

The Italian way towards standard expenditure needs

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Abstract

This report provides an overview of the recent Italian experience in the evaluation of the standard expenditure needs of local governments (6702 municipalities and 86 provinces of regions with ordinary statutes), discussing in detail the main technical choices and the final methodologies adopted in relation to the mainstream methods reported in the economic literature and developed by other countries. As of December 2013, the first wave of standard expenditure needs regarding the essential functions of municipalities and provinces has been completed from the technical point of view. However, the Italian way toward standard expenditure needs has not yet reached its end, since standard expenditures are now under the examination of the Houses of Parliament, and only after the political consensus will they be used to apportion equalisation grants. For simplicity, this analysis will focus on municipalities, the methodological approach being the same in the case of provinces.



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1 INTRODUCTION

Law No. 42 of 5 May 2009 (Enabling Law on fiscal federalism, Law 42/09) and the implementing provisions issued by *Legislative Decree No. 216 of 26 November 2010 (Decree 216/10)* regarding the valuation of the *standard expenditure needs* (SEN) of the local Italian authorities (municipalities and provinces) marked the beginning of a radical reform of intergovernmental relations. The valuation of SEN is a first and necessary step towards building the new mechanism for the distribution of equalisation grants as provided for in article 13 of Law 42/09 regarding the funding of essential functions for municipalities and provinces (see Section 3.2 for more details about the essential functions).

After three years of intensive work, *SOSE Soluzioni per il Sistema Economico S.p.A.*¹, in collaboration with the *Instituto per la Finanza e l'Economia Locale*² (IFEL ANCI Foundation)³, *Unione delle Province Italiane* (UPI)⁴, under the supervision of the *Commissione Tecnica Paritetica per l'Attuazione del Federalismo Fiscale* (COPAFF)⁵ has produced the first wave of the SEN of the essential functions of municipalities and provinces of the ordinary statute regions⁶, thus initiating the first essential step towards the design of a new equalisation system no longer linked to the parameter of actual expenditure, which is considered by many as a source of inequity in the distribution of resources and inefficiency in the provision of local services (overall 77 billion euros in 2010, equal to 5% of the GDP and 10% of consolidated public spending).⁷

On average within OECD countries, fiscal equalisation absorbs 5% of total public expenditure and represents a crucial aspect of all fiscal and administrative decentralisation processes, since equalisation grants limit the territorial imbalances that the devolution of a greater local autonomy tends to amplify. This aspect is of great importance in a country such as Italy, which is characterised by a marked economic duality between the north and the south of the country. The assessment of expenditure needs for local authorities is, in turn, the main component of all fiscal equalisation systems.⁸

The calculation of SEN is based on the idea that the financial needs of a local authority are an expression of the services provided, of the territorial features and of the social, economic and demographic characteristics of the resident population. By following this general approach, SOSE has developed an econometric methodology specific to the Italian system based on the *Regression-based Cost Approach (RCA)* methodology recognised by the international scientific community as the most advanced one. This methodology, which has been adopted in many countries including the United Kingdom and Australia, implies the determination of SEN through the estimation of a cost function (*pure RCA*) and/or an expenditure function (expenditure function RCA) using the technique of multiple linear regression (see Section 4.2 for more details regarding the SOSE methodology).

One of the main difficulties of calculating SEN using statistical techniques is the lack of information. In order to overcome this obstacle, the information provided by official sources (Budget Sheets, Ministry of the Interior, ISTAT, Ancitel, Ministry of Education, Land Registry Office, etc.) has been integrated with new data by sending all authorities a specific questionnaire for each standardised function. In this way a new database was built that, for the first time in Italy, allows a detailed analysis of outputs, inputs, methods of management and organisational decisions made in the production process of local services by local governments. The amount of data collected and processed for the determination of SEN, in addition to representing valuable information in

¹ *Solutions for the Economic System.*

² *Institute for Finance and Local Economy.*

³ *Union of Italian provinces.*

⁴ It is important to report also the technical support provided by the *State General Accounting Office (RGS)*, and the *National Statistic Institute (ISTAT)*.

⁵ COPAFF (*Joint technical committee for the implementation of fiscal federalism*) is established at the Ministry of Economy and Finance as an intergovernmental forum for sharing financial, economic and fiscal information and supporting the implementation of fiscal federalism.

⁶ The fundamental functions subject to expenditure standardization set out in article 3 of the Legislative Decree 216/10, are listed below in Tables 1 and 2, respectively for municipalities and provinces.

⁷ Expenditure before interests (source ISTAT).

⁸ H. Blöchliger et al. "Fiscal equalisation in OECD countries", OECD Network on Fiscal Relations across Levels of Government. OECD, 2007.



itself, gives the valuation procedure a considerable degree of robustness. In addition, the survey of structural data through the questionnaire represents an extraordinary innovation in international techniques to evaluate SEN.

With regard to municipalities, on which, for simplicity, the rest of this report is predominantly focused, it is important to emphasise that the valuation of SEN has been managed by dividing four - of the six essential functions - in ten sub-functions or services in order to adapt the general methodology to the specific supplied services and, thus, achieve high levels of accuracy in the identification of the expenditures of different territories. The valuation of SEN of municipalities, therefore, consists of twelve services; each of which has been organised into a specific methodological note (for which the acronym reference is shown in parenthesis in the following list).

The general administrative, management and control functions have been divided into four services, for which four separate questionnaires have been developed: tax office (FC01A), technical office (FC01B), civil registry (FC01C), general services (FC01D). Functions concerning public roads and urban transport have been divided into two services with a single questionnaire: public roads (FC04A) and local public transport (FC04B). Planning and environmental functions have been divided into two services with a single questionnaire: land management and planning (FC05A) and waste management (FC05B). Functions concerning social care have been divided into two services with a single questionnaire: general social services (FC06A) and nursery services (FC06B). The following functions have maintained their original uniformity: local police (FC02U) and education (FC03U). Despite the general method being the same for all twelve services, this division has allowed a more precise identification of the independent variables, thus considerably enriching the range of determinants of the overall SEN.

In view of the general unity of the methodological structure it is important to point out that, in relation to the available information and to the nature of the analysed services, in ten cases the standard expenditure has been computed using an expenditure function, while in two cases (complementary education services (FC03U) and nursery services (FC06B)), it was possible to adopt a cost function⁹. The distinguishing factor in the choice between the cost and the expenditure function (as explained in more details in Section 3) is represented by the characteristics of the variables available to measure the output of services provided for each function. In the majority of cases, in which the output cannot be satisfactorily measured (as it is the case of general services) the valuation of SEN has been carried out through the appraisal of an expenditure function, which links together the actual expenditure with the context variables characterising the demand of local public services. Only for two specific functions, as we said, in which the issues of output valuation have been easily overcome, the expenditure assessment has been carried out through a cost function, where the actual expenditure is directly linked to the output.

In addition to the variables that measure the level of the services supplied or the demand for public services, which are alternatively used according to the reference model (cost function or expenditure function), the other determinants of SEN, that are common to both models, are: the input prices (labour and capital cost), the context variables of the supply (such as morphological and climatic characteristics of the area, characteristics of vehicular traffic and urban streets and investment level from previous years), the exogenous load factors (services performed on behalf of higher-level authorities or not directly attributable to the discretionary choices of local governments, such as front office activities of registry office), and the organisational choices not directly modifiable in the short term and/or linked to qualitative elements for which there are reference standards (for example the staff/child ratio in nursery services, or the number of districts in each municipality in case of general administrative services).

In the Italian case the law has prescribed a top-down approach for the valuation of SEN¹⁰. This implies a two stage procedure. Firstly, the overall budget constraint (macro-budget) must be defined, that is the total amount

⁹ In the case of provinces SEN have always been evaluated using an expenditure function.

¹⁰ Concerning the financial implications of introducing SEN, note that article 1, paragraph 2 of Legislative Decree 216/10 states that the total amount of the SEN relating to fundamental functions for municipalities and provinces cannot exceed the present expenditure for the corresponding sectors.



of the equalisation fund established by the central government. At a second stage, the resources must be allocated among local governments. Thus the valuation of SEN of local governments ends up in establishing a criterion for the distribution of a fixed amount of resources. SEN are primarily a relative concept. Even if the econometric procedure evaluates SEN in absolute monetary terms, this is functional to measuring the relative weight of any single service for any single local entity. Therefore, the entire procedure of calculation of the SEN ends up with the identification of a share in total expenditure, which can be named *allotment coefficient*. Given that 1 stands for the overall expenditure for a specific service, this allotment coefficient represents the share of expenditure attributable to each municipality. For example, if we refer to the education complementary services, Rome's allotment coefficient is equal to 0.086513706844, while Milan's one is equal to 0.050924900485. Thus, Rome's standard expenditure can be defined as 8.65% of the whole expenditure allocated for the education services that, in turn, is equal to 13.5% of the overall expenditure allocated for the fundamental municipal functions.

The total standard expenditure need of each municipality is composed of 12 allotment coefficients of expenditure (one for each function/service) and a comprehensive indicator, which is calculated as the ratio of the sum of the amount (in euro) of the SEN of all the essential functions of the *i-th* municipality on the total standard expenditure of all municipalities.

It is important to point out that the valuation of SEN has also been extended to municipalities that did not provide the service object of standardisation in the reference year. This choice appeared best-suited to the role of SOSE, which is exclusively technical (Article 5, paragraph 1 a) of Legislative Decree 216/10). In fact no technical rationale could be adopted to support the attribution of zero expenditure needs to municipalities reporting actual expenditure equal to zero for a specific service. Moreover the recognition of zero SEN for municipalities that report no actual expenditure, would imply transforming equalisation grants in earmarked grants, in violation of paragraph 4 of article 119 of the Italian Constitution, which establishes that equalisation transfers should not be earmarked.

An exception to the rule of recognising SEN also to municipalities that do not provide the service, is given by the two functions of education and nursery services¹¹, for which, having SEN been evaluated using a cost function, it is impossible to attribute an expenditure need in the absence of output. If, as the law would require, some mandatory level of provision ("basic levels of services") were imposed to municipalities for this kind of services, the expenditure need could be calculated with reference to this prescribed output.

Figures 1 and 2 illustrates the gap between total SEN (the sum of expenditures for all the essential functions) and total actual expenditures (as registered in the 2010 Budget Sheets), where overall actual expenditure is placed equal to 100 and municipalities have been grouped, respectively, by population brackets and by geographical region.

It is important to note that the comparison with the actual expenditure of a particular year is indicative of neither the redistributive effects produced by an equalisation system based on SEN, nor the technical efficiency of a municipality in the provision of local services. This is, firstly, because the level of actual expenditure for a particular year may be affected by special circumstances beyond the control of local governments: consider, for example, the huge gap between standard and actual expenditure observed for the Abruzzi region, which is clearly due to the additional extraordinary resources received for the reconstruction after the 2009 earthquake. A second reason is that the redistributive effects of SEN cannot be evaluated on their own, but within the more general context of the new equalisation system, still under construction, which will also consider fiscal capacities.

¹¹ 4367 municipalities do not provide nursery services and two municipalities do not provide education services at the time of the data collection through the questionnaire.



Figure 1 - Comparison between actual expenditure and standard expenditure needs (overall actual expenditures for essential functions = 100), municipalities aggregated by population brackets.

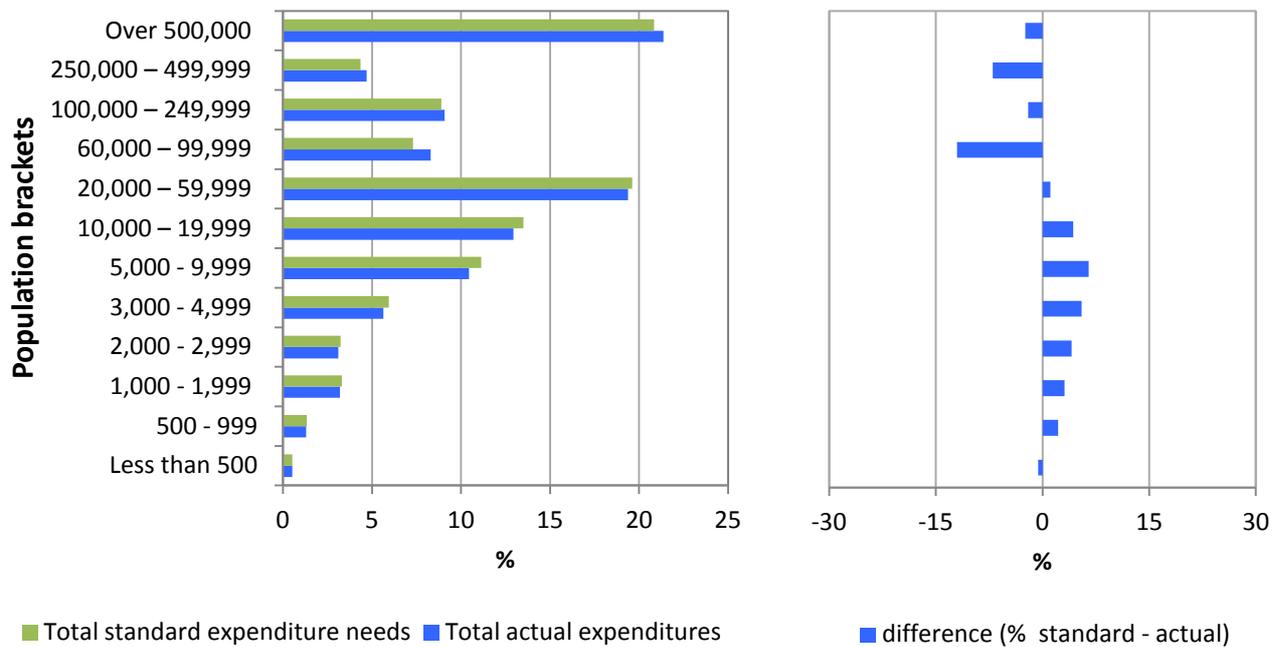
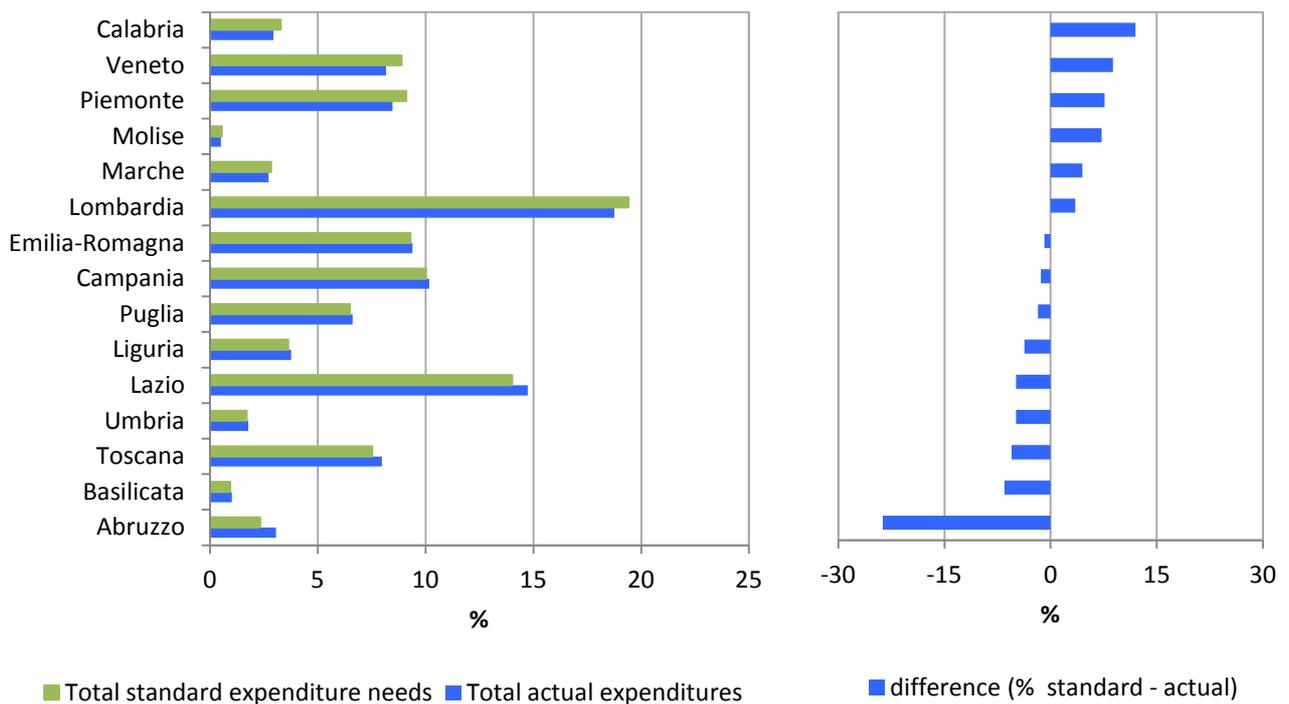


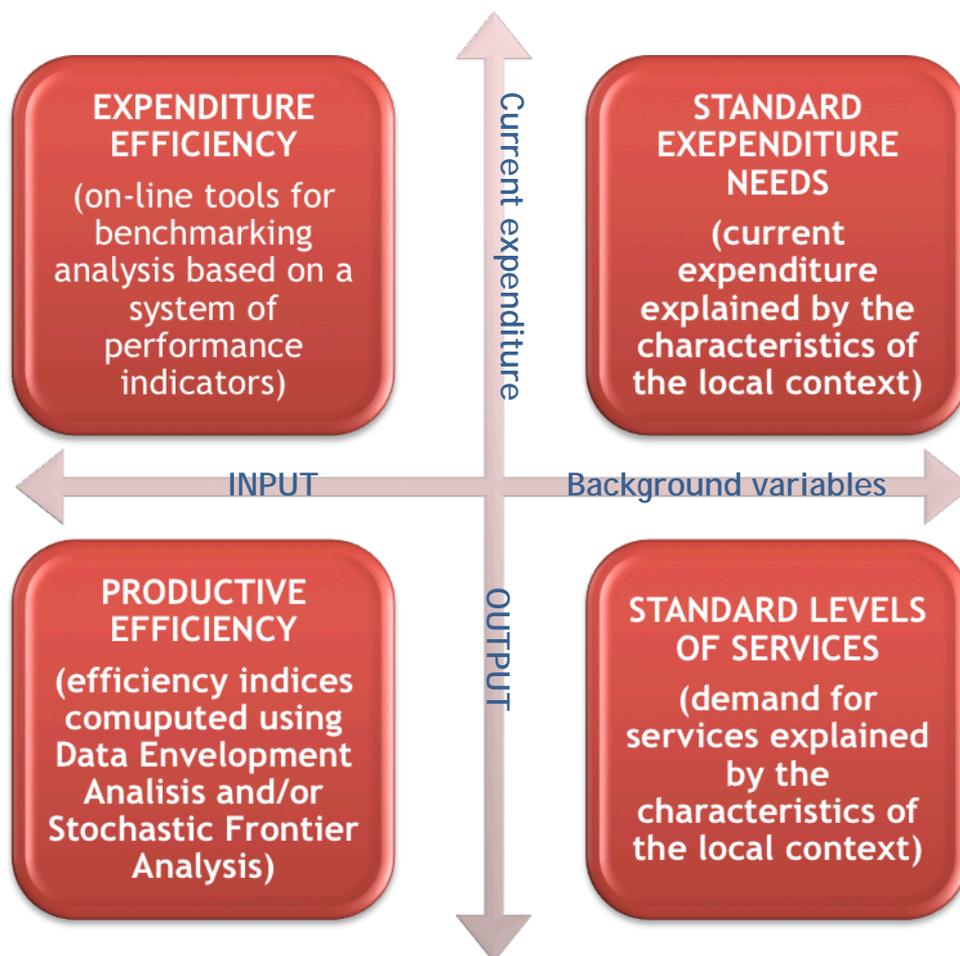
Figure 2 - Comparison between actual expenditure and standard expenditure needs (overall actual expenditures for essential functions = 100), municipalities aggregated by geographical region.





As summarised in Figure 3, beyond an valuation of SEN, SOSE also provides a wide range of complementary methodologies, with the aim of enhancing local governments' technical efficiency in the provision of public services, such as: a valuation of a standard level of services (standardised output), through the estimation of a demand function which captures the relationship between context variables and output produced; an assessment of production and cost efficiency in the provision of local services, through the estimation of frontier cost functions using both non-parametric (*Data Envelopment Analysis, DEA*) and parametric (*Stochastic Frontiers Analysis, SFA*) techniques; the construction of systems of performance indicators that provide a simulation software based on benchmarking to help local authorities to efficiently reallocate their expenditure toward the best combination of inputs (mainly labour and capital).

Figure 3 – Summary of SOSE's methodologies



Output values include the set of goods and services (tangible and intangible) produced by the local authorities. Input variables include the set of factors (usually labour and capital factors) employed in the production. Context variables are the tangible or intangible exogenous factors (such as the structure by age of the resident population) that explain why expenditure and level of services are unevenly distributed across local governments.



In conclusion, the process of determining SEN will provide additional benefits, such as allowing policymakers to make decision on the basis of a new set of information regarding local authorities. Moreover, the process of determining SEN allows for the acquisition of new data that are crucial in determining the essential level of services for essential functions, as stipulated under Article 117, paragraph 2, letters m) and p) of the Constitution. Moreover, according to Article 5, letter f) of Legislative Decree 216/10, all data will be included into the database of public administrations in accordance with Article 13 of *Law No. 196 of 31 December 2009 (Law 196/09)*, and Article 5 of Law 42/09.

The rest of the report is articulated as follows. Section 2 reviews the international and methodological context that forms the background for the technical choices adopted by SOSE. Section 3 presents the Italian context for determining SEN. Section 4 illustrates the methodology elaborated by SOSE for determining SEN and standard levels of services. Section 5 discusses the determinants of SEN providing an overview of the final results. Section 6 summarises the additional activities linked to the valuation of SEN. Section 7 discusses the general legal framework within which SEN are determined. The Appendix provides a detailed analysis of the theoretical framework that leads to the valuation of SEN using econometric techniques.

2 THE INTERNATIONAL METHODOLOGICAL CONTEXT

2.1 MAIN INSTITUTIONAL MODELS

The list of possible methods for determining the expenditure needs of local governments is extremely varied. The level of heterogeneity is due not only to the variety of available techniques, but also to the manner in which they are applied by different countries which adopt variants and particular features based on their own historic and cultural traditions. Generally speaking, there are as many techniques as the number of countries that adopt fiscal equalisation systems.

However, two essential dimensions emerge in all methodologies used to assess the expenditure needs of local governments when a top-down approach is followed as in the Italian case. The first defines the overall budget constraints (*macro-budget*), that is the global amount of transferable resources, and the second identifies the allotment mechanism adopted to allocate these resources among local governments.

This initial distinction is important, since the main purpose of the valuation of local governments' expenditure needs is to determine an allotment criteria for a predetermined amount of resources. In fact, standard expenditure needs are primarily a relative concept (*relative needs*), which only secondarily take on a validity in absolute monetary terms, particularly when used to finance basic levels of specific services.

Moreover, in spite of the extreme level of heterogeneity, the international literature¹² discerns two main methodologies to which it is possible to relate the practical experiences of different countries. The first based on *actual expenditure needs (AEN)*, the second based on *standard expenditure needs (SEN)*.

The two major approaches of AEN and SEN differ greatly in terms of information and calculation requirements. The AEN approach does not require the support of any statistical and/or econometric methodology, thus minimising the need for data: expenditure needs are determined in relation to what was previously accounted for in the last available budget or in a certain number of past financial statements. However, though this approach has the unquestionable advantage of simplicity, it nonetheless presents some notable inconveniences such as

¹² OECD (1981), "Measuring local expenditure needs: the Copenhagen workshop", *OECD Urban Management Studies*, no. 4; Blöchliger H. et al. (2007), "Fiscal equalisation in OECD countries", *OECD Network on Fiscal Relations Across Levels of Government*; Reschovsky A. (2007), "Compensating Local Governments for Differences in Expenditure Needs in a Horizontal Fiscal Equalization Program", in R. Boadway and A. Shah, *Intergovernmental fiscal grants: Principles and practice*, World Bank; Dafflon B. & Mischler P. (2007), "Expenditure needs equalisation at the local level: methods and practice", in J. Kim & J. Lotz, *Measuring Local Government Expenditure Needs*, The Copenhagen Workshop.



elements of randomness in the distribution of equalisation grants, the risk of perpetuating inequity in the distribution of grants over time, and the possibility of financial non-sustainability in the long run, as a result of soft budget constraints imposed on local governments.

For these reasons, the AEN approach is considered the least suitable system for the allotment of equalisation grants over the long run. It can, however, play a useful role in the short term, when the transition towards more valid equalisation formulas can require long and complex adjustment phases.

The SEN approach, though it may be adopted on the basis of different techniques, contrasts sharply from the AEN approach in that it aims to measure the expenditure needs of local authorities taking into account different characteristics of each local authority. The level of accuracy with which these expenditure differentials are taken into account depends on the quantity and quality of data used, as well as on the statistical tools adopted.

2.2 *STANDARD EXPENDITURE NEEDS*

The criteria for SEN are based on the concept that the financial needs of a local authority are an expression of the territorial and socio-demographic characteristics of the resident population. These aspects, on the one hand, impact the needs of citizens and thus the demand for services; on the other hand, they directly influence production costs. In the case of municipal police services, for instance, a higher level of expenditure needs can be generated either by a greater number of vehicles, which increases the need for controls and the risk of accidents, or by an increased length of municipal roads, since it is more costly to patrol a vaster territory.

The advantage of overcoming the principle of AEN is linked to the allotment of equalisation grants according to SEN, thereby combining equity and efficiency, two goals that are often difficult to achieve simultaneously. In terms of equity, the advantage is that of providing intergovernmental grants based on the real needs of each territory, guaranteeing that all authorities have enough resources to provide local services with uniform standards of quality and quantity. From the efficiency point of view, the advantage is that of stimulating higher electoral accountability of local administrators, because expenditure level above standard expenditures cannot be covered by intergovernmental grants and must thus be financed directly by citizens through local taxes.

The OECD includes the adoption of the calculation of SEN within the *best practices* related to the planning of financing systems for local government. In particular, it is argued that the provision of equalisation grants based on mathematical formulas that measure institutions' expenditure needs is preferable to systems based on actual expenditures or the discretion of the central government, since the mathematical formula approach guarantees greater transparency in the flow of grants, greater equity in the redistribution of resources, and greater efficiency in managing public expenditures, thanks to more rigid budget constraints for local governments.

The possibility of obtaining the concrete advantages attributed to the adoption of SEN criteria is strictly linked to the accuracy with which expenditure needs are calculated, as well as to the interpretability of results and the consequent possibility of transmitting them to the institutional entities concerned. For this reason, in order for the adoption of SEN criteria to prove effective, it is essential, first and foremost, to build broad ranging databases that provide the most accurate possible picture of the socio-economic context and territorial characteristics of each local authority. Secondly, advanced statistical and econometric techniques must be used to transform this information into expenditure needs as accurately as possible.

The calculation of SEN allows for the equitable and efficient provision of equalisation grants, but also requires adequate technological support in order to work correctly. For this reason, it is employed mainly in economically developed countries, and rarely used by developing countries. Within the OECD, the method is used successfully in Denmark, Finland, Norway, Sweden, the United Kingdom, Holland, Portugal, Japan and Australia.

Among European countries, the United Kingdom is the one that has been using sophisticated statistical and econometric techniques to determine the SEN of local authorities the longest. After more than a decade of debate and experimentation, the introduction of standardisation techniques for the valuation of expenditures



needs of local governments became operational during the early '90s, together with a process of renewal across the local public sector. This program has placed the UK at the forefront of countries that are most attentive to issues related to efficiency and performance measurement in the delivery of local services.

In the broader global scenario, the fiscal equalisation system adopted in Australia is considered one of the most complete and is used as a model for countries such as Italy which are undertaking reforms in this direction. One of the aspects of the Australian system that is generally appreciated is its choice to entrust the technical responsibility of determining standards to an independent agency, the *Commonwealth Grants Commission*.

2.3 THE MAIN TECHNIQUES FOR DETERMINING STANDARD EXPENDITURE NEEDS

The methodologies for determining SEN are characterised, on the one hand, for the quantity of data used to capture the environmental and socio-economic characteristics of the territories of the local authorities being analysed, and on the other hand for the statistical techniques used to select and evaluate the weight these variables have in determining differentials expenditure needs.

The simplest and least refined standardisation approach is that of *uniform per capita expenditure*, in which the size of the resident population is used as the sole determining factor for expenditure needs. Costs are standardised based on a uniform per capita amount for all authorities, equal to the macro-budget divided by the resident population: expenditure needs for each authority are obtained by multiplying this per capita value by the resident population.

A more complete approach to the calculation of expenditure needs, which includes other variables in addition to the size of resident population, is the *Representative Expenditure System (RES)*. In this approach, the expenditure needs for each authority are determined by the linear combination of a series of load factors obtained in relation to the weight these factors have in determining expenditure needs. Load factors can include environmental characteristics such as surface area, number of residents, composition of the resident population by age, length of roads, etc., or structural elements related to the quantity of services produced and the inputs employed for supplying local public services. Usually, the choice of these factors is entrusted to experts or to decisions of a political nature, while weights are normally determined using statistical methods.

A very simple case of RES occurs when the SEN for a given region depend only on two factors with pre-established weights: the resident population and surface area. For example, given a region where 10% of the national population live and whose surface area amounts to 50% of the country's overall surface area, if the weights are 0.8 for the population and 0.2 for the surface area, the region's SEN will be equal to $0.18 = 0.8 \times 0.1 + 0.2 \times 0.5$. The result is that the region will be entitled to 18% of all equalisation grants (supposing the equalisation is determined solely in relation to expenditure needs).

The RES approach can provide acceptable results when the authorities analysed are few in number and economically and socially similar. However, its application becomes less effective when the mixture of local authorities has markedly varied characteristics. The immediacy and flexibility of the RES are not supported by a theoretical model that can act as a guide in the selection of load factors and weights, which, in essence, are discretionary.

For these reasons, the majority of developed countries that allot equalisation grants based on SEN adopt an approach that is similar to the RES but more sophisticated in its application. This is the *Regression-based Cost Approach (RCA)*, based on which the SEN of each authority are assessed as the expected value for a cost function (i.e. linked to the efficient behaviour of the local government), estimated using multiple linear regression techniques.

With the RCA approach, the selection of variables to be inserted in the estimation model is guided by a theoretical framework based on the interaction between the demand for public services expressed by citizens and the supply of public services expressed by the local government (see the Appendix for more details about the theoretical framework). The result is that the efficient cost of supplying a given service depends on three



essential groups of variables: the optimal quantity of service offered¹³; prices for the inputs used in the production process (primarily labour costs); and the context variables related to the supply side, i.e. external factors that, with other conditions being equal, can favour or hinder the supply of local public goods (e.g. the morphological characteristics of the territory, or the extension of its surface area).

The weight with which each variable affects the determination of SEN is estimated in a statistically robust manner through the use of multiple regression techniques. In this way all factors for calculating cost differentials are determined within a model that is capable of correctly representing the variables that identify the real determinants of expenditure needs, especially in the case of extremely heterogeneous local authorities.

Compared to the RES approach, the RCA approach provides greater accuracy, but also requires greater quantity and quality of data, particularly in the measurement of input prices and the correct identification of output variables that can be used to measure the optimal quantity of public services supplied in equilibrium.

In particular, the presence of public service output variables within the estimation model for SEN presents two orders of problems. Firstly, the outputs are not always measurable and there may be therefore a very serious lack of information. Secondly, even if the public service outputs are observable with extreme accuracy (e.g. in situations in which the state establishes basic levels of services to which individual local authorities must conform) they can be endogenous, since the supplied quantity is determined jointly with the level of expenditures. In this last case, to correctly estimate the weight of an output in determining expenditure needs, it would be necessary to employ a two-stage estimation techniques based on the use of instrumental variables that cannot always be adopted successfully.

A commonly used solution for resolving both problems reported above is to estimate a variant of the cost function, known as an *expenditure function*. In essence, an expenditure function is a cost function in which the optimal quantity of the service provided is substituted by its determinants, represented by the background variables that impact the demand of citizens (e.g. the composition of the population by age, since an older population will express a larger demand for social support services).

For this reason, in the end, an RCA methodology based on the estimate of an expenditure function is the most complete and robust approach for evaluating SEN, and it is therefore the approach that is commonly used globally. This variant to the pure RCA approach is very similar to the RES approach in appearance, with the essential difference that the selection of variables used for the calculation is supported by a theoretical model and that the weights of these variables are determined by a multiple regression analysis, which leaves little space for discretionary interventions, thereby rendering the estimate of expenditure needs more robust and objective.

Compared to the pure RCA approach, the RCA approach based on the estimate of an expenditure function has the advantage of not having to adopt any further econometric instruments, other than basic multiple regression, in correctly estimating the impact exercised by the quantity and quality of outputs in determining standard expenditure levels. On the other hand, due to this simplification, it does not allow for the measurement of the direct relationship between expenditure needs and outputs, and thus it does not allow the direct estimation of expenditure needs based on the level of optimal public services that should be supplied in equilibrium.

2.4 STANDARD LEVELS OF SERVICES

In addition to SEN, Legislative Decree 216/10 introduces yet another innovative element for local authorities in Italy: the determination of the *standard levels of services (SLS)*.

The determination of *SLS* is very important because it provides an instrument for evaluating both the degree of technical efficiency in the provision of local public services and the adequacy of the quantity of services provided to the specific local needs. The necessity of such an instrument has long been debated in Italy at the political and academic level, but no concrete result has yet been produced.

¹³ Optimal service quantity refers to services that best satisfy the preferences and/or needs of resident citizens.



Unlike the determination of SEN, for which a consolidated academic literature and many international experiences exist from which to draw on, the determination of *SLS* is a quite new exercise.

The only important international experience with regard to standard level of services is that of local English governments. Over twenty years ago the outputs of local authorities began to be measured systematically through a range of indicators (over 200 active in 2009) known as *Best Value Practice Indicators* (BVPI).¹⁴ The most characteristic element of the English experience has been the implementation of a comprehensive performance evaluation system for local authorities, named *Comprehensive Performance Assessment* (CPA). CPA, based on BVPIs and the judgment of inspectors, led to the annual publication of a ranking of local authorities, which continued for eight years from 2002 to 2009. This ranking assigned to each authority a number of stars ranging from five for performance excellence, to one for very poor performance. Although CPA did not produce a direct impact on the allotment of equalisation grants, this performance assessment system was nonetheless used successfully to identify weaker administrations, on which the central government concentrated its attention in order to raise quality and quantity levels for services provided. The entire evaluation process was conducted by an independent auditing agency (*Audit Commission*) and represented a highly important experience, since, to this day, CPA is the sole concrete example of an assessment system based on quantitative indicators designed to monitor the overall performance of local authorities.

3 DETERMINING STANDARD EXPENDITURE NEEDS IN ITALY

3.1 THE ROLE OF SOSE AND IFEL

Legislative Decree 216/10 assigns the task of processing methodologies for the determination of standard expenditure needs (SEN) for local authorities in Italy to *SOSE Soluzioni per il Sistema Economico S.p.A.*¹⁵

This choice follows a governance model that is considered by the OECD among the best suited for the management of equalisation grants: a model that assigns technical/methodological tasks to an impartial body in order to facilitate mediation between the central government and local authorities.

In addition, this choice allows exploiting the full potential of the statistical and econometric *know-how* acquired by SOSE in the field of *Studi di settore* (sector studies), an instrument for tax assessment in the area of self-employment, which has been constructed by SOSE and successfully employed by the tax administration.

Lastly, the decree entrusts the *Istituto per la Finanza e l'Economia Locale*¹⁶ (IFEL ANCI Foundation)¹⁷ with the responsibility of providing scientific collaboration and support to SOSE in the following tasks: conducting analyses and studies on accounting and local finances; preparing questionnaires and submitting them to local authorities; developing a calculation methodology for SEN; evaluating the suitability of the estimates produced; providing analyses of results and monitoring the implementation process for SEN.

¹⁴ For example, among the output indicators for social care services are the number of elderly who require assistance at home in every 1000 inhabitants over 65 years of age (BPVI54); indicators related to environmental services include the percentage of recycled domestic waste (BPVI82a); and, lastly, indicators measuring the performance of general administrative services include the percentage of invoices paid within 30 days of receipt or within the agreed payment terms (BVPI8).

¹⁵ *Solutions for the Economic System*

¹⁶ *Institute for Finance and Local Economy*

¹⁷ It is important to also report the technical support provided by UPI (*Union of Italian Provinces*), RGS (*State General Accounting Office*) and STAT (*National Statistic Institute*).



3.2 ESSENTIAL FUNCTIONS FOR MUNICIPALITIES AND PROVINCES

The *essential functions* of local Italian governments object of standardisation, as indicated in Article 3 of Legislative Decree 216/10, are listed in Tables 1 and 2, for municipalities and provinces of ordinary statute regions, respectively. The tables indicate the amount of actual resources corresponding to each function and their weight with regard to the total.

Table 1 - Distribution of current expenditure allocated on the six essential functions, 2010 Budget Sheets, Municipalities belonging to ordinary statute regions

Essential functions	Current expenditure (Interventions 1, 2, 3, 4, 5 and 7)	
	Amount (euro)	Percentage
General Administrative, Management and Control Functions (only 70%)	8,416,198,009	24.83%
Local Police functions	2,628,769,227	7.75%
Education (complementary services)	4,343,680,368	12.81%
Public Roads and Transport	4,266,786,383	12.58%
Planning and Environmental functions	7,156,941,425	21.11%
Social care	7,092,667,354	20.92%
Total essential functions	33,905,042,766	100.00%

Table 2 - Distribution of current expenditure allocated on the six essential functions, 2010 Budget Sheets, Provinces belonging to ordinary statute regions

Essential functions	Current expenditure (Interventions 1, 2, 3, 4, 5 and 7)	
	Amount (euro)	Percentage
General Administrative, Management and Control Functions (only 70%)	1,286,707,603	20.74%
Education (complementary services)	1,421,475,486	22.91%
Public Transport	1,332,000,707	21.47%
Planning	736,907,007	11.88%
Environmental functions	686,282,827	11.06%
Economic Development, Employment and Labour Market Services	741,911,575	11.96%
Total essential functions	6,205,285,205	100.00%



3.3 THE ESTIMATION MODEL: COST FUNCTION AND EXPENDITURE FUNCTION

The assessment methodology for SEN deemed most suitable for Italy (a choice that also took into consideration other international experiences) was the *Regression-based Cost Approach* (RCA), both in its pure form based on the estimation of a cost function and in its reduced form based on the estimation of an expenditure function. This method was preferred over the *Representative Expenditure System* (RES), given the heterogeneity and complexity of local Italian authorities (municipalities and provinces). Moreover, the RCA approach, which is supported by a theoretical model that allows for the valuation of expenditures needs through the estimation of a cost function, fully embodies the legislative provisions that impose to value SEN, taking into account the degree of efficiency in the provision of local services.

However, faced with the extreme heterogeneity of the essential functions being assessed, it is necessary to adapt the RCA to the specific characteristics of each function, adopting diverse estimation models. The discriminating element for the choice of a specific model is the characteristic of the variables, which can be used for measuring the output provided, i.e. the possibility of considering the quantity of services provided in calculating SEN.

For these reasons, a preliminary choice must be made prior to the choice of estimation methodology. The best available model must in any case be adapted to the characteristics of the function being analysed. This allows for a maximisation of the results requested by current legislative provisions, without forcing statistical techniques in the event of a lack of information.

The two main characteristics of the essential functions implemented by local authorities are the level of measurability of the services provided and the extent to which these services are exogenous, with respect to the decision-making autonomy of each local authority.

Based on the combinations of these two output characteristics, three groups of services can be identified, each of which corresponds to a different model for the assessment of the expenditure needs. Table 3 below illustrates this ranking outline.

Table 3 – Summary of general assessment models for standard expenditure needs.

		Services are exogenous to the decision-making autonomy of each local authority	
		Yes	No
Measurable services	Yes	Pure RCA (cost function)	Expenditure function RCA or Pure RCA according to the possibility of testing the endogeneity of output variables
	No	Expenditure function RCA	

The first group (north-west quadrant) includes cases for which the quantity of services provided can be measured satisfactorily and the output variables capturing all the essential factors of the implemented activity are exogenous to the decision-making autonomy of each local authority. In these cases, we can proceed with estimating SEN using a pure RCA approach, effectively obtaining an estimation model of SEN based on the product between exogenous standard (or minimal) service levels and standard average costs.

The second group (north-east quadrant) includes cases for which the quantity of the service provided can be measured, but these services (in terms of quantity and/or quality) reflect the discretionary choices of each local authority. In these cases, the estimation of SEN can be performed robustly and consistently using the RCA approach, based on the estimation of a cost function, which easily and effectively overcomes the problem of



endogeneity for output variables with respect to actual current expenditure. Otherwise the estimation of expenditure needs will follow the reduced form approach based on the estimation of an expenditure function where output variables are replaced by exogenous demand factors.

The third group (south quadrant) includes those sectors for which it is not possible to measure the quantity of services provided since measurements of available outputs do not allow for a complete picture of the activities of the local authority. In these cases, the estimation of expenditure needs follows the RCA approach based on the estimation of an expenditure function. The majority of functions for municipalities and the whole set of functions for provinces fall in this group.

4 THE SOSE METHODOLOGY

As illustrated in the previous sections, standard expenditure needs (SEN) can be calculated following different strategies. The multiplicity of existing approaches has made necessary preliminary methodological choices guided by four basic principles: correctness and rigour from a scientific standpoint; feasibility in application; simplicity during the communication phase; representativeness in terms of the capacity of results to depict the reality to which they refer.

Based on these principles, the methodological approach elaborated by SOSE, though based on the best practices consolidated at the international level, introduces various innovative elements, which can elicit the interest of the scientific community and offer a contribution to research studies in various countries aimed at improving estimation procedures for SEN.

The SOSE methodology relies on four main pillars.

The first pillar concerns the construction of a database on the activities of local authorities which includes: the information on inputs and outputs for each service collected through the submission of questionnaires to municipalities and provinces, accounting information derived from existing official sources and supplemented with new data collected through the questionnaires, and information related to the local socio-economic context.

The second pillar concerns the valuation of SEN through the use of statistical and econometric techniques in line with the RCA approach. It is important to stress that all methodological choices will be reconsidered in relation to the specific features of each service provided by local government, and especially in relation to the different degree of endogeneity and representativeness of output measurements (refer to Section 3.3). A similar estimation strategy adopted for SEN will be used to calculate standard level of services (SLS), as requested by current legislation (Legislative Decree 216/10, Article 4, paragraph 1, letters b) and e)).

The third pillar involves the design of a procedure that may in the future allow for more efficient spending through the inclusion of "target" variables in the estimation of SEN and the construction of system of performance indicators for rewarding local authorities that express "efficient" behaviours.

The forth pillar concerns the elaboration of a variety of *Business Intelligence Models*, with the aim of providing local authorities and citizens with an innovative *online* information/management tool for monitoring the composition of SEN and SLS, as well as their own performance levels in relation to management indicators. Such a tool facilitates an awareness of local authorities' positioning with respect to other local authorities, particularly similar or neighbouring authorities



4.1 THE DATA

The methodology for gathering data is one of the main contributions provided by the Italian experience to the international literature of SEN valuation. The collection of data through questionnaires has allowed SOSE to effectively resolve what is generally deemed to be the primary weak point of estimation mechanisms for SEN: lack of information. Larger volumes of data collected and processed for the determination of SEN ensures higher degree of robustness in the estimation process.

Though the questionnaires, which were prepared in collaboration with IFEL and UPI and distributed through a dedicated web portal (the *Standard expenditure needs web portal project*), municipalities, unions of municipalities and provinces were requested to provide information relating to accounting and structural factors in the implementation of services for essential functions.

The questionnaires respond to the need to integrate/reclassify and correct what is already available from official sources. In particular, the data contained in the Budget Sheets¹⁸ provided by the Ministry of Interior proved insufficient in determining the actual expenditures of services object of the standardisation analysis. Although the use of Budget Sheets as a starting point has the unquestionable advantage of providing greater stability for gathered information, the extreme heterogeneity of the criteria for recording accounting data and the summary nature of the document prevent Budget Sheets to be credible as the sole source for the determination of actual current expenditures used as dependent variables for the estimation model.

Moreover, other official sources (ISTAT, Ancitel, Ministry of Education, Territorial Agency, etc.) also do not provide enough detailed information to analyse the main features of the services provided by local governments. For example, no official source exists to provide information neither about outputs nor about the main inputs employed in the production process.

The structural data collected through the questionnaire thus represents an extraordinary innovation, allowing elements such as inputs (personnel employed, capital goods, local units used, etc.), outputs (services implemented), and procedures for the implementation of services (unions of municipalities and other forms of joint or direct provision) to be assembled into a unitary framework. On the other hand, accounting information requested in the questionnaires allow for a reclassification and integration of the data contained in the Budget Sheets, thus providing a more accurate representation of actual expenditures.

Therefore, prior to undertaking the valuation of SEN, a unique database was built, including accounting information from the archives of the Budget Sheets, provided by the Ministry of the Interior for the year 2009 and 2010, structural information collected with the questionnaires and information related to socio-economic context derived from official sources. The database provides information about 6702 municipalities, 220 unions¹⁹ of municipalities and 86 provinces. In the process of data collection, the methodological contribution provided by ISTAT (National Statistic Institute) proved essential.

SOSE also put great effort into controlling the quality of data. For example for the questionnaire FC02U related to municipal police services, direct contacts were established with 486 local authorities via ordinary and certified electronic mail, as well as by telephone. This activity allowed for the correction of 1076 irregularities, corresponding to cases of serious incoherence in the declared data.

In addition, the information acquired through the questionnaires made it possible, for the first time ever, to assess the organisational models used by local authorities for the provision of services, thereby allowing the valuation of their impact on expenditure needs, as stipulated under Article 4 paragraph 3 of Legislative Decree 216/10. In particular, for the first time it has been possible to accurately assess the geography of unions of municipalities and other forms of joint provision of local public services (mountain communities, consortiums and agreements), of which very little was known before.

¹⁸ *Certificati di Conto Consuntivi*.

¹⁹ Maximum number of unions registered in the provision of local police services.



4.2 THE MODEL OF STANDARD EXPENDITURE NEEDS

The second pillar of SOSE methodology concerns the development of methodologies for evaluating SEN and SLS. Both methodologies will be briefly discussed in the following two subsections. It is important to underline that the methodologies related to the valuation of SLS are still in experimental stages and are not under the examination of the Houses of Parliament.

4.2.1 The theoretical framework of standard expenditure needs

The theoretical framework of SEN is based on the interaction between the supply and demand of local public services (the Appendix provides a more complete description of the theoretical framework), both expressed in per capita terms with respect to the number of beneficiaries designated here as the *client group*. In the majority of cases the client group corresponds to the total resident population; in the cases of education complementary services and nursery services, however, the client group corresponds to children aged 3-14 and aged 0-2, respectively.

The demand for local public services (g_e) in the equation (1) depends on: the background variables related to the demand for local public services (\mathbf{Q}), which capture the demographic and socio-economic aspects influencing the demand; the average income (\mathbf{R}); and the per capita cost (with respect to the client group) of local public services (y):

$$g_e = d(\mathbf{Q}, \mathbf{R}, y) \quad (1)$$

The supply for local public services (y), expressed in terms of per capita costs, is reported in the equation (2) and depends on the following variables: the level of exogenous load factors (g_s)²⁰; the level of endogenous outputs for public services (g_e); input prices (\mathbf{p}); and background variables related to the supply (\mathbf{A})²¹:

$$y = s(g_s, g_e, \mathbf{p}, \mathbf{A}) \quad (2)$$

The optimal level of local public services and their costs are thus determined simultaneously within a structural model that includes two equations: (1) and (2).

In some cases the estimation of SEN can be performed directly using the cost function reported in the equation (2): that is a model that multiplies the quantities of the service provided by coefficients expressing the standard average cost of individual outputs comprising the services implemented (*pure RCA*). This option can be suitably considered in certain specific cases. The first is when local public services can be measured adequately, and are represented by exogenous load factors (e.g. in the case of complementary education services provided by municipalities). The second is when local public services are represented by endogenous outputs that can be measured with an excellent degree of accuracy and the problem of output endogeneity can be tested through the identification of a set of valid instrumental variables (e.g. in the case of nursery services provided by municipalities).

²⁰These are, for instance, services provided by local authorities for higher-level administrations (such as crime notifications, lawsuits and disputes received or the notification of traffic accidents, in the case of local police functions of municipalities) and, generally, activities not directly attributable to the decisions of local administrators.

²¹These are, for instance, morphological and socio-economic factors that do not affect preferences regarding the level of public services (i.e., those exogenous factors that can favour or hinder the supply of local public goods, such as economies of scale measured through the size of resident population).



Alternatively, in order to combine simplicity and robustness of estimates, the valuation of expenditure needs can be implemented using an expenditure function, which represents a reduced form of the structural model for supply and demand for public services. The expenditure function used to estimate SEN is reported in equation (3), which is obtained by substituting equation (1) into equation (2), thus expressing the relationship between the costs for the provision of local services and the local context in which the local government operates.

$$y = f(Q, R, p, A, g_s) \quad (3)$$

The primary advantage of evaluating SEN through the expenditure function is that consistent estimates can be obtained easily and robustly using the *Ordinary Least Squares* (OLS) estimator, since the independent variables are represented only by exogenous variables. This is the main reason why the estimation of expenditure needs based on expenditure functions is the most commonly adopted econometric approach at a global level, while the pure RCA approach is rarely adopted (see Section 3 for more details).

4.2.2 *The empirical model of standard expenditure needs*

Regardless of the theoretical model selected (cost function or expenditure function), the estimation of SEN is implemented through the calculation of the expected values from an empirical model that identifies the relationship between the current per capita actual expenditures (dependent variable) and a set of independent variables within a multivariate regression model.²²

Usually the following groups of independent variables have been used:

- *Output variables* (specific to the cost function approach), measuring the quantity and quality of the services provided (e.g. the number of children using nursery services, the number of pupils using meal services etc.);
- *Demand background variables* (specific for the expenditure function approach), measuring the demographic and socio-economic aspects required to capture local preferences/needs regarding the demand for public services (e.g. the percentage of elderly people on total population, the number of people with addictions and mental health problems, the number of single-parent families etc.);
- *Supply background variables*, comprising environmental characteristics that impact the total productivity of input factors (e.g. the numerosness of the resident population, which captures congestion phenomena and/or economies of scale, the morphological characteristics of the territory etc.);
- *Exogenous load factors*, capturing the impact of services provided by local authorities on behalf of higher level administrations, or of activities not directly attributable to the decisions of local administrators (e.g. crime notifications, lawsuits and disputes received, or the notification of traffic accidents in the case of local police services; the front-office activity related to the issue of vital certificates carried out as part of registry office services etc.);
- *Input prices*, represented in the majority of cases by *the average staff expenditures per employee* computed as the ratio between the total labour costs and the total equivalent number of employees reported in the questionnaire, and the *average rents per square meter for commercial use* provided by the *Osservatorio del Mercato Immobiliare* (OMI)²³ of the Territorial Agency;²⁴

²² In the construction of the empirical model of standard expenditure needs, current expenditures are usually considered in per capita terms and, therefore, have been divided by the resident population, which constitutes the client group for the majority of services. Moreover, the use of current per capita expenditures as a dependent variable is preferable, since it allows for a reduction of the heteroskedasticity problem in the data.

²³ Real Estate Market Centre.

²⁴ The average rents per square meter for office use is a proxy of the price index of other productive factors different from labour.



- *Managerial choices*, represented by a set of variables used to capture the impact exerted on expenditure by organisational choices such as the joint provision of local public services with other authorities (unions of municipalities, conventions etc.) or the staff/child ratio (in the case of nursery service);
- *Regional fixed effects*, representing a set of dummy variables included in the model in order to capture the impact of regional policies.

As a result the estimation of SEN is conducted using the following empirical model:

$$y_i = \alpha + \beta'X_i + \gamma'W_i + \delta'Z_i + \varepsilon_i \quad (4)$$

where:

- i corresponds to the local authority index;
- $\alpha, \beta, \gamma, \delta$ are the coefficients to be estimated;
- y_i is the dependent variable corresponding to the current per capita expenditures;
- X_i is the vector of independent variables which are used both in the estimation and in the subsequent stage of calculating SEN. As evident in equation (3), these are demand background variables (Q), supply background variables (A), and variables related to exogenous load factors (g_s).
- W_i is the vector of independent variables which, while used in the estimation, become “target” variables when computing the SEN. These variables should be used as stated by each local authority in estimating the empirical model, so as to avoid distortions in the coefficients; however, in computing the fitted values, this variable can assume a target value (W^*) to be attained by the local authority. The W_i variables include the input prices (p) and endogenous outputs (g_e) when using the cost function approach.
- Z_i is the vector of independent variables that can explain cost differences related to organisational models, particular managerial choices and regional fixed effects. These variables are included in the empirical model in order to capture the variability related to organisational models, and consequently to avoid the problem of omitted variables. However, in computing SEN the impact of these variables is ignored or “neutralised”, in order to attribute to each municipality a standard expenditures need that does not depend on specific organisational choices adopted, form of service management, and the impact of regional policies.
- ε_i represents the idiosyncratic error term, with zero mean, uncorrelated with X_i , W_i and Z_i , but potentially heteroskedastic.

The specification of the empirical model has been conducted using the “stepwise” method validated by a “general-to-specific” and “specific-to-general” approach. Once the regressors have been selected, the empirical model is estimated using an OLS estimator with robust standard errors in order to control for the heteroskedasticity in the covariance matrix (the only exception is represented by nursery services).²⁵

²⁵ The following statistical tests have been used to ensure the robustness of the estimates: Cook's distance (*Cook D*), commonly used to estimate the impact of a single observation on OLS coefficient estimates; the leverage points analysis, which identifies the observations most distant from the corresponding fitted values; the coherence of “studentized” residuals (*Student R*); and the analysis of *dfbetas*, which examine the observations that significantly influence parameter estimates. In the end, observations identified as outliers or extreme values based on the statistical tests have been eliminated by the regression sample.



4.2.3 The computation of standard expenditure needs

Once the coefficients of the empirical model of SEN reported in equation (4) have been estimated, the expected values (\hat{y}_i) of the current expenditure of each municipality (also considering those excluded from the regression sample) are obtained as follows:

$$\hat{y}_i = \hat{\alpha} + \hat{\beta}'\mathbf{X}_i + \hat{\gamma}'\mathbf{W}_i + \hat{\delta}'\mathbf{Z}_i \quad (5)$$

Subsequently, the *Theoretical Standard Expenditure Needs* (FS) are computed, neutralising the impact of variables \mathbf{Z}_i and replacing the \mathbf{W}_i variables with target values (if available) as reported in equation (6):

$$FS_i = \hat{\alpha} + \hat{\beta}'\mathbf{X}_i + \hat{\gamma}'\mathbf{W}^* + \hat{\delta}'\mathbf{Z}^* \quad (6)$$

It follows that the difference Δ_i between the value of actual current expenditure and the theoretical standard expenditure needs is equal to:

$$\Delta_i = y_i - FS_i = \hat{\gamma}'(\mathbf{W}_i - \mathbf{W}^*) + \hat{\delta}'(\mathbf{Z}_i - \mathbf{Z}^*) + \hat{\varepsilon}_i \quad (7)$$

The difference Δ_i can be decomposed into three additive components, where:

- | | |
|---|--|
| $\Delta_i^1 = \hat{\gamma}'(\mathbf{W}_i - \mathbf{W}^*)$ | represents the difference corresponding to the impact exerted by target variables; |
| $\Delta_i^2 = \hat{\delta}'(\mathbf{Z}_i - \mathbf{Z}^*)$ | measures the variability connected to particular managerial choices, and regional fixed effects; |
| $\Delta_i^3 = \hat{\varepsilon}_i$ | represents the residual part of the difference between actual expenditures and standard expenditures due to the stochastic component of the model. |

After estimating the FS it is possible to calculate an indicator of relative needs for each municipality, corresponding to the allotment coefficient FS_CR_i reported below in equation (8):

$$FS_CR_i = \frac{N_i FS_i}{\sum_i N_i FS_i} \quad (8)$$

where N_i is the size of the client group of each municipality, which corresponds to the total resident population in the majority of services (in the case of education complementary services and nursery services a slightly different procedure has been followed because of the logarithmic specification of the empirical model of the cost function).

The FS_CR_i represents the final result of the procedure, since the valuation of SEN leads to the computation of a set of allotment coefficients for an overall expenditure amount determined externally by the central government. The allotment coefficients computed for each function can then be combined to calculate an overall allotment coefficient for the total amount of essential functions' expenditures.



Note that, in the case of unions of municipalities, the estimated SEN were calculated on a “consolidated” base, with reference to the union (with few exceptions such as variables related to the economies of scale) and then distributed to each municipality belonging to the union proportionally to the resident population of each municipality.

4.2.4 *The case of the social care functions*

As an example, we discuss in more details the main methodological aspects regarding the estimation of the SEN of the social care sector, which represents one of the main function performed by municipalities and absorbs about 20% of the total actual current expenditure, corresponding to more than 7 billion euros (2010 figures).

Information derived from official sources has been supplemented with accounting and structural data collected through questionnaire FC06U with reference to the year 2010. The questionnaire, similarly to those implemented for other functions, consists of twelve tables, each with different objectives and content. The top six tables contain mainly structural data about managerial choices, staff structure, other inputs employed in the production, and the quality and quantity of services. The remaining six tables are mainly used to collect accounting information aimed at supplementing the information derived from the Budget Sheets in order to evaluate the level of actual expenditures used as dependent variable in the empirical model. In particular, they provide information about the structure of staff cost, the outsourcing, and revenues from the provision of services. Regarding nursery services, for example, questionnaire FC06U provides a wide range of new information about staff structure, the number of children attending part-time and full-time, the number of voucher recipients, opening days and opening hours, the percentage of children using the meal service etc.

In sum, 6,667 municipalities (99.5% of the total) returned the questionnaire within the established deadline; subsequently, SOSE put great effort into controlling the quality of data by establishing direct contacts with 3,982 local authorities via ordinary and certified electronic mail, as well as by telephone. This activity allowed for the correction of 8,107 irregularities, corresponding to cases of serious incoherence in the declared data.

Based on the data collected, the services provided in the social care sector have been divided into 11 macro-services (or macro-output):

- 9 are potentially endogenous with respect to the choices of local administrators: nursery services; early childhood (e.g. other educational and recreational services for early childhood); social emergency (e.g. meals provided by the social canteen); social inclusion (e.g. transport of people with disabilities, literacy courses); income support (e.g. rent allowances); home care (e.g. home care meal service, tele-assistance, remote monitoring); day care centres (e.g. recreational social and cultural activities); residential care (e.g. children in foster care, assistance and social rehabilitation); back office activity;
- 2 can be classified as exogenous load factors: front office services; cemetery, cremation and mortuary services.

Each macro-output (excluding nursery services) is, in turn, divided into several basic services for a total of 36 elementary output variables.

In consideration of the specific nature of each macro-service, the estimation of SEN has been carried out by separately analysing the nursery services, which have children aged 0-2 as client group, and by grouping the rest of the social services which have the entire resident population as client group within a single category called general social services.

With regard to nursery services, the output produced can be easily measured through the number of served children. Preliminary tests conducted to verify output endogeneity did not reject the null hypothesis according to which the amount of children served can be considered exogenous with respect to municipal expenditure.



Consequently it was decided to evaluate the SEN through the estimation of a cost function using a log-log specification of the empirical model, as reported in the following equation (9):

$$\begin{aligned} \log(Y_i) = & \alpha_0 + \gamma \log(M_i) + \theta_1 \log(P_{1i}) + \theta_2 \log(P_{2i}) + \delta'_2 \mathbf{F}_i + \delta'_3 \mathbf{L}_i + \\ & + \eta_1 e_i + \delta'_{1e} \mathbf{S}_i e_i + \delta'_{1(1-e)} \mathbf{S}_i (1 - e_i) + \varphi_1 D_i + \varphi_2 D_i \log(V_i) + \varepsilon_i \end{aligned} \quad (9)$$

where: i is the municipal index, α_0 is the constant term, Y corresponds to the actual current expenditure, M is the output variable measured in terms of served children; P_1 is the variable capturing the price of labour (computed as the weighted average between internal and external labour costs), P_2 is the variable capturing the cost of capital (proxied by average rents per square meter for commercial use), \mathbf{F} is the vector of cost-shift variables related to fixed cost components and/or the service quality (total area in square meters and staff/child ratio), \mathbf{L} is the vector of binary variables related to the forms of joint provision and regional fixed effects; \mathbf{S} is a vector of cost-shift variables that measure the intensity of service;²⁶ e represents the share of children which attend nursery not run directly by the municipality because externalised to private entities; D is a binary variable that takes value 1 if the municipality provides only vouchers; V corresponds to the number of voucher recipients, ε is the idiosyncratic error term of zero mean, uncorrelated with the other independent variables and potentially heteroscedastic.

The analysis of managerial choices provides the following segmentation of local authorities: 1,783 municipalities directly provide nursery services; 552 municipalities provide the service jointly with other authorities (unions of municipalities, mountain communities, conventions etc.); 4,367 municipalities do not provide nursery service.

The sample used for the estimation of the cost function has been defined after an detailed analysis of the data reported only by those municipalities that provide nursery services. In this way we have constructed a sample of 1,133 local authorities (including 12 unions, 4 mountain communities, 6 consortia, and 33 conventions). After the removal of outliers, the regression sample shrinks to 970 observations.

Despite the elimination of outliers from the regression sample, OLS estimates showed a poor fit, as the value of the *root mean squared error* was very high making the transformation of the expected values of the logarithmic function into monetary values - a necessary transformation for the correct valuation of the SEN - impossible. To solve this problem, it was decided to compute the coefficient point estimates of the parameters of equation (9) using the *Least Absolute Deviations* (LAD) estimator²⁷, which corresponds to a quantile regression analysis performed in relation to median values. The estimates of the coefficients of the independent variables in all other percentiles have also been taken into consideration, however, in order to verify the robustness of the point estimates obtained at the median, thus showing a good stability of the coefficients' point estimates of all independent variables.

The coefficients' point estimates of the cost function are reported in Table 4a in relation to different groups of variables: \mathbf{X} , \mathbf{W} , and \mathbf{Z} . Tables 4b and 4c report the values considered for the computation of SEN regarding the variables included in group \mathbf{W} and group \mathbf{Z} . Final estimates show a pseudo R-squared value equal to 0.6783 providing evidence of a good fit for the empirical model. It is possible to note, in particular, the presence of slight increasing economies of scale, since the coefficient of output is below one. It should also be noted, moreover, that the null hypothesis of price elasticity equal to one cannot be rejected.

²⁶ This set of variables includes: the share of part-time children, the share of children who use meal services, the share of infants, the dummy that identifies opening hours of fewer than seven hours, the dummy that identifies opening days of fewer than 213 days and the variables related to the presence of kitchens.

²⁷ For more details about the LAD estimator see Cameron and Trivedi (2010) *Microeconometrics Using Stata*. Chapter 7. Stata Press.



The logarithmic specification of the final model allows us to interpret the coefficient estimates in terms of elasticity; however it makes an immediate valuation of the theoretical SEN (FS) impossible. In this case we need to use the following formula to evaluate the FS for each municipality i :

$$FS_i = \frac{\exp(\hat{\alpha} + \hat{\beta}' X_i + \hat{\gamma}' W_i^* + \hat{\delta}' Z_i^*)}{N_i} \quad (10)$$

where $\exp(\cdot)$ is the exponential function. As a result, individual components of the FS cannot be considered independently from the others since, in this case, the FS does not have an additive structure.

The absence of basic levels of services established by law according to which a minimum percentage of children aged 0-2 must be served by nursery services, prevents SOSE from listing the output variables in the set of target variables W . This implies that the FS of each local authority can be computed considering only the actual number of children served by nursery services, reporting zero SEN for those municipalities without nursery services²⁸. The valuation of a positive standard expenditure also for those municipalities without nursery service is subordinate to the identification of the some mandatory “essential level of services” by the policymakers.

²⁸ The presence of nursery services is identified by the positive number of served children (i.e., the number of children attending full time or part time, including the number of voucher recipients).



Table 4a – Nursery services, LAD coefficients' point estimates (coefficients can be interpreted as elasticities, dependent variable = $\log(\text{actual current expenditure})$).

CONSTANT		1.7834
<i>X variables</i>		
OUTPUT	Number of children attending full-time and part-time (log)	0.9412 ***
	Share of infants (part-time and full-time)	0.2783 **
INTENSITY OF SERVICE	Share of children using meal services	0.2305 **
	Share of children attending part-time sessions	-0.2449 **
	Share of children in kindergartens not directly managed by the local government	-0.5397 ***
MANAGEMENT CHOICES	Presence of kitchens (dummy, 1 = yes) X share of children under direct management	0.1461 **
	Presence of kitchens (dummy, 1 = yes) X share of children not under direct management	0.3350 ***
	Days open fewer than 213 days (dummy, 1 = yes)	-0.0858 **
	Hours open fewer than 7 hours (dummy, 1 = yes)	-0.1856 **
	Staff/child ratio	1,8647 ***
QUALITY OF SERVICE	Total area in square meters (log)	0.0918 ***
	Vouches recipients (dummy, 1 = only vouchers)	-0.6238 **
VOUCHERS	Number of voucher recipients (log) X Voucher recipients dummy	0.7246 ***
	<i>W variables</i>	
INPUT PRICES	Average staff expenditures per employee (weighted average between internal and external labour costs) (log)	0.5564 ***
	Average rent per square meter for commercial use (log)	0.3449 ***
<i>Z variables</i>		
ASSOCIATED MANAGEMENT	Unions of municipalities (dummy, 1 = yes)	0.2008
	Conventions of municipalities (dummy, 1 = yes)	0.2607 **
REGIONAL FIXED EFFECTS		

Bootstrap standard errors (200 repetitions), *** P-value < 0.001, ** P-value < 0.05, * P-value < 0.1

Table 4b – Nursery services, W^* variables used in the valuation of standard expenditure needs.

Average staff expenditures per employee (average between internal and external labour costs)	Internal component, as reported in the questionnaire. External component, replaced with the median value computed by the region and by population brackets.
Average rents per square meter for commercial use	Median value by the region and the population brackets

Table 4c – Nursery services, Z^* variables used in the valuation of standard expenditure needs.

Unions of municipalities	0
Conventions	0
Regional fixed effects	0



With regard to the remaining general social services, the output presents a more complex structure. Furthermore, the difficulties encountered in testing the endogeneity of the output variables with respect to municipal expenditure, and the multi-output structure of the cost function, made the estimation of a cost function unfeasible at least at this stage²⁹. Consequently, the valuation of the SEN has been obtained using the expenditure function approach, specifying a linear empirical model using as a dependent variable the current expenditure in per capita terms with respect to the total resident population.

The analysis of managerial choices provides the following segmentation of local authorities: 6,124 municipalities directly provide general social services; 531 municipalities provide these services jointly with other authorities constituting a union; instead, only 12 municipalities do not provide any of the general social services.

The sample used for the estimation of the expenditure function has been defined after a detailed analysis of only those data reported by municipalities that provide at least one of the general social services. In this way we have constructed a sample of 4,603 local authorities including 37 unions of municipalities. After the removal of outliers, the regression sample shrinks to 4,400 observations.

The coefficient point estimates of the expenditure function have been obtained using robust OLS estimator, and final results are reported in Table 5a in relation to different groups of variables: \mathbf{X} , \mathbf{W} , and \mathbf{Z} . Tables 5b and 5c report the values considered for the computation of SEN regarding the variables included in group \mathbf{W} and group \mathbf{Z} . Final estimates show a R-squared value equal to 0.3726 providing evidence of a good fit.

The linear specification of the expenditure function and the dependent variable expressed in terms of per capita actual expenditure allows us to interpret the coefficient point estimates in euros that multiplied by the related variables generate the additive components of the theoretical standard expenditure needs (FS).

Let us consider, for example, a hypothetical municipality of 25,000 inhabitants with all background variables and input prices equal to the sample mean. Considering that in the empirical model all background variables and input prices are expressed in deviation from the sample mean,³⁰ the FS of this hypothetical municipality can be computed as follows:

$$\begin{aligned} FS = & 57.2419 + (\text{constant term}) \\ & 0.00096 * 25000 + (\text{impact of resident population}) \\ & 4.66401 + (\text{whether support services are provided}) \\ & 6.04295 + (\text{whether home health care services are provided}) \\ & 2.89174 + (\text{whether social integration and prevention services are provided}) \\ & 7.08344 + (\text{whether residential care services are provided}) \end{aligned}$$

Therefore, if all services listed in the set of managerial choices variables were provided, the FS would be equal to 101.92 euros. As a result, the FS of an identical municipality with a percentage of households with severe material deprivation 10% above the sample mean would be equal to euro 113.33 = 101.92 + 1.14076 * 10, instead the FS of an identical municipality with a percentage of households with severe material deprivation 10% below the sample mean would be equal to euro 90.51 = 101.92 - 1.14076 * 10. Other examples can be provided along the same lines.

In conclusion, it is important to point out that although the FS can be computed for each local authority independently from the others, the SEN of each municipality, corresponding to the allotment coefficient FS_{CR}_i , are strictly dependent on the FS s of all other local authorities as reported in equation (8).

²⁹ However a first experimental attempt to estimate of cost function can be found in the valuation of standard levels of services discussed in Section 4.3.3.

³⁰ Note that this choice affects only the estimate of the constant term coefficient, since the other coefficient's point estimates are invariant to linear combinations of the regressors.



Table 5a – General social services, OLS coefficients' point estimates (all coefficients are expressed in euros, dependent variable = actual current expenditure / total resident population).

CONSTANT		57.2419 ***
<i>X variables</i>		
BACKGROUND VARIABLES (all variables entered in deviation from the sample mean)	Female employment rate (per capita)	144.152 ***
	Foreign resident population (%)	0.32541 **
	Elderly resident population (% over 65)	0.58844 **
	Mortality rate (average 2008-2010)	0.37831 *
	Pupils with disabilities (pre-school, primary and secondary; per capita)	1016.44 **
	People with addictions and mental health problems (per capita)	587.912 ***
	Number of crimes at provincial level (per capita)	119.157 **
	Percentage of households with severe material deprivation (%)	1.14076 **
	Number of single-parent families (per capita)	217.269 **
	Number of survivor pensions (per capita)	133.698 **
	Disability allowances (per capita)	315.613 **
	Life expectancy without disabilities at age 65 (years)	-2.68469 **
MANAGEMENT CHOICES	Support services (dummy, 1 = yes)	4.66401 **
	Home health care (dummy, 1 = yes)	6.04295 **
	Social integration and prevention services (dummy, 1 = yes)	2.89174 **
	Residential care (dummy, 1 = yes)	7.08344 ***
CONGESTION AND DISECONOMIES OF SCALE	Population spline (3.000 - 10.000 inhabitants)	0.00229 ***
	Population spline (10.000 - 50.000 inhabitants)	0.00096 ***
	Population spline (100.000 - 110.000 inhabitants)	0.00349 ***
<i>W variables</i>		
INPUT PRICES (% deviation from the sample mean)	Average rent per square meter for commercial use	0.05490 **
	Average staff expenditures per employee (weighted average between internal and external labour costs)	0.06993 **
<i>Z variables</i>		
INCOME (% deviation from the sample mean)	Income reported as a tax base for the national personal income tax	0.1532 **
MANAGEMENT CHOICES	Reception for appointment (dummy, 1 = yes)	4.8058 ***
ASSOCIATED MANAGEMENT	Unions of municipalities (dummy, 1 = yes)	5.5299
REGIONAL FIXED EFFECTS		

Robust standard errors, *** P-value < 0.001, ** P-value < 0.05, * P-value < 0.10

Table 5b – General social services, **W*** variables used in the valuation of standard expenditure needs.

Average staff expenditures per employee (average between internal and external labour costs)	Internal component, as reported in the questionnaire External component, median value by the region and the population brackets
Average rents per square meter for commercial use	Median value by the region and the population brackets

Table 5c – General social services, **Z*** variables used in the valuation of standard expenditure needs.

Unions of municipalities	s0
Reception for appointment	0
Income reported as tax base for the national personal income tax	National average = 20.240,36 (euro, year 2010)
Regional fixed effects	0



4.3 THE MODEL OF STANDARD LEVELS OF SERVICES

4.3.1 The empirical model of standard levels of services

In the absence of specific theoretical references and other international experiences that could be used as an example, the approach adopted for the computation of the standard level of services (*SLS*) has been developed along the same line of the methodology used to calculate SEN.

Starting from the same theoretical framework used for the valuation of SEN, the assessment of the *SLS* is based on estimating the reduced form of the demand for local services reported in equation (11) obtained by substituting equation (2) into equation (1).

$$g_e = h(Q, A, R, p, g_s) \quad (11)$$

In the presence of a multi-output service, such as most of the essential functions carried out by local authorities, g_e in the equation (11) corresponds to a vector. Therefore, for each output g_{ek} of the set J , we can express the demand for local public service as follows:

$$g_{ek} = h(Q_k, A_k, R_k, p_k, g_{sk}, G_k) \quad \forall k = 1, \dots, J \quad (12)$$

where, the suffix k indicates that some of the background variables related to supply and demand, prices and exogenous load factors can be output specific. Moreover, to capture the potential interdependencies between outputs, the vector G_k comprises the outputs with which g_{ek} is correlated.

In the event that the entire set of background variables is common to all outputs, or no interdependencies are detected between outputs, the demand for each output g_{ek} can be estimated simply with the following empirical model:

$$g_{ek} = \lambda'_k X + \varepsilon_k \quad \forall k = 1, \dots, J \quad (13)$$

where, the vector $X' = [Q, A, R, p, g_s]$ comprises the exogenous variables which explain the demand for local services, ε_k corresponds to the i.i.d. error component with a zero mean and potentially heteroskedastic, and λ_k corresponds to the coefficients that can be estimated correctly using the OLS estimator.

If the data confirm the presence of interdependencies among outputs, the model required to obtain correct coefficient estimates for λ_k would take on the typical form of the structural model shown in equation (14) below.



$$\begin{array}{l}
 g_{e1} = h_1(X_1, G_1) \\
 \dots \\
 g_{ek} = h_k(X_k, G_k) \quad (14) \\
 \dots \\
 g_{eJ} = h_J(X_J, G_J)
 \end{array}$$

In linear form, the empirical version of the structural model shown in (14) can be rewritten as follows:

$$\begin{array}{l}
 g_{e1} = \lambda'_1 X_1 + \theta'_1 G_1 + \phi_1 \\
 \dots \\
 g_{ek} = \lambda'_k X_k + \theta'_k G_k + \phi_k \quad (15) \\
 \dots \\
 g_{eJ} = \lambda'_J X_J + \theta'_J G_J + \phi_J
 \end{array}$$

Where, for each output g_{ek} of the set J , an equation is produced in which the vector $X'_k = [Q, A, R, p, g_s]$ comprises the exogenous variables which explain the demand for each output, the vector G_k includes the outputs with which g_{ek} is correlated, and ϕ_k corresponds to the idiosyncratic error component.

In order to estimate the coefficients of the model in equation (15), it is necessary to verify that for each output the vector X contains some background variables that are not present in other equations in order to use them as instrumental variables.

With a sufficient number of instrumental variables, the estimates for the coefficients λ and θ will be obtained consistently using the *Generalized Method of Moments* (GMM) estimator, the most commonly used estimator for structural models³¹; in this case it is necessary to verify that the model is “over-identified”, i.e. that it presents a number of moments greater than the number of parameters. If the variables available in the dataset do not allow the identification of a sufficient number of instrumental variables, each equation can be estimated using a *Seemingly Unrelated Regressions* (SUR) model, ignoring the presence of interdependencies between outputs, and capturing only the interdependence among the stochastic components.

In relation to each output k , once consistent estimates have been obtained for the parameters λ and θ , the SLS (or standard outputs) will correspond to the expected values for each equation (\hat{g}_{ek}).

³¹ Greene (2003), *Econometric Analysis*. Prentice Hall, New Jersey, 5th edn.

Harris D. & Mátvàs L. (1999), “Introduction to the Generalized Methods of Moments Estimator,” in L. Mátvàs (ed.) *Generalized Methods of Moments Estimation*. Cambridge University Press.

Nevo A. & Whinston M. (2010), “Taking the Dogma out of Econometrics: Structural Modeling and Credible Inference,” *Journal of Economic Perspectives*, 24(2), 69–82.

Wooldridge J. (2002), *Econometric Analysis of Cross-Section and Panel Data*. MIT Press, 1st edn.



We proceed, in conclusion, to aggregate (for each authority) the different measures of output, so as to obtain a composite index of per capita standard outputs \widehat{M}^* and a composite index for per capita actual outputs M^* corresponding to:³²

$$\widehat{M}^* = \sum_{k=1}^J \pi_k \widehat{g}_{ek} + \sum_{l=1}^L \pi_l g_{sl}, \quad M^* = \sum_{k=1}^J \pi_k g_{ek} + \sum_{l=1}^L \pi_l g_{sl} \quad (16)$$

where the weights π_k and π_l will be calculated considering the impact each output exercises on current expenditures estimating a multi-output cost function or using other statistical methodologies for computing composite indicators.³³

4.3.2 The map of local authorities

As illustrated in Figure 4, local authorities can be divided into four groups in relation to two dimensions: the difference between theoretical standard expenditure needs (FS) and per capita actual expenditures (Y) measured on the horizontal axis, and the difference between per capita standard outputs (\widehat{M}^*) and per capita actual outputs (M^*) measured on the vertical axis.

1. The first group comprises authorities for which $M^* \geq \widehat{M}^*$ and $FS \leq Y$, which can be defined *over-standard*;
2. The second group included those authorities for which $M^* \geq \widehat{M}^*$ and $FS > Y$, which can be defined *efficient*;
3. The third group comprises authorities for which $M^* < \widehat{M}^*$ and $FS > Y$, which can be defined *under-standard*;
4. The fourth group includes authorities for which $M^* < \widehat{M}^*$ and $FS \leq Y$, which can be defined as *non-efficient*.

The rationale behind the positioning of local authorities in the four quadrants of Figure 4 is based on the consideration that SLS provide a measure of the potential demand corresponding to standard expenditures.

Therefore, a red light comes on for the local authorities in quadrants III and IV of Figure 4: local authorities positioned in quadrant III are designated “under standard” since they present actual expenditures that are lower than the standard expenditures and should satisfy a potential demand that is higher than the current supply capacity; local authorities positioned in quadrant IV are designated “non-efficient” since in addition to facing a potential demand that is higher than the current supply capacity, they present actual expenditures that are higher than standard expenditures. Both these groups of local authorities should be placed under observation: the “under standard” authorities in order to ascertain that by obtaining more financial resources they effectively provide also more services in terms of quantity and/or quality, the “non-efficient” authorities to verify the likely presence of serious inefficiencies in the provision of local services.

On the other hand, a green light comes on for the local authorities situated in the two upper quadrants. Those in quadrant II, defined as “efficient”, present a potential demand that is lower than the one effectively satisfied, and standard expenditures that are greater than their actual expenditures. These local authorities should be used as benchmarks for identifying best practices. Lastly, local authorities positioned in quadrant I, defined as “over-

³² Note that exogenous load factors (g_s), for which it is not necessary to proceed with an estimate of theoretical values, are also included in the calculation of the composite indices.

³³ Consider for example Vidoli, F., & Mazziotta, C. 2013. Robust weighted composite indicators by means of frontier methods with an application to European infrastructure endowment. Italian journal of applied statistics, 23(2).

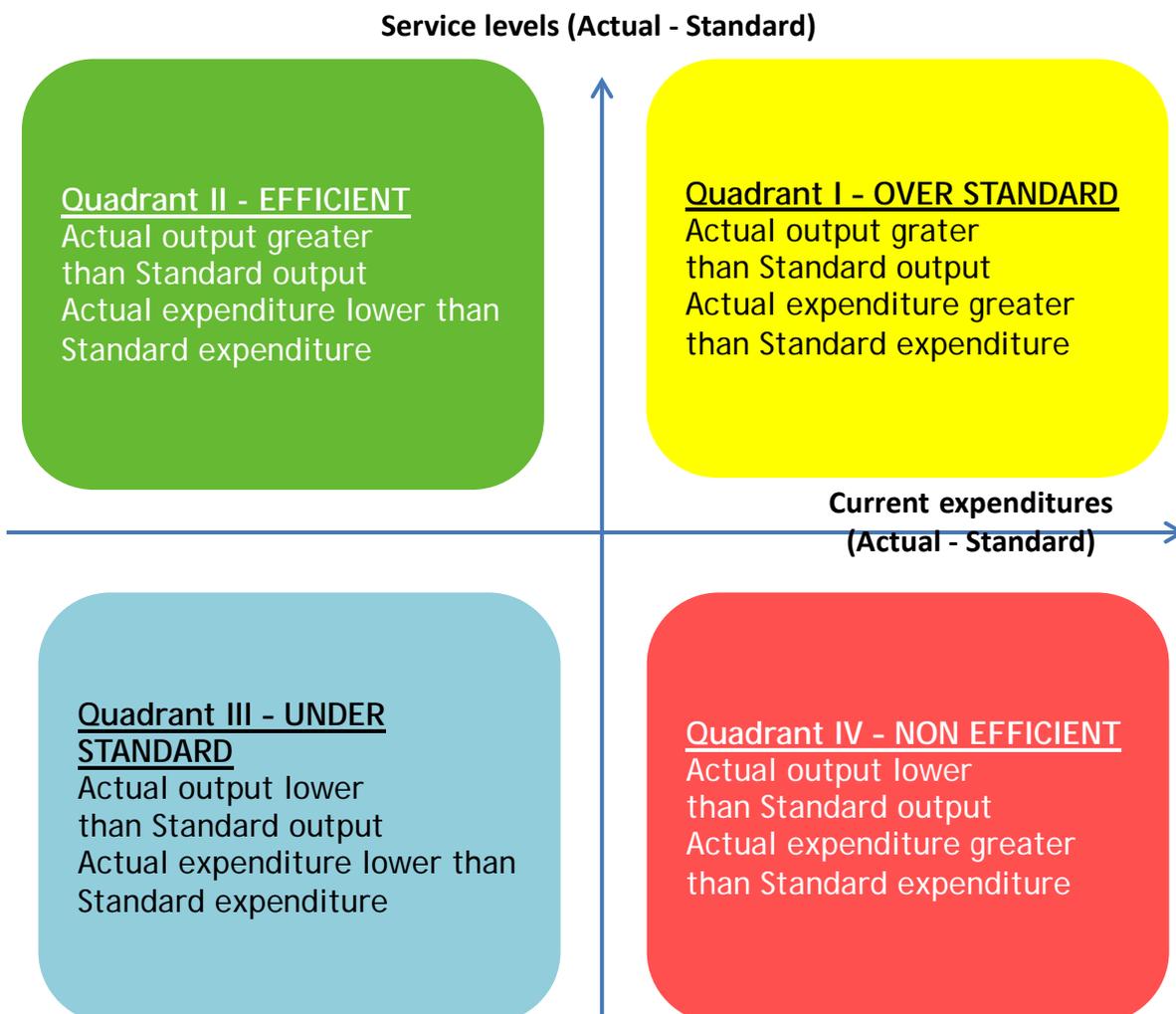


standard” are those with actual expenditures that are higher than the standard expenditures, but that prove an actual quantity of output that is also higher than the potential demand. These local authorities should be capable of autonomously financing effective service levels that are higher than potential demand, or of reduce their service levels to bring them in line with their standard expenditures.

The joint analysis of expenditure and output in terms of gaps from the respective standard values is a new methodology, still at an experimental stage, that in the future can become a simple tool to identify local authorities target of specific policies aimed at improving efficiency in the provision of public services, as well as a simple way to identify the best practices adopted by benchmark local authorities.

The goal is to compute the SLS of all municipal functions using proxies to measure the actual level of services when the outputs are not easily or unambiguously measurable as, for example, in the case of local police where the quantity of services was measured considering the number of fines. At the moment we have obtained preliminary estimates for the following sectors: general social services, nursery services, local police, tax office, technical office, civil registry and general services.

Figure 4 - Positioning map in relation to the gap between actual expenditure and standard expenditures (horizontal axis) and between actual outputs and standard levels of services (vertical axis)





4.3.3 The case of general social services

In order to provide more technical details regarding the methodology devised to evaluate the SLS we discuss the case of general social services. As shown in the previous section the social care sector is a multi-output function. As reported in the following Table 6a the set of general social services is made up of ten macro-outputs.

Table 6a – General social services, list of macro-outputs.

MACRO-OUTPUT	TYPE	No. elementary output variables
<i>(FO)</i> Front office	exogenous load factor	1
<i>(CM)</i> Cemetery services (e.g. burials, exhumations, cremations)	exogenous load factor	5
<i>(BO)</i> Back office	potentially endogenous	1
<i>(SE)</i> Social emergency (e.g. meals provided by the social canteen)	potentially endogenous	2
<i>(IS)</i> Income support (e.g. rent allowances)	potentially endogenous	2
<i>(DC)</i> Day care centres (e.g. recreational social and cultural activities)	potentially endogenous	2
<i>(EC)</i> Early childhood (e.g. other educational and recreational services for early childhood)	potentially endogenous	2
<i>(HC)</i> Home care (e.g. home care meal service, tele-assistance, remote monitoring)	potentially endogenous	4
<i>(SI)</i> Social inclusion (e.g. transport of people with disabilities, literacy courses)	potentially endogenous	8
<i>(RC)</i> Residential care (e.g. children in foster care, assistance and social rehabilitation)	potentially endogenous	8

As shown by Table 6a front office services and cemetery services are considered exogenous load factors, therefore the valuation of the SLS will be restricted to the estimation of a demand system composed by eight endogenous macro-output: back office, social emergency, income support, day care centres, early childhood, home care, social inclusion and residential care.

Table 6a also reports that, with the exception of back office services, each macro-output is composed by more than one elementary output variable collected through the questionnaire FC06U. Therefore, as a first step, we computed “first stage” weights in order to aggregate the elementary output variables to obtain a single measure for each macro-output. For example the measure of income support services IS_i for each municipality i has been obtained in the following way:

$$IS_i = 0.785 X \text{ no. of rent allowances}_i + 0.215 X \text{ no. of low income benefits}_i$$

where each weight is obtained rescaling the respective coefficient obtained estimating the impact exerted by each elementary output variable on per capita actual expenditures.

In the case of general social services some of the output variables are correlated, both from the economic and the statistic point of view, as shown by the correlation matrix reported in Table 6b.



Table 6b – General social services, macro-outputs correlation matrix

	FO	BO	SE	SI	IS	HC	DC	RC	EC	CM
FO	1									
BO	0.27912	1								
SE	0.08451	0.09110	1							
SI	0.12527	0.14403	0.14596	1						
IS	0.13873	0.18786	0.09432	0.19882	1					
HC	0.12925	0.20779	0.09671	0.13558	0.02185	1				
DC	0.07369	0.08606	0.03678	0.10291	0.09124	0.08906	1			
RC	0.05219	0.16573	0.02694	0.11519	0.10238	0.13951	0.04744	1		
EC	0.03795	0.05529	0.01031	0.05830	0.09645	0.03625	0.01783	0.05487	1	
CM	0.08002	0.07014	0.01841	-0.00676	-0.01365	0.12091	0.02368	0.04507	-0.00156	1

Considering the statistical evidence reported in correlation matrix and the indications provided by the experts in the social care sector, the following structural model was identified:

$$\begin{aligned}
 BO &= h(HC, RC, FO, \mathbf{X}_{BO}, \boldsymbol{\lambda}_{BO}, \boldsymbol{\theta}_{BO}) \\
 SI &= h(BO, IS, HC, SE, \mathbf{X}_{SI}, \boldsymbol{\lambda}_{SI}, \boldsymbol{\theta}_{SI}) \\
 IS &= h(BO, \mathbf{X}_{IS}, \boldsymbol{\lambda}_{IS}, \boldsymbol{\theta}_{IS}) \\
 HC &= h(BO, CM, \mathbf{X}_{HC}, \boldsymbol{\lambda}_{HC}, \boldsymbol{\theta}_{HC}) \\
 RC &= h(BO, \mathbf{X}_{RC}, \boldsymbol{\lambda}_{RC}, \boldsymbol{\theta}_{RC}) \\
 DC &= h(SI, \mathbf{X}_{DC}, \boldsymbol{\lambda}_{DC}, \boldsymbol{\theta}_{DC}) \\
 SE &= h(SI, \mathbf{X}_{SE}, \boldsymbol{\lambda}_{SE}, \boldsymbol{\theta}_{SE}) \\
 EC &= h(\mathbf{X}_{EC}, \boldsymbol{\lambda}_{EC})
 \end{aligned} \tag{17}$$

In each equation the output variables are expressed in per capita terms and the vectors \mathbf{X} comprise the exogenous background demand variables which proved statistically significant in the first stage analysis. The large number of variables available in the dataset allows us to use some of them as instrumental variables to identify the simultaneous relationships among macro-outputs. In fact, not all background demand variables enter into the equations of all macro-outputs at the same time, as a result both the order and rank conditions required for the correct identification of the structural model are verified.

The *Hausman test* rejects the null hypothesis according to which the OLS is a consistent estimator for model's parameters. This result confirms the necessity to take into account the interactions between different macro-outputs and, at the same time, confirms the need to use a set of instrumental variables in order to estimate correctly the interdependencies among outputs.

The linear version of the structural model shown in the equation (17) has been estimated using GMM and coefficients' estimates are reported in the Table 6c. Finally, the *Hansen J* test supports the validity of the instrumental variables which result uncorrelated with the stochastic component of the model.

In the end, the fitted values of the structural model are used to compute the SLS of each macro-output. Subsequently, in order to map the local authorities in the four quadrant of Figure 4, the actual and the estimated values of the 8 macro-outputs are aggregated respectively in two scalars as reported in (18): M^* the composite indicator of actual outputs, and \bar{M}^* the composite indicator of standard outputs. Both indicators can be interpreted in per capita number of services.



$$\begin{aligned}\widehat{M}^* &= \pi_1\widehat{BO} + \pi_2\widehat{SE} + \pi_3\widehat{SI} + \pi_4\widehat{IS} + \pi_5\widehat{HC} + \pi_6\widehat{DC} + \pi_7\widehat{RC} + \pi_8\widehat{EC} + \pi_9CM \\ M^* &= \pi_1BO + \pi_2SE + \pi_3SI + \pi_4IS + \pi_5HC + \pi_6DC + \pi_7RC + \pi_8EC + \pi_9CM\end{aligned}\quad (18)$$

The weights π in (18) have been obtained estimating a simple multi-output linear cost function using as dependent variable the same actual per capita current expenditure adopted in the empirical model used to estimate SEN. Coefficients' estimates of the cost functions are provided below in Table 6d.

The parameters estimated in relation to the endogenous outputs and the exogenous load factors were subsequently re-proportioned to 100 in order to calculate the weights π used in the construction of the composite indicators M^* and \widehat{M}^* as reported in the following table.

Weights		Re-proportioned value
π_1	Back office	0.32%
π_2	Social emergency	3.45%
π_3	Social inclusion	16.52%
π_4	Income support	5.97%
π_5	Home care	19.70%
π_6	Day care centres	2.48%
π_7	Residential care	31.46%
π_8	Early childhood	12.95%
π_9	Cemetery services	7.16%

The final results of the valuation of the SLS regarding general social services are summarised in Figure 5a and 5b that visualise the positioning of municipalities in the four quadrants according to the expenditure gap (actual – standard), measured on the horizontal axis in euros per capita, and the output gap (actual – standard) measured on the vertical axis in units of aggregate output per 1000 inhabitants. In particular Figure 5a displays the distribution of municipalities aggregated by regions providing clear evidence of the existence of regional models. In line with the expectation, it is important to note that all regions can be found along the diagonal from the south-west quadrant to the north-east corner showing that expenditure levels exceeding the standard are usually associated to the provision of services above the standard in terms of quantity and quality. This is particularly evident for the municipalities of the Emilia-Romagna that can be classified on average over-standard, and for municipalities of Campina that can be classified, instead, under-standard. None of the regions occupy the “non-efficient” quadrant, and the municipalities of Umbria stand out as the most efficient and therefore are the first candidates to be used as benchmark for the provision of social services. Figure 5b display the positioning of the municipalities with more than 100000 inhabitants providing similar conclusions: Napoli, the largest city in Campania can be clearly classified under-standard; instead Bologna, Modena and Parma, three of the most important cities in Emilia-Romagna are over-standard; finally Perugia and Terni, the two largest cities in Umbria are among the most efficient.



Table 6c – General social services, structural model, GMM coefficients' point estimates (regression sample = 3455)

	DEPENDENT VARIABLES (output units per 1000 inhabitants)							
	Income support	Home care	Social emergency	Residential care	Back office	Social inclusion	Early childhood	Day care centres
Back office (per 1000 inhabitants)	0.05125	0.01747		0.00354		0.01253		
Social inclusion (per 1000 inhabitants)			0.58025		1.68221			1.31695
Income support (per 1000 inhabitants)					51.81783	0.03154		
Home care (per 1000 inhabitants)						0.12407		
Social emergency (per 1000 inhabitants)						0.04753		
Foreign resident population (%)	0.16830	0.01769	0.04177	0.00398				
Reception for appointment (Dummy, 1 = yes)	0.55588	0.17684				0.06886		
Number of crimes at provincial level (per capita)	30.49403		16.49683					
Internal commuters 2001 - (per capita)	9.20081		1.46546					
Birth rate (2008-2010)	0.10979					0.02424		
Population density (inhabitants per sq-km) X 1000	0.37000			0.01000				
Total employed (per capita)	-3.27735	3.92924						
Young resident population (% < 18)		0.06564		0.00706				
People with addictions and mental health problems (per capita)			257.40868		401.82879			
Income reported as tax base for the national personal income tax (% deviation from the sample mean)			0.02200				0.00180	
Front office (number of users per 1000 inhabitants)					75.00749		0.63560	
Total Employees (per capita)					11.23147		0.41741	
Number of road accidents (per capita)	131.21322							
Average number of family members	1.32562							
Cemetery services (number of users per 1000 inhabitants)		28.85267						
Number of social pensions (per capita)		28.00428						
Total widows and widowers (per capita)		6.78644						
Illiterate (per capita)			6.31222					
Offences for drug dealing (per capita)				29.83623				
Number of single-parent families (per capita)				5.56650				
Elderly resident population (% over 65)				0.00453				
Average staff expenditures per employee (weighted average between internal and external labour cost) (% deviation from the sample mean)					-0.02931			
Rate of children with disabilities						0.01574		
Children 3-6, percentage over total population							3.74188	
Couples without children aged 65 or more (per capita)								8.84286
Single families - (per capita)								2.64485

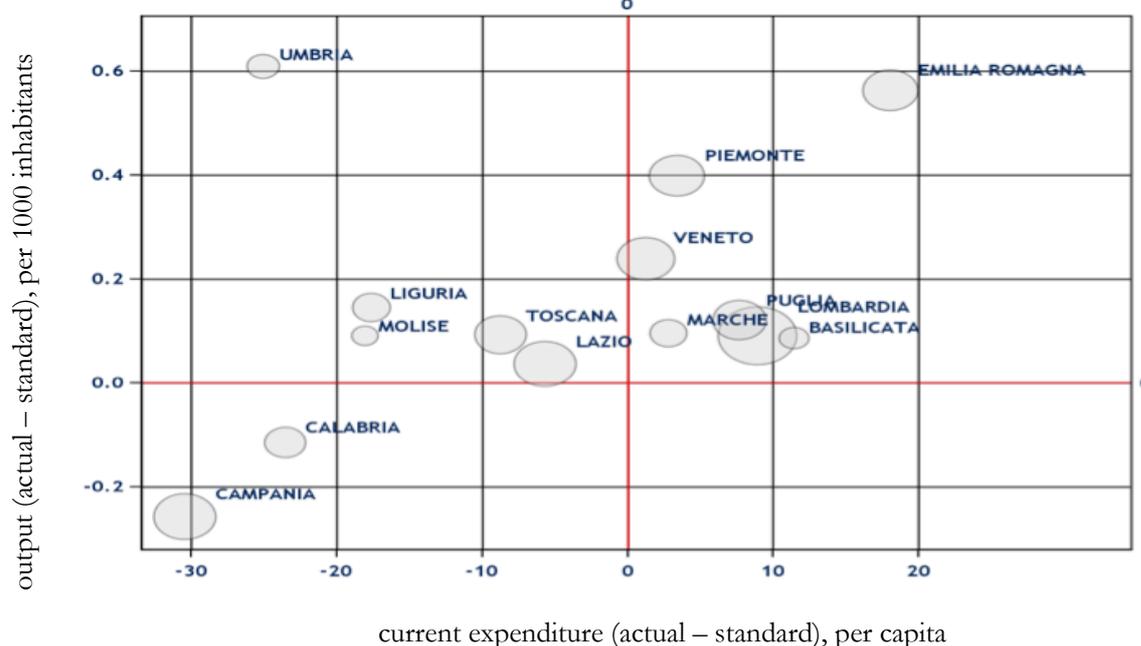


Table 6d – General social services, cost function, OLS coefficients' point estimates (all coefficients are expressed in euros, dependent variable = actual current expenditure / total resident population, regression sample = 3455).

CONSTANT		32.93029 ***
ENDOGENOUS OUPUTS	Back office (per capita)	39.8718 **
	Social emergency (per capita)	434.802 ***
	Social inclusion (per capita)	2083.67 ***
	Income support (per capita)	753.000 ***
	Home care (per capita)	2484.58 ***
	Day care centres (per capita)	312.240 **
	Residential care (per capita)	3968.02 **
	Early childhood (per capita)	1633.84 ***
EXOGENOUS LOAD FACTORS	Cemetery services (per capita)	902.638 ***
INPUT PRICES (% deviation from the sample mean)	Average rents per square meter for commercial use	0.08700 ***
	Average staff expenditures per employee (weighted average between internal and external labour cost)	0.35148 ***
CONGESTION AND DISECONOMIES OF SCALE	population spline (3.000 - 10.000 inhabitants)	0.00159 ***
	population spline (10.000 - 50.000 inhabitants)	0.00114 ***
	population spline (100.000 - 110.000 inhabitants)	0.00250 *
JOINT PROVISION	Unions of municipalities (Dummy, 1 = yes)	15.7142 **
REGIONAL FIXED EFFECTS		

Robust standard errors, *** P-value < 0.001, ** P-value < 0.05, * P-value < 0.1, R-sq = 0.5135

Figure 5a – General social services - positioning map in relation to the gap between actual expenditure and standard expenditures (horizontal axis) and between actual outputs and standard levels of services (vertical axis) – municipalities aggregated by regions

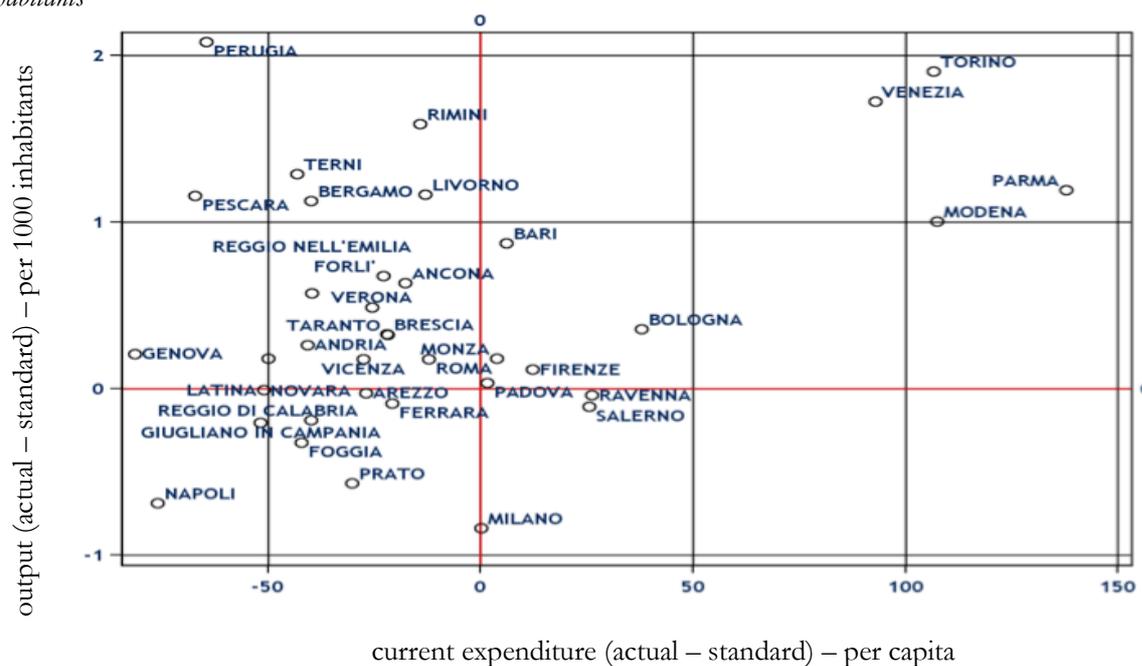


Dot dimension correspond to the total population.

Abruzzi region has been excluded from the graph because of the expenditure allocated in 2010 for the reconstruction after the 2009 earthquake.



Figure 5b – General social services - positioning map in relation to the gap between actual expenditure and standard expenditure needs (horizontal axis) and between actual outputs and standard levels of services (vertical axis) – municipalities above 100000 inhabitants



Dot dimension correspond to the total population.

The Abruzzo Region has been excluded from the graph because of the expenditures allocated in 2010 for reconstruction after the 2009 earthquake.

4.4 INCENTIVES AND EFFICIENCY

The third pillar of the SOSE methodology regards the analysis of efficiency for overall local spending, since different degrees of efficiency in the provision of local services can have a direct impact on the valuation of SEN, and therefore on the allotment of equalisation grants.

The aim of monitoring local governments' efficiency is that of rewarding local authorities that provide high quality services in relation to the amount of resources employed, thereby providing an incentive to improve the quantity and efficiency in the provision of local services.

The first approach currently proposed by SOSE is based on the estimation of theoretical standard expenditure needs (FS) which differs from the expected values of the empirical model in that, when calculating FS, variables W_i assume a target long term value W^* . For instance, instead of completely recognising the expenditure needs in relation to a local authority's labour cost, only the labour cost corresponding to the national average would be recognised. In this way, local authorities that present an effective labour cost that is lower than the national average are rewarded, and vice-versa, those whose effective labour cost is higher than the national average are penalised.

When the estimation of expenditure needs is based on the cost function approach, this procedure of substituting target values for the actual values of some variables, also known as neutralisation process, is very important, since it would respond to the necessity of substituting actual output values (g_e) with those deemed to be "optimal" or "essential" (g_e^*) when calculating SEN, in order not to reproduce the path of actual expenditures in the valuation of SEN.



Finally, we must underscore that the choice of the variables subjected to neutralisation introduces an element of flexibility in the procedure for determining SEN, since the choice of the variables to be neutralised is an issue that, in some cases, can be left to policymakers' decision.

Another analysis will concern the valuation of both the technical and the cost efficiency of each local authority in the provision of services. Non-parametric techniques such as *Data Envelopment Analysis (DEA)*, as well as parametric techniques such as *Stochastic Frontier Analysis (SFA)*, will be used to measure production and cost efficiency, thereby assessing, from different angles, the ability of local governments to transform inputs into outputs at lower cost.

4.5 MONITORING AND CONTROL

In line with the provisions under Legislative Decree 216/10, the fourth pillar of the SOSE methodology defines a system of performance indicators for assessing the adequacy of services, which allows local authorities to improve and to determine their technical and cost efficiency in comparative terms. This system of indicators, created with a hierarchical tree structure, will be integrated with a *Business Intelligence* model named *Opencivitas*, with the purpose of providing local authorities with an innovative online tool for information-management.

Opencivitas is primarily a benchmarking tool designed to allow each local authority to display its data and compare them with the data of other authorities with similar characteristics. The aim is to make available specific *online* management tools that allow local authorities to monitor the level of services provided and render them more efficient.

Moreover, these management tools will allow each local authority to be aware in real time of its positioning with respect to the quadrants reported in Figure 4.

5 A SUMMARY OF THE DETERMINANTS OF MUNICIPAL STANDARD EXPENDITURE NEEDS

Table 7 provides a general overview of the final results reached in the estimation of municipal standard expenditure needs (SEN), reporting the main technical issues for each of the 12 services provided in relation to the 6 essential functions.

In the majority of cases the actual expenditure adopted as dependent variable refers to 2010 values, only for local police and general administrative services the reference year is 2009. Although it would be preferable to use the actual expenditure from the same year as dependent variable for all services, it must be highlighted that, since the valuation of SEN seeks to compute an allotment coefficient, the choice of reference year for the actual expenditure exerts a negligible impact on the final results given the stability in the distribution of the current expenditure across sectors.

With regard the client group, it can be noted that the total resident population has been chosen in the majority of cases. The only exceptions are represented by education complementary services and by nursery services, where the client group is represented respectively by children aged 3-14 and aged 0-2

When considering the choice of the general theoretical approach, of the empirical model specification and of the estimator employed in the analysis, it is possible to divide the whole set of twelve services into two groups: one including 10 services related to the general administrative sector, the local police, public road and transport, planning and environment and general social services, for which an expenditure function approach has been followed using a liner specification of the empirical model and OLS; and a second including education complementary services and nursery services, for which a cost function approach (pure RCA) has been followed, estimating a logarithmic cost function through OLS for the former service and LAD for the latter.



Table 8 shows the percentage impact exercised by homogeneous groups of variables in determining the standard expenditure of each service. In all, 122 variables³⁴ divided into 13 homogeneous groups contribute to the determination of municipal SEN.

The size of the resident population generates 20% of the total variables' contribution, and it is one of the main components of the expenditure needs for six services: general services, registry office, local public transport, tax office, technical office and general social services. In particular, the numerousness of resident population exerts a mainly negative impact in the case of services relating to the registry office, the technical office and the tax office, providing evidence in favour of economies of scale related to the size of the municipality. The positive impact of the size of the municipality can be observed in the case of general social services and local public transport, in which cases the size of the resident population can also be interpreted as an important demand factor due to congestion phenomena.

The level of provided services generate almost the 14% of total variables' contribution and is the main component of the expenditure needs for complementary education services (with regard to the management of kindergartens, and the provisions of complementary services for primary and secondary schools) and nursery services, for which in both cases a cost function approach has been followed. The main expenditure driver is the number of attending children although, in total, 29 variables have been used to measure all different aspects of services that include, among others, school meals, transportation and care of children with disabilities.

The variables used to map the characteristics of the territorial morphology and other environmental features of each municipality (for example the seismic risk, altitude level or climatic zone) generate about 9% of total variables' contribution and are the main expenditure components of services related to public roads maintenance (including, for example, lighting and security of urban roads), land management and planning (for example, the maintenance of green areas).

The variables that describe the structure of the local economy provide about the 8% of total variables' contribution. They include, among others, the number of workers in the entertainment and touristic sector, which plays an important role in determining expenditure needs in the waste disposal sector; or the level of female employment, which particularly affects the demand for general social services.

The input prices generate about 8% of the total variables' contribution and they represent a cross component for all services, since they mainly measure the differences in labour costs along the peninsula.

External load factors generate about the 7.5% of the total variables' contribution and include a group of variables which measure services provided by municipalities to higher-level governments and the quantity produced is usually not directly attributable to the decisions of local administrators. This group includes: crime notifications, lawsuits and disputes received, the notification of traffic accidents in the case of local police services; the front-office activity carried out as part of the registry office services.

Variables measuring the number and types of buildings, such as the number of residential and non-residential buildings, produce about 7% of the total variables' and is an important determinant of the expenditure needs for services of waste disposal and services performed by the tax office.

Variables related to organisational choices generate less than 6% of the total variables' contribution and include choices not directly modifiable in the short term, such as the number of districts that affect the expenditure for general services, or the decision to provide residential services or home care services. In other cases these variables measure qualitative elements for which there are reference standards, such as the staff/child ratio in nursery services.

Variables measuring the level of deprivation (such as the number of people with addictions or mental illnesses, the number of students with disabilities, and the percentage of families in a situation of severe poverty) produce

³⁴ It is important to point out that, although 164 variables, of which only 122 contribute actively to the determination of standard expenditure needs, have been used in the process of evaluation, the database includes more than a thousand variables.



approximately 5% of the total variables' contribution and represent one of the main determinants of the demand for general social services.

The intensity of vehicular traffic and the structure of urban roads generate about 5% of the total variables' contribution. This group of variables, among which we can find the length of the urban roads, the number of incoming and outgoing commuters, and the parking areas for people with disabilities, is an important determinant of the expenditures of the local police service, and of services related to public roads and urban transport.

Variables measuring the demographic structure (such as population density, the percentage of elderly people over 65, the number of entries in registry office) generate approximately the 5% of total variables' contribution and have a positive impact on the demand for many services, primarily those of the registry office and general social services.

The tourist attraction, represented by the number of tourists registered in hotels and complementary facilities, and by the number of museums visitors and of tourists in second homes, produces about the 5% of total variables' contribution and is one of the main determinants of the demand for the services of waste disposal.

The average amount of investments, made in the five years prior to the year taken as a reference for the valuation of the expenditure needs, generates less than the 1% of total variables' contribution and mainly affects the expenditure of the technical office and services related to public roads.

Finally, it is important to point out that the expenditure variation explained by a specific set of variables has been eliminated in the calculation of the SEN. In order to capture in a precise way the differentials of actual expenditure, and to avoid the risk of estimating biased coefficients due to omitted variables, these variables have been included as regressors in the expenditure and cost functions, however, they cannot be considered as expenditures determinants in the valuation of the SEN, as their effect goes beyond the definition of standard expenditure.

This set includes the following groups of variables: the regional fixed effects designed to capture the average regional differences of expenditure, the local fiscal revenue recorded in the five years prior to the year taken as reference for the expenditures valuation, the dummy variables which capture the differentials of expenditure related to different forms of joint provision (union of municipalities, conventions, consortiums, etc.) and, lastly, the average total municipal per capita income reported as tax base for the national personal income tax (IRPEF tax base).³⁵

The neutralisation of the effect produced by these variables is accomplished by using, in the computation of the SEN, an equal value (in most cases, null) for all of the municipalities, in order to make the standard expenditure very little subject to the discretionary choices of local governments or to elements that reproduce the trend of the actual expenditure such as the regional fixed effects. The same treatment, in fact, has been assigned to most of the variables used to evaluate the organisational choices: this group includes a total of 30 variables of which, only 12 are included in the calculation of the SEN. As previously mentioned these exceptions are mainly due to the need to incorporate in the standard expenditure local choices that are not directly changeable in the short term or linked to qualitative elements such as child-teacher ratio in nursery services.

³⁵ Per capita income represents a very important demand factor, whose value, however, would have created significant distortions in the evaluation of standard expenditure needs, favoring richer local authorities at the expense of poorer ones



Table 7 – Overview of some technical issues regarding the estimation of municipal standard expenditure needs

Functions and services		Questionnaire	Actual expenditure	Client group	General approach	Model specification	Estimator	Dependent variable	R-sq.	Regression sample (n.)	Unions of municipalities (n.)
General Administrative, Management and Control Functions	<i>Tax office</i>	FC01A	2009	Total resident population	Expenditure function	Linear	OLS	Current actual per capita expenditure	0.4425	3,991	152
	<i>Technical office</i>	FC01B							0.4187	3,472	157
	<i>Civil registry</i>	FC01C							0.6029	4,761	137
	<i>General services</i>	FC01D							0.7322	3,882	178
Local Police		FC02U	2009	Total resident population	Expenditure function	Linear	OLS	Current actual per capita expenditure	0.3726	5,061	220
Education (complementary services)		FC03U	2010	Population aged 3-14	Cost function	Logarithmic	OLS	Log of total current actual expenditure	0.9254	3,990	183
Public Roads and Transport	<i>Public roads</i>	FC04U	2010	Total resident population	Expenditure function	Linear	OLS	Current actual per capita expenditure	0.6484	5,333	157
	<i>Local public transportation</i>								0.5829	915	157
Planning and Environmental Functions	<i>Land management and planning</i>	FC05U	2010	Total resident population	Expenditure function	Linear	OLS	Current actual per capita expenditure	0.2773	3,163	157
	<i>Waste management</i>								0.6462	3,989	157
Social Care	<i>General social services</i>	FC06U	2010	Total resident population	Expenditure function	Linear	OLS	Current actual per capita expenditure	0.3923	4,603	175
	<i>Nursery services</i>			Population aged 0-2	Cost function	Logarithmic	LAD (quantile regression)	Log of total current actual expenditure	0.6783	1,133	175



Table 8 – Summary of the determinants of municipal standard expenditure needs.

DETERMINANTS OF STANDARD EXPENDITURE NEEDS (In parentheses, the percentage of each service's standard expenditure with respect to the total) ¹⁾	No.	TOTAL (100%)	Waste management FC05B (21.02%)	General social services FC06A (16.36%)	General services FC01D (16.33%)	Education (complementary services) FC03U (13.50%)	Local Police FC02U (7.61%)	Public roads FC04A (5.66%)	Land management and planning FC05A (4.60%)	Technical office FC01B (3.95%)	Nursery services FC06B (3.57%)	Local public transport FC04B (3.56%)	Tax office FC01A (1.92%)	Civil registry FC01C (1.92%)
		% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact	% impact
RESIDENT POPULATION ²⁾	9	20.09		25.71	64.73*				12.16	31.18**		43.43	37.41**	65.73**
SERVICES PROVIDED	29	13.74				82.01					74.55			
TERRITORIAL MORPHOLOGY	7	8.66	14.12		4.53	0.71	5.18	40.33	27.24	9.76		15.20		
LOCAL ECONOMY	8	8.06	22.13	8.29			9.93	5.80		11.81		8.67	10.11	
INPUT PRICES	8	7.95	7.11	6.57	3.26	4.02	18.48	1.95	19.15	20.53	6.35	5.02	18.18	17.71
EXOGENOUS LOAD FACTORS	14	7.58	4.92		24.50		10.39	6.42	24.98			5.32		2.63
BUILDINGS & REAL ESTATE	3	6.87	27.61							15.33			23.75	
MANAGERIAL CHOICES ³⁾	12	5.83		15.57	2.98	12.61*	5.40				19.10*			
DEPRIVATION	8	5.34		32.62										
VEHICLES AND ROAD TRAFFIC	11	5.17				0.65	34.86	32.88				16.12		
CENSUS	9	4.94	9.50	11.24			2.98		3.95			6.24	10.55	13.93
TOURISM	3	4.84	14.62				12.78	3.95	12.51					
INVESTMENTS ⁴⁾	1	0.94						8.66		11.40				
<i>Variables used in the estimation process, but that do not contribute to the determination of standard expenditure needs</i>														
REGIONAL FIXED EFFECTS ⁵⁾	15	0.00	YES**	YES**	YES*	YES**		YES*	YES**	YES*	YES*	YES*	YES*	YES*
FISCAL REVENUES ⁶⁾	2	0.00	YES**		YES				YES	YES				
JOINT PROVISION ⁷⁾	5	0.00	YES*	YES	YES	YES*	YES**	YES*	YES		YES	YES*	YES	YES
INCOME	1	0.00	YES	YES				YES**	YES	YES		YES		

** Variables exerting a predominantly negative impact

* Variables exerting a partially negative impact

¹⁾ The percentage impact of each homogeneous group of variables is determined by re-proportioning the standardized coefficients based on the relative weight of each function. The empty boxes indicate that none of the variables in the homogenous group had a statistically significant impact (p-values less than or equal to 0.05) on expenditure.

²⁾ Polynomials of the resident population. These variables capture the presence of particular economies of scale related to the size of the resident population and to congestion phenomena.

³⁾ Organizational choices regarding qualitative elements and management decisions not immediately modifiable in the short term.

⁴⁾ The exogeneity of the variables measuring the level of investment choices is guaranteed through the use of average values over the five previous years.

⁵⁾ Regional fixed effects.

⁶⁾ The exogeneity of the variables measuring the level of local fiscal revenues is guaranteed through the use of average values over the five previous years.

⁷⁾ Dummy variables capturing the impacts of different associated management forms (unions of municipalities, mountain communities, consortiums and agreements, etc.)



6 ADDITIONAL ACTIVITIES LINKED TO STANDARD EXPENDITURE NEEDS

6.1 THE SPENDING REVIEW PROGRAM

Since January 2014, SOSE has been actively involved in the working group named "*Expenditures and Standard Costs*" which was established under the program of public spending review directed by the *Commissario straordinario* Carlo Cottarelli. The working group is mandated: firstly, to identify the methodologies needed to complete the procedure of determining the standard expenditure needs with the aim of improving efficiency in the provision of local services and to establish, by the end of July 2014, the definitive measures for the determination of the SEN with the purposes of reviewing/improving local governments' efficiency that can generate real spending savings in the period 2015-16, and to enact these measures by law by mid-September 2014; secondly, to identify a system of incentives to encourage the application of standard expenditure needs for the purposes of reviewing/improving efficiency in the provision of local services.

Within the working group, SOSE has proposed a methodology for determining the level of efficient expenditures for Italian municipalities compatible with the level of services (actual and standard) provided within the scope of the essential functions. This expenditure level then can be used as a parameter to quantify, with regard to the general equalisation system, the total resources to be allocated as an equalisation fund in line with the provisions of Law 42/09.

This methodology can be seen as a complement to other two methodologies: first, the methodology developed for the determination of standard expenditure needs (SEN) which solves the problem of the redistribution of equalisation grants by conferring each authority an allotment coefficient for each fundamental function, and second, the methodology for the determination of the standard level of services (SLS), by which SOSE proposes to define the optimal amount of services that should be provided in relation to the demand of each territory.

SOSE's proposal arises from the awareness that, despite the fact that the valuation of SEN and the spending review programs are two sides of the same coin, it is necessary to use specific methodological approaches due to the different purposes of the two analyses.

The calculation of SEN solves the problem of how to allocate a certain amount of funds among various authorities, according to the different needs of each territory. The spending review procedure, however, is devoted to the measurement of the total optimal level of resources to be distributed, which is determined through the identification, for the entire sector of local authorities, of the percentage of inefficient expenditures that can be cut without affecting the level of services, and of any spending reallocations among the different essential functions that should be implemented in line with the provision of essential service levels.

On the basis of these premises, and in line with the international literature³⁶ and the guidelines proposed by Longobardi and Zanardi (2013)³⁷, for the spending review program SOSE suggests the use of *Stochastic Frontier Analysis* (SFA) to estimate a cost function that, given the services provided to citizens and the input prices, envelope all the analysed local authorities with a curve of best practices that describes the lowest level of expenditure/cost observed depending on the characteristics of the territories in which the authorities operate. This approach also allows for a comparison between the cost structures of authorities far removed from best practices and the cost structures of the most efficient local governments.

³⁶Among others, see, for example: Grossman P.J., Mavros P. & Wassmer R.W. (1999), Public sector technical inefficiency in large U.S. cities. *J Urban Econ* 46:278–299; Worthington A.C. & Dollery B.E. (2000), An empirical survey of frontier efficiency measurement techniques in local government. *Local Govern Stud* 26(2):23–52.; Afonso, A. & Fernandes, S. (2005), "Local government spending efficiency: DEA evidence for the Lisbon Region", *Regional Studies*, 40(1), 39-53.; Lockwood B. & Porcelli F. (2013), Incentive Schemes for Local Government: Theory and Evidence from Comprehensive Performance Assessment in England. *The American Economic Journal: Economic Policy*, 5(3):1–36.

³⁷ Longobardi E. & Zanardi A. (2013), The determination of standard expenditure needs: state of the art and perspectives, COPAFF Seminar, Rome, October 10, 2013.



This methodology, which is also considered in the third and fourth pillar of SOSE methodology, represents a first step towards the implementation of a monitoring system aimed at the recognition of the efficient level of resources to be allocated using the allotment coefficients already computed through the estimation of SEN. Finally, the suggested methodology will also provide a range of complementary information such as the identification of best practices, which will facilitate the identification of the virtuous paths of improvement for those authorities that have to operate in circumstances characterised by high cost inefficiencies.

These techniques are used extensively in the international context and in many industrialised countries for the analysis of local government efficiency. Despite their wide spread use, however, we must carefully consider the limits of these techniques in light of the methodological developments suggested in the last decade in order to ensure the robustness of the final results.

Among the limits of the SFA methods, there is the impossibility of extending the efficiency analysis beyond the regression sample. As a result it is not possible to evaluate the percentage of inefficient expenditure of municipalities with missing data; therefore, the development of a robust methodology, to be adopted only in a representative sample (which should include more than 70% of the population), is recommended in order to ensure maximum reliability of the results.

Secondly, the SFA methods require the correct specification of the functional form of the technology underlying the production process. To tackle this problem, use of the methodology developed by Daraio and Simar (2007)³⁸, who suggest the parametric approximation of a robust non-parametric frontier in order to minimise the bias generated by the likely misspecification of the empirical model, is proposed.

6.2 REGIONAL STUDIES

A new area of activity concerning SOSE in 2013 and 2014 is that of “regional federalism”. In particular, as provided by Article 13 of the *Legislative Decree 68 of 2011 (Decree 68/11)*, SOSE’s role is to verify the basic levels of services that the central government, pursuant to Article 117 paragraph 2, letter *m* of the Constitution, must guarantee throughout the national territory in the following sectors: social care, education and local public transport (referring to capital expenditure only).

In addition, with reference to the aforementioned sectors, SOSE has the task to specifying the cost and the appropriateness of the supplied services monitoring the level of efficiency of the provision.

Legislative Decree 68/11 establishes that the basic levels of services and the SEN of the aforementioned functions are defined on a regional basis regardless of the level of government that provides them. Thus, the object of the analysis will be regions as macro-homogeneous areas of intervention and not as institutional bodies.

Furthermore, according to the law, SOSE will work in collaboration with ISTAT and will rely on the technical support of the *Conferenza delle Regioni e delle Province Autonome*³⁹ established at the *Centro Interregionale Studi e Documentazione* (CINSEDO)⁴⁰.

Finally, according to the aforementioned regulations, the methodology will have to follow the same guidelines as provided by Articles 4 and 5 of Legislative Decree 216/10 for the evaluation of SEN of municipalities and provinces.

Following this legislation, SOSE has developed a separate analysis for each sector producing a first draft of the methodological notes at the end of March 2014. In particular, regarding the social care sector, a detailed survey of the services provided within territory of the fifteen ordinary statute regions has been carried out using the data

³⁸ Daraio & Simar (2007). "Conditional nonparametric frontier models for convex and nonconvex technologies: a unifying approach," *Journal of Productivity Analysis*, Springer, 28(1):13-32

³⁹ *Conference of Regions and Autonomous Provinces*

⁴⁰ *Interregional Centre for Studies and Documentation*



from the questionnaire FC06U, which was designed for the calculation of the SEN of municipalities. In addition, the average costs at the regional level have been evaluated using the cost function designed for the calculation of the SEN of nursery services and estimating a specific cost function for general social services. Moreover, the analysis includes a series of simulations of various the levels of services according to different hypotheses regarding the coverage percentages related to the target population (for example the percentage of children aged 0-2 using nursery services).

With regards to the education sector, a detailed survey of the complementary services provided by municipalities within the territory of the fifteen ordinary statute regions was carried out using the data from questionnaire FC03U (which was designed for the calculation of the SEN of municipalities).

Finally, regarding the capital expenditure of local public transport, due to the lack of scientific literature, a new methodology has been designed for the valuation of standard “capital” expenditure needs. The methodology is centred on the preliminary assessment of the existing infrastructure using both established techniques, such as the perpetual inventory method, and innovative methodologies such as the construction of non-parametric composite indicators. The proposed methodology has been tested for the standardisation of capital expenditure on the urban-transport-related services provided by the provincial capitals, using data available from official sources (ISTAT, Ministry of Economy and Finance and the Ministry of the Interior) over a period of 11 years from 2000 to 2010.

Regarding the valuation of the regional capital SEN in the transport sector, a lack of adequate information from official sources has been verified; therefore, a questionnaire, to be filled in by each regional government was prepared in order to collect the missing information. The first version of the questionnaire, which has been agreed upon by the regional authorities within the CINSEDO, is in its final stages of development.

6.3 STRUCTURAL ANALYSIS

In order to support the recent reform process which seeks to reorganize the structure of local Italian governments, SOSE is studying two fundamental policy issues.

First, it is studying the possible economic and performance benefits resulting from the joint provision of municipal services, paying particular attention to the case of unions of municipalities in light of the obligation for municipalities of up to 5.000 inhabitants (3.000 if the municipalities have belonged or belong to a mountain community) to form a union, as provided by *Legislative Decree No. 95 of 2012*. Second, SOSE is studying the more general issue of identifying the optimal size of local authorities, which concerns both municipalities and provinces.

Through these studies, SOSE intends to provide analytical tools and new answers to concretely support the future choices of policymakers with quantitative elements. The studies SOSE is going to conduct along these two directions are also important, since they will use the database of information collected via the questionnaires developed for the valuation of SEN, which provides an opportunity to study, for the first time, phenomena such as output levels in relation to different organisational forms, until recently completely unknown.



7 STANDARD EXPENDITURE NEEDS IN THE ITALIAN LEGAL SYSTEM

7.1 PROCEDURE

According to Article 5, paragraph 2, letter *e* of Legislative Decree 216/10, the methodologies for determining standard expenditure needs (SEN) are submitted by SOSE to the Department of Finance within the Ministry of the Economy and Finance for approval and, as a subsequent step in the procedure, to the *Commissione tecnica paritetica per l'attuazione del federalismo fiscale* (COPAFF)⁴¹.

In the absence of observations, the methodologies are considered approved fifteen days after being submitted. The results prepared with the approved methodologies are subsequently transmitted to the State General Accounting Department within the Ministry of the Economy and Finance, as well as to the President of the Council of Ministers, who, after verification by the State General Accounting Department and in accordance with Article 1, paragraph 3 of the Legislative Decree 216/10, and after consideration by the Council of Ministers, thereby adopts through a decree the methodological document regarding the procedure for the valuation of SEN for each municipality and province.

The draft of the decree of the President of the Council of Ministers then is analysed by the State-City and local governments Conference. After fifteen days, the draft decree is submitted to the Houses of Parliament in order to receive the approval of the Bicameral Commission for the implementation of fiscal federalism, and the Parliamentary Commissions concerned with related financial matters.

The draft decree is accompanied by a technical report compiled pursuant to Article 17, paragraph 3, of Law 196/09, which underscores the financial impact of standard expenditure needs. Fifteen days after its submission to the Houses of Parliament by the government, the decree can then be adopted after a final deliberation by the Council of Ministers and is published in the Official Gazette.

Each municipality and province must then provide suitable notification of the decree on its institutional website, as well as through additional forms of communication regarding its budget.

Table 9 provides a summary of the legal path followed for the adoption of the SEN as it currently appears to be structured.

7.2 PERIODIC REVISION

The new criteria for SEN provide an important change in the financing of functions attributed to local authorities, following decades during which expenditure needs have been evaluated following actual expenditures. Legislative Decree 216/2010 (Article 7) states that, in order to guarantee the efficiency of local services, the valuation of SEN must be updated no later than the third year after being adopted. The revision process is monitored by the *Standing Conference for the Coordination of Public Finances* and the COPAFF.

Regarding the SEN of the regions,⁴² it is also appropriate to provide a monitoring and review process. It should, in fact, be highlighted that the verification of the basic levels of services for regions regarding social services, education and local transport are closely linked with the definition of SEN for municipalities and provinces in relation to the same essential functions. It is, therefore, advisable to assess the SEN of functions regarding social

⁴¹ *Joint technical committee for the implementation of fiscal federalism.*

⁴² Paragraph 6 of Article 13 of Legislative Decree 68/11 provides that SOSE S.p.A., in collaboration with ISTAT and relying on the technical support of the Conference of Regions and Autonomous Provinces established at the Interregional Centre for Studies and Documentation (CINSEDO), and according to the methodology and determination procedure referenced in Articles 4 and 5 of Legislative Decree 216/10, can develop a survey of the essential levels of services that ordinary statute regions actually provide and of the costs of these services.



services, education and local transport for regions, provinces and municipalities together in a single monitoring and review process.

The stability law of 2014 states that: "In order to complete the task of monitoring and review of the SEN and costs of functions and services provided by regions and local authorities, so as to obtain virtuous behaviour in local authorities, it is authorised the expenditure of 4 million euros for each of the years 2014 and 2015".

For the purposes of the monitoring and review of the SEN a single questionnaire for the six essential functions of the provinces has been already prepared with UPI and was published online on April 9, 2014. A single questionnaire for the six essential functions of the municipalities is being prepared along with IFEL/ANCI and will be published in September 2014.



Table 9 – Summary of the legal path followed for the adoption of municipal standard expenditure needs.

Functions and services		Questionnaire	Methodological note approved by COPAFF	Decree issued by the President of the Council of Ministers	Decree examined by the State-City and local governments Conference	Decree approved by the Houses of Parliament	Decree published in the Official Gazette
General Administrative, Management and Control Functions	<i>Tax office</i>	FC01A	20/12/2012	18/4/2013	7/8/2013 (*)	30/01/2014	
	<i>Technical office</i>	FC01B	20/12/2012	18/4/2013	7/8/2013 (*)	30/01/2014	
	<i>Civil registry</i>	FC01C	20/12/2012	18/4/2013	7/8/2013 (*)	30/01/2014	
	<i>General services</i>	FC01D	20/12/2012	18/4/2013	7/8/2013 (*)	30/01/2014	
Local Police		FC02U	28/06/2012	4/10/2012	11/10/2012	28/11/2012	5/4/2013
Education (complementary services)		FC03U	23/12/2013				
Public Roads and Transport	<i>Public roads</i>	FC04U	23/12/2013				
	<i>Local public transportation</i>		23/12/2013				
Planning and Environmental Functions	<i>Land management and planning</i>	FC05U	23/12/2013				
	<i>Waste management</i>		23/12/2013				
Social Care	<i>General social services</i>	FC06U	23/12/2013				
	<i>Nursery services</i>		23/12/2013				

(*) Decision not made



8 APPENDIX A - THE THEORETICAL FRAMEWORK

Let us consider a country whose local governments, which are democratically elected, provide local public services using, as a source of financing, local taxes levied on resident citizens, being the municipal fiscal capacity equalised by the central government⁴³. The demand for local public services is expressed during the electoral period. Assuming the validity of the median voter theorem, the electoral competition will lead to the victory of the party whose programme maximises the median voter's utility under its budget constraint:

$$\max_{C, G_e} u(C, G_e) \text{ s. t. } \tilde{R} = \tilde{C} + t\tilde{B}; tNB = Y \quad (A1)$$

where C is private consumption, G_e are local public services (where the subscript e identifies the output as endogenous) \tilde{R} is the income level, t and \tilde{B} are respectively the rate and the base of local taxes. All variables, with the exception of the tax rate t refer to the median values related to the local government in question. The level of local taxes, expressed through the tax rate t is announced during the electoral campaign in order to equalise the local government's budget constraint⁴⁴. Y is the total cost of supplying local public services, B is the average tax base, and N is the resident population. Thus, the local tax rate is given by the relationship between the total cost of local public services and the overall tax base $\frac{Y}{NB}$.

Solving the problem of the median voter in (A1), and assuming that the deviation between the average tax base and the median tax base is modest, we obtain the demand for public services G_e which expressed in per capita terms becomes:

$$g_e = d(R, Q, y) \quad (A2)$$

where: $g_e = \frac{G_e}{N}$, Q represents the vector of demographic and socio-economic aspects that characterise the preferences/needs of the citizens and y represents the per capita total cost.

At this point, the locally elected government will be the one that manages to produce g_e at the lowest possible cost, in order to minimise the tax rate t and therefore the fiscal burden of the median voter. Maintaining this policy during the post-electoral period maximises the re-election probability of the incumbent. Moreover, the goal of minimising the input cost is fully justified if we consider Tiebout's hypothesis⁴⁵, which constitutes the pillar supporting many theoretical models for local public finance⁴⁶. Finally, one last justification of the goal of minimising the input cost comes from the budget constraints imposed by the central government. Thus, based on these assumptions, the problem of the local government can be outlined as follows:

$$\min_x t \text{ s. t. } t = \frac{X'P}{NB}; G_e = g(X, A, G_s) \quad (A3)$$

⁴³ Among the sources of local government financing, a key role is also played by intergovernmental grants. These are neglected in the model, since they do not impact the decisions of citizens and local administrators, given the hypothesis of full income equalization. Moreover, this hypothesis is in line with the future structure of the system of financing current expenditures for the fundamental functions of local authorities in Italy, where grants are solely equalising in nature (Law 42/09, Art. 11, par. 1B).

⁴⁴ In stating the optimal level of local taxes, it is assumed that the candidates adopt a *Cournot-Nash* strategy, using the choices announced in other jurisdictions as parameters.

⁴⁵ According to the hypothesis put forward by Tiebout, the citizens examine the fiscal packages offered by the various jurisdictions and decide to reside in the jurisdiction that offers the best combination of local taxes and public services, from which comes the well-known expression that, based on Tiebout's hypothesis, "citizens vote with their feet".

⁴⁶ For a general overview of theoretical models for local public finance, consider: Rubinfeld D.L. (1987), "The Economics of the Local Public Sector" in A. Auerbach & M. Feldstein (eds.) *Handbook of Public Economics*, Volume 2, pp. 571-645; Ross S.L. & Yinger J. (1999), "Sorting and Voting: A Review of the Literature on Urban Public Finance" in P. Cheshire, and E.S. Mills (eds.) *Handbook of Regional and Urban Economics*, Volume 3, pp. 2001-2060.



where \mathbf{X} is the vector of inputs and \mathbf{P} is the vector of input prices. The obligation to balance the budget is in this case, joined by the production function of public services. For the production function, it is assumed that the total factor of productivity comprises two variables: \mathbf{G}_s aimed at capturing the resources employed in the exogenous load factors (e.g. services provided by the local government on behalf of higher level administrations and generally activities not directly attributable to local decisions); and \mathbf{A} , which captures the impact of exogenous environmental factors on the capacity to produce local public goods (such as congestion phenomena and economies of scale related to the size of the local authority in terms of the resident population)⁴⁷.

Resolving the problem of the local government in (A3), we obtain the demand functions for inputs and therefore the following per capita cost function for producing public services:

$$\left(\frac{Y}{N} =\right) y = s(\mathbf{g}_e, \mathbf{g}_s, \mathbf{p}, \mathbf{a}) \quad (A4)$$

where all variables are expressed in per capita terms (lowercase letters).

In conclusion, the optimal level of local public services and their per capita supply costs are simultaneously determined within a structural model of two equations: (A2) and (A4). Both the cost and the demand for public services are endogenous variables whose optimal value derives from the interaction between local administrators and citizens, in the process of allocating resources among the public and the private sectors.

At this point, substituting equation (A2) into (A4), we obtain the per capita cost for services in relation to all exogenous variables:

$$y = f(\mathbf{Q}, R, \mathbf{p}, \mathbf{a}, \mathbf{g}_s) \quad (A5)$$

However, equation (A5) no longer has the properties of a cost function, since it does not include the quantity of local public services among the independent variables. On the other hand, equation (A5) expresses the current per-capita and optimal level of expenditures in relation to the preferences/needs of citizens and other local characteristics.

In conclusion, the theoretical model provides precise indications of how to proceed with an assessment of standard expenditures needs using econometric methods. In case of endogenous outputs the simplest and most robust empirical strategy is to follow a reduced-form approach, estimating an empirical model derived from the expenditure function reported in equation (A5). The reduced-form approach has the advantage of having among its regressors only exogenous variables (e.g. demand background variables, input prices, supply background variables, to exogenous load factors); however, on the other hand, an empirical model based on the expenditure function does not allow an estimation of the relationship between output and expenditure. In case of endogenous output, in order to estimate the relationship between output and expenditure, it is necessary to consider a structural model based on the equations (A2) and (A4), a very complex econometric approach which requires correct specifications for the demand and the production functions and precise assumptions about the set of regressors used as demand and supply background variables, which should uniquely identify, respectively, the level of output and the cost of public services.

⁴⁷ Lastly, the variable \mathcal{A} measures how the production of local public services is impacted by environmental characteristics, where the environment refers, for instance, to both morphological and socio-economic aspects, which do not influence local preferences regarding the level of public services. In essence, these comprise all external elements that can, with other conditions being equal, in some way favour or hinder the supply of local public goods.