics of the LSS service provision: the LSS services are governed by a strict entitlement law and to be granted LSS services, the functional impairment must be “severe and permanent”. A person granted LSS service(s) in one municipality is not necessarily granted the same service(s) if moving to another municipality; therefore, migrating to another

municipality is not common among those granted LSS services.<sup>16</sup> Furthermore, individuals receiving LSS services one year are most likely receiving them the next year as well, so the number of individuals can be seen as exogenous with regard to other municipal services. Rather than decreasing the number of individuals who are granted LSS services, the resources for providing the LSS service may change (e.g. fewer personnel). If there is a change in the resources for providing LSS services, it is not exogenous to the other spending category. So while the *LSS expenditure* may be correlated with other spending categories, the number of *individuals receiving LSS services* should not be correlated with spending and it can therefore be used as an instrument. Both two-stage-least-squares (2SLS) and OLS will be used to estimate the equations, and the results from these will be presented in next section.

If an increase in LSS expenditure causes the municipal government to systematically reduce spending on other services (from the level they would otherwise choose), the parameter estimating the impact of LSS expenditures on the spending category studied should be significant and negative. However, if the parameter differed insignificantly from zero, this would indicate that the changes in the spending category are determined by changes in exogenous factors only and thus, the level of LSS expenditures does not directly affect the choice of spending category. If so, this would be interpreted as no evidence or support of the crowding out hypothesis.

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<sup>16</sup> A person who has been granted LSS services and wants to move to another municipality must apply six months beforehand to the new municipality with regard to the level of service the new municipality will offer.

Finally, municipality fixed effects are included to control for unobserved municipality factors that remain fixed over time. Dummy variables for year fixed effects are also included.

## **5. Empirical results and discussion**

In this section, the regression results from the five spending categories are presented and discussed. The section starts out with a test against endogeneity of the LSS expenditure variable, followed by a discussion of the validity and relevance of the instruments used. The section ends with the presentation and discussion of the regression estimates: the results for elderly & disabled care and education spending are presented in Table 3, and the results for social assistance, childcare & preschool, and culture & leisure spending are presented in Table 4.<sup>17</sup>

### **Test against endogeneity**

As discussed in the previous section, the expenditure on some or all of the spending categories may be simultaneously decided with the expenditure on LSS. Therefore, a test of whether LSS expenditure can be treated as exogenous is performed. Under the null hypothesis that the specified endogenous regressor can actually be treated as exogenous, the test statistic is distributed as chi-squared with one degree of freedom.<sup>18</sup> The test results are presented in Table 2.

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<sup>17</sup> In the regressions where the LSS expenditure variable is endogenous, the OLS estimates are just included for comparison; vice versa, in the regressions where the LSS expenditure variable can be treated as exogenous, the 2SLS estimates are just included for comparison.

<sup>18</sup> Degrees of freedom are equal to the number of regressors tested, in this case only one (LSS expenditures).

As can be seen in the Table 2, we reject the null hypothesis that LSS expenditure can be treated as exogenous in the elderly & disabled care spending equation as well as in the education spending equation. That is, LSS expenditure is simultaneously determined with both these spending categories. These results are as expected. The LSS services and elderly & disabled care are part of the same service area and the same social service sector budget; the expenditures are therefore decided simultaneously. For education, this result is also as expected. Education is one of the two largest sectors within municipality service, and when allocating budget to the educational sector, it will depend on the cost of services to functionally impaired, among other things.

**Table 2.** Test if LSS expenditure per capita can be treated as exogenous

Spending category / Dependent variable	Test against endogeneity	Chi-sq(1) P-value	Reject H <sub>0</sub> ?	2SLS or OLS
Elderly & Disabled Care	3.28	0.070	Yes	2SLS
Education	9.63	0.002	Yes	2SLS
Social Assistance	0.24	0.627	No	OLS
Childcare & Preschool	0.20	0.655	No	OLS
Culture & Leisure	1.90	0.168	No	OLS

For the three other categories, social assistance, childcare & preschool, and culture & leisure, we fail to reject the null hypothesis. That is, LSS expenditure can be treated as exogenous in the spending equations for these three categories. For the two latter categories, this is what was expected. However, it might be surprising that social assistance and LSS expenditure are not simultaneously decided, despite being in the same social service sector. The reason for this is probably that social assistance

is closely regulated in the Social Service Act, and that changes in spending on social assistance are not affected by LSS expenditures.

### **Validity of instruments**

Since we reject the hypothesis that LSS expenditures can be treated as exogenous for the elderly & disabled and education spending categories, instruments are used to obtain unbiased results. The instruments chosen must be correlated with the endogenous regressor, but uncorrelated with the error term (Green, 2003). To test if the instruments are correlated with the endogenous regressor, a test of underidentification is performed. The hypothesis – that the excluded instruments are not correlated with the endogenous regressor – is rejected for both the elderly & disabled care model and the education model; i.e. the instruments are relevant. The test statistic is reported in Table 3.

To test if the instruments are uncorrelated with the error term, an overidentification test is performed. The Hansen J-statistic for this test is reported in Table 3. According to the test, for both elderly & disabled care and education spending categories, the hypothesis that the instruments are valid cannot be rejected, indicating that the instruments are in fact valid. To sum up, the LSS expenditure variable is endogenous in the models for elderly & disabled care expenditure and education expenditure. Furthermore, both the underidentification and the overidentification tests confirm that the chosen instruments (the three LSS services variables) are, in fact, both valid and relevant instruments.

**Regression results***Spending on Elderly & disabled care*

Let us start with the elderly & disabled care spending category. As mentioned earlier, if LSS expenditure is endogenous in the model(s), the magnitude of the effect of LSS expenditure on elderly & disabled care spending will be underestimated by OLS. By comparing OLS and 2SLS estimates for spending on elderly & disabled in Table 3, the underestimation (in absolute terms) of the effect of LSS expenditure is evident: the OLS estimate is  $-0.140$ , while the 2SLS estimate is  $-0.418$ . From now on, the focus will be on the 2SLS results. In order to support the hypothesis that LSS expenditure crowds out other municipal expenditure, the LSS expenditure parameter should have a negative and significant effect on the expenditure studied. The result supports this hypothesis; it is indeed both negative and highly significant. The point estimate shows that for every 100 SEK increase in LSS expenditure, the expenditure on elderly & disabled care decreases by approximately 42 SEK.

In the model that estimates expenditures on elderly & disabled care, the coefficients of the explanatory variables for the share of elderly living in special residential homes, tax base, grants, and share of elderly, are as expected: all have a positive effect on the expenditure on elderly care (i.e. an increase in any of these variables increases the spending on elderly care). The (log) total population and the share of welfare recipients have a negative effect on the expenditure on elderly care (i.e. an increase in any of these variables decreases the spending on elderly care).

**Table 3.** Estimated results for Elderly & Disabled spending and Education spending

Explanatory Variables	Dependent Variables			
	Elderly & Disabled Care		Education	
	OLS	2SLS	OLS	2SLS
LSS expenditure, SEK	-0.140*** (0.038)	-0.418*** (0.139)	0.071* (0.039)	-0.355** (0.149)
Elderly with home care	-3.66 (10.23)	-3.07 (10.04)	--	--
Elderly living in special homes	88.28*** (15.04)	84.81*** (15.30)	--	--
Tax base t-1	0.074*** (0.009)	0.067*** (0.010)	0.058*** (0.008)	0.048*** (0.009)
Grants t-1	0.202*** (0.028)	0.185*** (0.029)	0.230*** (0.026)	0.204*** (0.028)
Debt t-1	0.002 (0.004)	0.003 (0.004)	-0.004 (0.003)	-0.004 (0.004)
Ln Population t-1	-17460*** (1861)	-18866*** (2093)	3778** (1767)	1601 (2058)
Welfare t-1	-60.48*** (17.32)	-54.73*** (17.11)	-39.53** (15.43)	-30.31* (16.92)
Share children (0-6) t-1	120.4** (57.84)	154.9** (62.71)	-263.4*** (55.37)	-210.1*** (62.21)
Share youth (7-15) t-1	41.1 (43.62)	62.9 (45.28)	203.7*** (46.37)	236.8*** (50.74)
Share elderly (75+) t-1	425.7*** (51.88)	480.4*** (56.46)	-169.8*** (51.98)	-86.2 (60.60)
Unemployment t-1	10.59 (24.33)	-6.540 (26.84)	89.80*** (26.09)	63.97** (29.24)
Year effects	yes	yes	yes	yes
Fixed effects	yes	yes	yes	yes

To be continued

**Table 3.** continued

	Elderly & Disabled Care		Education	
	OLS	2SLS	OLS	2SLS
R-squared (within)	0.664	0.649	0.727	0.698
Observations	2592	2592	2592	2592
Number of municipalities	288	288	288	288
Endogeneity test		3.96		9.63
Chi-sq(1) P-value		0.05		0.00
Underidentification test		71.41		70.86
Chi-sq(3) P-value		0.00		0.00
Hansen J statistic		3.58		3.15
Chi-sq(2) P-value		0.17		0.21

Note: The standard errors in parenthesis are robust to heteroskedasticity. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  represent significance at the 1, 5 and 10 percent level, respectively. Instruments: share of individuals receiving LSS services per 10000 inhabitants, share with the service "adults in residential homes", and share with the service "daily activity". Regressions are estimated with the XTIVREG2 command in STATA (Schaffer, M.E. 2007).

### *Education spending*

The OLS estimate is also underestimated for LSS expenditure in the education spending equation. The OLS estimate is 0.07, while the 2SLS estimate is  $-0.36$ . Contrary to the result for the elderly & disabled where both the OLS and the 2SLS estimate were negative, the OLS estimate in the education equation is positive and significant at the ten percent level, while the 2SLS estimate is negative and significant at the five percent level. Not accounting for the simultaneity bias in the education spending equation would lead to an incorrect conclusion on how this sector is affected. Since LSS expenditure is endogenous here, we will focus on the 2SLS estimates.

In Table 3, we can see that expenditure on education is negatively and significantly affected by the LSS expenditure; once more supporting the crowding out hypothesis. The point estimate shows that the expenditure

on education approximately decreases by 35 SEK for every 100 SEK increase in LSS expenditure. It is evident that education expenditure is greatly affected by increased expenditure on LSS services, despite its being in a different sector. Education is the second largest sector of the municipalities. Combined with being an area where municipalities' have the power to decide on how to provide education (although governed by the Education Act) – this makes it an area that is easily affected when resources must be reallocated within the municipality. For the explanatory variables in the education expenditure model, we can see that tax base, grants, share of youth, and share of unemployment all have a positive effect on spending on education. The share of young children and the share of welfare recipients have a negative effect on education spending.

#### *Social assistance spending*

Let us now move on to the third spending category, social assistance. Since LSS expenditure can be treated as exogenous in this equation, the OLS estimates are not biased here as they were in the two previous categories. As can be seen in Table 4, the LSS expenditure parameter is negative, but non significant for the social assistance model. This indicates that LSS expenditure does not affect or crowd out spending on social assistance. So even though elderly & disabled care, social assistance, and services to functionally impaired together make up the social service sector, only elderly & disabled care is affected by the increasing expenditure on services to functionally impaired. This result may seem surprising. However, since social assistance is strictly governed by the Social Service Act, combined with being a small area within the municipality as well as within the social service sector, there is no room for its expenditure to be crowded out; the cost will be too high. Therefore,

the burden of financing the LSS services might fall on the service provision to elderly & disabled care rather than social assistance provision.

**Table 4.** Estimated results for Social Assistance, Childcare & Preschool, and Culture & Leisure spending

Explanatory Variables	Dependent Variables					
	Social Assistance		Childcare & Preschool		Culture & Leisure	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
LSS expenditure, SEK	-0.004 (0.016)	0.020 (0.070)	0.008 (0.016)	0.029 (0.064)	0.006 (0.011)	0.069 (0.047)
Tax base t-1	-0.003 (0.004)	-0.002 (0.006)	0.039*** (0.004)	0.039*** (0.004)	0.010*** (0.003)	0.012*** (0.003)
Grants t-1	0.017 (0.013)	0.018 (0.013)	0.111*** (0.013)	0.112*** (0.017)	0.039*** (0.008)	0.043*** (0.009)
Debt t-1	-0.002 (0.002)	-0.002 (0.002)	-0.003* (0.002)	-0.003* (0.002)	-0.001 (0.001)	-0.001 (0.001)
Ln Population t-1	-3050*** (866.8)	-2928*** (925.9)	10233*** (933.6)	10342*** (1014)	906.3 (559.4)	1228** (613.6)
Welfare t-1	98.55*** (12.19)	98.04*** (12.12)	2.58 (8.37)	2.12 (8.42)	-16.43*** (6.03)	-17.79*** (6.32)
Share children (0-6) t-1	-68.1** (31.41)	-71.0** (32.52)	317.1*** (33.13)	314.5*** (34.48)	-47.2*** (17.73)	-55.1*** (19.06)
Share youth (7-15) t-1	-78.8*** (24.76)	-80.6*** (25.30)	23.4 (23.15)	21.7 (23.87)	3.1 (15.31)	-1.8 (15.56)
Share elderly (75+) t-1	-7.68 (27.05)	-12.33 (30.31)	-2.95 (28.20)	-7.12 (30.93)	10.78 (18.02)	-1.59 (19.84)
Unemployment t-1	-4.29 (11.59)	-2.86 (12.19)	1.38 (11.85)	2.67 (12.31)	-6.13 (12.13)	-2.31 (12.57)
Year effects	yes	yes	yes	yes	yes	yes
Fixed effects	yes	yes	yes	yes	yes	yes

To be continued

**Table 4.** continued

	Social Assistance		Childcare & Preschool		Culture & Leisure	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
R-squared (within)	0.320	0.319	0.731	0.731	0.145	0.130
Observations	2592	2592	2592	2592	2592	2592
No. of municipalities	288	288	288	288	288	288
Endogeneity test		0.24		0.20		1.90
Chi-sq(1) P-value		0.63		0.66		0.17
Underidentification test		70.89		70.86		70.86
Chi-sq(3) P-value		0.00		0.00		0.00
Hansen J statistic		3.63		1.48		0.11
Chi-sq(2) P-value		0.16		0.48		0.95

Note: The standard errors in parenthesis are robust to heteroscedasticity. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 represent significance at the 1, 5 and 10 percent level, respectively. Instruments: share of individuals receiving LSS services per 10,000 inhabitants, share with the service "adults in residential homes", and share with the service "daily activity". Regressions are estimated with the XTIVREG2 command in STATA (Schaffer, M.E. 2007)

*Childcare & preschool spending*

For the fourth spending equation, childcare & preschool, the LSS expenditure can be treated as exogenous. Similarly to the social assistance category, there is no indication that childcare & preschool is affected by the increasing expenditure on LSS services. This result is realistic, since the spending on childcare & preschool only constitutes a smaller share of the total municipal budget. Therefore, it is not likely that the municipalities will make budget cuts in this category in order to finance LSS services.

*Culture & leisure spending*

Finally, for the last spending category, culture & leisure, it can be seen in Table 4 that the LSS expenditure coefficient is once more non significant,

showing no evidence of crowding out. Since culture & leisure is the only category that is voluntary for the municipalities, it could be expected that increasing LSS expenditure would affect spending on culture & leisure in a negative way. However, the result indicates that the municipalities choose to reallocate resource from other categories, instead of decreasing spending on culture & leisure in order to finance the LSS service provision. One reason why the municipalities do not use resources from culture & leisure may be that this category is small and a decrease here would be more evident than a similar decrease in a larger size category. The results also point toward the fact that the municipalities indeed want to provide a certain level of culture & leisure and are therefore reluctant to decrease this spending; just to avoid their citizens migrating to other regions, so-called “Tiebout migration”. Although a municipality’s expenditure on culture & leisure may not be enough for anybody to migrate, it is a visible area and it is likely to act as a signal.

## **6. Conclusion**

The focus of this study was to investigate the hypothesis that crowding out occurs within the local governments with respect to expenditures on one particular service area; services to functionally impaired individuals. It became the responsibility of the municipalities to provide this service in 1994 via a reform, and the expenditures on this service have increased ever since. While the findings of this study do not support the existence of crowding out for three of the five expenditure categories studied (social assistance, childcare & preschool and culture & leisure), the findings strongly support crowding out of expenditures on elderly & disabled care

and expenditures on education, both in a statistical and an economic sense.

The results differ from those in the other studies on expenditure crowding out mentioned in the introduction; where none of those studies find support for the crowding out hypothesis. The difference between this study and previous studies might be the characteristics of the service area studied in this paper. At least three reasons come to mind. First, the area studied, i.e. services to the functionally impaired, is regulated via a strong entitlement law; the municipality must provide the care and services. Second, the expenditures on these services greatly exceeded the estimated costs (as predicted when the reform was implemented). For the municipality to finance the services, it must reallocate resources or crowd out other municipality expenditures. Third, the increasing LSS expenditures were not matched by any additional grant or funding for many years. This did not happen until 2004 when an intergovernmental LSS expenditure equalization grant system was implemented. However, the LSS expenditure equalization grant is not based upon the municipalities' factual costs, instead it is based upon standardized costs calculated and set by the national government. Thus, the crowding out of other expenditures is likely to have continued also after 2004. Therefore, for municipalities to finance their spending on services to the functionally impaired, the result obtained here is very plausible, i.e. the spending on services to the functionally impaired crowds out other municipal expenditures.

Naturally, an extended time series would be useful for studying if the crowding out of expenditure persists over time, or if it flattens out. It would also be interesting to study if crowding out of these expenditures continues after the new intergovernmental expenditure equalization system (directed toward expenditures for LSS services) has been fully implemented (in 2009). Although the equalization grant/fee is not based on factual cost but rather on standardized calculated cost, it would be interesting to study if this is sufficient for the crowding out to vanish.

This study shows the importance of considering the effect on other areas within the local government service provision when there are reforms, decentralization or national government intervention imposing new services on local governments targeted to a specific area. Moreover, the different effects on different expenditure categories must be taken into account when new services are imposed on local governments, making the findings in this study relevant in terms of policy implications and the design of new reforms.

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**Appendix A:** Variable definitions**Table A.** Variable definitions and data sources.

Variable name	Description	Data source
Elderly & disabled care spending	The per capita municipal spending on elderly & disabled care calculated in 2007 monetary value, in SEK	WebOr
Childcare & pre-school spending	The per capita municipal spending on childcare & preschool calculated in 2007 monetary value, in SEK	WebOr
Education spending	The per capita municipal spending on education calculated in 2007 monetary value, in SEK	WebOr
Social Assistance spending	The per capita municipal spending on social assistance (including welfare benefits, expenditures on rehab for drug and alcoholic users) calculated in 2007 monetary value, in SEK	WebOr
Culture & Leisure spending	The per capita municipal spending on culture & leisure calculated in 2007 monetary value, in SEK	WebOr
Expenditures on services for functionally impaired (LSS)	The per capita municipal spending on services to functionally impaired individuals calculated in 2007 monetary value, in SEK	WebOr
Home service (elderly care)	The percentage of the population that receives any type of elderly care in their homes	Kommun-databasen
Special residence (elderly care)	The percentage of the population that lives in special residence homes for the elderly	Kommun-databasen
Tax base, SEK	Tax base per inhabitant calculated in 2007 monetary value, in SEK	SCB

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To be continued

**Table A1.** continue

Grants, SEK	1998-2004: the municipality's income from general inter-governmental grants per capita calculated in 2007 monetary value; 2005-2006; the sum of municipal equalization per capita	SCB
Debt (long-term), SEK	The municipality's long-term debt per capita calculated in 2007 monetary value, in SEK	SCB
Population, log	The natural logarithm of the municipality's population	SCB
Welfare, percent	The percentage of the population that has received welfare benefits	Kommun-databasen
Unemployment, percent	The percentage of the population unemployed	Kommun-databasen
Population age 0-6, percent	The percentage of the population up to 6 years of age	SCB
Population age 7-15, percent	The percentage of the population between 7 and 15 years of age	SCB
Population age 75+, percent	The percentage of the population aged above 75	SCB
LSS Daily Activity, percent	The percentage of the "LSS population" that receives the service "daily activity"	NBHW
LSS Adult Residential home, percent	The percentage of the "LSS population" that lives in special residential homes for adults	NBHW
LSS individuals per 10000 inhabitants	The number of persons receiving any type of LSS service per 10000 inhabitants	NBHW

Note: The data sources are SCB = Statistic Sweden; WebOr and Kommundatabasen = data from SCB but with tools to analyze municipalities and counties; NBHW = National Board of Health and Welfare



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