ON THE DETERMINANTS OF LOCAL GOVERNMENT DEBT: DOES ONE SIZE FIT ALL?

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ABSTRACT: This article analyzes the factors that directly influence levels of debt in Spanish local governments. Specifically, the main objective is to find out the extent to which indebtedness is originated by controllable factors that public managers can influence, or whether it hinges on other variables beyond managers’ control. The importance of this issue has intensified since the start of the crisis in 2008, due to the abrupt decline of revenues and, simultaneously, to the fact that the levels of costs these institutions face has remained the same or, in some cases, increased. Results can be explored from multiple perspectives, given that the set of explanatory factors is also multiple. However, the most interesting finding is the varying effect of each covariate depending on a municipality’s specific debt level, which suggests that economic policy recommendations should not be homogeneous across local governments.

INTRODUCTION

In recent years, the problems of local treasury departments have attracted increasing attention and concern in several Euro-area countries. Some of the most
serious of these problems are related to high debt levels, which are now a concern for local politicians, since it is frequently the case that the only way they can fulfill their commitments is through borrowing. This situation also presents a problem for public managers, who are aware that higher levels of municipal debt will lead to increased fiscal pressure. Politicians at a national level are also concerned, since indebtedness in a large number of local governments will inevitably have an impact on the national economy.

In the particular case of Spain, our focus in this article, local governments are now responsible for a growing number of powers (although still much fewer than regions or comunidades autónomas), with a corresponding increase in the functions they perform, and resulting higher expenditure levels. In addition, their basic resources are often insufficient to keep pace with the rate of growth of their expenditure (López-Hernández et al. 2012). These circumstances have led to high levels of indebtedness in most local governments. Although the problem of local debt is relatively modest on a national scale, because the local public sector is less important than the other public organizations (central and regional), it has become a threat to local government solvency and, moreover, may have a negative effect on macroeconomic financial stability.

The severity of these issues has deepened since the start of the 2008 financial crisis, which developed into a real economic crisis, resulting in the burst of the housing bubble, a deep recession, and an unemployment rate that is currently more than twice the average rate in the European Union (EU).

This new macroeconomic scenario has had a profound impact on the public sector, leading to very high levels of deficit across all strata of government—central, regional, and local—although the level of total debt in Spain is still lower than that of many other EU countries. Local governments have also been affected and, in many cases, this new economic context has exacerbated difficulties to raise revenues they have faced since the Spanish constitution was approved in 1978. The crisis has led to a sharp decline in municipal revenues while, simultaneously, their costs have either remained the same or increased, forcing local governments to find new tools for dealing with the new financial scenario (Brusca Alijalde et al. 2012). It therefore seems reasonable to design policies that take into account the major sources of debt for Spanish municipalities.

Several contributions have analyzed the factors influencing past levels of local government debt, some examples of which include Inman and Fitts (1990) and Kiewiet and Szakaty (1996). These and related studies have dealt with the general issue of monitoring local government debt. Other relevant contributions in a similar line have considered more specific questions, such as the need to guarantee a balanced budget in the long run (Poterba 1997), the importance of preserving the principle of intergenerational equity when issuing debt (Musgrave 1989), or of minimizing the use of debt as a political instrument to prevent a disproportionate rise of taxes in constituencies (Cabasés et al. 2007).

The literature that explicitly explores the determinants of municipal debt, however, is not especially large, although it does contain some relevant contributions. Cross-country studies are virtually nonexistent, which introduces certain difficulties when reviewing the international literature. Some notable, specific country-based studies include, among others, Cropf and Wendel’s (1998) analysis of the UK case,
Ashworth et al.'s (2005) and Bastiaens et al.’s (2001) study of Flemish municipalities, or Baber and Gore (2008) and Bridges (2005), who focus on local governments in the US.

Against this background, the objective of the present article is to analyze whether certain economic, political, or social factors influence levels of debt in Spanish local governments. In the same context, Guillamón et al. (2011) provide a recent summary of the literature focusing on different aspects of municipal debt. Our contribution to this growing literature is twofold. First, we attempt to reveal the extent to which debt stems from factors that can be controlled and that managers can influence, or otherwise. The existing literature in this field has identified some relevant variables explaining the level of municipal debt. Second, using quantile regression, we provide an alternative perspective on how to evaluate the impact of each explanatory variable on municipalities’ debt.

The available empirical literature, whether on the Spanish case or other scenarios, has not considered the possibility that the effect of certain variables could depend on the level of debt of each particular local government, since all previous studies focused on the observable effects in terms of the average level of debt. As a result, it might well be the case that a variable with a specific average impact could play a very different role, depending on how indebted a municipality is. For instance, when the level of municipal debt is related to fiscal capacity, for local governments with few debts, we would expect that the greater the fiscal capacity—i.e., the more revenues coming from the respective municipal resources—the lower the need to raise funds from external borrowing. On the other hand, local governments with high fiscal capacity can make major investments because they may find it easier to raise money by increasing their level of debt beyond the reasonable limits for municipalities with poor fiscal capacity. In summary, we provide an alternative perspective to the existing literature in order to disentangle whether or not the variables explaining the level of municipal debt can be controlled by managers.

We apply quantile regression (Koenker 2001; 2005) to implement this perspective. This estimation method differs from other, more frequently applied approaches, such as ordinary least squares, in that it focuses on the effect each covariate has on the conditional distribution of the dependent variable—in our case, debt levels. Its informative power is therefore higher and, as a result, the number of relevant applications is rising in a variety of fields. This has been the case of finance and development especially, some examples of which include Klomp and de Haan (2012) and Klomp (2013), Abdelsalam et al. (2014) and Alamá and Tortosa-Ausina (2012), Peiró-Palomino and Tortosa-Ausina (2013), and Cunningham (2003), to name a few. In the case of finance, this approach is particularly informative since, as Klomp and de Haan (2012) and Klomp (2013) point out, some variables might affect high- and low-risk banks differently. In the case of development, Cunningham (2003) notes that the determinants of growth might be different for countries with different growth rates. However, there are fewer contributions in the case of local government studies, and those that do exist are related indirectly (see, for instance, Poterba and Rueben 1994; Mueller 1998; Eide and Showalter 1998, to name a few).
Our results can be helpful in designing strategic plans to reduce the level of debt because the first decisions to be made should concern variables that have a significant impact and, in one way or another, are easily influenced by public managers. In particular, we found that, for most of the variables, the effect on debt varied, which largely explained some of the “mixed” findings in the literature; in other cases, the effect even had opposite signs for municipalities with differing levels of debt. Obviously, the combination of the two dimensions (degree of controllability and analysis for varying levels of debt) influences the level of severity of the problems caused by high municipal debt levels. These results will be reported in both tables and figures. As we shall see, the latter are particularly informative, since, for several variables, the coefficients corresponding to their impact on debt are either increasing or decreasing—but, in any case, varying. This would therefore highlight the relevance of using quantile regression not only in this specific context, but also in other public policy and public management contexts; in other words, the use of this tool could be generalized.

The article is structured in six sections. After this introduction, the second section briefly reviews previous studies on local government debt in the same context, and presents the theoretical framework on the likely impact of fiscal, socioeconomic, and political forces, in order to discover whether managers can exert any influence on them. The third section provides information on the selected variables, and the empirical model is presented in the fourth section. The results of the analysis are discussed in the fifth section and, finally, the sixth section reports the main conclusions of the study.

**Forces That Influence Local Governments’ Public Debt**

The literature on the determinants of municipalities’ debt is heterogeneous in several respects. Given that differences can be quite striking, we follow Cropf and Wendel (1998) in considering three general types of forces that can impact on municipal debt policies; namely, financial (or fiscal), political, and social forces. Some of these can be controlled by local governments, but others lie beyond their influence. However, the increasing importance of debt for growth in many cities around the world, and also the general rise in indebtedness (in direct conflict with the austerity policies being implemented in many European countries), call for an understanding of which factors are having a stronger effect on municipal debt patterns and their likely impact on city policies.

**Fiscal and Financial Forces**

The first of these financial covariates can be broadly defined as “capital expenditure.” We term it \( \text{INVEST} \), since these expenditures are included in municipal budget categories corresponding to physical capital investments. Specifically, we will define it as total capital expenditures (capital transfers plus acquisitions of capital goods) divided by population. However, the variable is somewhat ambiguous, since there is no standard definition of precisely what it represents, in neither the Spanish case nor any other
In general—or, more precisely, on average—we can expect a positive relationship between debt and the capital expenditure variable. This is the case of Spain, where the law establishes that local governments can resort to long- or short-term public or private credit in any of its forms in order to finance their investment expenditure. The exact definition and descriptive statistics for this variable are provided in Tables 1 and 2, respectively.

The second financial force that may influence local governments’ debt is net savings, which we refer to as \textit{NETSAV}, and can broadly be described as the available funds municipalities can use to make their own investments. It corresponds to the difference between gross savings minus amortization expenses. Gross savings (which can be defined, following Fernández Llera et al. (2004), as the difference between current income minus current expenses) indicate local governments’ capacity to cover financial amortization. Hence, the lower the level of gross savings, the higher will be the need to resort to borrowing.

Some previous contributions on Spanish municipalities’ debt levels have considered a variable that corresponds to the ratio of non-financial surplus to deficit. We will refer to this variable as \textit{BUDGET}, which, in accounting terms (i.e., in terms of budget categories) can be broadly defined as the difference between the sum of the net recognized expenditures and the sum of net recognized revenues. However, although the specific definition of the variable might be interpreted in various ways, the sign of the impact on the levels of debt is not open to interpretation. If non-financial expenditures are higher than non-financial revenues, there will be a non-financial deficit and, therefore, it may be expected that the local government will have to go further into debt in order to balance such a deficit. Therefore, if we consider this variable as the ratio of non-financial budget expenditure to non-financial budget revenue, which we will refer to as \textit{BUDGET}, its relation to debt should be positive, since local governments will turn to this resource more in order to balance the non-financial deficit.

The literature has also considered a variable reflecting each municipality’s own fiscal capacity, which is usually defined as the ratio of direct taxes, indirect taxes, and revenues from other taxes to all expenditures. It indicates the percentage of total revenues (excluding indebtedness) represented by municipalities’ own resources, and some authors, such as Vallés et al. (2003), refer to this variable as “fiscal responsibility,” although they define it slightly differently, dividing it by GDP. These authors point out that the relationship between own fiscal capacity, which we refer to as \textit{FISCCAP}, and the level of debt is unclear since, in principle, municipalities that have more of their own resources will be under less pressure to borrow.

Finally, amongst the financial variables, the literature has also included what we refer to as “expenditure commitment” (\textit{EXPCOMM}), which corresponds to the sum of personnel and financial expenditures divided by total expenditures. The quantities in the numerator are usually very rigid and difficult to reduce, at least in the short run (see Fernández Llera et al. (2004)). Given such inflexibility, municipalities might be impelled to issue debt and, therefore, we might expect a positive link between this variable and debt levels.
| Type of variable | Variable name | Description | Definition/Calculation | Expected sign | Controllable/Non-controllable (short-term basis) |
|------------------|---------------|-------------|------------------------|---------------|------------------------------------------|
| Dependent variable | **DEBT/POP** | Debt level per inhabitant | (Total debt)/population | + | Controllable |
| Independent variable | **FINANCIAL** | Capital expenditures | (Capital transfers plus acquisitions of capital goods)/population | + | Controllable |
| Financial fiscal | **NETSAV** | Net savings (funds available to make investments) | (Gross savings – amortization expenses)/population | – | Controllable/Non-controllable |
| | **BUDGET** | Non-financial deficit/non-financial surplus | (Non-financial budget expenditures, headings 1 to 7 of NRE⁹)/(non-financial budget revenue, heading 1 to 7 of NRR⁹) | + | Controllable |
| | **FISCCAP** | Own fiscal capacity (revenues represented by municipalities’ own resources) | (Taxation revenues (NRR⁹ headings 1 to 3))/(Total revenues) | +/– | Controllable |
| Socioeconomic | **TOURISM** | Level of tourism | Index based on the (local) business tax (Impuesto de Actividades Económicas, IAE’) for tourism-oriented activities | + | Non-controllable |
| **ACTIVITY** | **DENSITY** | **POLITICAL** | **FORAL** | **POWERS** |
|-------------|-------------|---------------|-----------|------------|
| Level of economic activity | Population density | Color of municipality’s governing party | Foral regions (Navarre and the Basque Country) | Decentralization |
| (Local business tax (IAE\(^c\)) corresponding to the municipality’s economic activities)/(total IAE\(^b\) revenues for all Spanish municipalities) × 10,000 | Inhabitants per km\(^2\) | Dummy variable taking the value of 1 for municipalities governed by left-wing parties, 0 otherwise | Dummy variable taking the value of 1 for municipalities in the foral regions | Dummy variable taking the value of 1 for municipalities with fewer powers |
| (+) Non-controllable | (−) Non-controllable | (+) Non-controllable | (−) Non-controllable | (+/−) Non-controllable |

\(^a\)Non-financial budget expenditures are grouped into current expenditure and capital expenditures. The first ones contain four further categories, which account for: personnel expenditure, current goods and services expenditures, financial expenditures, and current transfers. Capital expenditures include investments and transfers to third parties in order to finance investments (headings 1 to 7 NRE). *NRE*: Net Recognized Expenditures.

\(^b\)Non-financial budget revenues contain current and capital expenditures. Current revenue comprises direct and indirect taxes, fees for services and received current transfers. Capital revenue includes disposal of investments and received capital transfers (headings 1 to 7 NRR). *NRR*: Net Recognized Revenues.

\(^c\)IAE: *Impuesto de Actividades Económicas* (local business tax).
### TABLE 2
Descriptive Statistics of the Relevant Variables

| Type of variable | Variable name | # of observations | Mean     | Std. Dev. | 1st quartile | Median   | 3rd quartile |
|------------------|---------------|--------------------|----------|-----------|--------------|----------|-------------|
| **Dependent variable** |               |                    |          |           |              |          |             |
|                  | $DEBT / POP^a$ | 1,381              | 0.2851   | 0.2873    | 0.0686       | 0.2134   | 0.4151      |
| **Independent variables** |               |                    |          |           |              |          |             |
| Financial/fiscal | $INVEST$      | 1,381              | 1.0355   | 0.1827    | 0.9336       | 1.0120   | 1.1090      |
|                  | $NETSAV^b$    | 1,381              | 87.8060  | 422.6137  | -8.4856      | 51.7434  | 119.0209    |
|                  | $BUDGET$      | 1,381              | 1.0353   | 0.1827    | 0.9336       | 1.0118   | 1.1088      |
|                  | $FISCCAP$     | 1,381              | 0.4357   | 0.1528    | 0.3212       | 0.4407   | 0.5425      |
|                  | $EXPCOMM$     | 1,381              | 0.6517   | 0.1268    | 0.5770       | 0.6635   | 0.7438      |
| Socioeconomic    | $TOURISM^c$   | 1,381              | 52.8704  | 349.2460  | 0.0000       | 2.0000   | 10.0000     |
|                  | $ACTIVITY^c$  | 1,381              | 56.4461  | 361.9620  | 2.0000       | 7.0000   | 23.0000     |
|                  | $DENSITY^d$   | 1,381              | 0.0246   | 0.0355    | 0.0031       | 0.0119   | 0.0310      |
| Political        | $POLITICAL^e$ | 1,381              |         |           | 1: 774; 0: 607 |        |             |
|                  | $FORAL^f$     | 1,381              |         |           | 1: 54; 0: 1,327 |        |             |
|                  | $POWERS^g$    | 1,381              |         |           | 1: 703; 0: 678 |        |             |

*In logs; $DEBT$ in thousands of €.

*b All the political variables used are dichotomous variables and therefore their values are not reported.

Both $TOURISM$ and $ACTIVITY$ are index numbers constructed by La Caixa Foundation. See “Anuario Económico de España” (Spanish Economic Yearbook) for details (http://www.anuarieco.lacaixa.comunicaciones.com).

*d In square kilometers per inhabitant (i.e., inverse of the usual definition of density).

*e Dummy variable which takes the value of 1 for municipalities governed by left-wing parties.

*f Dummy variable which takes the value of 1 for municipalities in foral regions.

*g Dummy variable which takes the value of 1 for municipalities with fewer powers.
Socioeconomic Forces

The second set of variables we will consider can be broadly defined as socioeco-
nomic variables. In this case, there are more studies available from which to select
the covariates, as most of the variables included in this category have a more standard
definition.

Some authors (Benito and Bastida 2004; 2005) have included level of tourism
(TOURISM) in their models. Tourist municipalities have higher expenditure on
infrastructures and face a higher demand for services than other towns and cities
and, as a result, they will need to borrow more in order to meet this additional
expenditure. The expected sign for this variable with regard to debt level should
therefore be positive.\textsuperscript{14}

Previous studies have also considered per capita income. The link with the level of
municipal debt is explained, among others, by Farnham (1985), who notes that the
per capita income variable reflects the influence of a positive income elasticity of
demand for capital goods, which would imply a positive link between this variable
and debt. However, there is no full consensus on this point, and the expected sign
for this variable is debatable.\textsuperscript{15} The per capita income variable is estimated on the
basis of available household income figures by province provided in the INE\textsuperscript{16}
Regional Accounting section.\textsuperscript{17} We will not use economic level exactly, since it is
no longer available; rather we use the level of economic activity, which we refer to
as ACTIVITY.\textsuperscript{18}

The literature has also considered the density of the municipality (DENSITY),
measured as inhabitants per square kilometer. According to Hortas-Rico and
Solé-Ollé (2010), the urban spatial structure of many Spanish cities, measured as
urbanized land per person, not only has an environmental impact, but also a major
effect on municipal finances. Benito et al. (2010) also consider similar issues. Specifi-
cally, these authors evaluate the impact of urban sprawl on municipal expenditures,
finding that the higher the population density, the lower the total expenditures and
current expenditures per capita which, in principle, would lead to lower levels of debt
(negative relationship).

Political Forces

Numerous studies have associated debt with aspects of a political nature (which
we will refer to as political factors), such as political fragmentation, ideology (pro-
gressive or conservative), or the length of time in office. Although it is a highly
nuanced question, a considerable number of contributions have been made in the
field, applied to very different contexts.

As Benito and Bastida (2004) point out, political theory has traditionally claimed
that left-wing governments are more lax in their governmental financial discipline.
Left-wing governments would therefore advocate a larger public sector, generally
with more powers, than right-wing governments, and would ultimately become more
indebted. Although a substantial number of studies have tested and corroborated
this theory (see, for instance, Blais and Nadeau 1992; Dickson and Yu 1997; Galli
and Rossi 2002), others have found that the link is not significant (see, for instance, Abizadeh and Gray 1993). In contrast, some studies, albeit fewer in number, conclude that right-wing governments accumulate more debt when facing a higher probability of defeat; one such study is by Pettersson-Lidbom (2001), who examines debt accumulation among local governments in Sweden. We will refer to this variable as POLITICAL, which is a dummy variable taking the value of 1 for municipalities governed by left-wing parties.

Two Spanish regions (Navarre and the Basque Country) are classified under a special foral regime, which essentially gives them more independence in managing transferred taxes and powers. In terms of municipalities, the minimum services that local governments in these regions are obliged to provide is different from those for the rest of Spanish municipalities. One might hypothesize, therefore, that these discrepancies will turn into differences in levels of municipal indebtedness. We refer to this variable as FORAL, defined as a dummy variable taking the value of 1 for municipalities in foral regions. The expected sign for this variable could a priori be undefined.19

We can also consider the FORAL variable to be strongly linked to the issue of decentralization. Some authors have dealt with the specific issue of how the different levels of powers Spanish municipalities have might impact on their efficiency in providing services. Specifically, Balaguer-Coll et al. (2013) argue that some municipalities with lower levels of powers might go beyond the legal minimum, providing more services than those legally required. This rationale would point to higher levels of debt. Therefore, one might hypothesize a negative link between the level of powers and the level of municipal debt. The variable POWERS takes the value of 1 for municipalities with fewer powers. Therefore, the sign one might expect is actually positive because of how the variable is defined.

DATA, VARIABLES, AND SOURCES

The sample comprises a large set of Spanish municipalities for which budgetary information is available for the year 2008. The representativeness of the sample is reported in Table 3. It is important to note that, when selecting our budgetary information, we chose actual expenditure and revenues (net recognized assets and net recognized liabilities) rather than budgetary data (final expenditure and revenue forecasts), despite the fact that these budgetary implementations are not published promptly. If final forecasts had been used instead of actual implementations, results could have been severely distorted, since forecasts tend to underestimate expenditures and overestimate revenues.

The reason why the sample is relatively small (compared to the total number of Spanish municipalities) is that we restricted it to those municipalities for which information was available for all variables (complete panel). We removed the municipalities that had no information on their budgetary payments (actual expenditure and revenues) and also those for which the database (La Caixa Yearbook) offered no information on the socioeconomic variables. This Yearbook does not provide
information for municipalities with fewer than 1,000 inhabitants (which represent about 40% of all Spanish municipalities). Although this might initially seem a significant reduction, we should bear in mind that Spanish municipalities with over 1,000 people account for more than 96% of the total population.

The year 2008 was chosen because it marked the start of the crisis in Spain. It might therefore be interesting, a priori, to include more years, since the effects of the crisis for local governments were more evident in later years. However, we consider this is problematic for a variety of reasons. First, local governments have faced remarkable difficulties since the crisis started, in many cases related to the burst of the housing bubble. Therefore, a dynamic analysis which included both pre-crisis and crisis years would be relevant, but its aims would go beyond the scope of this

| Region or autonomous city | Number of municipalities in the sample (A) | Total number of Spanish municipalities (B) | Representativeness of the simple (A/B, %) |
|---------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| Andalusia                 | 189                                      | 579                                      | 32.64                                    |
| Aragon                    | 50                                       | 117                                      | 42.74                                    |
| Asturias                  | 25                                       | 62                                       | 40.32                                    |
| Valencian Community       | 145                                      | 323                                      | 44.89                                    |
| Canary Islands            | 55                                       | 87                                       | 63.22                                    |
| Cantabria                 | 49                                       | 72                                       | 68.06                                    |
| Castile La                | 119                                      | 294                                      | 40.48                                    |
| Mancha                    | 49                                       | 72                                       | 68.06                                    |
| Castile and León          | 140                                      | 269                                      | 52.04                                    |
| Catalonia                 | 189                                      | 464                                      | 40.73                                    |
| Extremadura               | 89                                       | 187                                      | 47.59                                    |
| Galicia                   | 195                                      | 298                                      | 65.44                                    |
| Balearic                  | 13                                       | 61                                       | 21.31                                    |
| Isalands                  | 8                                        | 31                                       | 25.81                                    |
| Madrid                    | 51                                       | 129                                      | 39.53                                    |
| Murcia                    | 9                                        | 43                                       | 20.93                                    |
| Navarre                   | 2                                        | 85                                       | 2.35                                     |
| Basque                    | 51                                       | 150                                      | 34.00                                    |
| Ceuta                     | 1                                        | 1                                        | 100.00                                   |
| Melilla                   | 1                                        | 1                                        | 100.00                                   |
| Total                     | 1,381                                    | 3,253                                    | 42.45                                    |

a The municipalities in the sample represent 72.68% of Spain’s total population (2008).

b Municipalities with a population over 1,000.

c Autonomous city.
article. Second, information for some of the study variables is not available for all years. Third, as we shall see, some variables are actually time-invariant. In this sense, conducting a panel data analysis (i.e., extending the analysis to more years) with time-invariant variables is problematic from a methodological point of view. Specifically, Plümper and Troeger (2007) propose a three-stage procedure for the estimation of time-invariant (as well as rarely changing) variables in panel data models. More specifically, the advantage of a fixed-effects (FE) model comes at a price: since the FE model uses only the within variance for the estimation and disregards the between variance, it does not allow for the estimation of time-invariant variables (Plümper and Troeger 2007; Baltagi 2001; Hsiao 2003). Finally, although extending the analysis to the pre-crisis period (i.e., prior to 2008) would be desirable, this is not possible because there is no information on our dependent variable for the previous years.

The choice of exogenous factors is guided by the theoretical framework presented in the next section. Table 1 defines each one of the independent variables in the study, also indicating its expected impact on debt according to the theoretical framework, and whether the variable is controllable or non-controllable. Table 2 provides some summary statistics.

The variables come from several sources. The fiscal variables are mainly obtained from the municipalities’ budgetary information, with the exception of population or GDP and population, which are provided by the Spanish Bureau of Statistics (INE). The socioeconomic forces, TOURISM and ACTIVITY, are taken from La Caixa Foundation (Spanish Economic Yearbook), whereas DENSITY is provided by the INE. The political variables FORAL and POWERS were constructed by the authors, and the POLITICAL variable is provided by the Spanish Interior Ministry (Ministerio del Interior).

Regarding the units of measurement, although the fact that the dependent variable is in per capita terms would imply that the regressors should also be expressed in per capita terms, we should take into account that the determinants are either ratios (such as the financial variables), indexes (such as TOURISM and ACTIVITY), dummy variables (such as the political variables), or another type of variable (DENSITY) that would be more difficult to interpret in per capita terms. Therefore, we consider it pertinent to express them in their current form. In contrast, if the dependent variable was not expressed in per capita terms, then results would be wholly determined by the relative sizes of the municipalities.

**METHODOLOGY**

In order to analyze how the variables reviewed in the previous section influence levels of debt, we will specify a model in which the dependent variable is the level of municipal debt per inhabitant. We will refer to debt per inhabitant and debt per capita interchangeably throughout the article. Consistent with the contents of the previous section, this model will consider the three groups of explanatory variables examined earlier (financial, socioeconomic, and political) whose impact
on debt operates through the mechanisms described earlier. As for the units of measurement, our model is dimension-free; i.e., both dependent and independent variables are expressed in terms of population. In practical terms, this implies that only the dependent variable is in per capita terms, since the independent variables are either ratios (financial forces as well as tourism) or dummy variables (political variables), and the rest of the independent variables (level of economic activity, density) are also dimension-free.

**OLS Regressions**

Since the dependent variable is the total municipal debt per inhabitant, many of the selected covariates will also be expressed as shares of population. Therefore, we might initially consider the following empirical model:

\[
(DEBT/POP)_i = \beta_0 + \beta_1 INVEST_i + \beta_2 NETSAV_i + \beta_3 BUDGET_i \\
+ \beta_4 FISCCAP_i + \beta_5 EXPCOMM_i + \beta_6 TOURISM_i \\
+ \beta_7 ACTIVITY_i + \beta_8 DENSITY_i + \beta_9 POLITICAL_i \\
+ \beta_{10} FORAL_i + \beta_{11} POWERS_i + \varepsilon_i
\]  

(1)

Each of the lines in Equation (1) contains the three different types of variables considered in the second section. In the first two lines, after the intercept \((\beta_0)\), we include the financial variables referred to in subsection 2.1 (\(INVEST, NETSAV, BUDGET, FISCCAP\) and \(EXPCOMM\)); the third line displays the socioeconomic variables described in subsection 2.2 (\(TOURISM, ACTIVITY,\) and \(DENSITY\)); and the fourth one includes the political variables described in subsection 2.3 (\(POLITICAL, FORAL\) and \(POWERS\)). \(\varepsilon_i\) is the error term corresponding to municipality \(i\), with \(i = 1, \ldots, n\).

Our units of observation—municipalities—differ in many significant ways, such as size. This is a common source of heteroskedasticity, which is a strong assumption that may not hold in applied problems like the one we are dealing with where the units of observation have an important spatial component. Some relatively recent contributions, such as Anselin and Lozano-Gracia (2008) or Baltagi et al. (2008), are typical examples of empirical applications that require the use of spatial heteroskedasticity and autocorrelation consistent estimators. Therefore, Equation (1) was estimated using Ordinary Least Squares (OLS), correcting for both autocorrelation and heteroskedasticity—an estimation we will refer to as HAC (heteroskedasticity and autocorrelation corrected).

**Evaluating the Determinants of Local Debt Using Regression Quantiles**

Models such as the one presented in Equation (1) are typically estimated using Ordinary Least Squares (OLS). Alternatively, we will consider quantile regression (Koenker 2005), which allows estimation of the conditional quantiles of a response
variable distribution (in our case, the debt of each municipality) in a linear model that provides a much more detailed and comprehensive view of likely causal relationships between our variables of interest. Specifically, the estimation of models such as those presented in the previous section are relevant, but they confine the analysis to providing information on average impacts, which, in our case, would be the average impact for the average municipality. Using this instrument, the analyst will only be able to determine whether the mean effect of a covariate on a response variable is significant or not.

Quantile regression is an alternative to conditional-mean modeling, in which conditional quantiles are modeled as functions or predictors. It is a natural extension of the linear-regression model. The novelty is that, whereas the linear-regression framework specifies the change in the conditional mean of the dependent variable, the quantile regression model specifies changes in the conditional quantile. It therefore means the previously mentioned problems can be tackled more precisely. Applications are growing in a variety of fields (see, for instance, the survey by Buchinsky (1998)), but they are still largely outnumbered by those using linear models focusing exclusively on average behavior. Therefore, quantile regression does not confine the analysis to regression against averages (and hence it is not limited in its explanatory values), but rather it also uses information obtained from the underlying distribution of the dependent variable.

In our case, we can consider the entire distribution of local debt using quantile regression, which will enable us to provide a fuller picture of the relationship between variables—i.e., local debt and the relevant covariates. We can therefore specifically investigate whether, for municipalities whose debt is low (corresponding to the lower tail of the distribution, or to the lower quantiles), the sign and significance of the determinants is the same as for other municipalities whose debt is high (those lying in the higher tails of the distribution, and corresponding to the highest quantiles). This modeling will enable specific policies to be designed depending on each particular financial situation. Therefore, in the present study, we consider that both low- and highly indebted municipalities (especially the latter) are of interest in their own right—we do not want to consider them as outliers—and quantile regression allows us to analyze them in greater detail.22

Compared with basic models estimated via OLS, regression quantiles specify the \( \tau \)th quantile of the conditional distribution of \( y_i \) given \( x \) as a linear function of the covariates. As described by Koenker (2005), the estimation is carried out by minimizing the following equation:

\[
\min_{\beta \in \mathbb{R}^k} \sum_{i \in \{i,y_i \geq x' \beta \}} \tau |y_i - x' \beta| + \sum_{i \in \{i,y_i < x' \beta \}} (1 - \tau) |y_i - x' \beta|,
\]

where \( y_i \) is the same dependent variable as in Equation (1) for municipality \( i \), \( x \) is the vector of explanatory variables, \( k \) is the number of explanatory variables, and \( \tau \) represents the vector containing each quantile. The vector of coefficients \( \beta \) to be estimated will differ depending on the particular quantile.

These ideas have barely been explored in the field of local government finances, although there are some exceptions. For instance, Benito et al. (2010) find that the
impact of population on municipal expenditures is not linear. They show that population yields economies of scale up to a limit, since the functions present a U-shape; from the point of the minimum per capita spending, if the population keeps on growing, per capita spending rises. However, as indicated in the introduction, several initiatives in other contexts have analyzed the differential impacts of the regressors depending on the quantile of the dependent variable, among which the contributions by Klomp and de Haan (2012) and Klomp (2013) are notable.

**RESULTS**

**OLS Regressions**

Results from the OLS regressions are reported in Table 4. Since they correspond to cross-sectional data, the standard errors (in parentheses) were estimated using the White correction for both autocorrelation and heteroskedasticity (HA corrected). The results reported in this table are presented sequentially, in three different models (A), (B), and (C), the third one (column three in Table 4) containing the most complete model with all the regressors. We consider this sequentiality in order to isolate the effect of the financial (Model (A)), socioeconomic (Model (B)), and political (Model (C)) factors.

In the first group, not all the variables (financial) are significant in all three models (A), (B), and (C). For instance, with the exception of \textit{EXPCOMM}, all variables are

| Covariates               | \( (A) \)            | \( (B) \)            | \( (C) \)            |
|--------------------------|----------------------|----------------------|----------------------|
| Fiscal/financial variables |                      |                      |                      |
| (Intercept)              | -0.417*** (0.196)    | -0.458** (0.178)     | -0.558*** (0.186)    |
| \textit{INVEST}          | 0.074*** (0.020)     | 0.066*** (0.019)     | 0.059*** (0.019)     |
| \textit{NETSAV}          | -3.636*** (0.456)    | -2.289*** (0.416)    | -2.166*** (0.417)    |
| \textit{BUDGET}          | 0.106 (0.070)        | 0.169** (0.066)      | 0.189*** (0.066)     |
| \textit{FISCCAP}         | 0.457*** (0.052)     | 0.102* (0.056)       | 0.085 (0.059)        |
| \textit{EXPCOMM}         | 0.040 (0.124)        | 0.036 (0.111)        | 0.020 (0.111)        |
| Socioeconomic variables  |                      |                      |                      |
| \textit{TOURISM}         |                      | 0.033*** (0.008)     | 0.036*** (0.008)     |
| \textit{ACTIVITY}        |                      | 0.047*** (0.008)     | 0.056*** (0.014)     |
| \textit{DENSITY}         |                      | -0.043 (0.213)       | 0.034 (0.212)        |
| Political variables      |                      |                      |                      |
| \textit{POLITICAL}       |                      |                      | 0.046*** (0.013)     |
| \textit{FORAL}           |                      |                      | -0.004 (0.052)       |
| \textit{POWERS}          |                      |                      | 0.090 (0.058)        |
| \( R^2 \)                | 0.149                | 0.278                | 0.292                |
| Adjusted \( R^2 \)       | 0.146                | 0.274                | 0.286                |
| \( N \)                  | 1,381                | 1,381                | 1,381                |
significant either at the 1% or 5% level, with the expected signs. However, once the model becomes more complex (i.e., either socioeconomic or political variables are included), the impact of FISCAP vanishes; not only does it lose significance but, in addition, the magnitude of the coefficient falls substantially. Although this decreasing magnitude is also found for NETSAV, in other cases (BUDGET) it actually increases and the significance holds. Therefore, one may conclude that, on average, INVEST, NETSAV, and BUDGET have the expected impact, and the result is significant at the 1% level. The effect of both FISCAP and EXPCOMM also corroborates what one might expect according to the ideas presented in Section 3, but in these two cases significance is entirely lost at the usual levels. However, this is an average effect which might not be the same for different parts of the distribution of debt.

The socioeconomic variables, which are first introduced in the second column of Table 4, corresponding to Model (B), partly show the expected sign. This is the case of both TOURISM and ACTIVITY, whose impact is positive as expected, and significant at the 1% significance level. This result holds both for Model (B) and Model (C). In contrast, the DENSITY variable shows a negative sign as expected, but only for Model (B), whereas the most complete model (Model (C)) shows a positive average effect on the levels of debt; however, none of these effects is significant at the usual levels.

Finally, the three political variables considered also display heterogeneous results. Of the three variables, the one most frequently considered in the literature, the political color of the governing party (POLITICAL), shows the expected sign, and it is significant at the more demanding level (1%). This corroborates the ideas exposed in Section 3, since POLITICAL is a dummy variable taking the value of 1 for municipalities governed by left-wing parties.

The variable POWERS also has the expected sign, and the effect is also significant at the highest level. Although we had hypothesized a negative link between the level of powers and the level of municipal debt, we must keep in mind that this is a dummy variable taking the value of 1 for the municipalities with the lowest level of powers and, therefore, a positive sign (the result we obtain) would corroborate our hypothesis. The variable FORAL, which was assumed to be strongly linked with POWERS, takes the value of 1 for municipalities from Navarre and the Basque Country, with different levels of powers from the rest. However, although negative, the effect is on average low and not significant.

Model (C) provides the overall picture on the level of controllability of the independent variables. Level of debts depends on socioeconomic and political variables, both with a positive sign and characterized as non-controllable from the short-term perspective. In these circumstances, left-wing governments in municipalities with established tourism and/or industrial sectors should carefully monitor the development of fiscal and financial variables as a way of keeping debt levels under control.

Results From Regression Quantiles

Many of the results commented on in the preceding paragraphs corroborate those postulated in Section 3. However, this is not the case in all instances, as the effect for
all variables is not always significant at the usual levels and, in addition, these are average results, which might not hold for the lower and upper tails of the distribution of debt. We therefore report the results corresponding to the most complete model (Model (C)) using regression quantiles in both Table 5 and Figures 1, 2, and 3. These results are more nuanced than those obtained via OLS regressions. Amongst the financial covariates, INVEST, NETSAV, and BUDGET were found to be significant throughout and showed the expected signs. However, as reported in Table 4, these are average effects which hide very disparate behaviors for the different parts of the conditional distribution of the dependent variable (DEBT/POP). For instance, the positive and significant (average) effect found for INVEST is actually negative for the lowest tails of DEBT/POP; i.e., for those municipalities with the lowest levels of debt. However, as shown by the standard errors in parentheses in Table 5, the effect is not significant for quantiles \( \tau = .05, \tau = .10, \) and \( \tau = .25 \). In contrast, the effect is not only positive and significant for quantiles \( \tau \geq .50 \) but, in addition, the magnitude of the effect increases with the level of debt. In the case of NETSAV, results are also much richer than the OLS results. In this case, the average negative and significant effect found is negative for all quantiles, as shown in Table 5, but the magnitude of the effect is much higher for the upper tail of the distribution of debt. In this case, however, the effect is also significant for all the quantiles considered, with the sole exception of \( \tau = .05 \). The third financial variable that was significant throughout via OLS, BUDGET, also shows remarkable differences for the quantile regression analysis. In this case, results are partly similar to those found for INVEST, although, in this case, the lowest quantiles do not show a negative effect; rather, the effect is positive throughout, although significance holds only for the upper quantiles, and not for all of them. Analogously to what we found for INVEST and NETSAV, the magnitude is also much higher for the most indebted municipalities.

The financial variables FISCCAP and EXPCOMM, whose effect was not found to be significant on average, share with the rest of the financial variables the increasing magnitude of the effect with the quantiles—i.e., the effect is always much stronger for the highest quantiles. For both FISCCAP and EXPCOMM, the sign of the effect changes depending on the part of the distribution being analyzed—with a negative effect for the lower tail. In addition, some of the upper quantiles show a significant effect. Again, this behavior was completely overlooked by OLS regressions.

These results are corroborated in Figure 1, which displays the graphical counterpart to the results in Table 5 for the financial variables. As indicated in the figure, each sub-figure displays the slopes corresponding to the financial variables of the estimated linear quantile regression of Equation (2), which are plotted as functions of \( \tau \); i.e., the different quantiles that are represented on the horizontal axis, whereas the vertical axis represents the values of the slope coefficients for each quantile (\( \tau \)). Interestingly, the solid horizontal red line in each sub-figure represents the coefficient corresponding to OLS regressions, and the dashed horizontal red lines represent 95% confidence bands. Comparing them with the slopes of the estimated quantiles, it is easy to see how misleading it can be to confine the analysis to OLS
| Covariates        | 0.05     | 0.10    | 0.25     | 0.50     | 0.75     | 0.90     | 0.95     |
|-------------------|----------|---------|----------|----------|----------|----------|----------|
| Fiscal/financial  | (Intercept) | 0.146 (0.046) | 0.220 (0.066) | 0.123 (0.079) | -0.189 (0.086) | -1.012 (0.165) | -1.027 (0.264) | -1.243 (0.430) |
| variables        | $INVEST$ | -0.003 (0.002) | -0.006 (0.005) | -0.003 (0.006) | 0.025 (0.009) | 0.100 (0.010) | 0.126 (0.029) | 0.150 (0.045) |
| $NETSAV$         | -0.104 (0.103) | -0.495 (0.185) | -1.016 (0.244) | -2.037 (0.272) | -1.981 (0.508) | -2.961 (0.793) | -3.159 (1.163) |
| $BUDGET$         | 0.000 (0.006) | 0.013 (0.023) | 0.036 (0.035) | 0.118 (0.045) | 0.195 (0.065) | 0.205 (0.109) | 0.256 (0.183) |
| $FISCCAP$        | -0.009 (0.007) | -0.023 (0.017) | -0.001 (0.028) | 0.158 (0.042) | 0.126 (0.074) | 0.157 (0.098) | 0.137 (0.170) |
| $EXPCOMM$        | -0.011 (0.007) | -0.025 (0.033) | -0.081 (0.051) | -0.116 (0.060) | 0.215 (0.111) | 0.164 (0.180) | 0.229 (0.290) |
| Socioeconomic    | $TOURISM$ | 0.001 (0.001) | 0.004 (0.003) | 0.023 (0.004) | 0.023 (0.006) | 0.032 (0.009) | 0.059 (0.013) | 0.069 (0.026) |
| variables        | $ACTIVITY$ | 0.003 (0.002) | 0.012 (0.005) | 0.041 (0.007) | 0.049 (0.009) | 0.103 (0.016) | 0.088 (0.022) | 0.097 (0.036) |
| $DENSITY$        | 0.000 (0.007) | -0.017 (0.050) | -0.046 (0.116) | -0.091 (0.193) | 0.185 (0.233) | 0.136 (0.198) | -0.142 (0.867) |
| Political        | $POLITICAL$ | 0.005 (0.003) | 0.014 (0.006) | 0.020 (0.007) | 0.031 (0.009) | 0.045 (0.017) | 0.033 (0.028) | 0.139 (0.048) |
| variables        | $FORAL$   | -0.039 (0.016) | -0.032 (0.036) | -0.083 (0.012) | -0.006 (0.076) | -0.008 (0.037) | 0.161 (0.124) | 0.151 (0.503) |
| $POWERS$         | -0.128 (0.045) | -0.183 (0.048) | -0.091 (0.034) | 0.018 (0.036) | 0.201 (0.071) | 0.259 (0.086) | 0.304 (0.161) |
only. For instance, in the case of \textit{INVEST}, the variable is significant for $\tau > .50$ (approximately), since for values below this threshold the (gray) confidence bands contain the zero. In the case of \textit{NETSAV}, significance is only lost for the extreme

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1}
\caption{Regression quantiles, financial and fiscal variables, Model (C). \textit{Notes:} The slopes corresponding to the financial/fiscal covariates of the estimated linear quantile regression for model (2) are plotted as a function of $\tau$ (i.e., the different quantiles), represented on the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile ($\tau$).}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2}
\caption{Regression quantiles, socioeconomic variables, Model (C). \textit{Notes:} The slopes corresponding to the financial/fiscal covariates of the estimated linear quantile regression for model (2) are plotted as a function of $\tau$ (i.e., the different quantiles), represented on the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile ($\tau$).}
\end{figure}
upper and lower tails of the distribution, whereas for BUDGET we find that for \( \tau < .30 \) approximately the effect is not significant at the 5% significance level. We can also see how the effect varies with the quantiles. In the case of FISCCAP and EXPCOMM, the confidence bands for OLS coefficients (dashed horizontal red lines) contain the zero, indicating that, on average, these variables are not significant, as stated earlier. However, the confidence bands for the estimated quantiles do not contain the zero for many of the quantiles (dashed black lines inside the gray bands), especially in the case of FISCCAP, indicating that the effect of this variable is mostly positive.

In the case of the socioeconomic variables, one might a priori consider that the contribution of quantile regression would be minimal since, at least in the case of TOURISM and ACTIVITY, the effect is positive for OLS, as indicated by the solid red line in Figures 2a and 2b, respectively. However, paralleling the findings for the financial variables, the magnitude of the effect is much stronger for the most indebted municipalities, whereas the impact vanishes for the lower quantiles and, in addition, significance is partly lost, especially in the case of TOURISM, which is only significant for \( \tau \geq .50 \). In contrast, DENSITY is never significant and the effect presents an erratic pattern throughout quantiles, which naturally leads to the conclusion that this variable is not at all significant.

Figures 2a, 2b, and 2c provide graphical counterparts for the coefficients estimated for the socioeconomic variables in Table 5. The OLS results are corroborated for both TOURISM and ACTIVITY with effects of increasing magnitude which, in the case of TOURISM, are not significant for \( \tau < .30 \). In contrast, the effect of DENSITY is both low (very close to zero), not significant, and with no clear sign.

Finally, the effect for the political variables is also more nuanced than the OLS results. The variable POLITICAL, which takes the value of 1 for those municipalities governed by left-wing governments, shows a positive effect throughout,
corroborating what was found on average (solid red line in Figure 3a). This would imply that, on average, these municipalities have higher levels of debt. However, as shown in Table 5, the effect is not significant for the highest quantiles; i.e., the most indebted municipalities have these high levels of debt regardless of their political stance. Again, this result would be completely hidden by OLS.

In the case of FORAL and POWERS, the nuances with respect to OLS are more marked. Whereas the variable FORAL shows no particular pattern for OLS (the effect was low, and not significant), for quantile regression (Table 5) the negative effect becomes positive, and non-negligible for the highest quantiles ($\tau = .90$, $\tau = .95$). However, in this case the effect is not significant, although some quantiles are actually significant; in this case, the lowest ones ($\tau = .05$ and $\tau = .25$). Keeping in mind that FORAL is a dummy variable taking the value of 1 for the foral regions (Navarre and the Basque Country), it would indicate that those municipalities with the lowest levels of debt are located in these regions. In the case of the municipalities with the highest levels, the effect is not significant.

Finally, the behavior of the decentralization variable (POWERS) is similar in part to that found for FORAL, since the sign of the effect varies with the conditional distribution of debt. In this case, however, there are more quantiles with a positive sign, and with significant effects. Since POWERS takes the value of 1 for the municipalities with fewer powers, a positive effect indicates that the municipalities with fewer powers have higher levels of debt. Results in Table 5 indicate that this is actually the case for municipalities with more debt, corresponding to the highest quantiles, and this effect is very strong. In contrast, for municipalities with lower levels of debt, corresponding to the lowest quantiles, the effect is the opposite, and more modest in magnitude.

The effects of the three political variables considered are corroborated in Figure 3, which clearly shows how the effect of POLITICAL is present for most of the selected quantiles, whereas in the case of FORAL it only holds for a few of them. In the case of POWERS, this effect is of the opposite sign (albeit significant) for both tails of the distribution of debt.

The results from the OLS and quantile estimation help us to detect the asymmetric situation of debts in Spanish local governments. On the one hand, municipalities having a low level of debt seem to be affected by overall economic activity, but not by tourism activity. The requirements related to the level of investments do not appear to “drive” increased debt levels. In other words, the allocation of infrastructures seems to be financed without requiring funds from financial institutions, which helps these municipalities to avoid financial pressures. Cases with such characteristics can be taken as a “best practice” model on how to manage the requirements of the external environment with an adequate structure of controllable budget variables (as the regressors concerning net savings indicate).

In contrast to the previous case, local governments with a high level of debt appear to be influenced both by tourism and economic activities, and by operating with more powers in a decentralized environment; this may imply that they are required to offer their citizens a blend of more sophisticated services. For these municipalities, the investments increase the level of debt because control of the budgetary variables (i.e., the level of net savings) does not seem to reduce the requirement to raise
financial debts. The obvious implication from this is that investments should be carefully monitored for municipalities that offer complex services and maintain considerable levels of economic activities once a certain level of debts is surpassed. In other words, to find an analogy from the private sector, a kind of “debt covenant” should be introduced as a way to regulate the financial management of local governments. This regulation should only affect those municipalities with debt levels above a certain point. The results of the quantile regression are extremely useful to determine the upper limit of the debts to regulate the level of municipal investments.

**CONCLUDING REMARKS**

In Spain, all layers of government—central, regional, and local—contribute to public spending and have varying levels of powers. Although the municipal level of government clearly has the fewest powers (the second decentralization, from the central and regional governments to local governments actually never took place), they are allowed to both raise local taxes and charge tariffs for the services they provide. Depending on the size of their populations, they use these and other revenues obtained from different sources to provide services such as day-care nurseries, public transport, waste disposal, sewage, construction, management of sports centers, or public green areas, among others.

The current economic and financial crisis has had (and continues to have) a serious impact on European public administration systems. In the Spanish case, all layers of government are heavily affected. There are, however, many differences between the 17 regions (comunidades autónomas), some of which are facing much higher deficits than others, especially those where the housing bubble was largest—and, therefore, where more devastating effects were sustained when it burst. In those regions, the amount of revenues raised by regional governments has plummeted, whereas costs have either remained constant or even risen. A similar scenario is found at local government level, with the added problem that the number of municipalities is much higher (8,112 municipalities vs. 17 regions) and, therefore, the levels of heterogeneity are also much higher, with many municipalities facing extremely stringent financial demands, to which responses have differed remarkably.

Under these circumstances, this article has analyzed the main determinants of local government debt in Spain. This question has been partly approached in previous contributions, which found relevant results. However, the previous literature implicitly assumed that the impact of the different variables was homogeneous across the 8,112 municipalities, disregarding the possibility that effects could vary for different quantiles of the distribution of municipal debt. In other words, most of the subtleties that might exist were hidden by the fact that results were summarized into an average effect. We consider that this might be an over-simplification since, based only on this summary, economic policy recommendations would not be tuned to match the intrinsic characteristics of each municipality.

Our results indicate that, for most of the variables considered to have an impact on municipal debt, which were in line with those used in the literature, the effects
vary considerably depending on the quantile of the conditional distribution of local
government debt. This implies that the explanations previously given (explanations
that did not take into account these differing effects by quantile) should state that the
impacts corresponded to *average* impacts.

The analysis performed in this study considered three types of variables—
financial, socioeconomic, and political—finding that the effects are strong and, for
most of them, significant. Interestingly, the effects differ greatly depending on
how indebted municipalities are, and in some cases the impacts were even the
opposite for the lower and upper tails of the municipalities’ debt distribution, such
as the variable reflecting devolution. In other cases, the effects were not significant
for some parts of the distribution, but for others these effects were positive and sig-
ificant; the number of these cases was non-negligible and relevant. This was the case
of capital expenditures, non-financial surplus (as a share of deficit), own fiscal
capacity, and tourism, among others.

These results indicate that the design of public policies attempting to control local
governments’ costs, strongly encouraged by European Union institutions and con-
templated in the recent update of the Stability and Growth Pact (2011), should take
into account this *varying* reality, which is very obvious in the case of Spanish local
governments. Failing to do so would lead to public policies that, ultimately, could
be ineffective in achieving the desired objectives.

The obvious implications of these results are that flexibility and anticipation should
be considered when defining limitations to the levels of municipal debt. On the one
hand, when we compare the results of the OLS and quantile regressions, the impact
of the *controllable* debt drivers depends on the specific point of departure, so the
imposition of strict and rigid limitations to the level of debts may have an undesirable
impact on the investment and development plans of wealthy municipalities,
while arriving late to fiscally irresponsible municipalities. The Spanish case is a good
example of regrettable situations that public regulators should avoid: temporary
closures of public schools on public health grounds, deteriorating quality of public
transport, delays in paying civil servants’ salaries and settling debts with suppliers,
drastic reduction in municipal safety services, etc.

These extreme cases should be addressed in advance by considering the debt level
per inhabitant as well as the three significant financial/fiscal ratios (*INVEST*,
*NETSAV*, and *BUDGET*) which are perfectly controllable and, at the same time,
very easy to determine by using information from the municipal budget. This kind
of control can play a more dynamic role than simply establishing a limit to the level
of municipal debt (such as limiting the debt to the 7% of the assessed valuation of
taxable property established in 1874 in the Commonwealth; Brown and Ebenstein
1970). Indeed, the control of debt drivers can be an effective tool to avoid the
situation of municipal bankruptcy because the remedies can be substantially attenu-
ated: in extreme cases, the imposition of new taxes can be counterproductive because
citizens are unable to pay them and, unlike private firms, municipalities cannot
liquidate all of their assets to satisfy creditors. Therefore, as prudence in municipal
finance is a value worth preserving, prioritizing the levels of budget sustainability can
be an effective way to control municipal debt levels.
In a similar vein, in a recent article, Gras et al. (2014) identified another significant variable with a direct impact on the level of municipal debt; namely, good internal control systems. This is not, therefore, only a question of computing financial and budgetary ratios but of having good internal management systems. In summary, good municipal management is a multifaceted task, which can be observed from a range of different perspectives.

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NOTES

1. See also Zafra-Gómez et al. (2013) and González-Gómez et al. (2011) for related problems of Spanish municipalities.
2. The Spanish regions or comunidades autónomas (autonomous communities) correspond to level NUTS3 of the European Union (Nomenclature of Territorial Units for Statistics), whereas municipalities correspond to level LAU2 (Local Administrative Units). There are 8,112 municipalities and 17 regions. However, the level of heterogeneity across both municipalities and regions is notable in several dimensions, particularly size.
3. For an informative introduction, see Cade and Noon (2003), and for a compilation of relevant applications, see Fitzenberger et al. (2002).
4. These contributions are particularly interesting, since the title also stresses the relevance of considering approaches whose conclusions might differ depending on certain characteristics of the units of analysis.
5. Other contributions in the field of finance that consider quantile regression are Bassett Jr. and Chen (2001), who use regression quantiles to extract additional information from the time series of returns; Meligkotsidou et al. (2009), who introduce the idea of modeling the conditional quantiles of hedge fund returns using a set of risk factors; Luo and Li (2008), who investigate whether and how futures market sentiment and stock market returns heterogeneously affect the trading activities of institutional investors; Füss et al. (2009), who analyze the impact of experience and size of hedge funds on performance; and Chen and Huang
(2011), who study the relation between mutual fund performance and Morningstar fiduciary grades, among others.

6. The use of quantile regression has also proved relevant in other fields, such as applied industrial organization (Coad and Rao 2008) or to study issues related to the structure of wages (Buchinsky 1998), among others. The compendium on empirical illustrations of quantile regression by Cade and Noon (2003) includes an interesting set of applications.

7. For instance, some authors such as Benito and Bastida (2004; 2005) define it as a ratio of real investments and capital transfers to total expenditures. However, others (Vallés et al. 2003; Cabasés et al. 2007) calculate it as the ratio of real investment to GDP, and refer to this variable as *intergenerational equity*—since future generations will also benefit from the capital investments that current generations may make. In contrast, Escudero (2002) defines it as the consolidated non-financial fixed assets per capita, although others (Fernández Llera et al. 2004) confine the contents of this variable to real investments only.

8. LRHL, Ley Reguladora de Haciendas Locales, Law 39/1988 December 28.

9. In Spain, the amount local governments can borrow is limited by a set of restrictions imposed by central government. The legal framework regulating credit operations is established under Law 39/1988, of 28 December, on Local Governments (“Ley 39/1988 Reguladora de las Haciendas Locales”). The original wording of this law has been modified substantially through the Consolidated Text of the Law on Local Governments 2/2004 (“Real Decreto Legislativo” 2/2004 of 5 March) and the approval of other subsequent laws. Some of the reasons for establishing debt restrictions are described in Monasterio Escudero (1996). The details of this law are carefully summarized in, for instance, Guillamón et al. (2011).

10. Previous contributions using this variable, although considering a slightly different definition, are Brusca and Labrador (1998) and Cabasés et al. (2007). The former authors consider a gross savings index in their use of the variables, whereas the latter define it as the ratio of net savings to GDP. In this respect, Cabasés et al. (2007) also note how local governments that have an austere current expenditure policy, that obtain higher current income, or that plan debt amortizations appropriately, have a greater financing capacity, and are less likely to resort to borrowing to fund their investment expenses. Therefore, as indicated, we may hypothesize a negative relationship between the levels of debt and net savings; in other words, when an institution has positive net savings, the need to resort to borrowing might be, ceteris paribus, lower.

11. This variable has been defined in different ways in the literature. For example, whereas Benito and Bastida (2004; 2005) calculate it in relative values, Brusca and Labrador (1998) consider total budgetary revenues and expenditure—in other words, the difference between total budgetary revenues and total budgetary expenditure, what they term budgetary deficit.

12. As indicated by Campos et al. (2006), when evaluating the importance of this variable, it should also be taken into account that there might be an “unexplained” part of debt corresponding to the so-called “stock-flow reconciliation” (see also Lane and Milesi-Ferretti 2009).

13. However, the opposite effect may occur, as municipalities with more of their own resources will face lower financial risks and will therefore be granted certain advantages when accessing loans.

14. The tourism variable has been used not only by Benito and Bastida (2005) and Benito and Bastida (2004), who introduced two dummy variables to differentiate between coastal and inland municipalities, but also by Escudero (2002), who used the tourism index from the “Anuario Económico de España” (Spanish Economic Yearbook) published by La Caixa Foundation. See http://www.anuarioeco.lacaixa.comunicaciones.

15. While some authors, such as Clingermayer and Wood (1995) or Kiewiet and Szakaty (1996), consider its effect to be positive, others, such as Adams (1977), claim a negative relationship.
16. “Instituto Nacional de Estadística” (Spanish Bureau of Statistics).
17. In the particular Spanish case, previous studies considering this information include Benito and Bastida (2005), Benito and Bastida (2004), Cabasés et al. (2007), Escudero (2002), or Vallés et al. (2003), among others, who have used per capita income level as a possible indicator of economic level.
18. For year 2008 onwards, only the variable measuring economic activity is available. This is the one we use and, in addition, we consider that it has a stronger link with a municipality’s possible debt level than when per capita income is considered, as those local governments operating in environments where the general economic activity is more intense will have to provide their constituencies with more and, probably, more complex services, which generally imply higher costs.
19. However, some authors, such as Fernández Llera et al. (2004), consider that foral regions have created a relatively higher number of public firms (compared to the rest of Spain). Therefore, some municipalities might have decided to outsource some services which would lead to lower levels of municipal debt, pointing to a negative link with this variable.
20. We refer to debt per inhabitant and debt per capita interchangeably throughout the article.
21. In addition to this, the quantile regression estimator has other benefits, such as being characteristically robust to outliers on the dependent variable.

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