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Federalism and Health Expenditures: competition and cooperation in the Metropolitan Region of São Paulo

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ABSTRACT

The objective of this investigation was to examine the implications of the Brazilian federative structure in the comparative evaluation of public-spending performance in the health sector. Its further aim was to discuss the accountability of municipal public administrators and evaluate the technical efficiency of the municipalities of the São Paulo Metropolitan Region in terms of primary health-care. Primary health-care is the only sub-function that is the exclusive responsibility of local managers. Other health responsibilities are shared by the municipalities and the other federation entities, union and states. To explore the characteristics of cooperative and competitive federalism, data collected from the municipalities and aggregated for the different health regions that comprise the metropolitan region were analyzed. The study's focus was the technical efficiency, which is theability of an entity to obtain maximum outputs with fewer inputs. The analysis was performed using the Data Envelopment Analysis (DEA) method. The results showed a wide dispersion of municipality data in terms of both expenditure and the number of procedures performed, including coverage of the main primary health-care programs: the Family Health Program (Programa de Saúde da Família – PSF) and the Community Health Agents Program (Programa de Agentes Comunitários de Saúde – PACS). The results show that less than 20% of the municipalities are efficient. The analysis of the municipalities within their respective regions suggests the prevalence of competitive over cooperative practices. Such information may help improve the integration of services in health-care networks and encourage the reconsideration of the agreements existing between municipalities in a given health-care region. Furthermore, this article can contribute to the current debate on controllership in the public sector by outlining the potentialities and limitations of the methods used to generate information for decision making.

Keywords: Competition and cooperation in federalism. Unified Health System (Sistema Único de Saúde – SUS). Comparative performance assessment. Efficiency of public spending. Metropolitan Region of São Paulo.

1 INTRODUCTION

The theme of this article is the comparative evaluation of the performance of public managers in the context of Brazilian federalism, particularly regarding the use of budgetary resources. Benchmarking standards can be useful in replacing fixed budgetary targets with evaluations that adjust to the production technology and socio-economic circumstances faced by organizations (Merchant & Otley, 2007). More specifically, the article discusses the accountability of municipal administrators regarding actions undertaken within the scope of health policy.

Given the public administration's current focus on results, there is the need to develop theoretical-empirical bases for the control functions that are performed by the managers and internal and external control agencies and that function as an aid to social control. To this end, it is necessary to consider the specificities of the activities developed by the public sector that may differ from those pursued by private companies when goals are vague or complex; outputs are difficult to measure; the effects of interventions are not easily identified; and the activity is not always repetitive (Hofstede, 1981).

In addition, it is necessary to identify the relationship between the public-sector structure, policy design and the performance evaluation of government organizations. In the case of Brazil, the federalist structure, with elements of cooperation and competition in public policies must not be disregarded, since these factors interfere with performance and the ability to evaluate it and consequently with public-sector accountability.

The Federal Constitution of 1988 defined the responsibilities to be shared by the federal, state and municipal governments for a wide range of public policies, including the Unified Health System (Sistema Único de Saúde – SUS), which is characterized by a complex system of intergovernmental relationships. "The management of the Unified Health System is constructed in a solidary and cooperative form, with mutual support through commitments made in the Bipartite (Comissões Intergestores Bipartite – CIB) and Tripartite (CIT) Inter-management Commissions" (Ordinance/MS no. 399/2006, emphasis added).

In the search for health-care that is universal, equitable and comprehensive for all citizens, the federal government is responsible for formulating and standardizing the public health-care system at the national level. The municipalities are considered the main health-service providers, with full and exclusive responsibility regarding the primary health-care sub-function, which is considered the gateway to the health-care system. The states coordinate the decentralization process and, in a complementary manner, actions performed by local managers. They also provide them with technical and financial support. The municipal health policy must be consistent with the state policy, and the state policy, in turn, must be consistent with the national policy (Ordinance/MS. No. 399/2006).

In the process of decentralization and hierarchization, health-care services with a lower degree of complexity are available to the user at health-care units located near the user's home. Specialized services or those with a higher degree of complexity are reached through reference mechanisms, which are organized by managers across the three tiers of government. Regionalization guides the decentralization of health-care services and the processes of negotiation and agreement between the state and municipal managers. The objectives of regionalization include the rationalization of costs and the optimization of resources, leading to economies of scale in health-care services on the regional level (Ordinance/MS no. 399/2006).

Thus, the structure of the health-care system imposes restrictions on the evaluation of the performance of the municipal managers, given that only in the primary health-care sub-function can the municipal managers be held accountable for what occurs in their territory. On other levels of complexity, there are flows of resources and patients between the municipalities that are agreed upon by the managers of the health-care system.

Abrúcio (2005, p. 41) notes that one analytic vector for federalism refers to the problem of intergovernmental coordination, or "forms of integration, sharing and joint decision-making present in the federations." Additionally, the same author writes that this problem is highly important in terms of the complexity of intergovernmental relations because one of its causes is the expansion or maintenance of the welfare state in an environment in which resources are scarce. "This situation calls for better government performance, with strong pressure for saving (cutting expenditures and costs), efficiency (doing more with less) and effectiveness (having an impact on the causes of social problems)."

In this context, the present study aimed to examine the implications of the Brazilian federative structure for the comparative evaluation of public spending in the health sector and to evaluate the technical efficiency of the municipalities in the Metropolitan Region of São Paulo in providing primary health-care services.

The focus of this study was the evaluation of technical efficiency which is the ability of an entity to obtain maximum outputs with fewer inputs. The analysis was performed using the Data Envelopment Analysis (DEA) method, which is a non-parametric technique based on linear programming that allowed us to establish a measure of relative efficiency between different decision-making units.

The São Paulo Metropolitan Region is divided into seven health-care regions and is composed of municipalities with different socioeconomic profiles; financial and managerial capacities. Thus, the comparative evaluation, allows us to identify the municipalities with the worst performance and those that serve as references for other

jurisdictions and therefore to facilitate learning from the practices adopted in each municipality. Comparative evaluation is one of the positive aspects of competitive federalism. Such information may help improve the integration of health services in health-care networks and encourage the reconsideration of agreements between municipalities in a given health-care region. For example, instead of focusing on increasing the supply of medium- and high-complexity services, strategies could be prioritized to strengthen primary health-care, including the better use of available resources.

Besides identifying possible developments that might affect health-sector decisions, the present study may contribute to the current debate on public-sector controllership by outlining the potentialities and the limitations of the methods used to generate information for decision making. As noted by Broadbent and Guthrie (2008), it is important for those studying this topic to understand how accounting technologies are representative of the social context and at the same time are represented by this context.

Brazilian public-sector organizations make available several databases to ensure transparency and to facilitate performance evaluation by the society. However, these data often do not translate into relevant decision-making information for the public officials who control the scope and effectiveness of public policy. This article discusses the DEA comparative performance assessment, which can be an alternative to operational audits and increase the scope of Court of Accounts activities regarding the control of public expenditure. Thus, the DEA comparative performance assessment integrates the efforts to move from a purely formal audit to the evaluation of results.

Additionally, the analysis developed in the present study can facilitate social control by generating a synthesized measure of performance in terms of the actual information generated and of the reduction of analysis time, which is one of the constraints in performance evaluation. Therefore, the focus is on bridging the gap between the fields of control and accountability.

2 COMPETITIVE AND COOPERATIVE FEDERALISM, THE UNIFIED HEALTH SYSTEM AND ACCOUNTABILITY FOR MUNICIPAL GOVERNMENT EXPENDITURES

Like 24 other countries, Brazil has chosen a territorial division of government that leads "to the creation of institutions that make the task of governing more complex and that face the challenge of incorporating heterogeneous populations and regions into a single nation, ensuring their relative autonomy" (Souza, 2008, p. 29).

The literature contains several justifications for the creation of a federation and numerous definitions of federalism, each with a different emphasis with respect to the explanatory characteristics and variables of federal systems. Souza (2008) maps the theoretical lines of federalism that are considered to be the most influential or the most applicable to the Brazilian case: (1) federalism as the decentralization of political institutions and economic activities, (2) federalism as a pact, (3) federalism and democracy and (4) federalism and federations.

The first two approaches include elements important for the topic discussed in this article. In the first, federalism is viewed as "a system in which the distribution of political and economic activity is spatially decentralized within a national territory," facilitating competition between political markets and thereby promoting political and economic efficiency. The analysis focuses on the political divisions, conflicts and trade-offs among the entities that constitute the federation (Souza, 2008, p. 29).

In this respect, the analysis is part of the literature on fiscal federalism that "sees federalism as a decentralizing mechanism capable of promoting competition between governments to create or preserve the advantages of a market economy" (Souza, 2008, p. 30). One representative of this theoretical position is Tiebout (1956), who developed a model in which fiscal decentralization would reveal consumer/voter preferences. That would be so because each jurisdiction would be able to provide different packages of goods and taxes that would best fit consumer/voter preferences. They would choose and head to the jurisdiction that offers the best package for their preferences , “voting with their feet”. According to this view, competition would promote economic efficiency.

A classic study of the second approach is that of Elazar, for whom the simplest definition of federalism is "self-rule plus shared rule" (1991, p. 12), which implies the "combination, via agreement or alliance, of the principle of unity with the principle of internal self-government" (Souza, 2008, p. 31). Each tier of government (federal, state and municipal) has its autonomy guaranteed. At the same time, there is a relationship of interdependence between them.

> In essence, a federal arrangement is one of partnership, established and regulated by a covenant, whose internal relationships reflect the special kind of sharing that must prevail among the partners, based on a mutual recognition of the integrity of each partner and the attempt to foster a special unity among them. (Elazar, 1991, p. 5).

As noted by Abrúcio (2005, p. 43), shared sovereignty can be maintained over time if there is an equilibrium between the autonomy and interdependence of the members who signed the covenant. For Elazar (1991, p. 34), a key feature of the federation is non-centralization, and there is a “dispersion of powers among many centers whose legitimate authority is constitutionally guaranteed.”

Therefore, it is impossible for a government to take these rights from others, as in the case of the federal union in relation to the states and municipalities. Moreover, interdependence is achieved in a matrix structure because power

is distributed so that the hierarchy of the various governmental tiers is not fixed. Each tier of government has a greater relative importance in one specific area but not to the point of becoming a more influential center of power and imposing behavior on the other governmental tiers. "In a matrix, there are no higher or lower power centers, only larger or smaller arenas of political decision making and action." (Elazar, 1991, p. 37).

Federalism as the decentralization of political and economic institutions has the important characteristic of competition among federal agencies, notably at the sub-national levels. These levels are considered responsible for the provision of various public goods, and for this provision to occur, the sub-national governments must compete for funding. To ensure the autonomy of the sub-national governments, the constitution limits the federal government's activity to a few areas of public policy and establishes infrequent power-sharing between the central and sub-national governments (Franzese, 2010).

Cooperation is a key element of federalism as a covenant. The responsibilities for various public policies are shared among federal entities, with the federal government assuming the role of formulating a substantial portion of public policy and the state governments being charged with policy implementation. Tax competition is replaced by a system of joint taxation and vertical and horizontal equalization (Franzese, 2010). "Cooperative federalism has institutions that encourage regional actors to work together, sharing the power among them in a functional manner and providing tasks to be performed together" (Franzese, 2010, p. 68).

In intergovernmental relations, both the competition and cooperation between the spheres of government have positive and negative aspects. Federal competition is important for each other's checks and balances among governments. In addition, federal competition can facilitate the search for innovation and improve the performance of local administrations, while avoiding excessive sharing and unaccountability and the paternalism and parasitism caused by the dependence on higher spheres of power. However, excessive competition can affect the solidarity between parties and encourage financial competition between the tiers of government. Additionally, the view that citizens vote with their feet, if taken to an extreme, can cause health-care distribution to deteriorate if governments adopt a strategy of low levels of taxation and as a result provide only a minimum level of service (Abrúcio, 2005.)

According to Abrúcio (2005), federal cooperation favors the optimization of common resources; assistance to poor or less powerful governments in the execution of certain tasks; the integration of a shared set of public policies; and the dissemination of successful administrative formulas. Additionally, it fights predatory financial behavior. However, poorly measured cooperation can result in subordination more often than partnership and may lead to the "joint decision trap." In the latter, "all decisions are shared as much as possible and depend on the approval of virtually all federal actors." This degree of cooperation causes a tendency to standardize policies, "a process that can slow the innovative momentum of government tiers, weakening intergovernmental checks and balances and complicating the accountability of public administration" (Abrúcio, 2005, p. 44).

Given the negative effects that poorly measured competition and cooperation can generate for society, what is sought is a combination of the characteristics that stand out as positive and a minimization of those characteristics that are negative. However, this solution is not without problems because it increases the cost of operating the system. As noted by Aguirre (2007), any combination of the characteristics of these two types of federalism represents higher transaction costs.

The State's performance of its primary role as a promoter of social welfare is affected by working federal models - more interested in competition or cooperation. According to Franzese (2010), the comparative literature indicates that cooperative federalism favors the expansion of the Welfare State, the same way social policies can transform the federal model through the introduction of cooperation mechanisms.

In Brazil, the Federal Constitution of 1988 defined the powers common to a wide range of public policies, including health-care policy. Citizens have a constitutional guarantee of the right to universal, equitable and comprehensive health-care that must be met by the joint action of the federal government, the states, the federal district and the municipalities, and that encourages the adoption of the mechanisms of federal cooperation. However, the constitution did not clearly establish the responsibilities that each state must assume. This type of distribution of powers created an environment conducive to producing overlapping actions, territorial inequalities in the provision of services and lowest common denominators in terms of national policies (Arretche, 2004).

According to Dourado and Elias (2011), the first decade of the SUS was marked by an intense process of transferring resources and responsibilities to municipalities directly from the federal union, which was considered the leading formulator and funding source of health-care policy. Even so, the 1990s were marked by the underuse of cooperation mechanisms and disputes between state and local governments regarding the administration of health services. The municipal structure alone was insufficient to meet the goals of the SUS because of the extreme diversity and inequality that characterizes the Brazilian federation. Thus, in the 2000s, the concept of regionalization was introduced, which was designed to meet the "need for rationalization of the system to address fragmentation in the provision of services and disparities of scale and production capacity between the municipalities, at risk of loss of efficiency and therefore worse outcomes"(Dourado & Elias, 2011, p. 207). The Operational Standard for Health-Care implemented through regionalization was not successful because of the resistance of the munici-

palities to a possible "recentralization" by assigning the states the responsibility for regional planning (Dourado & Elias, 2011, p. 208).

Under these circumstances, the 2006 Health Pact was established, based on the idea from the Ministry of Health and the Tripartite Inter-management Commission that for effective accountability, managers should come to an agreement, with negotiated commitments and defined goals to be achieved in a cooperative and supportive manner (Dourado & Elias, 2011, p. 208). Regionalization was reaffirmed as a structural axis of the Management Pact, which is a sub-item of the Health Pact, for guiding the decentralization of health services. Thus, the health-care regions have been classified as a permanent space for supportive and cooperative negotiation and co-management through a Regional Management Board (Ordinance/MS no. 399/2006). For Dourado and Elias (2011, p. 209), these boards represent "a proposal for a balance between the two basic mechanisms of federal cooperation and coordination: direct negotiations among local governments (horizontal relationship) and induction by the central entity (vertical relationship)."

Since the 2006 Health Pact, primary health-care services are not viewed as shared responsibilities to be assumed by all of the municipalities. Other health services are allocated in accord with the agreed rules or the complexity of the units that comprise a municipality's service network. To reduce competing interests and clarify responsibilities, one function of the Management Pact is to establish the responsibilities of each state, thus strengthening supportive and shared management in the SUS.

The health-policy redesign has introduced new mechanisms of cooperation into the Brazilian federal system. However, "much of the literature specializing in federalism tends to be critical of the decrease in competition, pointing out new problems that the increased intertwining of government tiers has brought to the federations" (Franzese, 2010, p. 70).

One of these new problems is the impact on accountability. This problem appears because "cooperation tends to make it difficult for voters to identify which tier of government is responsible for a particular policy." This difficulty discourages the use of the main mechanism of democratic accountability, which is "the ability for the citizen to hold a candidate responsible for what was done by him or by his party in the exercise of his duties" (Franzese, 2010, p. 71). Citing Cameron and Simeon (2002), Franzese (2010, p. 71) states that "part of the literature notes the cooperation between the governments as a form of 'collusion' by which the participants in the negotiation decide according to what is best for them and not what is best for the citizen." Competition would prevent this "collusion," forcing the governments to seek the best for their citizens because they are accountable.

In a specific analysis of the Unified Health System, Franzese (2010, p. 168) concludes that progress has been made regarding accountability and the terms of commitment, which must be signed by the managers when agreeing to targets, thus establishing a new form of accountability for results. Additionally, the same author argues that the role of state support for municipalities remains impractical and difficult in terms of accountability. Moreover, the author notes that the shift in focus to making states and municipalities responsible for organizing networks of activities makes it more difficult to establish accountability.

The agreed targets relating to the terms of commitment signed by the managers are in the context of recent efforts to modernize public administration, the focus of which is results-oriented management and efficient resource use. In negotiations between federal entities, the entities contractually agree to achieve outcomes in a set time period based on predetermined indicators. However, this development is recent, and the public authorities have gone through a learning process regarding the incorporation of measures of efficiency and effectiveness in agreements signed not only with public-sector entities but also with the private sector (Trosa, 2001).

One inherent difficulty in evaluating the provision of public goods and services is the measurement of outputs, effects and outcomes. According to Cohen and Franco (2004), outputs are the tangible results of activities developed from the available inputs. Effects are the results of the use of those outputs. Outcomes are the consequences of the effects of a project or social program, i.e., the degree to which objectives (the desired state) are achieved in relation to the target population. For example, municipal governments are monitoring the hypertensive population, for whom the outputs offered are medicine and doctor's office appointments. This effort creates the effect of reducing the rate of hospitalization for stroke patients, thus promoting as an outcome a reduction in the mortality caused by hypertension.

The use of indicators of direct outputs as parameters for the contractualization of results is less complex than the use of indicators of effects or outcomes, This is so because it is difficult to establish a direct relationship between the actions taken by the public managers and the effects and, particularly, the outcomes for the health status of the population. In certain cases, there is a time lag between the actions and the changes in the indicators. Moreover, it is difficult to argue that the effects and outcomes were generated solely by the implementation of a particular public policy (Trosa, 2001).

Such considerations also apply when trying to relate public-sector spending with the indicators of effects and outcomes, i.e., one must seek to identify how current and previous spending influences the outcomes achieved in the public sector. This limitation is characteristic of the evaluation models for the efficiency of expenditures in studies by authors such as Gupta and Verhoeven (2001), Afonso and Aubyn (2004), Retzlaff-Roberts, Chang and Rubin (2004) and Mirmirani and Mirmirani (2005). Moreover, it is important to consider the influence of programs from other areas on health indicators.

Studies that adopt the country as the unit of analysis eliminate a major difficulty in comparative performance evaluation: the flow of patients and resources between governments. Marino (2003) and Faria, Jannuzzi and Silva (2008) performed studies on the technical efficiency of the health-care sector in Rio de Janeiro's municipalities. However, the studies did not consider the flow of the patients and resources or the homogeneous structures of production. These omissions limit the robustness of the results.

The public sector is going through a learning process regarding the contractualization of results. However, to ensure that the public managers can be held accountable for the outcome of their activities, more effort is required. The contractualization of results in terms of direct outputs is an improvement, although insufficient for evaluating the performance of the municipal managers regarding the application of public resources because providing health-care procedures at the lowest cost is not the same as achieving effectiveness with the lowest possible use of resources. The change in the health status of the population depends on how many and which treatments are provided by government programs and other health factors. For example, the combination of preventive and curative measures may have a greater impact on stroke mortality than offering only curative treatment. At the same time, a health impact depends to a certain degree on the behavior and lifestyle of the population, such as tobacco use.

Shared and solidary management, typical of cooperative federalism, imposes additional restrictions on performance evaluation, particularly the comparative one, and on the accountability of the municipal administrators. The results achieved in a given region hardly ever can be individualized for each municipality. The municipal managers abide by results based on indicators such as infant mortality and neonatal mortality. Even considering the sensitivity of these indicators in relation to primary health-care, the municipal managers depend on a regionalized health-care network for cases involving procedures of medium and high complexity, particularly in small municipalities.

Alternatively, for indicators to have an impact, an agreement must be reached by the health-care regions rather than the municipalities. In such a case, problems relating to high complexity would remain because the health-care regions would be able to provide only a certain degree of resolution within their territory, with sufficient resolution in primary health-care and some resolution of average complexity (Ordinance/MS. No. 399/2006). To ensure that attention is directed to problems of high and to some extent average complexity, the regions should make inter-regional arrangements, including macro-regional aggregation (Ordinance/MS. 399/2006). Thus, the most suitable unit of analysis to evaluate impact would be the macro-region. However, this scale might favor the shifting of responsibility among the municipal managers when the time comes to assign the blame for goals that are not met by the macro-region.

Finally, the accountability of the managers for the efficiency of public spending based on the provision of direct outputs is far less complex than the evaluation of spending efficiency based on effects and particularly the outcomes caused by the implementation of health-care services. Evaluating the performance of the municipal administrators is much more readily achievable in the former case. However, the key point is whether individuals are becoming healthier, and assessing this point implies a more complex municipal accountability because of the indicators involved and the interrelationships of the federal entities that promote health-care.

In primary health-care, which is defined as a non-shared sub-function, the balance between the mechanisms of federal cooperation and competition can favor accountability and the achievement of better results by the health system. The performance of the municipal managers regarding primary health-care affects the results of the health-care regions and macro-regions because primary health-care is the gateway to the health system and is responsible for the system's organization. The emphasis of primary health-care is on prevention rather than curative treatments, the latter being more typical of ambulatory and hospital-based care of medium and high complexity. Therefore, the good performance of the municipal managers in primary health-care contributes to the good performance of the health-care networks and ultimately of the entire SUS.

3 THE EVALUATION OF THE TECHNICAL EFFICIENCY OF PRIMARY HEALTH-CARE: METHODOLOGICAL ASPECTS

3.1 The Survey Population.

The unit of analysis in this study was the municipality, which is responsible for the sub-function of primary health-care. The population was composed of municipalities in the São Paulo Metropolitan Region (Região Metropolitana de São Paulo – RMSP), selected because of the importance of their economy to Brazil and their socioeconomic diversity. The RMSP consists of 39 municipalities divided into seven health-care regions. It has approximately 20 million inhabitants and is responsible for 57.3% of the state gross domestic product (GDP), 19.4% of the national GDP and 25% of the taxes collected in the country. In addition, the RMSP contains municipalities with different levels of quality of life (Observa Saúde, 2011). The study was conducted through a census of the municipalities of the region.

The municipalities of Guarulhos and São Paulo are the most populous of the RMSP, with 11,037,590 and 1,299,283 inhabitants, respectively, and represent two health-care regions of the state of São Paulo. The other five regions and their respective populations are Alto do Tietê (1,511,076), Franco da Rocha (519,696), Grande ABC (2,605,266), Mananciais (974,620) and Rota dos Bandeirantes (1,829,553).

The municipalities of each health-care region establish commitments based on the priorities, goals, targets and indicators of the Pact for Life and the Management Pact that comprise the Health Pact (Ordinance MS no. 2669/2009). Depending on the type of indicator (e.g., indicators relating to the priority of reducing infant and maternal mortality), agreement is only possible if there is cooperation between the federal entities.

One priority of the Health Pact is to strengthen primary health-care, the indicators for which have been generally agreed on since 2007. The specific primary health-care indicators are of two basic types: coverage and effects.

3.2 Data-Analysis Techniques.

One parameter for evaluating government performance is the efficiency and capacity of an entity to obtain maximum outputs at the lowest cost. To measure the efficiency of primary health-care, it is necessary to know the production function of municipalities, i.e., how resources are used to produce the system outputs. In practice, there is no defined production function. The function must be estimated from a data sample using parametric or non-parametric methods, in the latter case with DEA because DEA is considered appropriate to evaluate the efficiency of decision-making units (DMUs) that produce multiple outputs.

First used by Charnes, Cooper and Rhodes (1978), DEA is an optimization technique based on linear programming and designed to establish a measure of relative efficiency among different DMUs. The various DEA models are based on the analysis of the efficiency of DMUs with multiple inputs and outputs and the idea of constructing an efficiency frontier. The most efficient DMUs are located on the frontier, whereas the less efficient DMUs are not. The geometric shape of the surrounding surface depends on the DEA model used.

DEA models may have orientations to maximize outputs or minimize inputs, and the variables depend on whether the administrator has more control over inputs or outputs. In this study, the BCC model (Banker, Charnes and Cooper, 1984) was used with an orientation towards outputs because public-health managers have a set budget and should seek to provide the largest possible number of procedures and services within certain quality standards using the resources they have available. Currently, a main challenge for the SUS is to ensure citizen access to health services, which relates to demands to increase the budgetary resources of the health-care system, given that the system cannot fully meet the needs of the population. The BCC model considers variable returns to scale, which proved to be adequate after preliminary analyses of the data.

For the analysis of efficiency, it is assumed that there are *n* DMUs to be evaluated. Each DMU consumes varying quantities of *m* different inputs to produce *s* different outputs. Specifically, DMU*j* uses the quantity *xij* of input *i*, and produces *yrj* of output *r*. It is assumed that $x_{ij} \geq 0$ and $y_{rj} \geq 0$ and furthermore that each DMU has at least one positive input and output value. Mathematically, the model can be expressed as follows:

$$\max \phi + \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right)$$

$$\sum_{j=1}^{n} x_{ij} \lambda_j + s_i^- = x_{i0} \qquad i=1,2...., m;$$

$$\sum_{j=1}^{n} y_{rj} \lambda_j - s_r^+ = \phi y_{r0} \qquad r=1,2...., s;$$

$$\lambda_j \geq 0 \qquad j=1,2...., n;$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

The technical efficiency score is given by the measure $1 \leq \theta < \infty$, and θ-1 is the proportional increase in outputs that could be achieved by a DMU, maintaining the number of inputs constant. It was observed that $100/\theta$ defines the technical efficiency score, which varies between zero and 100%. A value of θ indicates that all of the outputs can be increased simultaneously at the same rate without changing the mix by which they are produced.

The slacks s_i^- or s_r^+ that are not equal to zero indicate that it is possible to reduce the inputs or to increase the outputs which would necessarily change the proportion of the outputs. In other words, for the orientation towards outputs, the efficiency score θ indicates the proportional increase of all of the outputs of a DMU, given the DMU's current production standard. However, with the resources available, a DMU could produce a larger quantity of some of the outputs, indicating "mix inefficiencies," i.e., according to the combination of the outputs it provides (Cooper, Seiford, & Tone 2007.)

To complement the study, comparative analyses of the DEA results were performed with indicators of the strengthening of primary health-care specific to each municipality and aggregated by health-care region.

3.3 Efficiency Model Variables.

Initially, we might think of relating indicators of the Health Pact referring to the priority Strengthening Primary Health-Care with the expenditure made with such subfunction. However, the limitations discussed above regarding the relation of budgetary and performance resources to effect indicators would exist. In addition, there are restrictions related to DEA regarding measures of the variables under analysis. As noted by Dyson et al. (2001), indices typically associated with performance measures should not be mixed with levels of activity or volume measurements because the mixing would cause distortions in the calculated efficiency scores. For example, to obtain 55% coverage with the PSF, the municipality of São Paulo would have to spend significantly more than any other municipality in the RMSP. In DEA, when comparing expenditure values with the coverage percentage, São Paulo would be considered inefficient. The solution would be to use per capita expenditure values, although distortions would persist because the base composition of the indicators is not always the total population.

Therefore, we chose to estimate the primary health-care production frontier based on volume measurements. The outputs are represented by the number of primary health-

care procedures grouped according to the specific type of service and the number of families enrolled in the PSF and the PACS and the inputs by expenditure in this sub-function.

The initial concept was to break down the spending on primary health-care into its main components: personnel and taxes, outsourcing, consumables and materials for free distribution, among others. This breakdown would enable us to understand the decisions related to the composition of the spending and to exclude from the analysis the expenditure values that do not contribute to the generation of products (such as pensions, retirement benefits and contributions) or that benefit production in several activities, which is the case for capital expenditure.

However, the relationship between the number of cases and the variables did not provide a good fit for the model because the data from the Court of Accounts of the State of São Paulo, whose source were the municipal authorities' balance sheets as delivered to the Electronic Audit System of the State of São Paulo (Auditoria Eletrônica do Estado de São Paulo – AUDESP), were obtained from only 33 of the 39 RMSP municipalities, and the data from two of the municipalities were inconsistent with those provided to the Information System on Public Health Budgets (Sistema de Informações sobre Orçamentos Públicos em Saúde – SIOPS). Thus, the decision was made to choose aggregate primary health-care expenditure data as the input variable.

For the RMSP municipalities, we estimated a production function consisting of an input and six products directly related to primary health-care activities, including the PSF and PACS (outputs 1-6), as shown in Table 1. The data are for 2009.

Table 1 *Input and Output Variables of the Technical Efficiency Model of the Municipalities of the Metropolitan Region of São Paulo, 2009*

Type	Variable	Description	Source
INPUT 1	Primary health-care expenditure	Total expenditure on primary health-care sub-function	SIOPS/DATASUS
OUTPUT 1	Health-promotion and preventative care	Number of procedures	SIA/DATASUS
OUTPUT 2	Diagnostic procedures	Number of procedures	SIA/DATASUS
OUTPUT 3	Clinical procedures	Number of procedures	SIA/DATASUS
OUTPUT 4	Surgical procedures	Number of procedures	SIA/DATASUS
OUTPUT 5	Complementary primary health-care	Number of procedures	SIA/DATASUS
OUTPUT 6	Families registered by the PSF and PACS	Number of families registered in the PSF and PACS	SIAB/DATASUS

Three municipalities were excluded from analysis because of a lack of data on primary health-care expenditure: Franco da Rocha, Guararema and Juquitiba.

4 RESULTS

The descriptive statistics of the variables in the efficiency model in per capita terms shows a wide dispersion of municipality data in terms of both spending on primary health-care and the number of procedures performed. The same can be said regarding the coverage of the PACS and PSF programs.

Table 2 *Descriptive Statistics of Variables Used in the Technical Efficiency Model, in per Capita and Coverage Terms: RMSP Municipalities, 2009*

Statistic	Mean	Standard deviation	Minimum	Maximum	Percentiles		
					25	50	75
Primary health-care expenditure	158.740	95.371	33.976	469.338	86.534	149.574	208.819
Promotion/prevention	1.592	1.237	0.025	5.160	0.539	1.636	2.354
Diagnostic procedures	1.015	0.650	0.226	3.126	0.550	0.778	1.317
Clinical procedures	4.912	2.241	1.826	9.728	3.009	4.433	6.761
Surgical procedures	0.201	0.095	0.062	0.397	0.130	0.181	0.284
Complementary health-care	0.008	0.005	0.000	0.022	0.005	0.007	0.011
PSF/PACS coverage	34.189	27.231	0.000	100.000	12.678	28.770	51.603

Source: DATASUS, 2011.

According to Table 2, the per capita expenditure on primary health-care varies widely among the municipalities. Whereas the group comprising the 25% of the governments that spend the least has per capita values of up to R$ 86.53, the group comprising the 25% of the governments that spend the most has per capita values exceeding R$ 208.82. Additionally, there is substantial variability in the per capita number of health-care services and procedures

offered to the population in each municipality, with the exception of surgical procedures and complementary health-care. The emphasis is on clinical procedures and health-fostering and disease-prevention activities. PSF coverage is one of the targets agreed on in the Health Pact. However, there are municipalities that had not joined either of the two programs (PSF and PACS).

To estimate the efficiency frontier, the input variables are expected to be positively correlated with the product variables. All of the outputs of the model showed statistically significant correlations with the primary health-care spending at a significance level of 0.01.

The technical-efficiency frontier estimated by DEA was formed by 7 of the 36 cities under analysis. The other 29 municipalities are off the frontier, i.e., they should provide more health services given their expenditure on primary health-care. The results indicate that 19.44% of the municipalities were efficient and that 80.56% were inefficient.

When only the inefficient municipalities are analyzed, the mean efficiency score is 42.75%, indicating that the supply of direct primary health-care products could be increased by an average of 57.25% without directing additional public financial resources to health-care. Regarding the general evaluation of the representativeness of the output improvement targets, as shown in Figure 1, the efforts of the inefficient municipalities should be directed towards increasing PACS/PSF coverage, the number of health-fostering and preventative services and diagnostic procedures. This conclusion considers proportional increases for the efficiency score and the possibility of non-proportional increases represented by the slacks.

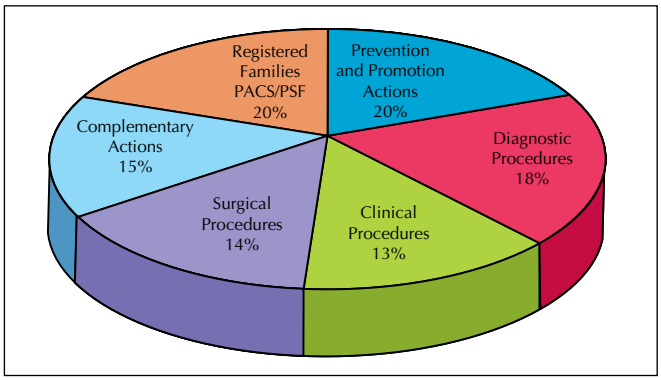

Figure 1 *The Representativeness of the Output Improvement Targets*

Table 3 shows the efficiency scores and indicators for the strengthening of primary health-care for each municipality and the mean and standard deviation of each respective region. The analysis of the municipalities within their respective regions facilitates discussion on federal cooperation and competition issues.

The municipality/region of São Paulo is considered to be efficient. The same cannot be said of Guarulhos, which has an efficiency score lower than that of four other municipalities, three of which belong to the Mananciais region.

The two least efficient municipalities of the RMSP are Biritiba-Mirim and Cotia, which are located in the Alto do Tietê and Mananciais regions, respectively. In the analysis of the disaggregated expenditure data, these municipalities had the highest percentage of capital expenditure; thus, it was expected that the volume of their activities would be increased. Notably, by removing capital expenditure inputs, Cotia becomes more inefficient and Biritiba-Mirim remains among the most inefficient. The latter municipality had the second highest percentage of expenditure on social grants, trailing only Salesópolis.

With the exception of the regions of Franco da Rocha and Guarulhos, there is at least one efficient municipality in each region, with a larger concentration in the Grande ABC region, which achieved the second highest mean efficiency score. The lowest mean score is in the region of Rota dos Bandeirantes, where all of the municipalities had low efficiency rates, except for Osasco, which was considered to be efficient. Elsewhere, there are large differences between municipalities in terms of technical efficiency.

One matter relating to disaggregated expenditure data merits further attention. Diadema, Suzano and Embu are among the most efficient municipalities, and their highest concentration of expenditure is on third-party services, in the proportion of 47%, 85% and 68%, respectively. These municipalities did not provide values for personnel and expenses, indicating that they did not work with their own personnel or that they had not been able to adequately classify spending.

In relation to primary health-care indicators and after applying Spearman's correlation analysis to the efficiency scores, it became clear that there is no statistically significant relationship between the technical efficiency of spending and better performance of the indicators.

In relation to PSF coverage (IND 1), the national expectation was that in 2010, the number of registered families would be 54.5%. However, in 2009, on average, there was no region whose indicator was at this level, with all of the regions being well below the predicted value. When the municipalities are considered individually, only São Lourenço da Serra, Cajamar and Diadema were within the target area. In 2009, eight municipalities had not yet joined the Family Health Strategy.

Regarding prenatal consultations (IND 2), the regional mean values were similar, and only four municipalities in Alto do Tietê had not reached the desired value of 62.91% of mothers who gave birth to a living child and had seven or more consultations. These municipalities were Suzano, Salesópolis (municipalities considered technically efficient), Itaquaquecetuba and Biritiba-Mirim.

Hospitalization for diabetes mellitus (IND 3) was on average at the desired level (less than or equal to six per 10,000 inhabitants in 2010) in all of the regions except Alto do Tietê, which contains two municipalities with values higher than expected for the national target: Salesópolis (21.2) and Santa Isabel (6.5). Moreover, in the Rota dos Bandeirantes region, Jandira had an indicator of 7.9 in 2009.

Table 3 *Technical Efficiency Scores and the Strengthening of the Primary Health-Care Indicators: RMSP Municipalities according to Health-care Region, 2009*

Region	Municipality	Score	Strengthening of Basic Care							
			IND1	IND2	IND3	IND4	IND5	IND6	IND7	IND8
São Paulo	São Paulo	100.0%	30.1	74.1	2.9	5.5		21.2	4.0	1.0
Guarulhos	Guarulhos	60.4%	20.4	66.7	2.7	6.7	3.0	25.3	8.5	1.2
Mananciais	São Lourenço da Serra	100.0%	75.5	64.0	1.4	1.4	2.2	71.9	0.0	13.6
	Embu	79.7%	22.7	66.8	2.1	6.1	4.4	55.8	12.5	13.7
	Itapecirica da Serra	73.7%	2.1	71.7	3.1	7.7	1.7	90.0	2.1	9.8
	Taboão da Serra	69.5%	37.2	69.1	5.2	7.5	3.0	47.4	10.6	12.9
	Embu-Guaçu	44.9%	20.9	68.9	5.1	5.1	5.1	63.1	16.7	1.4
	Vargem Grande Paulista	31.0%	31.6	74.1	1.2	6.4	6.2	71.0	23.1	10.2
	Cotia	16.9%	4.3	71.5	3.5	5.7	2.2	62.0	5.7	0.7
	Mean	**59.4%**	**27.8**	**69.4**	**3.1**	**5.7**	**3.5**	**65.9**	**10.1**	**8.9**
	Standard Deviation	**29.4%**	**24.7**	**3.4**	**1.6**	**2.1**	**1.7**	**13.6**	**8.2**	**5.6**
Rota dos Bandeirantes	Osasco	100.0%	0.0	72.6	1.5	5.4	2.4	26.9	0.0	7.4
	Barueri	35.5%	0.0	87.5	2.7	6.9	2.1	59.5	0.0	21.9
	Carapicuíba	34.8%	0.0	63.9	3.7	7.0	2.4	42.2	0.0	0.0
	Itapevi	29.8%	32.6	68.6	1.5	7.0	4.7	31.1	8.4	0.0
	Pirapora do Bom Jesus	24.2%	32.4	73.8	1.8	3.7	7.4	24.0	22.0	0.0
	Jandira	22.6%	0.0	75.4	7.9	4.0	2.5	71.5	0.0	3.8
	Santana de Parnaíba	20.7%	4.8	80.1	0.4	1.1	5.5	96.2	6.0	4.9
	Mean	**38.2%**	**10.0**	**74.6**	**2.8**	**5.0**	**3.8**	**50.2**	**5.2**	**5.4**
	Standard Deviation	**27.8%**	**15.5**	**7.7**	**2.5**	**2.2**	**2.0**	**26.8**	**8.2**	**7.8**
Franco da Rocha	Mairiporã	72.9%	26.4	83.5	3.2	3.5	2.8	38.3	8.7	9.6
	Caieiras	38.3%	0.0	71.5	2.9	1.4	3.2	50.8	0.0	9.6
	Cajamar	29.5%	65.9	89.1	1.2	6.4	4.4	68.8	32.5	11.6
	Francisco Morato	29.1%	49.5	61.8	6.2	8.4	4.1	47.0	15.4	0.0
	Mean	**42.4%**	**35.4**	**76.5**	**3.4**	**4.9**	**3.6**	**51.2**	**14.1**	**7.7**
	Standard Deviation	**20.8%**	**28.6**	**12.2**	**2.1**	**3.1**	**0.8**	**12.8**	**13.8**	**5.2**
Grande ABC	Diadema	100.0%	83.6	78.4	2.6	8.7	2.7	42.2	41.6	3.5
	Santo André	100.0%	16.9	76.8	3.8	4.0	2.4	31.5	4.1	0.2
	São Caetano do Sul	100.0%	51.3	86.1	3.2	6.8	0.4	80.9	18.2	0.6
	São Bernardo do Campo	47.3%	6.2	80.6	2.1	7.3	2.2	46.5	0.0	0.5
	Mauá	36.0%	36.2	79.6	2.3	6.3	2.2	46.7	0.0	0.1
	Ribeirão Pires	34.0%	0.0	82.9	2.8	6.0	3.7	22.2	0.0	2.9
	Rio Grande da Serra	30.5%	35.2	73.9	1.3	7.0	2.2	17.9	0.0	0.4
	Mean	**64.0%**	**32.8**	**79.8**	**2.6**	**6.6**	**2.3**	**41.1**	**9.1**	**1.2**
	Standard Deviation	**34.1%**	**28.8**	**4.0**	**0.8**	**1.4**	**1.0**	**20.9**	**15.8**	**1.4**
Alto do Tietê	Suzano	100.0%	10.7	58.2	1.5	2.2	3.1	56.4	4.9	0.5
	Salesópolis	100.0%	0.0	51.6	21.2	11.4	4.0	41.1	0.0	0.5
	Mogi das Cruzes	58.8%	6.5	69.5	4.4	6.4	4.3	36.2	0.0	0.0
	Santa Isabel	55.2%	51.2	83.4	6.5	18.5	4.4	51.1	36.8	4.5
	Itaquaquecetuba	52.1%	7.2	58.4	3.0	7.4	2.6	32.8	0.0	0.0
	Poá	40.1%	28.0	73.5	5.7	4.8	2.4	65.8	6.1	0.1
	Ferraz de Vasconcelos	35.5%	33.7	73.5	4.8	4.9	2.5	88.9	0.0	11.5
	Arujá	21.2%	0.0	70.0	1.6	3.2	2.1	67.6	0.0	0.3
	Biritiba-Mirim	15.5%	52.3	58.7	2.8	13.8	4.2	83.3	11.6	0.0
	Mean	**53.2%**	**21.1**	**66.3**	**5.7**	**8.1**	**3.3**	**58.1**	**6.6**	**1.9**
	Standard Deviation	**30.3%**	**20.9**	**10.2**	**6.1**	**5.4**	**0.9**	**20.0**	**12.0**	**3.8**

The same cannot be said of hospitalizations for stroke in the SUS (IND 4), where the national value expected for 2010 was 5.2/10,000 inhabitants. On average, only the Rota dos Bandeirantes and Franco da Rocha regions were under the desired level in 2009. The worst performers in relation to this indicator were the regions of Alto do Tietê, Guarulhos and Grande ABC. Of the 36 municipalities, only nine were within the expected limits.

In relation to the percentage of children under five years of age who were underweight for their age (IND 5), in 2009, two municipalities of Rota dos Bandeirantes (Itapevi and Pirapora do Bom Jesus) did not attain the desired value of 4.4% for 2010. Regarding the monitoring of families enrolled in the Family Grant Program (Programa Bolsa Família – PBF) (IND 6), in 2009, on average, all of the regions still had to struggle to achieve the target set nationally for 2010 of at least 70% of monitored families. Three municipalities in the Mananciais region met the minimum expected level (São Lourenço da Serra, Itapecerica da Serra and Vargem Grande Paulista), as well as two from Rota dos Bandeirantes (Jandira and Santana do Parnaíba), one from Grande ABC (São Caetano do Sul) and two from Alto do Tietê (Ferraz de Vasconcelos and Biritiba-Mirim).

Indicators relating to oral health were included in the pact from 2011 on (Ordinance/MS no. 3.840/2010). With the exception of Diadema, the estimated population coverage by oral-health teams (IND 7) of 40% was not being met in 2009, and 14 municipalities had no oral-health teams deployed in their territory. The mean for the collective health-care activity of supervised tooth brushing (IND 8) in 2009 was within the desired 2011 levels of 3% in 15 municipalities. The biggest shortfalls were in the cities of São Paulo, Guarulhos and the municipalities belonging to the Rota dos Bandeirantes, Grande ABC and Alto do Tietê regions.

Finally, large differences can be observed between municipalities in the same region in technical efficiency and in relation to the strengthening of the primary health-care indicators, and the municipalities that were more efficient in their use of resources were not necessarily those that presented the best pact indicators.

5 DISCUSSION AND FINAL CONSIDERATIONS

The main contribution of the present study was to discuss the possibilities and limitations of the comparative evaluation of performance in relation to public spending and the influence of the federative structure on such a process, particularly within the scope of the SUS.

Primary health-care, when regarded by the SUS as the sole responsibility of the municipalities, instills characteristics of the competitive federalism into health policy, promoting both the accountability of public officials with respect to the results achieved with the expenditure of public funds, and the comparative evaluation of performance.

The technical efficiency analysis of municipalities with regard to spending on primary health-care indicates that municipalities within the same health-care region and the health-care regions within the RMSP can differ substantially in performance. Misused resources in a municipality or health-care region create a negative impact on the entire system because failure at the primary health-care level may increase the pressure on outpatient and hospital services for medium- and high-complexity cases. For example, the failure to control blood pressure within the population can lead to an increase in the number of hospitalizations. In each region, the existence of one or a few municipalities with exceptional efficiency may reflect the opportunistic attempts of other municipalities to pass the costs of the health-care system onto the entire region. Thus, cooperation within the SUS does not appear sufficient to inhibit predatory financial behavior, which would be an advantage of this type of federalism as described by Abrúcio (2005).

The use of comparative performance evaluation through DEA encourages the mutual control among governments by indicating those governments that could increase the volume of services rendered to the population within the budget they have available. Competition promotes the search for innovation. DEA identifies the practices that were successful in the use of public resources and cases in which a municipality may be employed as a benchmark for others. Therefore, if used by control agencies, the comparative performance assessment facilitates the creation of parameters for evaluating public officials and promotes the benefits of competitive federalism.

Although primary health-care is not a shared sub-function, horizontal relationships between the municipalities occur when their goals are agreed on. That is, the practice of the municipalities is affected by the priorities set by the Health Pact and the agreements reached in the municipalities' respective regions. In this sense, primary health-care is not viewed in isolation but as part of a regionalized health-care network. Thus, budgetary resources that appear to be exclusive to each municipality come to be viewed as resource common to the entire health-care system.

Therefore, the differences in the municipalities' primary health-care indicators should be handled carefully by the regional boards, bearing in mind that one of the characteristics of federal cooperation is to assist less powerful governments (Abrúcio, 2005). In the strengthening of primary health-care, five indicators are related to service coverage. Thus, the efficient use of available resources can facilitate the achievement of the goals set by the indicators. Additionally, regional management facilitates better performance of the health-care system by disseminating successful administrative formulas, i.e., the innovative practices of the municipalities that are considered efficient.

Achieving coverage objectives with the efficient use of resources does not guarantee the improvement of the population's health. In other words, providing more direct products at the lowest cost does not imply the effectiveness of the system. However, it is in the citizen's interest to know how public funds are used, as noted by Trosa (2001).

The assessment of effects and outcomes requires rigor of its own, because it is necessary to identify the actions that generated the results, to know the territorial limits, the time and the environmental variables that influenced the achievement of the results. In this sense, comparative effec-

tiveness evaluation becomes more complex, and within the SUS, such evaluation should be performed using regions or macro-regions as units of analysis rather than municipalities. An exception to this approach can be made in which the effects can be attributed to the achievements of the municipal manager, such as the reduction of hospitalizations due to diabetes and stroke. However, the regional scale can encourage the shifting of responsibility among municipal managers when they are to be held accountable for goals not achieved by the region or macro-region, making accountability difficult. According to Franzese (2010), this problem is typical of cooperative federalism.

The existence of this problem does not mean that the contractualization of results cannot include effect or outcome indicators, which are in fact desirable. In the analysis of individual cases, it is less complex to identify specific actions that led to certain results. Therefore, the controllership functions performed by comparative evaluations differ from those performed within the limits of public organizations that are related, for example, to a government program. To perform quality control on public spending, it is important to understand the limits and potential of each performance assessment method, particularly in relation to the context in which the method is used. This understanding can make institutional organization possible through internal, external and social control of the performance of duties.

The comparative evaluation of government performance depends fundamentally on the quality of data available to citizens. However, one major limitation of the present study relates to the lack of data or their inconsistency. It was not possible to work with costs broken down by elements, and three municipalities were excluded from analysis because of missing data. If there is no transparency, then it is impossible to achieve accountability for public spending.

In future research, further analysis should be performed regarding the discrepancies between the municipalities and the role of the regional boards in addressing the discrepancies. Additionally, it would be appropriate to extend the analysis to other health-care regions and periods.

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