

# Efficiency Measurement of Local Public Sector in International Perspective: a literature survey

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## Abstract

This article presents a literature review designed to identify the main indicators used to evaluate local government efficiency. The main scientific articles that measure local government efficiency were selected by consulting the Web of Science database. The input (or cost) indicators and main indicators of outputs provided by local authorities were analyzed. The research community engaged in investigating local government efficiency was also mapped out, including the journals that cover the subject most, the areas in which the researchers work, the countries most studied, and the countries that produce most articles on the subject.

## 1. Introduction

If you are interested in knowing what the overall efficiency of your country's local governments is, what indicators should you look at? Whose researchers' work should you turn to? What research institutions are these researchers from? What areas of research investigate this subject? What countries have undertaken systematic studies into public sector efficiency? This study will cover all these questions. I have undertaken a literature review into local public sector efficiency to show how it is measured in different parts of the world. I have also mapped out the main research areas that discuss the subject, the scientific journals and countries that most study the subject, and the countries most widely researched.

This article reports on part of a broader project designed to evaluate the hypothesis that intergovernmental grants have a negative effect on the efficiency of Brazil's sub-national governments based on the same argument Kalb (2010) used for Germany. The underlying mechanism by which this happens could be described as follows: when local services are funded by taxpayers from outside that jurisdiction and not by local voters, the local community loses its capacity to correctly evaluate the cost-

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benefit ratio of the public sector, allowing room for the private appropriation of public monies by local government officials. Brollo et al. (2013) have demonstrated that the Brazilian municipal governments that receive the most grants tend to have less educated mayors and more cases of corruption. However, no study has been done to investigate whether there is an association between intergovernmental transfers and the efficiency of the local public sector in Brazil. Given that block-grant transfers are widely used in Brazil and that the Brazilian public sector is not seen as being particularly efficient (Afonso et al. 2006; Afonso et al. 2013), this begs the question as to whether one fact is related to the other.

The first part of the research of which this study is part seeks to measure the dependent variable of the study, namely local public sector efficiency. It is widely acknowledged the world over that measuring public sector efficiency is not an easy task (Boyle 2006), not least because so many public services have no price attached to them (Dunleavy & Carrera 2013, chapter 1). Even so, many countries have created performance evaluation systems in a bid to improve the efficiency of their public sectors (Bouckaert & Halligan 2008).

In recent decades, many countries have undergone recurring fiscal crises as they have lost the capacity to sustain growing public expenditure. Even so, demand for more and better public services does not seem to have waned, and the public sector continues to be expected to respond to increasingly sophisticated demands by the population. This has spurred debates and studies of the efficiency of the public sector in order to find ways to provide better, cheaper, and quicker public services.

One of the strategies central governments have employed to respond to these new demands is to decentralize state activities (Kazepov 2010), yet doubts still remain as to whether decentralization actually has a positive effect on government efficiency. In Brazil, received wisdom would have it that local governments are less efficient than the central government, so public opinion tends to favor centralization (Arretche et al. 2014). However, the fact is that the centralization/decentralization dilemma can only be overcome by better understanding what causes (in)efficiency in local governments. This is precisely the issue this article aims to tackle.

## **2. What is efficiency?**

Efficiency is the relationship between inputs consumed and outputs produced by a production unit (Farrell 1957; Boyle 2006; Dunleavy & Carrera 2013). However, when this original idea is applied to the public sector, there are two approaches that can be taken. The first sees public sector efficiency in the same way as industry, meaning the capacity of the public sector to produce goods and services from the resources it

extracts from society<sup>2</sup>. This is very similar to the way the efficiency of non-governmental entities, such as NGOs, companies, or even departments of an organization, is analyzed. The second approach has no parallel with private sector efficiency because it has to do with the efficiency of government as a regulator of the local economy. Examples of this approach study the effects institutions have on local economic growth.

The approach that interests us here is the organizational efficiency of the local public sector – its capacity to transform a set of inputs into a set of outputs. We are not concerned with studies that investigate the efficiency of the local economic system, although it is to be hoped that a more efficient local government will have a positive impact on the local economy.

We will analyze articles that make an overall analysis of local public sector efficiency rather than ones that concentrate on a single area (e.g. education, health, waste treatment, libraries, etc.). This is because we want to observe the overall efficiency of the local public sector in order to ascertain how intergovernmental grants influence the behavior of local elites (in a study to be conducted in the future). If we were to analyze just one sector of the economy we would run two major risks: (1) some governments specialize in given areas, so they could look more efficient than they really are; and (2) the peculiarities of the sector chosen could introduce bias into our analyses. One such example would be central government control over the use of the financial resources it transfers. In Brazil, health and education are subject to intense regulation by the central government, which means their monitoring has a strong impact on local efficiency and could offset or even annul any local government tendencies towards budgetary slack<sup>3</sup>.

### **3. Bibliographic Selection Process**

In this article I present a systematic literature review that makes use of a structured bibliometric search procedure based on Villas et al. (2008). The search was almost entirely based on the Web of Science (WoS) research platform run by Thompson Reuters. The first stage consisted of a search using a restricted set of terms intuitively related to the research topic, namely, to measure the productive efficiency of the local

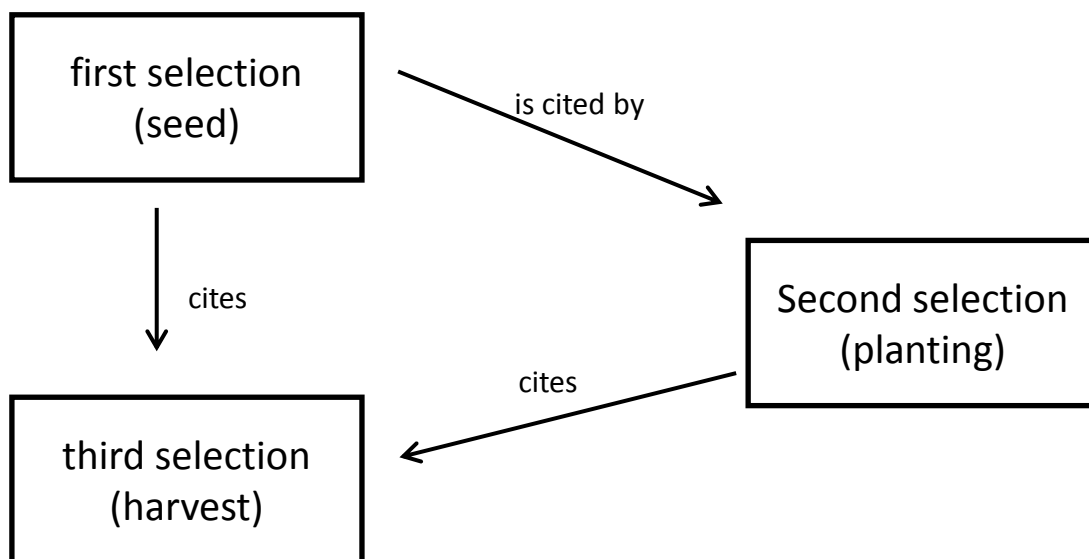
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<sup>2</sup> Organizational efficiency is often divided into technical efficiency and allocative efficiency, as in the classic definition by Farrell (1957). Technical efficiency has to do with the quantity of outputs from a given set of inputs, or, inversely, the quantity of inputs consumed to produce a set of outputs. Meanwhile, allocative efficiency has to do with combining inputs and outputs in optimal proportions in such a way as to optimize the production process.

<sup>3</sup> Meanwhile, a large number of Brazilian local government activities are not regulated by the federal or state governments. Furthermore, most of the intergovernmental transfers in Brazil are not conditioned (block grants), leaving the local government free to allocate the funds to regulated or unregulated areas, as they see fit

public sector. The articles retrieved in this search were then filtered qualitatively to identify which ones were of interest to the subject under investigation. Next, we checked to see whether any other articles that cited the ones selected in this first stage were of relevance to the research topic. Finally, we found out whether there were any articles of interest in the bibliographies of the articles retrieved in the first and second stages. Figure 1 shows the analysis stages schematically.

Diagram 1 – Article selection method



The initial search was done using a set of keywords with the “topic” search option. “Topic” is the broadest search option in the WoS in that it searches for terms in the titles and abstracts of articles in the database, the area of research, the keywords provided by the authors, and the keywords provided automatically by the WoS system. The keywords used in this initial search were:

Technical Efficiency (Municipalitie\$ OR Local government\$)

We used the term “technical efficiency” to restrict the scope of the study to analyses of efficiency that were related, albeit indirectly, to Farrell’s (1957) work. This meant that the articles retrieved would be more likely to discuss the organizational efficiency of governments, rather than governments’ efficiency in coordinating the local economy. This more restrictive search also ruled out any articles that used the word “efficiency” with a less precise meaning. Although this is a limited approach to

efficiency, the subsequent steps in the process were designed to retrieve other articles that dealt with efficiency in a broader sense.

Dollar signs (\$) at the end of the words are wildcards that can be replaced by any number of characters (e.g. government\$ could retrieve government, governments or governmental). Meanwhile, “OR” serves to broaden the search, retrieving texts that contain any of the words beside the operator. There is an implicit operator (“AND”) between any words that have a blank on either side, which restricts the search to those texts that contain the words on either side of the operator. Brackets are used to ensure that the search satisfies both conditions: it has to be a text about local government (contain the words “Municipalitie\$” or “Local” and also the word “government\$”) and it has to be about “technical efficiency”.

The search was only of articles, not of books or presentations given at conferences. This was to ensure that only peer-reviewed texts were retrieved, serving as an assurance of minimum academic standards. The search was restricted to the social sciences citation index to reduce the likelihood of retrieving articles that were not related to the target subject, like agricultural or energy efficiency<sup>4</sup>. Also, only texts in English were retrieved. The first selection was restricted to the last ten years (2005-2015), but the final selection stretched back as far as 20 years (1995-2015).

The first search of the WoS system retrieved 76 articles. These were analyzed qualitatively to ensure they addressed the target subject matter. The articles selected at this stage had to fulfill the following criteria:

- present empirical, quantitative research;
- seek to measure the efficiency of a sample group of local governments;
- present a selection of input indicators and output (or outcome) indicators to measure local government efficiency;
- address the efficiency of governments as organizations rather than their capacity to render the local economy more efficient;
- use official statistics rather than studies that cannot be reproduced (e.g. one-off surveys);
- address the efficiency of local government as a whole rather than specific areas like health, education, waste collection, sewage treatment, road maintenance, libraries, etc.

This process reduced the original set of articles from 76 to 22. Then, using the WoS bibliometric database, we found out which other articles cited these studies (excluding duplicates). This second group of selected articles was then filtered using the same criteria as the first group, resulting in the addition of a further 16 articles. Finally, all the articles in the bibliographies of the articles identified in the first and second selection

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<sup>4</sup> The social sciences citation index includes subject categories like economics, political science, and public and private administration. One article may belong to more than one subject area.

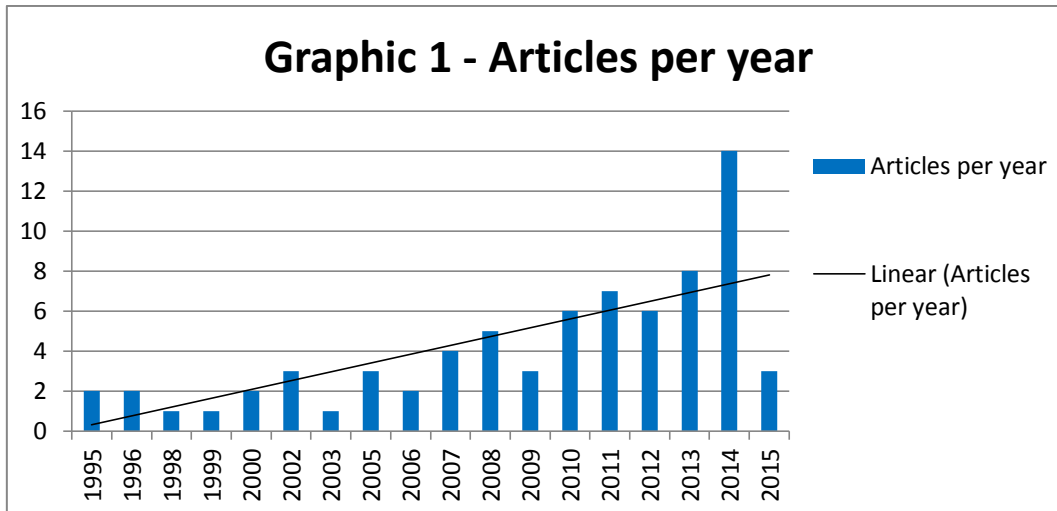
stages were checked. This third stage yielded 16 new articles, bringing the total to 54. More details about the articles retrieved can be obtained in section 4 below.

The advantage of this simple bibliographical search method is that it enables a broad and open-ended search to be made from a very restricted initial selection. It identified articles that used synonyms for the initial expressions (e.g. “performance,” “cost-effectiveness,” “productiveness,” etc.) without these having to be thought up as alternative keywords. It also permitted a qualitative refinement of the quantitative bibliometric search, combining it with qualitative analyses, as recommended in the Leiden Manifesto (Hicks et al. 2015). Nevertheless, it is important to bear in mind that this cannot be considered a comprehensive literature review, since the proposed method was designed to retrieve a significant but not exhaustive sample of the works published in scientific periodicals. Indeed, while the set of articles indexed by WoS may be broad, it cannot be assumed to cover the entirety of the scientific literature.

Finally, we found that the present proposal to undertake a bibliographic search of the subject was done previously by Kalb et al. (2012) and Afonso & Fernandes (2008). We decided to take advantage of the articles they selected, which added six more articles to our sample that had been overlooked because they were not in the WoS database.

#### **4. Who studies local government efficiency?**

In this section I will give an overview of the field of study of local government efficiency, showing the main publications, the areas most interested in the topic, the countries most studied, and the countries that most study the subject. Although local government efficiency is a small research area if compared with others topics about decentralization, it is clear that interest in the subject is on the rise, as can be seen from the graphic below. The number of articles published per year has risen from two in 1995 to nine in 2014. Although this table could be biased by the increase in the number of articles indexed by the WoS, the analysis of the bibliographies of the articles selected for this study shows that very few studies were published prior to the 2000s.



**Source:** based on 60 papers , Web of Science and other sources

The increase in the number of articles on the subject has been accompanied by growth in the number of countries researched, especially developing countries. While the average age of publication of the articles on Central and Northern Europe (Germany, Belgium, Finland, Norway) is nine years, the articles on Eastern Europe (Slovenia, Macedonia, Czech Republic) have an average age of just over a year. Meanwhile, the average age of the articles focusing on developing countries from outside Europe is just four years. This figure would be lower if it were not for the single article published on Brazil in 2005.

Table 1 shows the main journals that publish articles on this subject. This is not an exhaustive sample, in view of the fact that not all the world's academic publications are indexed in the Web of Science. Most of them are from economics (applied, urban, spatial), local government, operations research, and urban studies.

<b>Table 1 – Journals with most publications on the subject</b>			
<b>N</b>	<b>Journal</b>	<b>F</b>	<b>%</b>
1	APPLIED ECONOMICS	7	11.67%
2	JOURNAL OF URBAN ECONOMICS	5	8.33%
3	JOURNAL OF PRODUCTIVITY ANALYSIS	4	6.67%
4	LEX LOCALIS-JOURNAL OF LOCAL SELF-GOVERNMENT	3	5.00%
5	OMEGA-INTERNATIONAL JOURNAL OF MANAGEMENT SCIENCE	3	5.00%
6	ENVIRONMENT AND PLANNING C-GOVERNMENT AND POLICY	2	3.33%
7	PUBLIC CHOICE	2	3.33%
8	URBAN STUDIES	2	3.33%
9	Public Performance and Management	2	3.33%

13	Others (one paper per journal) <sup>5</sup>	30	50.00%
	<b>Total</b>	<b>60</b>	<b>100%</b>

**Source:** based on 60 papers , Web of Science and other sources

Out of interest, Table 2 presents the main journals from the bibliographies of the articles retrieved in this study. We can see that the area draws on an unusual combination of articles from the applied social sciences, like economics and urban planning, with areas related to production engineering and operations research. Actually, articles from this field tend to draw heavily on mathematical and computational tools in their efficiency analyses – tools that were developed for private organizations, especially industry, like data envelopment analysis and stochastic frontier analysis.

<b>N</b>	<b>Journal</b>	<b>F</b>	<b>%</b>
1	JOURNAL OF PRODUCTIVITY ANALYSIS	91	6.48%
2	PUBLIC CHOICE	84	5.98%
3	EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	64	4.56%
4	JOURNAL OF URBAN ECONOMICS	60	4.27%
5	JOURNAL OF PUBLIC ECONOMICS	54	3.85%
6	MANAGEMENT SCIENCE	50	3.56%
7	APPLIED ECONOMICS	48	3.42%
8	REGIONAL SCIENCE AND URBAN ECONOMICS	46	3.28%
9	EUROPEAN ECONOMIC REVIEW	37	2.64%
10	JOURNAL OF ECONOMETRICS	36	2.56%
	....		
	<b>Total</b>	<b>1404</b>	

**Source:** based on 54 papers, Web of Science

Table 3 shows the areas of research covered by the final selection of articles. The categories cited are the WoS subject categories. Although the target subject is clearly interdisciplinary in nature, the research area that dominates the field is

<sup>5</sup> ANNALS OF REGIONAL SCIENCE, AFRICAN DEVELOPMENT REVIEW-REVUE AFRICAINE DE DEVELOPPEMENT, AUSTRALIAN ECONOMIC REVIEW, DEVELOPMENT SOUTHERN AFRICA, EUROPEAN JOURNAL OF POLITICAL ECONOMY, EUROPEAN JOURNAL OF POLITICAL ECONOMY, Financial Accountability and Management, FINANZARCHIV, FISCAL STUDIES, INFOR, INTERNATIONAL CONFERENCE ON APPLIED ECONOMICS (ICOAE) 2013, INTERNATIONAL REGIONAL SCIENCE REVIEW, INTERNATIONAL TAX AND PUBLIC FINANCE, JOURNAL OF PUBLIC ECONOMICS, JOURNAL OF REGIONAL SCIENCE, Journal of Socio-Economics, JOURNAL OF THE OPERATIONAL RESEARCH SOCIETY, LANDBAUFORSCHUNG, OXFORD ECONOMIC PAPERS-NEW SERIES, PUBLIC ADMINISTRATION, PUBLIC MONEY & MANAGEMENT, REGIONAL SCIENCE AND URBAN ECONOMICS, REGIONAL STUDIES, SCANDINAVIAN JOURNAL OF ECONOMICS, SOUTH AFRICAN JOURNAL OF ECONOMICS, URBAN AFFAIRS REVIEW, Urban Public Economics Review, UTILITIES POLICY, WORLD CONGRESS ON ADMINISTRATIVE AND POLITICAL SCIENCES.



economics, followed by environmental studies, management, public administration, and political science. Two other areas – planning & development and urban studies – are also a strong presence in the selection. The prominence of environmental studies would seem surprising at first sight. However, a closer inspection of the articles from this category reveals that the term “environmental analysis” could be misinterpreted by the WoS system, because the environment mentioned in the articles is almost always the economic and social environment rather than the natural environment. This is because one of the recurring themes in the literature is the influence of external environmental factors that are not under the control of public administrators on public sector efficiency, like geographical, economic, and local demographic factors.

<b>Table 3 – Areas of Research</b>			
<b>N</b>	<b>Journal</b>	<b>F</b>	<b>%</b>
1	Economics	33	33.3%
2	Environmental Studies	11	11.1%
3	Urban Studies	10	10.1%
4	Political Science	7	7.1%
5	Public Administration	7	7.1%
6	Operations Research & Management Science	5	5.1%
7	Planning & Development	4	4.0%
8	Social Sciences, Mathematical Methods	4	4.0%
9	Business	4	4.0%
10	Management	4	4.0%
11	Geography	3	3.0%
12	Business, Finance	3	3.0%
13	Environmental Sciences	1	1.0%
14	Computer Science, Information Systems	1	1.0%
15	Energy & Fuels	1	1.0%
16	Social Sciences, Interdisciplinary	1	1.0%
	<b>Total</b>	<b>99</b>	<b>100%</b>

**Source:** based on 54 papers, Web of Science

Table 4 shows the most researched countries, the countries with the most researchers investigating the topic, and the countries with most researchers investigating the topic with repetitions for each article published. The researchers’ reference details

were taken from their professional addresses, so they may not coincide with their actual nationality or the country researched. There is a clear predominance of European countries being researched. Four of the five most widely studied countries are European: Spain, Belgium, the UK, and Norway. Indeed, 65.21% of the cases are about Europe, and 69.44% of the authors are from this continent. Although the United States is a decentralized federation with a clear mastery of many areas of research, it is relatively underrepresented in the selection of articles retrieved<sup>6</sup>. Meanwhile, Spain stands out both for the number of cases and the number of researchers. It would seem that the hotly debated subject of decentralization in Spain has yielded considerable research into local government efficiency. It is also likely that the ready availability of data makes studies into local government in Spain an attractive option. Indeed, this subject does not seem to be restricted to federations, as the sample contains a good number of federal and unitary states.

**Table 4 – Cases and Authors**

<b>Countries</b>	<b>Cases</b>	<b>Author</b>	<b>Author repeat</b>	<b>Countries</b>	<b>Cases</b>	<b>Author</b>	<b>Author repeat</b>
Spain	11	15	28	Slovenia	2	2	3
Belgium	6	5	7	South Africa	2	2	2
USA	4	10	10	Brazil	1	2	2
Norway	4	3	5	Czech Republic	1	2	2
United Kingdom	4	1	5	Netherlands	1	2	2
Australia	3	3	7	Finland	1	2	2
Italy	3	7	9	Morocco	1	1	1
Portugal	3	6	8	Macedonia	1	1	1
Greece	2	3	3	Malaysia	1	1	1
Japan	3	5	5	Europe	1	0	0
Germany	2	5	14	Switzerland	0	1	1
South Korea	2	4	4	Canada	0	1	1
Israel	1	0	0	<b>Total</b>	<b>60</b>	<b>84</b>	<b>123</b>

**Source:** based on 60 papers , Web of Science and other sources

## 5. Local government efficiency indicators

<sup>6</sup> Web of Science is also known to be biased in favor of publications in English, leading it to over-represent studies about the USA.

In this section I will analyze the measures that are most widely used to evaluate local public sector efficiency. It should be noted that not all of them can be used effectively in every country. In fact, a general lesson to be learnt from consulting such a comprehensive sample of the literature is that efficiency measures are very specific to each country, either because different kinds of data are available or because local government has different powers. A case in point would be a comparison of two of the most widely studied countries identified in this analysis: Spain and Norway. In Spain, local government is a kind of caretaker of local infrastructure, but is involved very little in social areas, which are the responsibility of higher tiers of government. Even primary and secondary education is not a municipal task. Meanwhile, in Norway, local government is the main provider of social benefits. As such, most of the indicators used to evaluate local government in Norway cannot be used to evaluate local government in Spain. However, this section is not designed just to find out what the best measures of efficiency are, but to observe which are most widely used and why, in order to map out the literature on the subject and to offer some insights that might help researchers analyze efficiency more effectively in their specific context.

Efficiency indicators can be split into three groups: inputs, outputs, and negative outcomes. The articles consulted use mathematical and computer models to calculate how efficiently local governments transform inputs into outputs, but we will not cover these methods here. Inputs are the resources local authorities have at their disposal. Input variables can be split into three sub-groups: (a) financial resources, (b) non-financial resources, and (c) indicators of the price of inputs. The third category weights public sectors operating under different input market conditions so they can be equated with one another. In this study we divided the output indicators into 14 areas of public policy, described in Table 5. Although this is neither an exhaustive list nor the only way of organizing the variables, it was the best way found here to classify the many and varied activities of local authorities. The section ends with a brief description of the negative outcomes, which should be minimized and not multiplied, like pollution or unemployment.

## **5.1. Input indicators**

The input indicators used depend on the methodological choices of each researcher, the way local government is funded in each country, and the respective public accounting practices, which also vary considerably. These measures are classified here as financial resources, non-financial resources, and indicators of the price of inputs.

### **5.1.1. Financial Inputs**

**Total expenditure.** This is the most widely used input indicator<sup>7</sup> and has the advantage of being the simplest and being available in most countries<sup>8</sup>.

**Current Expenditure.** A great many studies only use current expenditure and not capital expenditure<sup>9</sup>. Capital expenditure tends to vary greatly because of the presence of large-scale infrastructure investments in some regions. Many authors believe that civil construction spending could distort this input indicator, making municipalities that are really investing look less efficient than they really are. Meanwhile, in many countries, large infrastructure is the responsibility of more central tiers of government, while local governments' capital expenditure is limited to small amounts that can be included in analyses without much risk of distortion. It is important to consider whether infrastructure maintenance spending is classified as capital expenditure or current expenditure. If maintenance is taken as capital expenditure, it may be advisable for it to be included in the analysis.

**Current or total expenditure minus financial expenditure.** Financial expenditure represents consumption and investment in the past, rather than present expenditure, which is why many studies do not include it in their analyses<sup>10</sup>.

**Expenditure on selected functions<sup>11</sup>.** As no set of output measures is ever going to be exhaustive, some authors believe it is better to use only the spending in the areas where output indicators exist as an input. Although this option may be appealing, the fact is that not all countries have their local public spending broken down per function, at least not with a unified methodology.

### 5.1.2. Non-financial inputs

The literature review showed that some articles use non-financial local inputs, namely:

**Number of government employees.** In some countries, especially unitary states, it is not possible to identify local spending on civil servants since the local

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<sup>7</sup> Afonso & Fernandes, 2006; Andrews & Boyne, 2011; Ashworth, Geys, Heyndels, & Wille, 2014; Balaguer-Coll, Prior, & Tortosa-Ausina, 2007, 2010b; Barone & Mocetti, 2011; Borge, Falch, & Tovmo, 2008; Borger & Kerstens, 1996; Bruns & Himmler, 2011; De Borger & Kerstens, 1996; Geys & Moesen, 2008, 2009; Grossman, Mavros, & Wassmer, 1999; Mehdi & Hafner, 2014; Nold Hughes & Edwards, 2000; Prieto & Zofío, 2001; Reingewertz, 2012; Revelli & Tovmo, 2007; Revelli, 2008, 2009; Sørensen, 2014; Sung, 2007; Taylor, 1995.

<sup>8</sup> Some studies use per capita variables, but this hampers the use of the population as an output variable.

<sup>9</sup> Fogarty & Mugerá, 2013; Haneda, Hashimoto, & Tsuneyoshi, 2012; Mahabir, 2014; Monkam, 2011; NIKOLOV & HROVATIN, 2013; Sampaio De Sousa & Stošić, 2005; Štastná & Gregor, 2015.

<sup>10</sup> Geys, Heinemann, & Kalb, 2010; Gimenez & Prior, 2007; Kalb, Geys, & Heinemann, 2012; Zafra-Gómez, Antonio, & Pérez, 2010. use current expenditure minus financial expenditure. Balaguer-Coll, Prior, & Tortosa-Ausina, 2010a, 2013; Bosch, Espasa, & Mora, 2012; Cuadrado-Ballesteros, García-Sánchez, & Prado-Lorenzo, 2013; Teresa Balaguer-Coll & Prior, 2009 use total expenditure minus financial expenditure.

<sup>11</sup> Andrews & Boyne, 2011, 2009; Boetti, Piacenza, & Turati, 2012; Loikkanen & Susiluoto, 2005; Moore, 2005; Storto, 2013; Ting, Dollery, & Villano, 2014; Worthington & Dollery, 2002.

government's workforce is actually employed nationally and simply allotted to the local government. In this case, the number of allocated employees serves as a proxy for local personnel expenses.

**Health facilities.** Sampaio De Sousa & Stošić (2005) use the number of non-municipal hospitals (private, state-run or federal) as healthcare inputs. Measures like this are important for trying to pick up on spillovers between the facilities in the municipal and non-municipal healthcare systems. This strategy could in theory be used for other areas like education.

**Quality of local workforce.** Sampaio De Sousa & Stošić (2005) use the number of teachers as a proxy for the quality of the workforce.

**Availability of land.** Haneda et al. (2012) use land as an input, considering it a municipal asset, since land can be converted into public and private resources. However, a large municipality with a small population could have high service production costs. Therefore in certain cases municipal area could be better classified as a proxy for cost of public services or a control variable.

### 5.1.3. Indicators of the Price of Inputs

Some authors try to pick up the difference between the prices of inputs in order to create parity between municipalities with different exogenous costs.

**Labor costs.** The labor market in some countries varies considerably from region to region, making labor costs an exogenous factor beyond the control of local governments. Cruz & Marques (2014) e Worthington (2000) use average municipal salary as a proxy for labor costs. However, this is not necessarily a reliable measure because high local civil service wages could be a symptom of inefficiency and the appropriation of public resources by the bureaucratic apparatus. A closer proxy for labor costs could be average local wages (counting both civil servants and private sector employees), but this strategy was not encountered in any of the articles analyzed.

**Financial Costs.** In most of the countries studied, the government bond market is controlled centrally, which is why local financial costs do not differ. However, in those countries where local governments have autonomy to obtain credit, the prices of local government bonds could be taken as a proxy for financial costs, as was the case in Worthington & Dollery (2002) a study of Australia.

**Official index of public sector costs.** Norway (Borge et al. 2008; Revelli & Tovmo 2007; Sørensen 2014; Bruns & Himmler 2011) has an official index of public service costs that it uses to achieve fiscal equalization. Very few countries have a comparable set of indices.

## 5.2. Indicators of Outputs

In this section I will describe the different ways of measuring the output of local public services in the 14 areas listed in Table 5. Measuring the output of local services is often an incredibly hard task and estimates have to be employed that can often be problematic. Output variables can be classified into three types: (a) estimates of demand for services; (b) estimates of supply of services; and (c) estimates of quality of services. Estimates of demand for services are the least reliable variables, because they fail to indicate whether demand is met. For instance, we can use the local population as an estimate of demand for administrative services, like the issue of documents. However, the local population size does not indicate whether this demand is being met. Even so, demand estimates are used in most of the studies analyzed, given that these are the only variables encountered by the authors to measure a number of services. Meanwhile, estimates of the delivery of services go one step further, indicating effective output of the public sector. However, such variables do not tell us much about the quality of the services, which is the job of quality variables. Combining output and quality variables would seem to be the best strategy, but it is also harder to do because of the scarcity of data on the quality of municipal services.

We could illustrate the difference between demand, supply, and quality with an example from the area of education. Demand for education services can be described using “school-age population” as a variable. However, this indicator alone does not tell us whether the children actually attend school. This could be resolved by using a different variable, “number of students enrolled.” However, this would still not tell us about the quality of the local education service. A more comprehensive indicator of the delivery of educational services could be to combine three variables, like “enrollment numbers,” “number of teaching hours per student,” and “student/teacher ratio,” with the second and third indicators evaluating quality.

Table 5	
N	Policy
1	Administrative Costs
2	Local Revenue
3	Infrastructure
4	Social Services
5	Education
6	Health
7	Public Transport
8	Public Utilities
9	Public Buildings
10	Culture, Parks & Recreation
11	Security
12	Environmental Conservation
13	Property Prices
14	Official Index

### 5.2.1. Administrative Costs

Administrative cost variables are designed to measure the provision of services linked to the issue of documents, regulation of local economic activities, heritage preservation, public order, and maintenance of the local administrative structure. The variables used to measure these costs are as follows:

**Local population.** This is the most popular variable encountered in the literature review<sup>12</sup>, but it is one of the least effective and most problematic indicators because a population may be served well, poorly, or not at all. The assumption that lower public spending per capita means greater efficiency only applies if either of the following conditions prevails: (a) the production and quality of the public services is uniform across all local governments, or (b) the production and quality of public services is effectively controlled by the other output variables. Afonso & Fernandes (2006) and Reingewertz (2012) both include the population of immigrants and tourists in this indicator, because their numbers could be significant in some cases. Reingewertz (2012) also adds the population growth rate as a variable, because the positive flow of immigrants could cause administrative costs to go up.

**Number of registered jobs**<sup>13</sup>. Like “local population,” this indicator is designed to serve as a proxy for demand for local administrative services. However, it is better at measuring the services demanded by businesses. As a proxy, this variable is better than population in that the poor provision of services for businesses could drive them away, since they are a more mobile factor of production than the population. Two articles Cuadrado-Ballesteros et al. (2013) e Šťastná & Gregor (2015) use the number of registered companies with the same idea as the number of registered jobs.

**Number of registered vehicles**<sup>14</sup>. This variable could be an effective proxy for demand for local administrative services when vehicles are registered by the municipal authority. It also helps to know the demand for traffic management services. In this case, quality could be weighted by the number of traffic accidents, but this strategy was not encountered in any of the articles analyzed.

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<sup>12</sup> Afonso & Fernandes, 2006; Andrews & Boyne, 2009; Ashworth et al., 2014; Athanassopoulos & Triantis, 1998; Balaguer-Coll et al., 2007, 2010a, 2010b, 2013; Boetti et al., 2012; Borger & Kerstens, 1996; Bosch et al., 2012; Cuadrado-Ballesteros et al., 2013; Cruz & Marques, 2014; De Borger & Kerstens, 1996; Fogarty & Mugerá, 2013; Geys et al., 2010; Gimenez & Prior, 2007; Haneda et al., 2012; Kalb et al., 2012; Monkam, 2011; Moore, 2005; NIKOLOV & HROVATIN, 2013; Pevcin, 2014; Sampaio De Sousa & Stošić, 2005; Šťastná & Gregor, 2015; Storto, 2013; Teresa Balaguer-Coll & Prior, 2009; Ting et al., 2014; Worthington, 2000; Zafra-Gómez et al., 2010.

<sup>13</sup> Geys et al., 2010; Kalb et al., 2012; Ting et al., 2014.

<sup>14</sup> Cuadrado-Ballesteros et al., 2013; Gimenez & Prior, 2007; Moore, 2005; Sung, 2007.

**Area of municipality and built area**<sup>15</sup>. Total area is a proxy for demand for services, but not for their quality (or even their delivery). Meanwhile, built area can be a good proxy for the attractiveness of the municipality for investments.

**Number and price of documents issued.** Some articles use the number of building licenses issued<sup>16</sup>, measuring the local provision of administrative services more directly. Others use the number of personal documents issued (birth certificates, electoral register, military enlistment, etc.)<sup>17</sup>. Only one article (Seol et al., 2008) records the number of internal documents issued by the local government and the number of applications made by the population, made possible by the good control of internal flows of the South Korean government. The cost of documents, like vehicle licenses or building licenses, is used by Cuadrado-Ballesteros et al. (2013) and Doumpos & Cohen (2014) as a proxy for local administrative costs. However, this strategy could be hampered when these amounts are taxes rather than actually representing the cost of producing said documents.

**Number of civil servants**<sup>18</sup>. Number of civil servants is used as a proxy for the supply of municipal services. However, when taken in isolation, this indicator is based on the unrealistic assumption that there is a direct correlation between service delivery and number of civil servants.

### 5.2.2. Local Revenue

Local revenue can be a proxy for local administrative capacity. The authors that use this indicator argue that high local revenue is an indicator of a good quality bureaucracy. They also argue that an effective local civil service will increase the local government's bargaining power vis-à-vis higher tiers of government. However, this measure could be hampered in countries where the distribution of resources to local governments is ruled by clientelistic relations.

Local revenue was used as an indicator of local service delivery through the following variables: local tax (and other sources of) revenues<sup>19</sup> and the value of the grants from central government to local governments (Ting et al. 2014).

### 5.2.3. Infrastructure

We encountered two indicators relating to local infrastructure.

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<sup>15</sup> A área total foi utilizada como variável por Cuadrado-Ballesteros et al., 2013; Gimenez & Prior, 2007; Storto, 2013, a área construída foi utilizada por Athanassopoulos & Triantis, 1998; Fogarty & Muger, 2013; Gimenez & Prior, 2007; Moore, 2005; Reingewertz, 2012; Šťastná & Gregor, 2015 e a área construída discriminada por tipo (residencial, industrial, turísticas, etc) por Athanassopoulos & Triantis, 1998.

<sup>16</sup> Afonso & Fernandes, 2008; Barone & Mocetti, 2011; Worthington & Dollery, 2002

<sup>17</sup> Barone & Mocetti, 2011; Worthington & Dollery, 2002.

<sup>18</sup> Haneda et al., 2012; Pevcin, 2014.

<sup>19</sup> Mehdi & Hafner, 2014; Nijkamp & Suzuki, 2009; Reingewertz, 2012; Ting et al., 2014.



**Municipal road network size**<sup>20</sup>. This was the second most widely used indicator found in the studies analyzed after local population. It measures a local government's capacity to produce infrastructure, and is also a proxy for the demand for local infrastructure maintenance.

**Street lighting**<sup>21</sup>. The number of street lights measures the provision of street lighting and is a proxy for the demand for local infrastructure maintenance.

Spain is a special case in that it regularly evaluates infrastructure quality. This is done by specialists as part of an infrastructure census, which classifies local facilities as good, fair, or poor. Three articles (Balaguer-Coll et al., 2010b; Balaguer-Coll et al., 2007; Teresa Balaguer-Coll & Prior, 2009) use this measurement to weight local infrastructure quality. The same classification is made for the quality of parks and public utilities in the country. Storto (2013) also uses a quality indicator devised by specialists to assess infrastructure in Italian towns and cities. Benito et al. (2010) use the number of hours of maintenance as an indicator of the quality of local infrastructure.

#### 5.2.4. Public Transportation

Although public transportation is a major issue in towns and cities, there was just one article that had an indicator for it (Šťastná & Gregor, 2015), which involved counting the number of bus stops.

#### 5.2.5. Social Services

Social services were measured by the following indicators:

**Number of people receiving benefits.** Quite a few of the articles consulted used this measure<sup>22</sup>, which has the advantage of being readily available in most countries as part of their official statistics.

**Social service institutions.** Some of the articles measured the number of places available at social institutions (Sung 2007; Šťastná & Gregor 2014; Loikkanen & Susiluoto 2005), while others used the area of social centers as a proxy for their output (Balaguer-Coll et al. 2010b; Balaguer-Coll et al. 2010a; Balaguer-Coll et al. 2013).

**Care for senior citizens.** In the countries where local authorities are involved in providing care for the elderly (especially Japan and Scandinavia), this service was

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<sup>20</sup> Afonso & Fernandes, 2008; Balaguer-Coll et al., 2007, 2010a, 2010b, 2013; Barone & Mocetti, 2011; Boetti et al., 2012; Borger & Kerstens, 1996; Bosch et al., 2012; Cruz & Marques, 2014; Doumpos & Cohen, 2014; Fogarty & Mugerá, 2013; Geys & Moesen, 2008, 2009; Geys, 2006; Moore, 2005; Nakazawa, 2013; Nijkamp & Suzuki, 2009; NIKOLOV & HROVATIN, 2013; Prieto & Zofío, 2001; Šťastná & Gregor, 2015; Sung, 2007; Teresa Balaguer-Coll & Prior, 2009; Worthington, 2000; Zafra-Gómez et al., 2010.

<sup>21</sup> Balaguer-Coll et al., 2007, 2010a, 2010b, 2013; Barone & Mocetti, 2011; Doumpos & Cohen, 2014; Prieto & Zofío, 2001; Teresa Balaguer-Coll & Prior, 2009; Zafra-Gómez et al., 2010.

<sup>22</sup> Ashworth et al., 2014; Borge et al., 2008; Borger & Kerstens, 1996; Bruns & Himmler, 2011; De Borger & Kerstens, 1996; Geys & Moesen, 2008, 2009; Geys, 2006; Revelli & Tovmo, 2007; Sørensen, 2014.

measured in three ways: places in institutions for the elderly<sup>23</sup>, senior citizens receiving benefits<sup>24</sup>, and residential population aged over 65 or over 75<sup>25</sup>. The last of these indicators measures the demand for services rather than their delivery. It is generally agreed that caring for old people is more costly than caring for youth and adults. It should therefore be an independent factor in order to counteract the risk of producing an analysis biased against municipalities with more an older demographic.

**Care for children and adolescents.** This item was measured mostly by the number of child care places<sup>26</sup>. In Norway, the number of children in child custody and the number of investigations into young people were also counted<sup>27</sup>.

### 5.2.6. Education

**Number of primary and secondary school children.** This was the main indicator used for the provision of education services<sup>28</sup> and the fourth most widely used indicator of all the output indicators. We also found indicators that tried to measure the number of students indirectly by observing the number of schools or area of schools (Afonso & Fernandes 2006; Afonso & Fernandes 2008) or even the number of classrooms (Bosch et al. 2012). Education was one of the areas with the most quality measures. The quality indicators used were grade repetition (Sampaio De Sousa & Stošić 2005), percentage of students in an age-appropriate grade (Sampaio De Sousa & Stošić 2005), number of teachers (Nakazawa 2013), number of teaching hours per student<sup>29</sup>, and class size (Reingewertz 2012).

**Libraries.** We found indicators related to libraries, like size of collection and number of users (Benito et al. 2010; Moore 2005; Afonso & Fernandes 2008; Loikkanen & Susiluoto 2005).

### 5.2.7. Health

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<sup>23</sup> Borge et al., 2008; Bruns & Himmler, 2011; Nakazawa, 2013; Nijkamp & Suzuki, 2009; Revelli & Tovmo, 2007; Sørensen, 2014.

<sup>24</sup> Borge et al., 2008; Bruns & Himmler, 2011; Loikkanen & Susiluoto, 2005; Revelli & Tovmo, 2007; Sørensen, 2014.

<sup>25</sup> Afonso & Fernandes, 2006, 2008; Ashworth et al., 2014; Borger & Kerstens, 1996; De Borger & Kerstens, 1996; Geys et al., 2010; Kalb et al., 2012; Pevcin, 2014 use population over 65 years of age; Boetti et al. (2012) use population aged over 75.

<sup>26</sup> Barone & Mocetti, 2011; Boetti et al., 2012; Borge et al., 2008; Bosch et al., 2012; Bruns & Himmler, 2011; Geys et al., 2010; Kalb et al., 2012; Loikkanen & Susiluoto, 2005; Nakazawa, 2013; Nijkamp & Suzuki, 2009; Revelli & Tovmo, 2007; Sørensen, 2014; Štastná & Gregor, 2015; Storto, 2013.

<sup>27</sup> Borge et al., 2008; Bruns & Himmler, 2011; Revelli & Tovmo, 2007; Sørensen, 2014.

<sup>28</sup> Afonso & Fernandes, 2006, 2008; Ashworth et al., 2014; Boetti et al., 2012; Borge et al., 2008; Borger & Kerstens, 1996; Bosch et al., 2012; Bruns & Himmler, 2011; De Borger & Kerstens, 1996; Geys et al., 2010; Geys & Moesen, 2008, 2009; Geys, 2006; Kalb et al., 2012; Loikkanen & Susiluoto, 2005; Nakazawa, 2013; Nijkamp & Suzuki, 2009; Pevcin, 2014; Reingewertz, 2012; Revelli & Tovmo, 2007; Sampaio De Sousa & Stošić, 2005; Sørensen, 2014; Štastná & Gregor, 2015.

<sup>29</sup> Borge et al. 2008; Revelli & Tovmo 2007; Sørensen 2014; Bruns & Himmler 2011; Loikkanen & Susiluoto 2005.

Surprisingly few articles presented indicators for municipal health service provision. Indicators on this area were only found for four countries: Norway, Finland, Japan, and the U.S.A. The health service indicators used were:

**Number of health workers.** This figure includes the number of local doctors<sup>30</sup>, nurses, and physiotherapists<sup>31</sup>.

**Number of health products supplied.** The indicators encountered include public hospital beds (Nakazawa 2013), hospital attendances (Loikkanen & Susiluoto 2005), and dental attendances (Loikkanen & Susiluoto 2005).

**Response time for medical services.** This was the only indicator to measure the quality of health care services (Moore 2005).

### 5.2.8. Public Utilities

After administrative costs, the policy area most covered in the literature selected is public utilities. The variables used are:

**Waste collection.** Whether measured by ton or population served, this is the third most widely used indicator in the articles studied (after population and size of road network)<sup>32</sup>. Afonso & Fernandes (2006) are the only authors to cover the collection of waste for recycling.

**Water and sewage system.** A number of articles measure the supply of treated water<sup>33</sup> and sewage services<sup>34</sup>. Benito et al. (2010) measure the length of municipal sewage systems.

**Electricity network.** The articles that investigate South Africa (Monkam 2011; Mahabir 2014) also measure electricity supply.

### 5.2.9. Public Buildings

Some articles measure the number of public buildings in use (Cruz & Marques 2014; Nakazawa 2013), without discriminating between administrative buildings, museums, libraries, etc. Balaguer-Coll et al. (2010b), Balaguer-Coll et al.

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<sup>30</sup> Borge et al., 2008; Bruns & Himmler, 2011; Nakazawa, 2013; Revelli & Tovmo, 2007; Sørensen, 2014.

<sup>31</sup> Only the studies analyzing Norway take into account the number of nurses and physiotherapists (Borge et al. 2008; Revelli & Tovmo 2007; Sørensen 2014; Bruns & Himmler 2011).

<sup>32</sup> Afonso & Fernandes, 2006, 2008; Balaguer-Coll et al., 2007, 2010a, 2010b, 2013; Barone & Mocetti, 2011; Benito, Bastida, & García, 2010; Boetti et al., 2012; Bosch et al., 2012; Cruz & Marques, 2014; Geys & Moesen, 2008, 2009; Gimenez & Prior, 2007; Mahabir, 2014; Monkam, 2011; Moore, 2005; Nakazawa, 2013; Prieto & Zofío, 2001; Štastná & Gregor, 2015; Sung, 2007; Teresa Balaguer-Coll & Prior, 2009; Worthington, 2000; Zafra-Gómez et al., 2010.

<sup>33</sup> Afonso & Fernandes, 2006, 2008; Benito et al., 2010; Bosch et al., 2012; Cruz & Marques, 2014; Mahabir, 2014; Monkam, 2011; Moore, 2005; Prieto & Zofío, 2001; Sampaio De Sousa & Stošić, 2005; Sung, 2007; Worthington, 2000.

<sup>34</sup> Afonso & Fernandes, 2006; Cruz & Marques, 2014; Mahabir, 2014; Monkam, 2011; Sung, 2007; Worthington, 2000.

(2010a), and Balaguer-Coll et al. (2013) do the same thing, but measure the area of the buildings rather than the number. These latter studies are all on Spain and also measure the area of public markets.

#### 5.2.10. Culture, parks & recreation

One of the most commonplace responsibilities of local governments is to provide leisure options for the local people. The indicators used in this area were:

**Area of leisure facilities.** The total area of leisure facilities, without breaking them down by type, is used as a proxy for the provision of leisure services in some articles<sup>35</sup>. Other articles break this total area down into type of leisure provided, using indicators related to the area of municipal parks<sup>36</sup> and the area for sports facilities<sup>37</sup>. The articles that study Spain have the advantage of being able to draw on assessments made by specialists, which classify the state of conservation of leisure facilities as good, fair, or poor<sup>38</sup>. Benito et al. (2010) use the number of sports facility users, which makes the indicator more accurate.

**Cultural facilities.** Cultural facilities, whether counted by numbers or by area, are used by Bosch et al. (2012), Šťastná & Gregor (2015), Nijkamp & Suzuki (2009) e Prieto & Zofío (2001). The number of municipal monuments was analyzed by Šťastná & Gregor (2015)..

#### 5.2.11. Security

In some countries, local authorities are responsible for public security. Most of the indicators in this area could be considered negative outcomes, meaning unintended results that should be minimized rather than multiplied. These are described in further detail below. Nonetheless, some local police indicators are used as positive indicators of local output, namely:

**Local police.** There are three indicators for the provision of police services: Šťastná & Gregor (2015) use a dummy when there is a local police force, Bosch et al. (2012) count the number of municipal police officers, and Barone & Mocetti (2011) use the area covered by the local police force.

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<sup>35</sup> Ashworth et al., 2014; Borger & Kerstens, 1996; De Borger & Kerstens, 1996; Doumpos & Cohen, 2014; Geys et al., 2010; Geys & Moesen, 2008, 2009; Geys, 2006; Kalb et al., 2012; Šťastná & Gregor, 2015.

<sup>36</sup> Balaguer-Coll et al., 2007, 2010a, 2010b, 2013; Benito et al., 2010; Borge et al., 2008; Moore, 2005; Nijkamp & Suzuki, 2009; Prieto & Zofío, 2001; Šťastná & Gregor, 2015; Sung, 2007; Teresa Balaguer-Coll & Prior, 2009; Zafra-Gómez et al., 2010.

<sup>37</sup> Benito et al., 2010; Bosch et al., 2012; Cruz & Marques, 2014; Prieto & Zofío, 2001; Šťastná & Gregor, 2015.

<sup>38</sup> Balaguer-Coll et al., (2007, 2010b), Storto (2013), Teresa Balaguer-Coll & Prior (2009) use a measure of quality.

### **5.2.12. Environmental Protection**

Šťastná & Gregor (2015) are the only authors to use an indicator for environmental protection, namely the area of land covered by conservation areas in the municipality.

### **5.2.13. Property Value**

Three articles (Grossman et al. 1999; Nold Hughes & Edwards 2000; Taylor 1995), all from the United States, make use of local property values as a general indicator of the quality of public municipal services. The articles use control variables to filter the influence of other factors on properties, like local income, percent of immigrants, distance to town/city center, etc. The indicator of the quality of the municipal services is given by applying these filters. The fact that articles on just one country use this indicator suggest there may be a correlation between property value and local service provision only in certain economic and institutional contexts. This is a good example of how output variables can be country-specific.

### **5.2.14. Official index of public service provision**

Three of the studies identified (Revelli 2009; Revelli 2008; Andrews & Boyne 2011) made use of the UK's official index for local public service provision, the Comprehensive Performance Assessment (CPA). The CPA was prepared by an independent agency, the Audit Commission<sup>39</sup> and, as its name suggests, it was designed to provide an overall evaluation of local public sector performance. It includes indicators for education, social services, environment, housing, libraries, leisure, welfare, and financial management that are both quantitative and based on auditor judgements. There is a considerable body of academic work on the CPA, but we only selected articles that combine it with some input indicator in order to be able to measure efficiency. The CPA is the most comprehensive indicator of outputs found in all the studies identified, because although it is still an estimate, it has the advantage of having more accurate and comprehensive measures than the other proxies observed in this study. Despite any criticisms that may be made of the quantification of government performance<sup>40</sup>, we hope that other countries will come to adopt similar indicators to evaluate their own local public sector.

Like the UK, Norway also has an official indicator of the provision of local social services, developed by the Norwegian Advisory Commission on Local Government Finances (Det tekniske beregningsutvalg for kommunal og

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<sup>39</sup> The Audit Commission was dissolved on March 31, 2015.

<sup>40</sup> An interesting criticism of the government performance movement can be seen in Radin (2006).

fylkeskommunal økonomi, TBU)<sup>41</sup>. This indicator only covers quantitative indicators, so it is simpler than the CPA because it does not make use of auditor judgements.

### **5.3. Negative outcome indicators**

A few of the articles studied used measurements of negative outcomes. Negative outcomes are undesirable social outcomes, which may or may not be the consequence of local government actions. The methods used to measure efficiency enable negative outcomes to be analyzed by calculating the negative outcome as if it were an input, because just as for inputs, the lower the quantity of negative outcomes generated, the better the estimated local efficiency. Some of the negative outcome indicators used are infant mortality (Sampaio De Sousa & Stošić 2005), waiting lists for childcare places (Nakazawa 2013), and number of unemployed workers (Nakazawa 2013; Cuadrado-Ballesteros et al. 2013). Public security indicators are often negative outcomes, like number of police interventions (Benito et al. 2010), number of arrests (Benito et al. 2010), and crime rate (Moore 2005). In fire protection, the following indicators of negative outcomes are used: number of people killed in fires (Moore 2005), number of fires (Nakazawa 2013), and cost of fire damage (Moore 2005). In the literature selected, no article used local pollution indicators, which is surprising in view of the importance of the topic. Although so few indicators of negative outcomes are used, they are still a promising alternative for analyzing the side-effects of state actions and for broadening the scope of analyses of local government efficiency.

## **6. Conclusion**

This article has presented a systematic search of articles on local public sector efficiency by searching the Web of Science database. We used an open-ended method that proved effective in saving time. We identified 60 articles on the subject investigating 23 countries. The bibliography encountered is still small, but is on the rise, especially in developing countries; most of the authors and countries studied are from Europe. The subject is eminently multidisciplinary, but the area that has invested most in it is economics, followed by public administration, urban studies, and political science. The articles also depend heavily on methodologies developed in the field of operations research and econometrics, with many of the techniques having been formulated to analyze industrial efficiency. There are a great many indicators used to measure local government efficiency. In many cases, an indicator used in one country cannot be used in another because of the availability (or lack) of data, the different powers of local governments, and the economic and institutional circumstances of each country. Even so, we were able to reach some conclusions that may help guide future

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<sup>41</sup> The variables used by the Norwegian Advisory Commission on Local Government Finances are listed above per policy area (Borge et al., 2008; Bruns & Himmler, 2011; Revelli & Tovmo, 2007; Sørensen, 2014).

research agendas on the subject. Indicators of non-financial inputs and input prices are under-used. They could be helpful for drawing parallels between governments with different input markets, either because of the presence of spillovers or because of the different costs of factors of production. Many of the studies investigated use indicators for service demand, which often fail to correlate with the services that are actually delivered. There are few indicators that measure the quality of public services, even though it is such an important issue for society. A handful of studies explore the production of negative outcomes. I believe these should be given closer attention because the public sector is responsible not only for providing benefits, but also for preventing damaging phenomena in society, like crime and pollution. There are some public policy areas that have received surprisingly little attention in the literature, like traffic accidents, public transportation, and environmental protection. Few governments have created official indicators specifically to analyze local public sector efficiency. However, there are a few promising examples in this respect, such as Norway, which has created a measure for the cost of local inputs and an aggregated index for the local production of social services. Every five years, Spain holds an infrastructure census that provides detailed information on the quantity and quality of local facilities. The UK has also created a comprehensive local government quality index that combines quantitative indicators and auditor judgements.

To sum up, we would conclude that the analysis of local public sector efficiency is still in its infancy, although it is now showing encouraging signs of growth. This is certainly an area of academic study set to garner increasing interest in the coming years.

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