Received: 7 June 2021 | Accepted: 15 July 2021

DOI: 10.1111/jors.12555

RESEARCH ARTICLE

JOURNAL OF REGIONAL SCIENCE WILEY

Quality of government and economic growth at the municipal level: Evidence from Spain

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Funding information

Ministerio de Economía y Competitividad, Grant/Award Numbers: ECO2017-85746-P, ECO2017-88241-R; Generalitat Valenciana, Grant/Award Numbers: HIECPU/2020/1, PROMETEO/2018/102; Universitat Jaume I, Grant/Award Numbers: UJI-B2020-27, UJI-B2020-48

Abstract

This paper analyzes the relationship between government efficiency—an important dimension of quality of government—and economic growth at the municipal level in 1,820 Spanish municipalities during the period 2008–2015. At this level of disaggregation, the literature is virtually nonexistent due to severe data constraints. The efficiency of local government provides an accurate indicator of how good local authorities are in managing their budget. This variable is expected to be highly correlated with other more traditional quality of government indicators, such as corruption. After computing our measure, we then use it in a growth regression framework. We find a dominant positive effect of government efficiency on income per capita growth, which is robust to a wide variety of scenarios. Our findings also suggest that increases in local government quality are particularly rewarding for the poorest municipalities.

KEYWORDS

economic growth, efficiency, municipalities, quality of government

1 | INTRODUCTION

Institutions have been recognized as a central factor to explain economic performance, particularly by some outstanding scholars, such as Douglas North, Oliver Williamson, and Daron Acemoglu, among others (Acemoglu et al., 2005; North, 1989, 1990, 1994; Williamson, 1979, 1983, 1985). They are viewed as those rules and norms governing economic systems, embodying the structure of incentives in societies via the creation of markets and other growth-enhancing activities (Fernández & Tamayo, 2017). Indeed, the relevance of the contributions to the field has been substantial, showing positive views on institutions as a fundamental cause of economic growth (Acemoglu et al., 2005; Clague et al., 1999; Easterly & Levine, 2003; Jones, 2003; Keefer & Knack, 2005; Keefer & Shirley, 2000; LaPorta et al., 2008; North, 1981; Rodrik et al., 2004).

Unfortunately, most of the measures available so far to evaluating institutions and/or quality of government are only available at limited levels of disaggregation—usually country level (LaPorta et al., 1999) and, less frequently, regional level (Charron et al., 2019). Therefore, the analysis of the effect on economic performance is necessarily constrained to the highest layers of government, due to the lack of measures for lower levels, such as municipalities. The exceptions are few, and almost entirely constrained to the recent studies by Rodríguez-Pose and Zhang (2019) and Hortas-Rico and Rios (2019), focusing on the case of China and Spain, respectively. As we shall see in Section 2, both studies make important contributions to the field, but can be complemented in some respects, particularly in terms of the quality of government measures proposed.

We argue that, given that one of the proposed measures for government quality by the literature is public sector efficiency (see, e.g., La Porta et al., 1999) we should, ideally, measure it as explicitly and accurately as possible.[1] Given we are focusing on the municipal level, we should, therefore, look for measures of public sector efficiency at this level, which in this case would be local government efficiency. It turns out to be that there is a large literature dealing with this issue, in which the number and relevance of the contributions are already remarkable (see, e.g., Balaguer-Coll et al., 2007; De Borger & Kerstens, 1996), to the point that some surveys have just been published (Aiello & Bonanno, 2019; Narbón-Perpiñá & De Witte, 2018a, 2018b). This literature proposes measuring local government performance (as well as a variety of related issues) using, in general, activity analysis techniques (Färe, Grosskopf, Norris, et al., 1994; Kumar & Russell, 2002). Despite the richness of this literature and the accuracy of the estimations, they have never been considered by the literature on the quality of government.

Likewise, the analysis of economic growth and convergence has also been relatively limited in terms of the layers making up each country's territorial organization or levels of government. Those subnational levels whose economic performance has been more frequently studied are those immediately below the country level—such as states in the case of the United States, and NUTS 2 and NUTS 3 in the case of the European Union. However, if the analysis is extended to lower layers, and more particularly municipalities, the empirical evidence is virtually nonexistent for many contexts.

In this article, we combine the literatures on quality of government and on economic performance at the local level. Specifically, we measure government efficiency, which is a particular dimension of quality of government, and analyze its impact on municipal economic growth. To do this, we first construct a government efficiency indicator considering frontier analysis methodologies from the benchmarking literature—particularly Data Envelopment Analysis (DEA; Charnes et al., 1978). Our measure only captures one specific dimension of quality of government, but nevertheless it offers several advantages. First, it overcomes the limitations found in previous literature regarding the complete lack of data for quality of government at the local level. Second, whereas typical quality of government indicators are based on survey data, our measure is based on accounting data. This means it is available yearly and it is more precise in the sense

[1]Some seminal papers (La Porta et al., 1999) have evaluated government performance using measures of government intervention, public sector efficiency, public goods' provision, size of government, and political freedom. In more recent contributions, such as Charron et al. (2019), the dimensions measured are similar—control of corruption, the rule of law, government effectiveness, and protection of property rights. Yet, as indicated by Kaufmann et al. (2011), regardless of the type of data or methodology employed to construct the different indicators of quality of government, they are usually highly correlated.

that we know exactly what we are measuring. In contrast, survey responses can be affected by the survey design, the particular economic circumstances at the time they are conducted, and other external factors that may condition the results, which are retrospective by definition, in that responses depend on past experiences.

The study is carried out for Spanish municipalities with a population between 1,000 and 50,000 inhabitants for the period 2008–2015. We focus on the particular case of Spain for a variety of reasons. Interestingly, it is a context for which detailed information at the municipal level exists. Specifically, the survey on local infrastructures and facilities provides detailed information on the goods and services (outputs) that each population provides to their constituencies. This allows measuring public sector efficiency at the local level with detail. We also have information on municipalities disposable per capita income, which is also rarely available in many contexts.

The empirical strategy proceeds in two stages, measuring in the first one municipal efficiency, which is subsequently plugged-in in the second stage of the analysis as a regressor in the different models considered. Our results suggest that efficiency improvements have a positive and significant impact on municipal growth, whose results are robust for a variety of alternative scenarios. These efficiency improvements have a higher impact on poor municipalities that see how efficiency improvements make them grow faster than that in the richest municipalities. In addition, we observe that the effects of an efficiency improvement on growth are higher for municipalities with low efficiency, indicating that, analogously to other production factors, diminishing returns may be at play.

The article is structured as follows. After Section 1, we introduce the links between the quality of local government and local economic performance. Section 3 explains how the efficiency of local government is computed and presents some results for this indicator. Section 4 provides the empirical strategy followed to analyze the relationship between local government quality and growth. Results are presented and discussed in Section 5, and some concluding remarks are summarized in Section 6.

2 | HOW QUALITY OF GOVERNMENT AFFECTS ECONOMIC PERFORMANCE AT THE LOCAL LEVEL: ARE THE MECHANISMS DIFFERENT?

The links between quality of government and economic performance at the municipal level are widely unexplored. First, the concept of quality of government is difficult to define and even more difficult to measure. Second, data for municipal jurisdictions are comparatively scanter than those for regions and countries. Despite these difficulties, recent evidence is provided by Rodríguez-Pose and Zhang (2019) for the Chinese case. Using public management efficiency and control of corruption as measures of municipal quality of government, the authors report a positive effect of these variables on municipal growth.

We focus on the Spanish case, for which the related evidence is restricted to Hortas-Rico and Rios (2019), who analyzed a wide variety of potential factors of income inequality across Spanish municipalities. Although very limited attention is devoted to government quality, these authors include a corruption index (based on information for the year 2001), which they find to be an important driver of municipal inequality. However, attention to government quality has increased substantially since their period of analysis (2000–2006), especially because constraints during the economic crisis forced decision units to make more rational and efficient use of resources. In addition, public authorities have also increased their efforts to unveil bad practices at all levels of government during these years. These efforts uncovered several long-standing cases of corruption that had gone unnoticed for many years. As a result, Spain's rating in Transparency International's Corruption Perceptions Index[2] fell by 23% between 2005 and 2017 and corruption was covered widely in the media and it became a matter of social concern.

[2] https://transparencia.org.es

These investigations were useful in that they improved government quality, first because corrupt bureaucrats were fired, and second, because their successors are by necessity more committed to good governance practices.

The negative effects of bad government practices on municipal wealth are expected to be in line with those at higher aggregation levels, such as regions or countries, for which evidence is much more abundant. Good government has been linked to better economic performance at the national level (Acemoglu et al., 2005) and also at the regional level (Rodríguez-Pose, 2013). It is also argued that government quality can operate both directly and indirectly through impacts on innovation (Rodríguez-Pose & Di Cataldo, 2014), investments (Rodríguez-Pose & Garcilazo, 2015), and several dimensions of social well-being (Peiró-Palomino et al., 2020). Also, the labor market is less transparent where government quality is low since contracts are more based on personal connections and nepotistic networks than that on the personal merits of the candidates (Di Cataldo & Rodríguez-Pose, 2017). Similarly, as shown by Ezcurra and Rios (2019), European regions with high government quality have been more resilient in terms of employment during the last recession. However, and as mentioned in Section 1, at the municipal level there are no data on government quality measures, such as control of corruption, impartiality, or quality of municipal services, which are typical dimensions of quality of government (Charron et al., 2014). Our analysis is then constrained to the government efficiency dimension, although it offers other advantages already discussed in Section 1.

It is expected that efficiency is highly correlated with other measures of institutional quality, such as corruption and transparency. For instance, Guillamón and Cuadrado-Ballesteros (2021) find that lack of government transparency is associated with lower efficiency. The channels might be manyfold, although it is expected that corrupted governors favor certain lobbies and allocation of municipal resources can therefore be potentially inefficient. Indeed, Mauro (1998) concluded that corruption modifies the allocation of public spending toward less efficient activities. Dreher and Schneider (2006) revealed links between corruption and the shadow economy, which is unregulated and uncertain and thus more prone to inefficiencies. Therefore, efficiency can be one of the channels through which the effects of other quality of government dimensions, such as transparency or corruption operate.[3] Management requires, among other things, the reallocation of government resources, as well as the effective and efficient use of those resources toward identified and transparent strategic priorities (Angelopoulos et al., 2008). We argue that better use of the available inputs can yield positive impacts for the local economies. If subnational governments are efficient at producing public goods and services, this will lead to more or better quality public goods and services with the same level of expenditures (Rodríguez-Pose et al., 2009), which is likely to have a positive effect on income and growth (Martínez-Vázquez & McNab, 2003).

Moreover, management quality is likely to reduce uncertainty, which may severely affect the degree of vulnerability of local economies by affecting firms' investment and employment rates (Acemoglu et al., 2003). The development of the private sector needs from a reliable institutional framework guaranteeing private investments. A government perceived as efficient will attract new investments (Hakimi & Hamdi, 2017) and might be among the set of factors a firm takes into account when deciding where to establish or where to allocate resources. Similarly, higher efficiency might also mean that the governors are not favoring particular elites, which can generate substantial social and economic inequalities. More efficient management of resources can also contribute to a better economic environment, fueled by more trust and interactions, which can lower transaction costs and foster economic activity (Ahrend et al., 2017). By contrast, inefficient management practices discourage participation, limiting knowledge sharing and constraining the possibilities of innovation.

In a similar vein, another aspect related to the quality of government is reputation. Agasisti et al. (2019) argue that public institutions, such as universities, are expected to be efficient, and this may foster a positive relationship with the activities of other stakeholders. We argue that these ideas can also apply to municipal governments, which might generate new collaborations and economic opportunities for local firms. In contrast, if local management is

[3]Other studies suggest that there are also important links between quality of government, informal institutions (social capital, trust, etc.), and the performance of territories (see Cortinovis et al., 2017; Cruz-García and Peiró-Palomino, 2019).

perceived as inefficient, companies will be reluctant to establish solid links with public entities. An additional and closely related consideration concerns incentives for efficiency for those agents which are already interacting with local governments. If the latter carry out their duties efficiently, their partners will be encouraged to improve their efficiency.

In sum, the literature has established strong links between quality of government and institutions and economic growth at both country and regional levels, in the broad sense. If the analysis is constrained to a single dimension of quality of government (i.e., efficiency), the literature is scarcer, but also conclusive (Angelopoulos et al., 2008). Unfortunately, and as stated in the preceding paragraphs, to date virtually no initiatives have extended these analyses to lower levels of government, particularly the lowest one—municipalities.

However, as Glaeser et al. (1995) note, the analysis at the city level complements country and regional analyses in several ways. For instance, there are advantages with respect to country-level and regional-level studies, because some mechanisms are more easily understood at the city level. Cities are completely open economies, with high movement of labor, capital, and ideas across them, but boundaries that prevent factor mobility and policies that encourage industrial diversification might eliminate the benefits yielded by factor mobility (Glaeser et al., 1995). On this point, Stansel (2005) identifies a problem of using the nation as the unit of analysis, namely, "that there are numerous important differences (e.g., cultural and institutional) between countries that are very difficult to quantify, and thus difficult to incorporate into an econometric test." National and regional boundaries can also be discretionary, with substantial heterogeneity for municipalities within those boundaries. In addition, reliable historical data for variables as specific as quality of government are not always easily obtained. Furthermore, although ideas are important for growth (e.g., Romer, 1986), particularly in knowledge-based economies (Davis & Dingel, 2019), studies, such as Glaeser et al. (1992), have shown that cross-industry intellectual externalities are particularly important for urban growth. In this regard, some critical issues in the creation of new ideas and the entrepreneurship underlying higher income and economic growth are the learning and human spillovers which mainly occur in cities (Duranton & Puga, 2019). Low levels of quality of (local) government could thwart these mechanisms and, ultimately, erode municipal income levels.

The reasons that justify shifting the focus to lower territorial units, such as municipalities, are also related to public finance and decentralization issues. As indicated by Agasisti et al. (2020), resources devoted to growth-enhancing expenditures can be more efficiently allocated in smaller territorial units. This issue gains importance in more decentralized countries, where lower levels of government have extensive powers. In contexts where devolution initiatives have taken place (such as the country under analysis), it is therefore equally important to evaluate spending efficiency at each level of government: central, regional, and local.[4] Indeed, one might argue that the analyses should be multilevel, evaluating how inefficiency at each government level might contribute to eroding overall country growth (Méon & Sekkat, 2005).[5] However, we consider that the analysis at the municipal level is important for several additional reasons; first, because the municipal budget is more directly linked to practical actions and interventions to promote the overall growth of the municipality[6,7] and the wealth of its inhabitants (Agasisti et al., 2020) and second, because corruption (a typical indicator of quality of government) is difficult to measure explicitly but might impact on municipal growth via the inefficiencies it generates, as considerable amounts of the municipal budget might be misallocated.[8]

[4]In addition, focusing on the lowest level of government has also the advantage of its consensus, since it is a relatively homogeneous territorial unit across countries (i.e., virtually all countries have cities), whereas there is a myriad of territorial organizations across countries (Narbón-Perpiñá et al., 2021).

[5]For an analysis of the links between decentralization and economic growth see, for instance, Rodríguez-Pose and Ezcurra (2011).

[6]Other studies that have focused on economic growth at the municipality level include De Mello (2002), DiLiddo et al. (2018), and Schaltegger and Torgler (2006), among others, although they focus on issues different to quality of government or spending efficiency.

[7]These views can be complemented and extended from a more purely public economics perspective, taking into account that, for the full economic potential of cities to be realized, the public goods and services provided by local governments must be done efficiently (Sieg, 2020) and this requires, in a previous stage, to define local governments' functions with detail. This will be done in Section 3.

[8]Corruption at the local government level in Spain and its effects has been studied by Costas-Pérez et al. (2012) and, more recently Solé-Ollé and Sorribas-Navarro (2018) and Sanz et al. (2020).

However, and as indicated in the preceding paragraphs, to date, extending the analysis of the links between quality of government and growth at the municipal level has proved challenging for two main reasons. First, in many countries data are not available at the municipal level, particularly data on variables related to economic growth and development (gross domestic product [GDP], disposable income, etc.). This is an almost insurmountable hurdle to research at this level of government. Second, the necessary information to evaluate how economic growth and development variables relate to the quality of institutions at this level of government is nonexistent—with a few exceptions. However, we can overcome this obstacle by focusing on one dimension of quality of government (i.e., efficiency), which has not only been extensively analyzed for local governments (Aiello & Bonanno, 2019; Narbón-Perpiñá & De Witte, 2018a, 2018b) but also, according to the literature, is highly correlated with other dimensions of quality of government. In turn, it has a critical advantage over other quality of government measures, since it is much more precise—that is, we know exactly what we are measuring, and we do not have to rely on survey data.

3 | MEASURING QUALITY OF GOVERNMENT AT THE MUNICIPAL LEVEL

Performance measures have been widely used in the public sector to measure governments' provision, the role of rules and institutions. They can be used as managerial decision-making tools, and are essential to any economy concerned with accountability, transparency, efficiency, and effectiveness of public institutions (Worthington & Dollery, 2000). At the municipal level, performance can be evaluated using a huge variety of indicators, including financial measures (debt ratios, budget stability, expenditures per capita, tax revenue per capita, etc.), efficiency measures (i.e., how well the organization uses resources in service provision) and indexes of effectiveness (i.e., of the degree to the organization achieves its policy objectives; De Borger & Kerstens, 2000). However, the focus of performance evaluation will depend on the role, and objectives analyzed, as well as data availability.[9]

As commented on along the article, we measure how efficient local governments are in managing their municipal budgets to provide public services. Municipalities are complex organizations responsible for multiple tasks while being subject to financial and budgetary constraints. Efficiency evaluation facilitates the management of municipal resources, and the greater control of the activities carried out by public managers (politicians), which are responsible for implementing efficient policies facing different interested parties (i.e., both higher levels of government and citizens), with different objectives and information asymmetries (De Borger & Kerstens, 2000). It seems therefore logical that bad local government practices (such as an extravagant use of public resources, corruption or opportunistic behaviors related to the political agenda), would undermine efficiency.

By using frontier techniques from the benchmarking literature, we compute the efficiency estimates for every municipality under analysis for the 2008–2015 period as a proxy of government quality or government performance. Estimating efficiency concerns the relative comparison of a group of decision-making units (DMUs; which in our case are Spanish local municipalities), to assess how the available resources (or inputs) are used to provide local services and facilities (or outputs; Narbón-Perpiñá et al., 2019).[10] In particular, in an input-oriented framework, the one that we consider, the model aims at reducing the input amounts as much as possible while keeping at least the present output level.[11] In public sector institutions, such as local governments, outputs are established externally

[9]For example, at municipal level we find previous studies that have used different definitions of performance, including financial measures (Cohen, 2008; Zafra-Gómez et al., 2009), transparency indexes (Albalate, 2013; DaCruz et al., 2016), or effectiveness aspects, such as the urban quality of life (González et al., 2011; Morais & Camanho, 2011). However, the large majority of studies evaluating municipal performance refer to efficiency measures (see, e.g., Balaguer-Coll et al., 2007; Narbón-Perpiñá et al., 2019).

[10]For an introduction and further details on efficiency measurement see the excellent contributions by Coelli et al. (2005), Daraio and Simar (2007), Färe, Grosskopf, and Lovell (1994), and Fried et al. (2008), among others.

[11]The output-oriented framework looks at maximizing output levels under at most the present input levels (Daraio & Simar, 2007).

(i.e., the services that local governments must provide by law), and it makes sense to evaluate efficiency in terms of input minimization (Balaguer-Coll & Prior, 2009; Narbón-Perpiñá et al., 2019).

Depending on the focus of the analysis as well as the available data for input and outputs (quantities only, or quantities and prices), different types of efficiency can be measured. If only data on physical units are available, *technical efficiency* can be estimated, while *allocative efficiency* introduces information on prices (Fried et al., 2008). With the product of these two measures we obtain the *economic efficiency*, called *cost efficiency* when the economic objective is cost minimization.[12] However, when data on total costs are available, but not for quantities and input prices separately, cost efficiency can be estimated but not decomposed into its technical and allocative components (Balaguer-Coll et al., 2007). In a public sector environment, as in our particular case, it is common not to have information on prices given its nonmarket or nonprofit nature (Kalb et al., 2012). Accordingly, we measure cost efficiency using data in municipal budgets as input costs.

Regarding the methodologies to measure efficiency, it is possible to differentiate between two different strands, namely, the parametric and nonparametric methodologies.[13] In this paper, we are going to focus on the nonparametric estimation methods because require fewer assumptions since do not impose any particular functional form and allow for the inclusion of several inputs and outputs in the model (Daraio & Simar, 2007). Specifically, we use DEA, the most widely known and applied technique in the nonparametric field.[14] This methodology has attracted considerable theoretical and applied interest (see, e.g., Emrouznejad et al., 2008; Emrouznejad & Yang, 2018; Liu et al., 2013; for about 10,300 DEA-related articles references of their applications), and has been widely used in measuring efficiency at the municipal level (Narbón-Perpiñá & De Witte, 2018a).

DEA, initially developed by Charnes et al. (1978) and adapted to the cost measurement by Färe, Grosskopf, and Lovell (1994), is a mathematical programming method used to measure the relative efficiencies of DMUs. With data on municipal inputs and outputs, DEA defines an empirical frontier which is determined by the "best-practice" or efficient DMUs and "envelopes" all the units under evaluation. The units located in the frontier are the efficient units, and their efficiency score is equal to 1. For the rest of units, located above the frontier in the input-oriented model, the distance from the efficient frontier measures its inefficiency, and has efficiency scores lower to 1. The linear programming problem used to calculate the minimal cost efficiency for each municipality under evaluation and year is as follows:

$$\begin{aligned} & Min_{\theta,\lambda}\, \theta \\ & \text{s.t. } -y_i + Y\lambda \geq 0, \\ & \theta c_i - C\lambda \geq 0, \\ & 1'\lambda = 1, \\ & \lambda \geq 0, \quad i = 1, \ldots, N, \end{aligned} \tag{1}$$

where θ represents the cost-efficiency coefficient for each n municipality. C and Y are defined as the input (representing the cost or budget level) and output matrices that include information for inputs and outputs for all N municipalities, while c_i and y_i are the observed inputs and outputs corresponding to municipality i under evaluation. λ is the activity vector which describes the relative importance of the unit considered to determine the virtual reference used as a comparison to evaluate unit i. The last two constraints imply variable returns to scale (VRS), which assures that each DMU is compared only with others of a similar size, and that the activity vector cannot be negative.[15]

[12]It is called *revenue efficiency* when the economic objective is output maximization.

[13]Both parametric and nonparametric frontiers have their advantages and disadvantages, as can be seen in the excellent reviews provided by Bogetoft and Otto (2010) and Murillo-Zamorano (2004).

[14]Although we use DEA for our baseline estimations, we also considered alternative nonparametric methods to measure efficiency to verify the robustness of our results. These alternatives are discussed further in Section 5.2.

[15]We implemented Simar and Wilson's (2002, 2011) returns-to-scale test for DEA models to test whether we should assume Constant Returns to Scale (CRS) or VRS. We reject the null hypothesis of CRS, so VRS should be assumed. Note that in our particular context we are analyzing a heterogeneous sample of Spanish municipalities that differ in terms of the amount of services and facilities they provide, depending on their size. Therefore, under the VRS assumption each municipality is only compared with other municipalities of the same size.

To perform the analysis, we use a sample of Spanish municipalities[16] with a population between 1,000 and 50,000 inhabitants for the period 2008–2015. The final sample contains 1,820 observations for every year (which represents 22.40% of all Spanish municipalities, 27.51% of the total Spanish population, and 61.76% of the total population of municipalities with between 1,000 and 50,000 inhabitants). This is a relatively large sample in studies that focus on municipal data.[17] Therefore, although data restrictions can be a potential limitation to this study and it would be desirable to have a full and complete data set for all Spanish municipalities, our comprehensive data set makes a valuable contribution to the literature using municipal data.[18]

Regarding the variables used to compute the efficiency estimator for each municipality, on the input side, the variable used represents the total costs of the municipal services and facilities provided (C). The use of budget expenditures as inputs is a common practice in previous literature given the unavailability of data for the costs of each municipal service and facility (e.g., Balaguer-Coll & Prior, 2009; Balaguer-Coll et al., 2007, 2010, 2013; Bosch et al., 2000; DaCruz & Marques, 2014; Narbón-Perpiñá et al., 2019; Narbón-Perpiñá et al., 2020; Narbón-Perpiñá et al., 2020; Prior et al., 2019; Zafra-Gómez & Muñiz-Pérez, 2010). Our variable is calculated by using information retrieved from the municipal budget expenditures annually published by the Ministry of the Treasury (*Ministerio de Hacienda*). Specifically, our input measure includes the following items from the budget: personnel expenses, expenditures on goods and services, current transfers, capital investments, and capital transfers.

On the output side, the selection of variables is a complex task, given the difficulties in the data collecting process, the availability of data, and the accurate and direct measurement of local services and facilities provision (Balaguer-Coll et al., 2013). Following previous literature focused on Spanish municipalities (e.g., Balaguer-Coll & Prior, 2009; Balaguer-Coll et al., 2007, 2013; Bosch-Roca et al., 2012; Narbón-Perpiñá et al., 2019; Narbón-Perpiñá et al., 2020; Zafra-Gómez & Muñiz-Pérez, 2010) as well as others papers focused on different European countries (e.g., Cordero et al., 2017; DaCruz & Marques, 2014; Doumpos & Cohen, 2014; Kalb et al., 2012; Šťastná & Gregor, 2015), we use proxies for the services and facilities provided to citizens. Specifically, we selected 10 output variables which represent the specific services and facilities that municipalities should provide according to the Spanish law which regulates the local system (*Ley 7/1985, Reguladora de Bases de Régimen Local*). Table 1 contains the list of services and facilities that each local government is legally required to provide with the corresponding output indicators available.

Data on total population (number of inhabitants, Y_1) for each municipality was obtained from the Spanish Statistical Office (*Instituto Nacional de Estadística, INE*). This output indicator is the most frequently used in the literature (Narbón-Perpiñá & De Witte, 2018a), and proxies the scope of services that municipalities should provide, but a more direct output measure is not available. The rest of output variables used are direct measures for the municipal services and facilities. Specifically, we include the street infrastructure surface area (in km^2, Y_2), the number of lighting points (Y_3), the waste collected (in tons, Y_4), the length of water distribution networks (in km^2, Y_5), the length of sewer networks (in km^2, Y_6), the public parks surface area (in km^2, Y_7), the public library surface area (in km^2, Y_8), the market surface area (in km^2, Y_9), and the sport facilities surface area (in km^2, Y_{10}). Information for these variables was gathered from a survey on local infrastructures and facilities (*Encuesta de Infraestructuras y Equipamientos Locales, EIEL*) published by the Spanish Ministry of the Treasury

[16]LAU2 in the European terminology used for the classification of territorial units for statistical purposes.

[17]For instance, the paper of Rodríguez-Pose and Zhang (2019) on government institutions and the dynamics of urban growth in China only comprises 283 Chinese cities. Similarly, those studies that analyze efficiency at local level generally focus on a specific region of a country or a year. For example, the study of Afonso and Fernandes (2006) assesses 51 Portuguese municipalities in 2001, Lo Storto (2016) uses a sample of 108 large Italian municipalities in 2013, or Guillamón and Cuadrado-Ballesteros (2021) analyses 100 largest Spanish local governments.

[18]Specifically, we do not include municipalities from the regions of Catalonia, Madrid, the Basque Country, and Navarre, nor for the provinces of Burgos and Huesca since the data for inputs and/or outputs needed to construct the efficiency measures were unavailable for all these territories. In any case, municipalities in the excluded provinces and/or regions that would meet the criteria for inclusion in the sample are not very different from those in the final sample, so the sample used can be considered as representative.

TABLE 1 Minimum services and facilities defined by the law and corresponding output variables

	Minimum services and facilities	Output indicators
In all municipalities	Public street lighting	Number of lighting points
	Cemetery	Total population
	Waste collection	Waste collected
	Street cleaning	Street infrastructure surface area
	Supply of drinking water to households	Length of water distribution networks (m)
	Sewage system	Length of sewer networks (m)
	Access to population centers	Street infrastructure surface area
	Paving of public roads	Street infrastructure surface area
	Regulation of food and drink	Total population
In municipalities with populations of over 5,000, in addition	Public parks	Surface area of public parks
	Public library	Surface area of public libraries
	Market	Surface area of markets
	Treatment of collected waste	Waste collected
In municipalities with populations of over 20,000, in addition	Civil protection	Total population
	Provision of social services	Total population
	Fire prevention and extinction	Street infrastructure surface area
	Public sports facilities	Surface area of public sport facilities (m^2)
In municipalities with populations of over 50,000, in addition	Urban passenger transport service	Total population, street infrastructure surface area
	Protection of the environment	Total surface area

Source: Narbón-Perpiñá et al. (2019).

(*Ministerio de Hacienda*). Table 2 contains the descriptive statistics for the inputs and outputs used in the efficiency measurement.

The cost-efficiency results (averaged for all municipalities for each year) are presented in Table 3. To support the descriptive results, we also provide boxplots for the efficiency scores by year (see Figure 1). DEA results show that average efficiency scores have ranged between 0.495 and 0.602 throughout the period 2008–2015. According to these values, on average, inefficient municipalities could have reduced their inputs by 40%–50% while maintaining their provision of municipal services and facilities. Similarly, results for the first quartile (i.e., the most inefficient municipalities) range from 0.361 to 0.478, while for the third quartile (i.e., the most efficient municipalities) range from 0.607 to 0.699. The maximum values, equal to 1, correspond to the efficient units (i.e., benchmark units located in the frontier). Moreover, although we do not aim to analyze efficiency scores under a temporal efficiency framework, our results show some trends. Despite average efficiency increases slightly during the period, in general, they are quite stable.

TABLE 2 Summary statistics for inputs and outputs to measure efficiency, average values for the period 2008–2015

Variables	Mean	S.d.
Total costs[a] (C)	6,629,357.562	8,036,718.685
Total population (Y_1)	7,097.912	8,174.880
Street infrastructure surface area[b] (Y_2)	334,833.203	331,529.783
Number of lighting points (Y_3)	1,485.161	1,522.432
Tons of waste collected (Y_4)	3,771.651	18,871.600
Length of water distribution networks[b] (Y_5)	47,808.036	85,570.038
Length of sewer networks[b] (Y_6)	29,624.571	32,416.533
Public parks surface area[b] (Y_7)	97,879.857	570,575.685
Public library surface area[b] (Y_8)	349.129	1,621.335
Market surface area[b] (Y_9)	4,044.351	11,116.074
Sport facilities surface area[b] (Y_{10})	92,959.663	648,614.726

[a]In thousands of euros.
[b]In square meters.

TABLE 3 Municipal efficiency, summary statistics 2008–2015

Year	Mean	S.d.	Min	1St quartile	Median	3Rd quartile	Max	Number of efficient units
2008	0.495	0.192	0.045	0.361	0.468	0.607	1.000	57 (2.876%)
2009	0.586	0.171	0.098	0.467	0.575	0.690	1.000	57 (2.876%)
2010	0.536	0.169	0.115	0.420	0.513	0.625	1.000	46 (2.321%)
2011	0.535	0.175	0.133	0.417	0.512	0.626	1.000	57 (2.876%)
2012	0.531	0.177	0.109	0.407	0.511	0.627	1.000	51 (2.573%)
2013	0.581	0.168	0.147	0.467	0.569	0.678	1.000	64 (3.229%)
2014	0.602	0.177	0.136	0.478	0.583	0.699	1.000	87 (4.390%)
2015	0.580	0.175	0.109	0.459	0.560	0.680	1.000	68 (3.431%)

4 | MEASURING THE EFFECT OF QUALITY OF GOVERNMENT ON MUNICIPAL ECONOMIC GROWTH

4.1 | Econometric strategy

In analyzing the relationship between municipal quality of government and growth, we run different regression models. Formally, the most general model can be expressed as follows:

$$\triangle INCOME_{it} = \beta EFF_{it} + \gamma X_{it} + \sigma_i + \tau_t + \varepsilon_{it}, \quad (2)$$

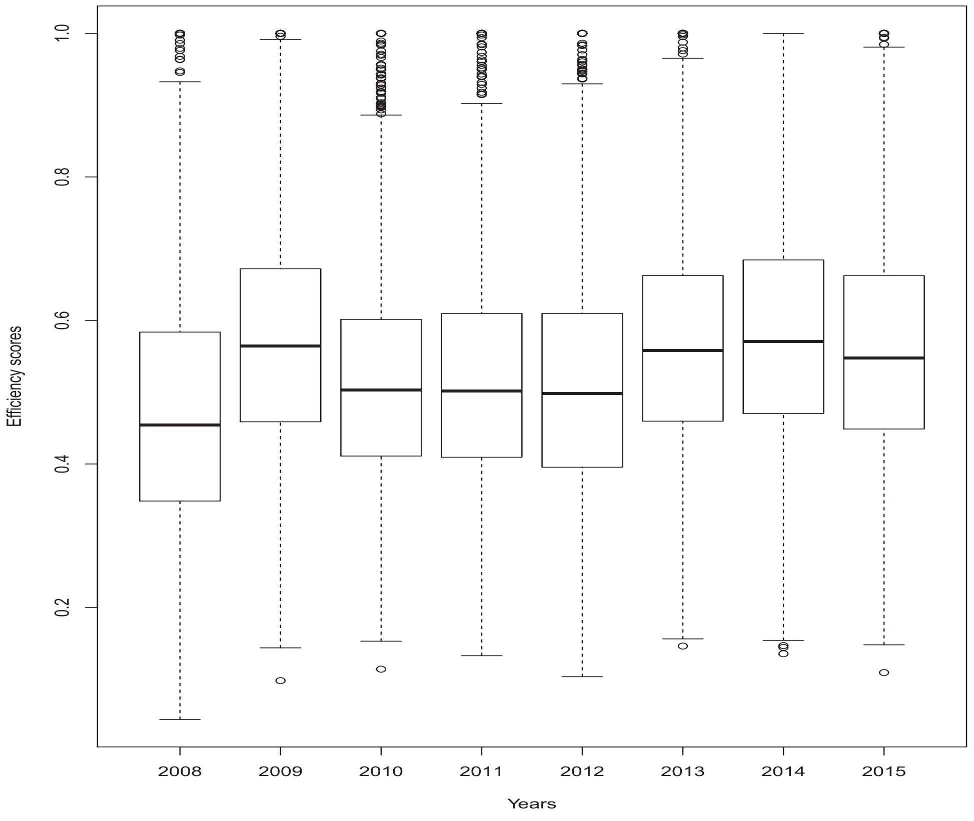

FIGURE 1 Efficiency scores by years

where *i* and *t* represent a municipality and year, respectively, *INCOME* is the disposable income per capita in euros, *EFF* is the efficiency score, lying in the interval [0–1], *X* is a vector of control variables (explained in detail below), β, γ, σ, and τ are the model parameters, and ε stands for the error term.

Data for our dependent variable, disposable income per capita growth comes from the statistics of personal income tax declarers published by the Spanish Tax Agency (*Agencia Tributaria*) for municipalities with a population over 1,000 inhabitants. Disposable income per capita is estimated by discounting from the individual gross income the net tax liability resulting from the tax and the social security contributions and passive rights on the worker's account included in their tax return.

A central issue in growth models, and particularly in the institutions—growth literature is endogeneity, which can arise from different sources. One is reverse causality, which implies that growth may increase institutional quality (Rodríguez-Pose, 2020). In this regard, government quality dimensions are relatively persistent over the years and, accordingly, in a short period, such as ours reverse causality is less plausible. Another source of endogeneity might come from omitted variables that can be related to government efficiency. To mitigate this potential problem, we include control variables, time, and municipal fixed effects in our models. Nevertheless, we perform two-stage least-squares (2SLS) instrumental variables estimations in an attempt to provide some robustness on this issue.

We use the political concentration in a municipality as an instrument, by calculating a Herfindahl index which indicates the degree of competition among political parties. Although it is true that low political competition (i.e., high political concentration or strength) can make the implementation of policies easier, and therefore increase efficiency, a large body of literature holds the opposite view: high political concentration can be detrimental to efficiency. For instance, under high political concentration, other parties have less control over public expenditures and, as a consequence, efficiency may be reduced. Also, a governing party with a weak opposition can make decisions and implement policies to satisfy voters, regardless of their cost. Some findings in the literature supporting this argument are Balaguer-Coll et al. (2007), Geys et al. (2010), Geys et al. (2013), Kalb (2010), Kalb (2012), Loikkanen et al. (2011), and Helland and Sørensen (2015), to name a few. For our particular case, we calculated political concentration by using information from the municipal elections of 2007, 2011, and 2015. We use the 2007 value for years 2008–2010, the 2011 value for years 2011–2014, and the value for 2015 for that year.

Regarding the control variables, it is worth mentioning that at the municipal level, and especially when trying to elaborate a panel data, there are severe data limitations in comparison with regional- or country-level analyses. In some cases, data are directly not available. In others, limitations come from coverage in terms of the number of municipalities (some data are provided only for municipalities with a minimum size) or time (some data are only available for a single year). Despite these difficulties, we were able to collect several variables which allowed us to estimate growth models in line with those used in cross-regional and cross-country studies. These variables capture economic, demographic, and political factors.

As economic variables, we include the initial disposable income per capita (in logs) to control for the convergence hypothesis (see Barro, 1991; Sala-i Martin, 1996) and also financial development, whose links with growth are largely documented (see Badunenko & Romero-Ávila, 2013; Henderson et al., 2013; King & Levine, 1993), although not all authors concur that the effect should always be positive. Several survey studies have already been published on the issue, including Ang (2008), Valickova et al. (2015), and, extending the analysis to include the role of institutions, Fernández and Tamayo (2017). Although several contributions exist at both the national and the regional level, at the municipal level there are virtually no contributions analyzing the effect of this variable on municipal growth. In our study, financial development is measured by the number of bank branches per 1,000 inhabitants. This indicator is especially interesting for the Spanish case, given that the recent banking restructuring process as a consequence of the financial and economic crisis has originated several cases of financial exclusion, that is, municipalities without any bank branch (Martin-Oliver, 2019).

Demographic characteristics can also influence economic performance. In that regard, we control for population growth (in %), which is an essential variable in virtually all neoclassical growth models (Mankiw et al., 1992). We also attempted to measure agglomeration economies (see, for a recent review, McCann & Van Oort, 2019, Chap. 1), captured in our paper by population density (inhabitants per km^2). Economic agglomeration in one region spurs growth because it reduces the cost of innovation in that region through a pecuniary externality due to transaction costs (Martin & Ottaviano, 2001). It has been shown that in the municipal sphere, agglomeration can yield substantial costs savings for local governments. According to De Borger and Kerstens (1996), the degree of population concentration might influence the cost of providing certain public services, with cost inefficiency expected to increase where the population is more dispersed. Greater population concentration can make interrelated local services easier to both manage and consume (Afonso & Fernandes, 2008) as they enjoy the cost advantages associated with agglomeration economies (Geys et al., 2010). Moreover, densely populated areas are expected to generate increased economic activity and can be relevant to distinguish between rural and urban areas. This is particularly important for the Spanish context, where there is a strong duality between relatively densely populated cities and an increasing number of barely populated rural areas, popularly known as the *empty Spain* or *España vacía* in Spanish, which has generated an intense debate in recent times (see, e.g., Pinilla and Sáez, 2017).

In addition, we also account for the structure of the population by considering the share of the retired population. Regarding the potential effect on the growth of this variable, the literature is still inconclusive, as there are several indirect mechanisms in action at the same time and therefore the final effect depends on which predominates (Nagarajan et al., 2016). In this vein, Hagen and Vabo (2005) find evidence that older people have negative effects on public finance surplus; RodríguezBolívar et al. (2016) find evidence that citizens over the age of

65 have a negative effect on the financial sustainability of local authorities. However, Rios et al. (2017) conclude that older people do not have significant effects on municipal spending.

Political factors are captured by the political alignment with the regional and the national governments. This is measured with two binary variables that take the value of 1 if the political party at the municipal government coincides with that at the regional or national level, and 0 otherwise. We expect a positive effect of these variables, given that municipalities with aligned ideology can receive greater transfers and grants from higher levels of government to carry out investments. In this line, the studies of Migueis (2013) and Solé-Ollé and Sorribas-Navarro (2008) find that institutions politically aligned with upper levels of government receive more transfers than their nonaligned counterparts. Also, possible favoritisms and distortions in the allocation of resources and regulations can generate positive spillovers for local economic dynamism (Asher & Novosad, 2017).

Finally, we take into account fiscal autonomy, measuring the extent to which municipal revenues come from their own sources (%). The effect of fiscal autonomy on municipal growth is ambiguous. Some studies, including Ebel and Yilmaz (2002) and Meloche et al. (2004), suggest that the degree of revenue autonomy is positively related to per capita GDP. However, others, such as Thiessen (2003), observe a hump-shaped relationship between fiscal decentralization and growth.[19] Yet the debate is still inconclusive, as other studies, such as Thornton (2007) and Baskaran and Feld (2013), suggest nonsignificant or even negative impacts.

Despite our comprehensive set of control variables, we argue that there might be other factors explaining disparities in municipal growth rates. Differences in human capital, innovation, or the industrial structure can have a relevant effect too. Unfortunately, data constraints at the local level limited the number of control variables we were able to account for. To address this potential limitation, all our models include municipal fixed effects and time effects that might help to capture unobserved city-specific characteristics and common shocks in some years of our period, such as the economic crisis and subsequent recovery. We argue that given that our temporal period is relatively short, fixed effects can appropriately capture these unobserved local features and clean estimates to a large extent from potential omitted variable bias.

The first panel in Table 4 provides a complete definition of the variables, their sources, and some descriptive statistics. The second panel in Table 4 provides the definition and sources of the instrumental variables as well as some descriptive statistics.

4.2 | Descriptive statistics

Before running the models, we first elaborated some descriptive results to represent the bivariate relationship between our two variables of interest. Panel (a) in Figure 2 shows a moderate, albeit positive, association between local government efficiency and disposable income per capita growth. Similarly, panel (b) displays two notched boxplots, representing disposable income growth for municipalities with efficiency scores below and above the median, respectively. It can be observed that growth is slightly higher for the second group, although the notches overlap and, therefore, we cannot affirm that the medians between the two groups are statistically different. However, beyond the median, there are other interesting aspects, such as the higher number of outliers for the first group, especially in the lower tail of the distribution and thus corresponding with municipalities with negative growth rates. In contrast, the municipalities with efficiency levels above the median have a lower number of negative growth rates. Also, the number of municipalities with notably high growth rates is higher in this second group.

[19]Thiessen (2003) analyzes fiscal decentralization from the point of view of expenses and income, that is, the power of subnational governments to raise tax revenues and decide on spending programs on their own initiative within legal criteria.

TABLE 4 Descriptive statistics of the control and instrumental variables included in the analysis (average values for the period 2008–2015)

	Description	Mean	S.d.
Control variables			
Disposable income[a]	Disposable income per capita (in €)	13,070.940	2,817.271
Financial development[b]	Number of bank branches per 1,000 inhabitants	1.145	0.655
Population density[c,d]	Total population by km^2	247.611	952.194
Population growth[d]	Population variation from year *t* to *t* − 1 (in %)	−0.003	0.023
Retired[d]	Population older than 65 years over total population (in %)	0.209	0.074
Regional alignment[e]	Dummy variable. If the political party in the regional government is the same that in the municipal government, equals 1. Otherwise, 0	0.562	0.496
State alignment[e]	Dummy variable. If the political party in the national government is the same that in the municipal government, equals 1. Otherwise, 0	0.468	0.499
Fiscal autonomy[f]	Share of tax revenues (chapters expenditures from 1 to 3) over nonfinancial revenues (chapters expenditures from 1 to 7; in %)	0.482	0.155
Instrumental variable			
Political concentration (Herfindahl index)[e]	Values between 0 and 1 depending on the number of councilors for each party in the council. High values denote a lower level of political fragmentation or higher political strength. It is measured in years 2007, 2011, and 2015	0.390	0.108

[a]Tax Agency, Ministry of the Treasury.
[b]Maestre Ediban.
[c]National Geographic Information Center, Ministry of Development.
[d]Spanish Statistical Institute (INE).
[e]Ministry of Territorial Policy and Public Function.
[f]State Secretariat for Budgets and Expenditure, Ministry of Treasury.

5 | RESULTS

5.1 | Impact of government efficiency on municipal growth

This section reports the results from the regression analysis. Our baseline results are reported in Table 5. As indicated in previous sections, the dependent variable is disposable income per capita growth. Regarding the exogenous variables, we specify different models depending on which variables we use as controls. Specifically, we start with a basic model—Model (i)—in which government efficiency (*EFF*) and lagged income (*LAG_INCOME*) are included. According to this model, which includes both fixed and time effects, the impact of efficiency is positive and significant.

The rest of the control variables referred to in the preceding sections are added sequentially. Although growth models tend to start initially from larger sets of covariates until a relatively parsimonious specification is achieved (Sala-i-Martin, 1997), in our case, this strategy is more challenging. First, the literature on determinants of growth at the municipal level is much scarcer than that for country or regional levels. Second, the information available

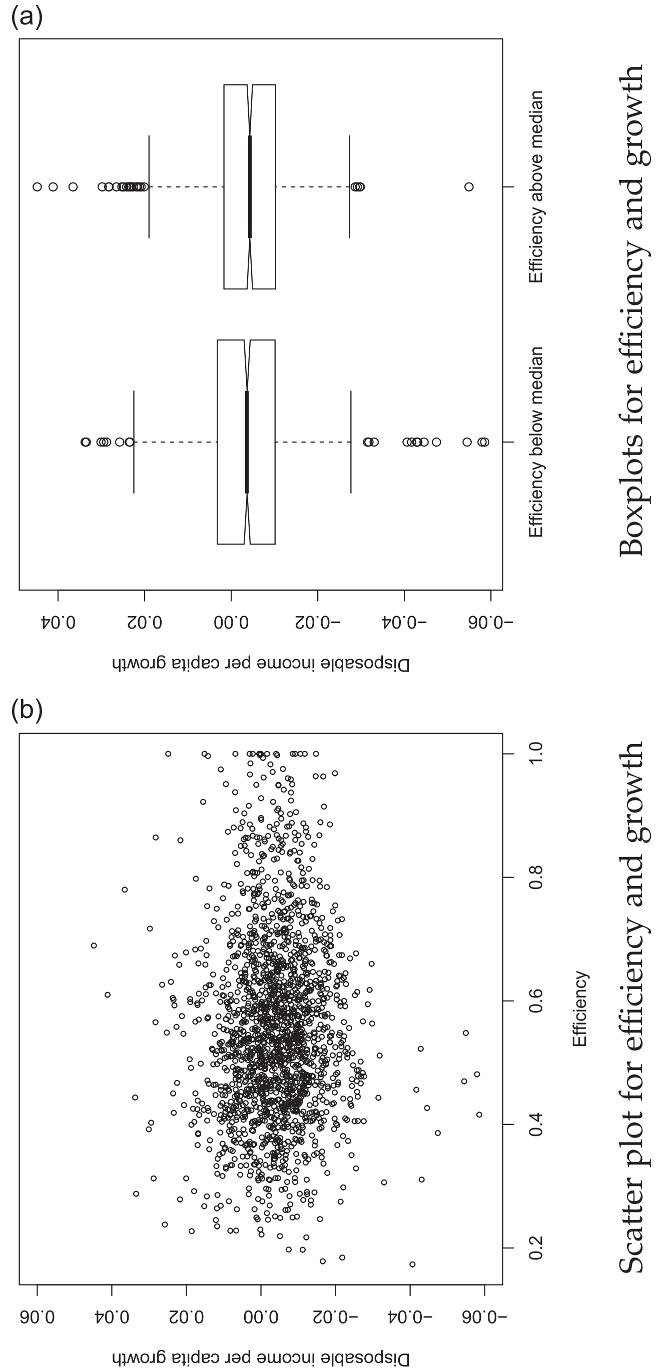

FIGURE 2 Efficiency and disposable income per capita growth: (a) scatter plot for efficiency and growth; (b) boxplots for efficiency and growth

(variables) is also more limited; and third, the powers in the hands of the different levels of government also vary greatly across countries, which makes international comparisons more complicated and, to some extent, meaningless.

However, relevant controls are necessary to obtain meaningful estimates, which we do in columns 2–5 in Table 5. In Model (ii) we add financial development (*FIN_DEV*). Its effect is positive and significant and the impact of local

TABLE 5 Determinants of municipal growth, baseline estimations

Variable	Dependent variable: *INCOMEGROWTH* (i)	(ii)	(iii)	(iv)
Intercept	5.478***	5.467***	5.489***	5.487***
	(0.137)	(0.137)	(0.140)	(0.140)
EFF	0.0149***	0.0150***	0.0157***	0.0148***
	(0.00524)	(0.00523)	(0.00523)	(0.00536)
LAG_INCOME	−0.579***	−0.578***	−0.579***	−0.579***
	(0.0146)	(0.0145)	(0.0145)	(0.0145)
FIN_DEV		0.00679**	0.00659**	0.00676**
		(0.00272)	(0.00263)	(0.00265)
POP_DENS			−0.00000924	−0.00000814
			(0.0000321)	(0.0000317)
POP_GROWTH			0.0652**	0.0672**
			(0.0281)	(0.0285)
RETIRED			−0.0691	−0.0865
			(0.0860)	(0.0866)
REG_ALIGN				0.000660
				(0.00125)
STATE_ALIGN				0.00364**
				(0.00146)
FISCAL_AUT				0.0123
				(0.00888)
N	14,560	14,560	14,560	14,456
R^2 (within)	0.430	0.430	0.431	0.431
F_{STAT}	1,598.77***	1,443.09***	1,123.51***	893.19***
Fixed effects	Yes	Yes	Yes	Yes
Temporal effects	Yes	Yes	Yes	Yes

Note: Robust standard errors to heteroskedasticity and serial correlation are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1% significance levels, respectively.

government efficiency on growth remains unaltered. The results when considering two additional unrestricted models are analogous. Specifically, in Model (iii) we add the demographic variables population density, (*POP_DENS*), population growth (*POP_GROWTH*), and retired population *RETIRED*). Model (iv) includes political alignment with the regional government (*REG_ALIGN*), the national government (*STATE_ALIGN*), and the degree of fiscal autonomy (*FISCAL_AUTON*).

Although it is not our main interest to analyze in detail the role of the control variables included in the different models, we will briefly evaluate their impact on municipal growth. Overall, the results found for most of them are in line with the previous literature, although we also detect several differences across models. As for the economic variables, the impact of both the lagged disposable income per capita and financial development has the expected sign—negative for the former, positive for the latter. In the first case, it is a sign in favor of convergence, as the negative sign indicates that poorer municipalities are growing faster. Regarding financial development, the issue has been largely examined in the literature, as documented in recent contributions, such as Hasan et al. (2017, 2019) and, in the Spanish case, by Martin-Oliver (2019) and Pastor et al. (2017). The relevance of the topic makes it liable for a specific investigation.

Turning to the demographic variables, population density is nonsignificant, while population growth is positive and significant, indicating that the demographic pressure is largely offset by increased economic activity. The retired population, whose effect was a priori unclear, also shows a nonsignificant coefficient. Political alignment had a hypothesized positive impact on municipal growth, although this effect is only corroborated for national government alignment. Finally, fiscal autonomy is also irrelevant in our models. Overall, the inclusion of the control variables can reduce to some extent the potential bias due to omitted variables, although their explanatory power is relatively low. However, the inclusion of fixed and time effects might capture the effect of other unobserved variables, since the R^2 in the simplest specification is already high and acceptable for a growth regression framework like ours. The coefficient of efficiency remains fairly stable and significant in all cases, thus indicating a low correlation with the control variables.

To better understand whether the mechanisms governing the links between government efficiency and growth might work differently for municipalities with different levels of efficiency and development, we consider different scenarios for the most comprehensive model in Table 6. We provide estimations for municipalities with efficiency above and below the median and municipalities with income per capita above and below the median.

The first two columns report results for municipalities above and below the median efficiency. Interestingly, the impact of efficiency is only significant for the second group, in line with Rodríguez-Pose and Zhang (2019). This would suggest that efficiency is, as with other production factors, subject to diminishing returns. Once a municipality is already highly efficient, additional improvements have no effect on growth.

Regarding the effects for municipalities with income per capita levels below and above the median, the results (columns 3 and 4) suggest that the impact of efficiency is only significant for the poorer municipalities. These results invite interesting interpretations; one explanation might be that local governments with poorer constituencies will face more difficulties in raising tax revenues. Therefore, managing resources efficiently becomes a powerful tool to achieve growth.

Finally, noted in Section 4, we provide results for instrumental variable estimations, which are available in Table 7. The models correspond to 2SLS estimations using political concentration as the instrument. Note that, as previously explained, the information on political concentration is available for three years (2007, 2011, and 2015) and we used repeated values for intermediate years. This prevents us from using the fixed effect estimator, so the reported IV models are random effects estimations.[20] In all models, both the sign and the significance of the variable of interest remain positive and significant. The first-stage regressions—not reported for space reasons—show in all cases a negative and highly significant relationship between political concentration and government efficiency, in line with the theoretical arguments provided in Section 4.[21]

The results for the instrument validity tests are reported at the bottom of the table. First, the first-stage F_{STAT} test suggests that the selected instrument has sufficient explanatory power beyond the purely economic intuition described in the data section and the individual significance in the first-stage regressions. Second, the Cragg–Donald statistic and the critical Stock–Yogo value indicate that the instrument is not weak and is statistically acceptable. Finally, the Anderson–Rubin statistic suggests that the instrumented variable has sufficient explanatory power even under a potentially weak instrumentation strategy. Therefore, although instrumental variable regressions should be always interpreted with caution, our results seem to be robust to endogeneity.

[20]We thank an anonymous referee for this suggestion.

[21]First-stage results for all our models can be provided on request.

TABLE 6 Determinants of municipal growth, alternative scenarios

	Dependent variable: *INCOMEGROWTH*			
Variables	Efficiency above median	Efficiency below median	Income pc above median	Income pc below median
Intercept	5.727***	5.608***	5.667***	6.997***
	(0.216)	(0.203)	(0.203)	(0.275)
EFF	0.00663	0.0241*	−0.000103	0.0335***
	(0.00840)	(0.0134)	(0.00694)	(0.00684)
LAG_INCOME	−0.605***	−0.591***	−0.593***	−0.760***
	(0.0224)	(0.0209)	(0.0206)	(0.0290)
FIN_DEV	0.00630*	0.00624*	0.00793**	0.00325
	(0.00367)	(0.00348)	(0.00333)	(0.00459)
POP_DENS	−0.00000272	−0.0000594	−0.0000178	−0.000104*
	(0.0000200)	(0.000155)	(0.0000367)	(0.0000563)
POP_GROWTH	0.106***	0.0487	0.0804	−0.0256
	(0.0349)	(0.0462)	(0.0523)	(0.0221)
RETIRED	−0.0403	−0.148	−0.0268	0.395***
	(0.133)	(0.125)	(0.130)	(0.107)
REG_ALIGN	−0.000391	−0.000492	0.00150	−0.00211
	(0.00169)	(0.00192)	(0.00196)	(0.00149)
STATE_ALIGN	0.00643***	0.00134	0.000164	0.0110***
	(0.00208)	(0.00210)	(0.00192)	(0.00207)
FISCAL_AUT	−0.00212	0.0186	0.0308***	0.00103
	(0.0137)	(0.0121)	(0.0113)	(0.0124)
N	7249	7207	7236	7217
R^2 (within)	0.418	0.461	0.489	0.583
F_{STAT}	337.98***	364.04***	371.88***	470.53***
Fixed effects	Yes	Yes	Yes	Yes
Temporal effects	Yes	Yes	Yes	Yes

Note: Robust standard errors to heteroskedasticity and serial correlation are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1% significance levels, respectively.
Abbreviation: PC, per capita.

5.2 | Robustness checks

We performed several tests to verify the robustness of the results, the results of which are displayed in Table 8. The first test takes into account the potential persistence of efficiency over time, since institutions can be slow to change. Table 3 and the boxplots in Figure 1 indicate that in our case, government efficiency has some variation in our period. However, the variation is small and it can still be argued that it may be the result of unobserved yearly

TABLE 7 Determinants of municipal growth, instrumental variable estimations

Variable	Dependent variable: *INCOMEGROWTH* (i)	(ii)	(iii)	(iv)
Intercept	0.601***	0.683***	0.709***	0.821***
	(0.0294)	(0.0364)	(0.0354)	(0.0363)
EFF	0.101***	0.175***	0.153***	0.137***
	(0.0206)	(0.0317)	(0.0283)	(0.0261)
LAG_INCOME	−0.0671***	−0.0823***	−0.0828***	−0.0972***
	(0.00374)	(0.00547)	(0.00503)	(0.00506)
FIN_DEV		0.0156***	0.0152***	0.0136***
		(0.00225)	(0.00208)	(0.00192)
POP_DENS			−0.00000217**	−0.00000185**
			(0.000000845)	(0.000000798)
POP_GROWTH			0.120***	0.107***
			(0.0225)	(0.0221)
RETIRED			−0.0293***	0.00479
			(0.00905)	(0.00907)
REG_ALIGN				0.0000471
				(0.00104)
STATE_ALIGN				0.000403
				(0.00109)
FISCAL_AUT				0.0464***
				(0.00426)
N	14,560	14,560	14,560	14,456
R^2 (within)	0.223	0.198	0.210	0.224
F_{STAT}	383.01***	303.44***	249.92***	216.37***
Cragg–Donald F_{STAT}	261.67***	133.64***	161.47***	183.44***
Stock–Yogo (10%)	16.38	16.38	16.38	16.38
Anderson–Rubin F_{STAT}	26.59***	38.59***	34.69***	31.89***
Fixed effects	No	No	No	No
Temporal effects	Yes	Yes	Yes	Yes

Note: Results from the second stage of two-stage least-squares (2SLS) estimations. Efficiency is instrumented by political concentration (see Section 4.1). The first-stage regressions (available on request) yield a negative and significant association between political concentration and local government efficiency. Robust standard errors to heteroskedasticity and serial correlation are in parenthesis.

*, **, and *** denote significance at 10%, 5%, and 1% significance levels, respectively.

disturbances, which would lead to a scenario in which efficiency would follow a random walk. We discard that possibility by computing a time-invariant efficiency estimator for the whole period.

Specifically, we apply an extension of the original DEA model proposed by Surroca et al. (2016) that allows us to estimate long-term efficiency, taking into account the panel structure of the data set (Pérez-López et al., 2018). This approach yields a single time-invariant efficiency estimator representative of the whole period of analysis. In doing so, the reference technology considers inputs and outputs for every year under evaluation as well as the averaged values of the period for each observation. Accordingly, if a municipality appears as efficient in the panel data estimation, it will also be efficient in each respective year, because the underlying technology is not modified. The time-invariant efficiency scores (EFF_2) are used to estimate annual municipal growth in a Hausman–Taylor estimation. This estimation method is a hybrid of the fixed and the random effects model and, interestingly, it allows both variant and time-invariant regressors to be included. In this estimation, the new efficiency variable enters as time-invariant. The results, reported in the first column are in line with the main results.

As a second robustness test, we use alternative methodologies to compute our municipal efficiency scores, namely, Free Disposal Hull (FDH) and the bias-corrected DEA. The FDH estimator (Deprins et al., 1984) is a more general version of the DEA estimator that drops the convexity assumption. Accordingly, FDH provides higher average efficiency scores than DEA because it has a lower discriminatory power (i.e., it presents a higher number of efficient units). Moreover, the bias-corrected DEA (Simar & Wilson, 1998) corrects the upward-biased DEA estimator by applying bootstrapping techniques to analyze the sensitivity of the efficiency scores to the sampling variation and allowing for an accurate statistical inference. The results for the model using FDH (EFF_3) and the bias-corrected DEA (EFF_4) are displayed in columns 2 and 3 and show that the impact of efficiency on growth is robust to different methods of efficiency computation.

Third, given the intricacy of selecting the bundle of output variables to be included in the efficiency analysis (Balaguer-Coll et al., 2013) as well as the number of variables to include in the efficiency analysis, we considered an alternative output specification model to assess the robustness of our results (Narbón-Perpiñá et al., 2019; Narbón-Perpiñá et al., 2020; Narbón-Perpiñá & De Witte, 2018a; Narbón-Perpiñá et al., 2021). Specifically, this second output specification includes only six output variables (instead of 10) which represent all the minimum compulsory services for all local governments, regardless of their population size (see the first horizontal panel in table 2). The results for the alternative model (EFF_5) are reported in the fourth column of Table 8 and are also robust to this change.

As a final robustness test, we estimate models including spatial spillovers. In particular, we include in the model not only the lagged income of each municipality but also the lagged income of its neighbors to account for the development level of the nearby municipalities. These models might help to control not only for a potential contagion effect in terms of development, but also for the possibility that our dependent variable is capturing income generated by residents from their activities in neighboring municipalities. We used two alternative criteria to define the neighborhood. The first is based on distance and considers municipalities within a radius of 45 km as neighbors. This is the minimum distance for which all municipalities have at least one neighbor. The second is based on the *k-nearest* criterion and takes the 10 closest municipalities (k=10) as neighbors. Once the neighborhood of each municipality has been defined, we follow the standard practice in the spatial econometrics literature (see, for details, LeSage & Pace, 2009) and construct a row-standardized neighbor matrix (W), which is defined as follows:

$$W = \begin{cases} w_{ij}(n) = 0 & \text{if } i = j, \\ w_{ij}(n) = 0 & \text{if } i \neq j, j \notin nbr(i)_n, \\ w_{ij}(n) = \frac{1}{n} & \text{if } i \neq j, j \in nbr(i)_n, \end{cases} \tag{3}$$

TABLE 8 Robustness checks, alternative measures, and spatial spillovers

	Dependent variable: ***INCOMEGROWTH***					
	Hausman–Taylor	Fixed effects	Fixed effects	Fixed effects	FE spatial	FE spatial
Intercept	4.663***	5.481***	5.485***	5.486***	6.131***	6.133***
	(0.0698)	(0.140)	(0.140)	(0.140)	(0.152)	(0.141)
EFF					0.0142***	0.0145***
					(0.00535)	(0.00537)
EFF_2	0.0591***					
	(0.0162)					
EFF_3		0.0159***				
		(0.00446)				
EFF_4			0.0154**			
			(0.00632)			
EFF_5				0.0148***		
				(0.00543)		
LAG_INCOME	−0.4420***	−0.579***	−0.579***	−0.579***	−0.545***	−0.524***
	(0.0067)	(0.0145)	(0.0145)	(0.0145)	(0.0183)	(0.0192)
$LAG\_INCOMExW_{d=45}$					−0.103***	
					(0.0214)	
$LAG\_INCOMExW_{k=10}$						−0.124***
						(0.0204)
FIN_DEV	0.0143***	0.00655**	0.00674**	0.00675**	0.00639**	0.00612**
	(0.00209)	(0.00265)	(0.00265)	(0.00265)	(0.00264)	(0.00264)

(Continues)

TABLE 8 (Continued)

	Dependent variable: *INCOMEGROWTH*					
	Hausman–Taylor	Fixed effects	Fixed effects	Fixed effects	FE spatial	FE spatial
POP_DENS	0.00000614***	−0.00000654	−0.00000732	−0.00000185**	−0.00000926	−0.00000560
	(0.00000216)	(0.0000318)	(0.0000317)	(0.0000317)	(0.0000308)	(0.0000304)
POP_GROWTH	0.0727***	0.0687**	0.0664**	0.0667**	0.0677**	0.0708**
	(0.0201)	(0.0283)	(0.0284)	(0.0284)	(0.0285)	(0.0288)
RETIRED	−0.050**	−0.0908	−0.0852	−0.0863	−0.0751	−0.0839
	(0.0257)	(0.0864)	(0.0868)	(0.0866)	(0.0871)	(0.0874)
REG_ALIGN	0.000969	0.000609	0.000646	0.000651	0.000640	0.000744
	(0.00112)	(0.00125)	(0.00125)	(0.00125)	(0.00125)	(0.00125)
STATE_ALIGN	0.0036***	0.00364**	0.00364**	0.00365**	0.00367**	0.00364**
	(0.0010)	(0.00146)	(0.00146)	(0.00146)	(0.00146)	(0.00146)
FISCAL_AUTON	0.0631***	0.0134	0.0127	0.0124	0.0114	0.0109
	(0.0070)	(0.00871)	(0.00892)	(0.00888)	(0.00885)	(0.00885)
N	14,456	14,456	14,456	14,456	14,456	14,456
R^2 (within)		0.431	0.431	0.431	0.4327	0.4340
χ^2	8,600.48***					
F_{STAT}		885.32***	891.15***	894.62***	919.45***	942.57***
Fixed effects	No	Yes	Yes	Yes	Yes	Yes
Temporal effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors to heteroskedasticity and serial correlation are in parenthesis.
*, **, and *** denote significance at 10%, 5%, and 1% significance levels, respectively.

where w_{ij} terms denote the spatial weights connecting municipalities i and j and $nbr(i)_n$ denotes the neighborhood of i given a specific neighborhood criterion n. To obtain spatial lags of a given variable, we multiply that variable by W.

The results of the spatial models are reported in the last two columns of Table 8. The coefficient of government efficiency barely changes and remains highly significant. Moreover, the differences between the two different neighboring approaches are negligible, indicating that both criteria are able to capture the underlying spatial effect in a similar way. The results for the spatially lagged variable show it has a negative sign, in line with the nonspatial lagged income. Thus, lower lagged income in one municipality not only improves its own growth prospects but also those of its neighbors.[22] This indicates that nearby municipalities have similar income levels, which is consistent with the regional science literature (Peiró-Palomino et al., 2020) and with studies at the municipal level in the Spanish context (Hortas-Rico & Rios, 2019).

6 | CONCLUSIONS

Over the past 20 years, several contributions have documented that economic development and other social indicators, such as health, subjective well-being, happiness, or environment, among others, are directly related to the quality of government. The available cross-country empirical evidence in this regard is now vast, generally finding strong support for the hypothesis that socioeconomic performance is higher when governments act impartially, efficiently, and without corruption.

Whereas several institutions provide measures at the country level, the information for lower levels of government is scarcer—if not directly unavailable. The literature has recently been filling this gap (Charron et al., 2014; Charron & Lapuente, 2013; Rodríguez-Pose & Garcilazo, 2015; Tabellini, 2010) showing that, indeed, disparities in quality of government measures at subnational levels can be even greater than at the national level. However, if we focus on the (generally) lowest level of government, that is, municipalities, measures of quality of government are virtually nonexistent. In addition to this, the literature on quality of government indicates that among the different dimensions included, one of them is public sector efficiency—that is, governments must act "in an impartial, efficient way, and without corruption" (Charron et al., 2019). However, this is only rarely measured. Therefore, we combine these two gaps in the literature and analyze how an explicit measure of local government efficiency (as a specific dimension for quality of government) might impact on economic growth at the municipal level.

The study is carried out for a wide sample of Spanish municipalities for the period 2008–2015, a particularly interesting scenario, due to the strong impact that the crisis had on the economy during this period. We also analyzed what other factors (economic, demographic, or political) can affect municipal growth. This is an additional contribution of the study since growth at the municipal level is only rarely analyzed. One of the reasons is that, up to now, information on per capita income was not available at this level of government. Therefore, its availability enables us to evaluate some links which might be as important for municipalities as for other levels of government, and others that are more specific to local governments. Although the mechanisms depend on the powers devolved to municipalities, which vary from country to country, they would include, among others described in Section 2, the ease of allocating resources more efficiently in local jurisdictions to fund growth-enhancing expenditures, as well as the efficacy of fiscal policies in countering area-specific recessionary shocks (Acconcia et al., 2014).

The empirical strategy proceeded in two stages, the first measuring municipal efficiency, which was subsequently incorporated in the second stage of the analysis as a regressor in the models considered. We estimated a variety of specifications, including different controls, instrumental variables, and alternative scenarios. Our main conclusion is that efficiency improvements have a positive and significant impact on municipal growth, the results

[22]The robustness of the results was checked with other matrix specifications, using higher distances (50, 55, and 60 km) and different number of neighbors in the k-nearest criterion (5, 7, and 12 nearest municipalities). The results are robust to all these specifications and they can be provided on request.

of which are robust for all scenarios analyzed. These efficiency improvements have a higher impact in the case of relatively poor municipalities and in municipalities with low-efficiency levels. In addition to efficiency, other factors of municipal growth are financial development, population growth, and national political alignment.

Our study therefore suggests that quality of government at the municipal level is just as important as it can be for higher levels of government—in the case of Spain, regions (*comunidades autónomas*), and the central government. We consider this result is particularly relevant in decentralized contexts, in which all public sector inefficiencies, regardless of level of government, can throw sand in the wheels of economic growth (Méon & Sekkat, 2005). The impact of the variable is mostly robust to different specifications and inclusion of instrumental variables. However, municipal wealth is not only connected to a single factor—efficiency—but also to other individual factors, which all contribute to explaining the heterogeneity of economic growth found in our sample. In this regard, it is also important to highlight that the study contributes to the literature on the determinants of economic growth at this level of government, for which previous evidence is scanter in comparison to the regional or country level.

Our study is not free from limitations, mostly related to the difficulty of finding variables beyond the regional level. For instance, our dependent variable, disposable income per capita, might be capturing residents' income generated in other municipalities. We attempted to mitigate this potential problem by means of spatial models, but another variable, such as productivity would probably perform better. Unfortunately it is not available at the municipal level. Moreover, our measure of quality of government is admittedly crude, in the sense that it reflects only one of its dimensions. Indeed, as Rodríguez-Pose and Zhang (2019) point out, "institutions are very hard to measure." Although restraining the analysis to one of its attributes could be understood as a limitation, we must bear in mind that, as acknowledged by the quality of government literature, its measures and dimensions are usually highly correlated. In contrast, it has several advantages, particularly that we know exactly what is being measured and, more importantly, that there is an important body of literature on its exact measurement (apart from other related issues), which opens the way to explore how some variables affect urban economic growth via indirect (efficiency) paths.

ACKNOWLEDGMENTS

We thank José Antonio Camacho, Juan Pérez, Daniel Tirado, Diego Prior, Pilar Poncela, Joan Crespo, Antonio Montañés as well as participants at the XLV International Conference on Regional Science (2019) and XVI INTECO Workshop on International Economic Integration (2019). We are particularly grateful to three anonymous reviewers, whose comments contributed greatly to an overall improvement of the paper. We acknowledge the financial support of the Ministerio de Economía y Competitividad (ECO2017-88241-R and ECO2017-85746-P), Generalitat Valenciana (PROMETEO/2018/102 and HIECPU/2020/1), and Universitat Jaume I (UJI-B2020-27 and UJI-B2020-48). The usual disclaimer applies.

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How to cite this article: Balaguer-Coll, M. T., Narbón-Perpiñá, I., Peiró-Palomino, J., & Tortosa-Ausina, E. (2021). Quality of government and economic growth at the municipal level: Evidence from Spain. *Journal of Regional Science*, 1–29. https://doi.org/10.1111/jors.12555