



# What can increase the default risk in local governments?

**Andrés Navarro-Galera,  
Juan Lara-Rubio, Dionisio Buendía-  
Carrillo and Salvador Rayo-Cantón**

University of Granada, Spain

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## Abstract

Concern has been expressed by international organisations and in previous studies about the financial situation of local governments, and the question of debt has been identified as a crucial element in efforts to overcome the current financial crisis. However, the variables that can affect the financial soundness of these governments have not been sufficiently studied, despite their direct relation to the credit risk premium. In this article, we aim to identify risk factors for default by local governments, and provide useful information to municipal financial managers. We conducted an empirical study of 148 Spanish municipalities and analysed data from four years, applying a random effects logistic regression model. Our findings reveal that a lower population density, less dependent population, falling levels of per capita income and the presence of progressive local government are all risk factors for default by local governments. Furthermore, our findings indicate that the general financing structure variable and debt composition and maturity variable do influence the risk of default by local governments.

## Points for practitioners

The findings of this article can provide useful information for managers and politicians responsible for the financial management of local governments, in particular, by enabling them to better understand the risk premiums assigned by banks. Specifically, by identifying the risk factors for default, this article highlights the warning signs of this risk, so that suitable arguments may be expressed in negotiating loan repayment schedules and interest rates, and in designing financial viability and restructuring plans.

## Keywords

default risk, financial factors, local government, population factors, socio-economic factors

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## Corresponding author:

Juan Lara-Rubio, Department of Financial Economics and Accounting, Faculty of Economics and Business Studies, University of Granada, Campus Universitario de Cartuja, s/n, Postcode 18071 Granada, Spain.

Email: [juanlara@ugr.es](mailto:juanlara@ugr.es)

## Introduction

In recent years, various authors (Cohen et al., 2012; Guillamón et al., 2011; Inceu et al., 2011) have concluded that the global financial crisis has had a very negative impact on public sector finances, and this has raised concerns about the viability and financial position of governments, especially local administrations. In consequence, a growing body of academic research has addressed the question of the financial condition of local governments (Carr and Karuppusamy, 2010; Wang et al., 2007; Zafra-Gómez et al., 2009), the fiscal stress that they face (Benito et al., 2010; Cohen et al., 2012) or their financial health (Cabaleiro et al., 2013; Carmeli, 2007).

More specifically, local government borrowing has been identified as a key issue to be addressed in order to overcome the present financial crisis, and for this reason, studies have been undertaken to determine the factors that influence the level of municipal debt (Guillamón et al., 2011; Lago-Peñas, 2008). Among their conclusions, these studies have identified several variables that affect local government debt, including population density, immigration, economic level and the political orientation of the governing party.

However, none of these previous studies have specifically examined the factors that may influence the risk of default on the debt incurred by local governments, despite the fact that leading international bodies (EC, 2011; EU, 2012; World Bank Group, 2010) have expressed concerns about government insolvency, since, in their opinion, this question is of crucial importance for financial sustainability in view of the often high levels of bank borrowing by public entities. Thus, the International Federation of Accountants (IFAC, 2013) has identified borrowing as one of the key dimensions of the financial sustainability of governments.

Therefore, in view of many local governments' currently high levels of bank debt, we believe that it would be interesting and useful to analyse the factors that may influence the possibility of default by local governments, identifying variables that may limit their ability to meet loan repayment schedules and which, consequently, would increase their risk premium.

According to international pronouncements (EU, 2012; IFAC, 2013; US Department of the Treasury, 2013), knowledge of these risk factors could be very useful for local government managers and policymakers by enabling them to predict the risk premium that banks will assign them. Moreover, by identifying these factors, local officials may be better equipped to take decisions in their negotiations with banks regarding loan amounts, interest rates and maturities, and to take preventive measures against situations of default by designing viability and restructuring plans and taking measures to strengthen local finance, among other actions.

According to organisations like the World Bank Group (2010) and the US Department of the Treasury (2013), the New Basel Capital Accord (better known as Basel II) represented a groundbreaking advance for the international financial system. The Basel II model helped ensure the solvency and stability of credit institutions by assessing the financial risks faced by loan recipients, including

private companies, individuals and governments (which are now very significant players in this field). The Basel II model (BCBS, 2006) encouraged banks to apply new instruments and to strengthen capital requirements in order to limit the exposure arising from credit risk transactions.

In any analysis of the capital requirements of financial institutions, government debt plays an important role, and so the effective implementation of the Basel II model could provide new knowledge so that local governments can take into account how their risk profile is viewed by financial institutions and, on that basis, undertake the loan negotiation process with more significant information, especially as regards the maturity of the loan and the interest rate applicable.

In this study, we seek to generate new findings on the financial solvency of local governments. Therefore, the main objective of the empirical investigation conducted was to identify risk factors for loan default by local governments by examining variables and circumstances that can lead local governments to be at greater risk of default, and thus to obtain information to help them make decisions aimed at reducing or eliminating these risks.

This was addressed by means of an empirical study based on the analysis of variables associated with the probability of default, in terms of the Basel II parameters. Specifically, we took a sample of 148 large Spanish local governments and analysed, in each case, the probability of default in relation to population, socio-demographic and financial variables.

## **The Basel II model and factors influencing local government finance**

In line with the pronouncements of the aforementioned international organisations, concerns about governments' financial viability and survival conditions have motivated numerous research studies aimed at identifying the factors that may influence the health of public finances, with special attention to local governments.

Various papers have considered the variables associated with public spending. In this respect, Wang and Hou (2012) concluded that greater population size and density tend to increase municipal costs. Similarly, Choi et al. (2010), Gonçalves-Veiga and Veiga (2007) and Solé-Ollé (2006) found these two variables, together with the size of the immigrant population, to be positively associated with public spending.

Other studies have attempted to identify factors influencing the financial condition of local governments and the fiscal stress to which they are subjected. Evidence has been reported of the adverse effect on financial condition of variables such as population size (Carr and Karuppusamy, 2010) and the proportion of the dependent population (Zafra-Gómez et al., 2009). In this respect, other authors have concluded that fiscal stress may be adversely influenced by a larger dependent population (Benito et al., 2010), and by increases in the numbers of the unemployed and of the immigrant population (Benito et al., 2010).

In the same vein, Cabaleiro et al. (2013), based on the statement issued by the Canadian Institute for Chartered Accountants (CICA, 2009), examined the relationships between certain variables (long- and short-term debt, debt per capita, specific weight of debt by type of revenue, tax burden) and the financial health of local governments. Zafra-Gómez et al. (2009) defined financial health as an institution's ability to meet its debts while maintaining an acceptable level of service, and linked this concept to that of solvency.

Elaborating on this theme, another group of studies identified several factors explanatory of the level of local government debt. Thus, Guillamón et al. (2011) found that population density, the unemployment rate and the level of the immigrant population may all increase local government debt. Other authors, too, have reported that increases in municipal debt may be caused by a rising immigrant population (Schultz and Sjöström, 2001), by an expanding economy and by an increasing tax burden. Furthermore, Ashworth et al. (2005) showed that the fragmentation of political power contributes to increasing local government debt.

Taking into account this review of previous research in the field, the variables most relevant to local government finance can be grouped into three types: a) demographic variables; b) socio-economic variables; and c) financial variables. This classification, moreover, is consistent with the pronouncements of numerous international organisations, which have recommended governments to monitor the impact of demographic and economic and financial variables on public finances (Center for Strategic & International Studies, 2010; CICA, 2009; EC, 2011; EU, 2012; IFAC, 2012; US Agency for International Development, 2011).

However, to date, no study has been carried out to specifically consider the relationship of these variables with the risk of default by local governments. Therefore, in view of the currently high levels of government debt, we believe it interesting and timely to investigate the risk factors that may increase the probability of such default.

In this respect, the Basel II model is considered to be a highly significant advance in the international financial system. This model helps ensure the soundness and stability of credit institutions, making it possible to assess the financial risks associated with the institutions, such as governments, to which these entities make loans.

For local government politicians and administrators, knowledge of the level of risk assigned by financial institutions to the loans made to governments can be of crucial importance, and especially so in the current crisis of public finances, for various reasons. First, identifying banking risk factors is crucial for local governments to be better able to negotiate loan conditions, such as the loan maturity date and the interest rate to be applied. The greater the loan default risk assigned to the local government, the higher the rate of interest the government should be willing to bear, while a lower default risk would be associated with a correspondingly lower predisposition. Second, knowledge of these risk factors can help governments adopt control measures to avert default situations. Third, financial viability and restructuring plans for governments with loan repayment problems could be

designed and implemented with less uncertainty if they were based on accurate knowledge and understanding of the risk factors that should be avoided.

In summary, knowledge of the factors relevant to the risk of default by local governments – from the point of view of financial institutions – can help improve municipal financial health, which underlines the timeliness and interest of this research study.

## **Research methodology and experimental design**

### *Sample selection*

In line with the studies by Navarro-Galera (2005), Cohen (2008), Cohen et al. (2012) and Rodríguez-Bolívar and Navarro-Galera (2007), and in accordance with the Spanish Local Government Modernisation Act (No. 57/2003, of 16 December), in this article, we select information on Spanish municipalities with over 50,000 inhabitants, together with those that have fewer inhabitants but are provincial capitals. Our sample consists of 148 Spanish municipalities, of which 146 have a population of over 50,000 inhabitants and two have less than 50,000 inhabitants but are provincial capitals. The selection criterion of the sample has been followed by other authors (Alcaráz-Quiles et al., 2014; Navarro-Galera et al., 2010). In the sample, we could have differentiated between the two types of municipalities by introducing a dummy variable specifying the difference. In the end, we did not do so since two municipalities have very low specific weight and the rules on indebtedness are common, setting the same limits on debts in all municipalities. These large municipalities were chosen for the following reasons: (a) in accordance with Article 26 of Act 7/1985, municipalities with a population of over 50,000 inhabitants are obliged to provide an extensive body of public services; (b) these towns and cities, despite accounting for only 2% of all Spanish municipalities, represent nearly 56% of the total population and 38.7% of local spending (Fundación La Caixa, 2011); c) in general, these large municipalities have more and better-prepared managers in charge of local government finance – this fact, together with the use of a common accounting system, contributes to the homogeneity of our sample; and d) the recent Local Government Rationalisation and Sustainability Act (No. 27/2013, of 27 December) includes among its stated motivations the existence of solvency problems arising from financial mismanagement by large Spanish municipalities. Accordingly, our sample consists of 148 Spanish municipalities, for which we compiled data for the four years from 2008 to 2011, a total of 592 observations.

### *Independent variables*

Table 1 shows the input variables used in our study. This table also shows the expected sign of the relationship between each input variable and the probability of default. The statistical descriptions of all the input variables are shown in

**Table 1.** Description of demographic, socioeconomic and government financial variables.

Variable	Description	Expected estimator sign ( $\beta$ )
<b>Population variables</b>		
<i>Pop_Size</i>	Population size (million). Numeric variable. Source: Spanish Institute of Statistics (INE).	+
<i>Pop_Dens</i>	Population density: number of inhabitants/surface area of municipality (km <sup>2</sup> ). Numeric variable. Source: INE and La Caixa Yearbook.	+
<i>Depend_Pop</i>	Proportion of dependent population: number of inhabitants aged <16 and >65/total population. Numeric variable. Source: INE.	+
<i>Immigr</i>	Proportion of immigrant population: number of immigrants/total population. Numeric variable. Source: INE.	+
<b>Socioeconomic variables</b>		
<i>Abs_Maj</i>	Absolute majority. Dummy variable: (0) Absolute majority, (1) No absolute majority. Source: Ministry of the Interior.	–
<i>Political_Sign</i>	Political sign. Dummy variable: (0) Conservative, (1) Progressive. Source: Ministry of Finance and Public Administration.	–
<i>IPC</i>	Municipal income per capita: real budget income (thousands €)/total population. Numeric variable. Source: Ministry of Finance and Public Administration and INE.	–
<i>Unemployment</i>	Proportion of unemployment: number of persons unemployed/total population. Numeric variable. Source: Ministry of Employment and Social Security and INE.	+
<b>Government financial variables</b>		
<i>Fin_Aut</i>	Financial autonomy: total income less transfers and grants/total income. Numeric variable. Source: Ministry of Finance and Public Administration.	–
<i>Fin_Struct</i>	General financing structure: debt finance/equity finance. Numeric variable. Source: Court of Auditors.	+
<i>Comp_Debt</i>	Debt composition and maturity: short-term debt/long-term debt. Numeric variable. Source: Court of Auditors.	+
<i>Source_Debt</i>	Origin and nature of the debt: financial debt/commercial debt. Numeric variable. Source: Court of Auditors.	+

Tables 5–7 in Appendix 1. These variables are grouped into three classes, taking into account the diverse characteristics of the population of the municipality in question, the socio-economic variables of the local government and, finally, government financial variables.

Authors such as Solé-Ollé (2006), Gonçalves-Veiga and Veiga (2007), Zafra-Gómez et al. (2009), Benito et al. (2010), Carr and Karuppusamy (2010), Choi et al. (2010), Guillamón et al. (2011) and Wang and Hou (2012) included population variables in studies of financial management by local governments and in analyses of the financial health of municipalities. In this respect, too, Ashworth et al. (2005), Solé-Ollé (2006), Carmeli (2007), Wang et al. (2007), Zafra-Gómez et al. (2009), Benito et al. (2010) and Guillamón et al. (2011) analysed socio-economic variables relevant to management problems in public administration. Finally, Wang et al. (2007) and Cabaleiro et al. (2013) incorporated government financial variables in their respective studies.

Although none of these previous studies specifically examined the factors influencing the risk of default, their findings represent a basis for theorising that the variables found to be significant could also be relevant to local governments' problems with respect to financial default.

*Population variables.* *Pop\_Size* has been used in previous research by Solé-Ollé (2006), Gonçalves-Veiga and Veiga (2007), Carr and Karuppusamy (2010), Choi et al. (2010) and Wang and Hou (2012). These studies conclude that larger populations generate more government spending, which may lead to a greater volume of debt being incurred and to difficulties in meeting it. In theory, at least, as concluded by studies carried out in private firms (Abdou, 2009; Campbell and Dietrich, 1983; West, 2000), an increase in the volume of debt could raise the likelihood of default. Therefore, we would expect a positive sign for the estimator. On the other hand, the variable *Pop\_Dens* has been used by Wang and Hou (2012), Choi et al. (2010), Gonçalves-Veiga and Veiga (2007), Solé-Ollé (2006) and Guillamón et al. (2011). Given that an increase in population density has a positive effect on municipal debt, and taking into consideration the conclusions drawn by Gardner and Mills (1989), West (2000) and Abdou (2009) in their studies of the business sector, that is, that greater debt means a greater risk of default, it seems reasonable to assume that this variable, too, could aggravate the problems facing local governments (i.e. the indicator sign is expected to be positive).

*Depend\_Pop* has been employed by Zafra-Gómez et al. (2009) and Benito et al. (2010). According to these authors, the greater the proportion of the dependent population, the greater the demand for public services and the smaller the contribution made to government revenues. Therefore, a rising dependent population could lead to an increased budget deficit – as income would be lower and expenses higher – which could also provoke greater financial difficulties and thus problems in meeting debt repayment commitments. We therefore expect the sign for the estimator to be positive.

Finally, the *Immigr* variable has been used in studies by Choi et al. (2010), Gonçalves-Veiga and Veiga (2007), Solé-Ollé (2006), Benito et al. (2010) and Guillamón et al. (2011). According to these authors, the higher the proportion of immigrants among the total population, the higher the accumulated debt (Schultz and Sjöström, 2001). From a theoretical standpoint, and in view of the

findings of previous research into default by private companies (see, among others, Abdou, 2009, West, 2000), an increase in the volume of local government debt may increase the probability of municipal default (positive sign).

*Socio-economic variables.* *Abs\_Maj* has been used in studies by Ashworth et al. (2005), Solé-Ollé (2006) and Benito et al. (2010). According to these authors, when a single party enjoys an absolute majority in local government, it will have greater freedom to increase the tax burden as a means of funding public services. Consequently, borrowing needs could be less, and therefore we expect the sign for this estimator to be negative.

*Political\_Sign* is constructed as a dichotomous variable and has also been used in studies of municipal debt. Blais and Nadeau (1992), Kiewiet and Szakazy (1996), Dickson and Yu (1997) and Guillamón et al. (2011) all concluded that conservative governments tend to borrow less. Theoretical reasoning suggests, therefore, that a local authority with a conservative-oriented governing party would be less likely to default because its level of debt would be lower than that of a municipality governed by a left-wing party. Accordingly, this variable is expected to present a negative sign.

*IPC* is an indicator that has been used by Wang et al. (2007) and Zafra-Gómez et al. (2009). According to these studies, a higher value for this variable suggests there is less need to resort to borrowing, and thus the volume of debt could be lower. Studies by Gardner and Mills (1989), West (2000) and Abdou (2009) have shown that when *IPC* falls, debt levels may rise, and so there is a greater probability of local government default. For this reason, the sign for this estimator is expected to be negative.

*Unemployment* has been used by Benito et al. (2010) to study fiscal pressure among local governments, and these authors have observed a positive relationship between the independent variable and the dependent variable. Therefore, from a theoretical standpoint, if rising unemployment means that local governments will have greater need of financial resources, then municipalities with the highest levels of unemployment would be the most indebted and therefore would face the most severe financial problems. Therefore, we expect there to be a positive relationship between the unemployment rate and the probability of loan default by municipal governments.

*Government financial variables.* According to Cabaleiro et al. (2013), financial autonomy (*Fin\_Aut*) contributes to enhancing the financial health of local government, a fact that is inversely related to the probability of default. Thus, theoretical reasoning leads us to believe that the greater the financial autonomy, the lower the probability of default, and therefore the expected sign is negative; an increase in the specific weight of own revenue to total revenue implies, in theory, less uncertainty in financial planning (this revenue is not dependent on external agency decisions) and therefore less risk of default.

On the other hand, studies of default by private companies and credit customers have shown that as the debt/equity ratio (the general financial structure) increases,



so does the probability of default as an excessive proportion of enforceable debt to unenforceable debt (equity and reserves) can lead to problems of insolvency (Mossman et al., 1998). Therefore, we expect the sign for this estimator to be positive for the variable *Fin\_Struct*.

None of the previous studies reviewed made use of the variable *Comp\_Debt* (debt composition) in local governments, although logic suggests that analysis of this aspect could be useful. Given that a higher proportion of short-term debt means that local governments will have fewer options due to the greater immediacy of due dates, it seems reasonable to assume that as this ratio rises, so will the likelihood of default.

Another variable included that has not been studied in previous research in the field of local government is a proxy for the origin and nature of the debt (*Source\_Debt*). However, by theoretical reasoning, a rising proportion of financial debt (i.e. that issued by banks) with respect to commercial debt (i.e. that issued by suppliers) could raise the probability of local government default because the due dates of bank debt are usually time-invariant whereas those for the payment of commercial debt to suppliers are often more negotiable. Accordingly, we expect a positive sign for this variable.

### *The dependent variable*

In this article, taking into account the criteria set out in the corresponding Spanish legislation, we consider a local corporation to be at risk of insolvency when it meets at least one of the conditions, or financial indicators, stipulated in the following. We specify the legal statute that addresses each of these financial indicators, considering it a risk factor for local governments as regards meeting the payment schedule for debts, that is, a risk factor for insolvency:

- *Default 1:* Cash surplus for overheads  $<0$  (Index of cash surplus), as addressed in Article 193 of the Revised Text of the Local Government Finance Act. For information on this item, we consulted various sources in the following order of preference: (a) the Court of Auditors, through its accountability website; (b) the external audit body for the autonomous community to which the municipality belongs; and (c) the local authority's own website.
- *Default 2:* Legal borrowing limit (capital or current debt) exceeding 110% of current revenues, in accordance with Article 53.2 of the Revised Text of the Local Government Finance Act. For information on this variable, we consulted the virtual office of local authorities, administered by the Ministry of Finance and Public Administration.
- *Default 3:* Solvency (current assets/current liabilities)  $<1$ . This indicator of solvency is commonly used in financial analysis. For information on this variable, we consulted the same sources of information as for the Default 1 condition.
- *Default 4:* Gross budget savings (current revenue – current expenditure)  $<0$ , as established in Article 53.1 of the Revised Text of the Local Government Finance

Act. For information on this variable, we consulted the virtual office for financial coordination with local authorities, administered by the Ministry of Finance and Public Administration.

It could be thought that a situation where more conditions are satisfied for the default is more severe than a situation where fewer conditions for the default are satisfied. This would imply considering a specification that assigns 0 or 1 for each of the default conditions. However, we did not do so as the Spanish regulations define the same default as complying with one or more requirements for the default.

A second reason for selecting these four criteria for loan default by local governments concerns the Basel Committee on Banking Supervision (BCBS, 2004), the International Convergence of Capital Measurement and Capital Standards of the Bank for International Settlements (June 2004) and Circular 3/2008, of 22 May, of the Bank of Spain (2008), which implemented the Basel II regulations for banks operating in Spanish territory, including local corporations, with respect to loan exposure to central government, central banks, institutions and companies.

In a similar way to the approach taken in Spanish legislation, both texts consider that there is reasonable doubt as to whether financial obligations will be met when, among other circumstances, the debtor's solvency worsens, as revealed by an inadequate economic or financial structure, negative equity, continuing losses, generalised late payments, insufficient cash flow to pay debts, inability to obtain additional financing or a situation of official receivership.

### *Statistical methods*

To measure the probability of loan default by a local government, we assigned a value of 1 to municipalities that meet one or more of the conditions previously defined for default, and a value of 0 otherwise, analysing data from a sample of 148 Spanish municipalities for the period from 2008 to 2011. The data comprised: (a) demographic variables; (b) socio-economic variables; and (c) government financial variables.

According to the literature, discrete choice models are appropriate when the study goal is to analyse the determinants of the probability of an individual economic agent choosing a particular course of action within a set of options, and such models have been used in many cases to explain the factors underlying the probability of loan default (Kukuk and Rönnerberg, 2013).

Logit panel data can be used to establish the correlation between unobserved factors over time, and to eliminate the bias arising from the existence of unobservable and time-invariant heterogeneity among individuals (Train, 2003). These characteristics are relevant for our purposes as they closely fit the characteristics of our sample.

In the present study, the dependent variable is binary, according to the description of the dependent variable, and we have a data panel for the period 2008–2011.

Therefore, a conditional random-effects logistic regression<sup>1</sup> can be used for the study sample, composed of 148 local governments. The random intercept logit model was chosen for several reasons: first, to control and model the unobserved heterogeneity in our data – for instance, the model also provides intra-class correlation, that is, a percentage of the variance of the dependent variable that is due to individual unobserved characteristics; and, second, it allows for subject-specific interpretations and inferences. However, this model is sensitive to possible subject-level confounding that can produce inconsistent estimates. Nevertheless, random effects can be used to remove the restrictions on the distribution of errors corresponding to the ‘fixed effects’ mode, albeit at the expense of imposing a parametric specification for the conditional distribution of the unobservable individual effects.

Under the theoretical framework based on the discrete choice model proposed by McFadden (2001) and McFadden and Train (2000), for each observation  $i$ , there may be  $j$  alternatives at time  $t$  given a deterministic indirect utility function of alternative  $j$  that can be captured by the explanatory variables, which are specified as follows:

$$Y_{it} = \alpha_i + X_{it}\beta_i + \varepsilon_{it}$$

where  $\alpha_i$  represents the constant term,  $X_{it}$  represents a vector of explanatory variables that affect the probability of default each year and  $\varepsilon_{it}$  is a random term.  $Y_{it}$  is a dummy variable that equals 1 if the local government  $i$  is in default at time  $t$ , and 0 if not:

$$Y_{it} = \begin{cases} 1, & \text{if local government } i \text{ defaults,} \\ 0, & \text{if local government } i \text{ does not default} \end{cases}$$

To deal with the particular structure of these municipal data – longitudinal data structure and random time effects – a logit panel data model is used to estimate the probability that a local government  $i$  will default at time  $t$ . As shown by Train (2003), this can be computed as follows:

$$Prob(Y_{it} = 1) = \frac{\exp(\alpha_i + X_{it}\beta_i + \varepsilon_{it})}{1 + \exp(\alpha_i + X_{it}\beta_i + \varepsilon_{it})}$$

The test specification designed by Hausman (1978) contrasts two regressions, one (fixed effects) in which the problem of correlation is corrected and one (random effects) in which they are not. If the differences between the two are not significant, this could mean that no correlation correction need be performed. On the other hand, if the differences are very large, correlation problems must be addressed and fixed effects should be used (Gujarati, 2004).

Finally, the model implemented in this study meets all the requirements of the Basel II regulations for statistical models used to calculate the probabilities of loan default.

## Analysis of results

We now examine the results of the random effects logistic regression analysis performed on the data included in this study. According to these results, in 302 cases (51.01%), a loan default occurred, and in 290 (48.99%), there was no default.

Taking these results into account, Table 2 presents the estimated coefficients transformed into odds ratios (OR) of the conditional random-effects logistic regression of the final model, as well as their statistical significance and other statistics of the models. The model is statistically significant and, according to the coefficients, two variables have a positive influence and another four have a negative influence on the probability of default by local governments. Thus, of the 12 variables selected, six are significant and six are not.

These results show that the *Pop\_Dens* variable is significant, but with a negative sign ( $-0.270232$ ), when a positive one had been expected. Although previous studies have concluded that increased population density promotes local government borrowing (and, according to the findings of parallel research in private companies, the risk of default), our results show, on the contrary, that such an increase could contribute to avoiding or reducing problems of default. In our case, we understand that a higher population density could involve a larger number of users of public services that generate, at the same time, a greater volume of financial revenues for local governments (tax revenues and public fees and prices) in order to meet the payment of the debt. It could also involve the more responsible behaviour of managers regarding solvency and compliance with payment commitments.

At the same time, our results indicate that the variable *Depend\_Pop* is also significant, but with a negative sign ( $-21.59687$ ), also contrary to that expected

**Table 2.** Variables included in the final model.

Variable	Coef. ( $\beta$ )	Std. Err	Exp ( $\beta$ )	CI 95% for Exp ( $\beta$ )	
				Lower	Upper
POP_DENS	$-0.270232^{(***)}$	0.0768787	0.7632023	$-0.420911$	$-0.119552$
DEPEND_POP	$-21.59687^{(***)}$	7.266459	4.1744E-10	$-35.83886$	$-7.354871$
POLITICAL_SIGN (1)	$-1.757557^{(***)}$	0.3756014	0.1724656	$-2.493723$	$-1.021392$
IPC	$-5.756884^{(***)}$	0.7862592	0.0031609	$-7.297924$	$-4.215844$
FIN_STRUCT	$0.444984^{(***)}$	0.1428	1.560465	0.1651011	0.7248669
COMP_DEBT	$1.182225^{(***)}$	0.2314663	3.261624	0.7285595	1.635891
Constant	$13.267^{(***)}$	2.618851			

Log likelihood: 261.67

Wald Chi-square: 77.07; sig.: 0.000

Chi-square: 28.54; sig.: 0.000

Hausman (1978) Test: 7.79; sig.: 0.2542

<sup>(\*)</sup>, <sup>(\*\*)</sup>, <sup>(\*\*\*)</sup> represent significance at the 10%, 5% and 1% level.

from previous research findings, according to which an increase in the dependent population will tend to increase the budget deficit. Our results suggest that an increase in the dependent population could mean that local governments are more aware of and place a higher priority on debt repayment. This finding also suggests that the influence of this variable may be determined by the specific characteristics of this population group (per capita income, wealth, etc.) and by the capital transfers received by the local government for this specific purpose.

With respect to the socio-economic variables, we found empirical evidence to corroborate the influence of the political orientation variable on the risk of local government default, with the expected negative sign ( $-1.757557$ ). This result, that is, that left-wing governments, as well as tending to incur higher levels of debt, are also more likely to be at risk of default, represents a novel contribution in the field.

Regarding the variable *IPC*, and with respect to the causal relationships reported in previous studies, our results also represent an advance. We obtained evidence of the influence, with a negative sign ( $-5.756884$ ), as expected, of this variable on the probability of default. In other words, an increase in income per capita may reduce the risk of local government default.

For the financial variables, our results show that an increase in the *Fin\_Struct* ratio may raise the risk of local government default since the coefficient obtained is  $+0.444984$ . In view of these results, we suggest that in local governments, the influence of this variable on the risk of default is similar to that reported elsewhere with respect to the private business sector, where an increase in debt finance that is proportionally greater than the increase in equity reflects a higher risk of default.

For the *Comp\_Debt* ratio, our findings are similar, with empirical evidence of its positive relationship with the probability of default ( $+1.182225$ ), which means that local governments with higher short-term debt ratios are at greater risk of default.

We obtained no empirical evidence on the influence of other variables that previous studies have suggested may be significant, such as population variables (size and immigration), socio-economic variables (absolute majority and unemployment) and financial variables (autonomy and origin of the debt). These findings suggest, first, that the capability of a variable to affect the volume of debt does not necessarily influence the risk of default and, second, that the causes of the risk of default by private firms cannot always be extrapolated to government entities.

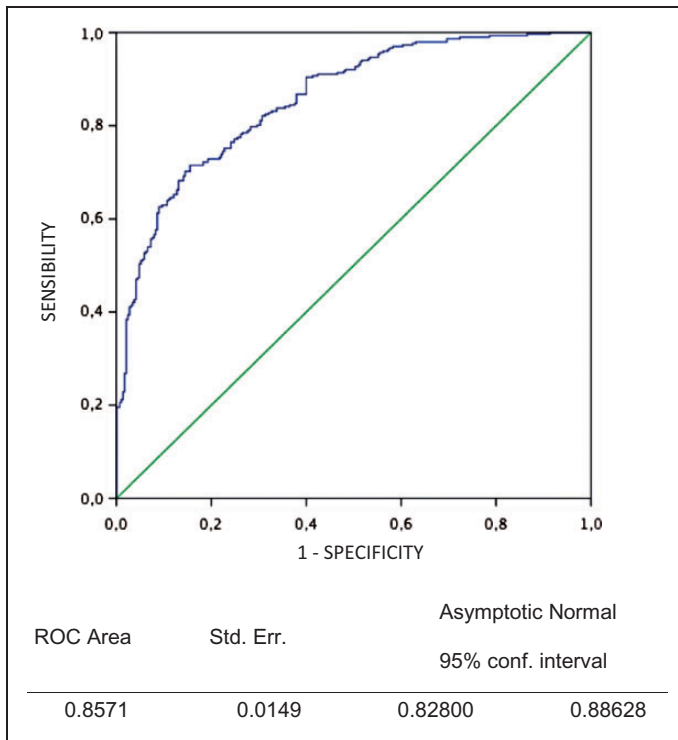
Finally, the results of the Hausman (1978) test show that the model should be assessed by random rather than fixed effects, following the confirmation of the null hypothesis that there is a correlation between the latent effects, or the number of observations, and the model predictors.

The correlation matrix in Table 3 shows that the correlations among the explanatory variables included in the final model are very small, which confirms that there is no relationship among these variables that would account for the event studied. We conclude, therefore, that the results obtained are robust and reliable.

As regards the goodness of fit, the Wald statistic confirms the joint significance of the variables included in the model by rejecting the null hypothesis that the

**Table 3.** Correlation matrix.

	POP_ DENS	DEPEND_ POB	POLITICAL_ SIGN	IPC	FIN_ STRUCT	COMP_ DEBT
POP_DENS	1.0000					
DEPEND_POB	0.0300	1.0000				
POLITICAL_SIGN	0.0988	0.0174	1.0000			
IPC	0.1390	0.0727	-0.0975	1.0000		
FIN_STRUCT	0.0300	-0.0068	-0.0071	-0.0070	1.0000	
COMP_DEBT	-0.0060	-0.0390	-0.0303	-0.0009	-0.0211	1.0000



**Figure 1.** ROC curve.

coefficients are equal to zero. As can be seen in Figure 1, the receiver operating characteristic (ROC) curve of the model approaches the upper-left corner of the graph, which confirms that the model discriminates sufficiently well between the two groups of local governments.

**Table 4.** Classification matrix (percent).

		Prediction		Correct percentage
		Y		
Observ.		Non-default	Default	
Y	Non-Default	214	76	73.79
	Default	66	236	78.14
Overall percentage				76.01

Optimal cut-off: 0.50. Sens.: 76.42%; Spec.: 75.64%.

The classification matrix, that is, the table of estimated versus observed values (Table 4), shows the degree of accuracy of the classification obtained. It can be seen that for an optimal cut-off of 0.50, an accuracy of 76.01% is obtained in the correct classification of the database items, which confirms that there is sufficient predictive capacity, as can be corroborated by the credit scoring and credit risk literature in private banking (Chuang and Lin, 2009; Šušteršič et al., 2009).

## Conclusions

The authors of previous research in this field, as well as international agencies engaged in public finance, have expressed concern about the financial health of local governments, observing that public debt and its repayment are key issues to be resolved if governmental financial crises, at an international level, are to be overcome as this issue is directly associated with the risk premium.

However, although various studies have examined variables that influence municipal debt, hardly any have reported information on the risk factors for loan default by local governments. Therefore, in view of the high levels of debt of many local authorities, and considering that their capacity to repay this debt is an essential element of their financial sustainability, we believe it interesting and timely to identify factors that may increase or reduce the risk of default by local governments.

The findings of the present article may provide useful information for managers and politicians responsible for the financial management of local governments in accordance with the Basel II model. Following this model, as discussed in the second section, financial institutions assign a higher risk premium to government entities with greater problems of insolvency. Therefore, if governments are aware of their risks of default, they possess crucial information for negotiating more beneficial rates of interest and payment terms, whether from a stronger position (low risk) or a weaker one (high risk), as they will be informed of the data used by the financial institution with which they are negotiating.

Our empirical study, of 148 Spanish local governments for the period 2008–2011, has identified two population variables, two socio-economic variables and

two financial variables that influence the risk of loan default. In particular, the statistical evidence obtained reveals that falling values of three variables (population density, dependent population and per capita income) represent an increased risk of default for local governments.

A local authority's financial structure and the composition of municipal debt are also influential in the risk of local government default. Our findings show that increases in the proportion of short-term debt and in the proportion of debt finance may increase the risk of default. Moreover, this risk can also be affected by the political orientation of the governing party, with left-wing governments being more likely to be at risk of default.

However, we found no empirical evidence that the risk of default is affected by the population variables examined (population size and immigration), by the socio-economic variables of absolute majority and unemployment, or by the financial variables of financial autonomy and origin of the debt. In the case of the population variables and the socio-economic variables, this result implies that the impact of immigration and unemployment on the level of budget deficit, the volume of debt, the financial condition and fiscal stress does not necessarily influence the risk of default. Moreover, in the case of the financial variables, the financial causes of the risk of local government default do not appear to resemble those affecting private business. Finally, financial autonomy in itself does not reduce the risk of default, although previous research has reported a relationship with the volume of debt.

From the standpoint of those responsible for the finances of local governments, our findings indicate that a continual increase in short-term debt (whether extended by suppliers or by banks) and a reduction in per capita income are clear warning signs that measures should be adopted to control and reduce the risk of default. This risk could be even higher in municipalities with a low population density, especially those governed by left-wing parties.

Our findings show that an increase in the population density may reduce the probability of default. This finding could be due to the fact that a higher population density could involve a larger number of users of public services that generate, in turn, a greater volume of tax revenues and public rates for services rendered to citizens. It could also involve the more responsible behaviour of managers regarding solvency and compliance with payment commitments.

Our findings show that an increase in the size of the dependent population may reduce the risk of default; this conclusion is unexpected as prior studies had reported that such an increase could provoke a budget deficit, thus worsening fiscal stress and producing difficulties in debt repayment. Instead, our findings suggest that in response to a rising dependent population, local governments could be more aware of the importance of paying off their debts, and thus be very concerned to reduce the risk of default, in order to contribute to the viability of this service and of future ones aimed at the dependent population. On the other hand, it is also possible that the influence of this variable is determined by the specific characteristics of this sector (per capita income, wealth, etc.) and by the



capital transfers obtained by the local government specifically to meet the demands of this population group.

Therefore, local government financial managers should seek to obtain a suitable balance between short- and long-term borrowing and equity, and take appropriate policy actions to increase per capita income (e.g. by contributing to job creation schemes and business investment incentives) in order to reduce the risk of default, and thus present very strong arguments in negotiating loans with banks to agree longer repayment terms and lower rates of interest.

The obtained results should be considered by taking into account two conditioning factors. On one hand, the Spanish norm on indebtedness considers that a local government is similarly insolvent with one condition of default as with more than one. On the other hand, an accuracy ratio of 76.01% could be, a priori, low. However, this accuracy ratio has been achieved with the variables used by the specialised literature, opening a path for further research to improve results.

The findings of this article provide reasons for undertaking further research in this area, considering issues such as: a) the risk of default by local governments of different sizes, including small towns; b) a comparative analysis of the risks of default by local governments in different countries; c) the design of models to predict the risk of default; d) the study, as potential risk factors, of the political characteristics of local government; and e) an analysis of the specific characteristics of the dependent population, including per capita income and wealth, as well as capital transfers received by the municipality in order to provide services for this population.

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## Note

1. We used the random effects logistic regression procedure in the software package Stata 12.0.

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**Andrés Navarro-Galera** is a Full Professor at the University of Granada, Spain. He is a member of the European Accounting Association. His current research interests are focused on public administration and public management, where he has published articles in international journals with a high impact factor. His last publication was ‘Governance, transparency and accountability: An international comparison’, *Journal of Policy Modeling* (2015) 37(1): 136–174.

**Juan Lara-Rubio** has a PhD in Economics and Business from the University of Granada and is currently a Professor of Finance at the University of Granada, Spain. His current research interests are focused on the study of credit risk and the Basel II banking regulations in Microfinance Institutions, on which he has published articles in international journals. His last publication was ‘Improving the management of microfinance institutions by using credit scoring models based on statistical learning techniques’, *Expert Systems with Applications* (2013) 40(17): 6910–6917.

**Dionisio Buendía-Carrillo** holds a PhD in Economics from the University of Granada and is currently appointed as Associate Professor at the University of Granada, Spain. He has wide research expertise in Economic and Financial Information Systems in public administration. His last publication was ‘Financial information management for university departments, using open-source software’, *International Journal of Information Management* (2014) 34(2): 191–199.

**Salvador Rayo-Cantón** has a PhD in Finance and Accounting and is currently Associate Professor at the University of Granada, Spain. Currently, his research focuses on the analysis of credit and operational risk models under Basel II. His last publication was ‘Credit scoring models for the microfinance industry using neural networks: Evidence from Peru’, *Expert Systems with Applications* (2013) 40(1): 356–364.

## Appendix I

**Table 5.** Statistical description of independent variables (all cases).

Variable		Mean	Std. Dev.
POP_SIZE	overall	0.1665207	0.3075457
	between		0.3083189
	within		0.0025229
POP_DENS	overall	2.467569	3.122749
	between		3.130349
	within		0.0470973
DEPEND_POP	overall	0.3105144	0.0251716
	between		0.0246221
	within		0.0055169
INMIGR	overall	0.0627354	0.0448673
	between		0.0448937
	within		0.0028035
ABS_MAJ	overall	0.4527027	0.4981789
	between		0.4994481
	within		0
POLITICAL_SIGN	overall	0.5591216	0.4969122
	between		0.4891349
	within		0.094251
IPC	overall	1.155718	0.3790334
	between		0.3475454
	within		0.1532698
UNEMPLOYMENT	overall	0.0917823	0.0254694
	between		0.0239735
	within		0.0087681
FIN_AUT	overall	0.6848736	0.1222504
	between		0.0938813
	within		0.0785889
FIN_STRUCT	overall	0.6597953	5.085823
	between		1.43971
	within		4.878868
COMP_DEBT	overall	1.437994	2.697164
	between		2.096442
	within		1.703507
SOURCE_DEBT	overall	1.629223	2.112542
	between		1.264131
	within		1.694969

**Table 6.** Statistical description of independent variables (non-failed group).

Variable		Mean	Std. Dev.
POP_SIZE	overall	0.1609995	0.209635
	between		0.1821362
	within		0.0013072
POP_DENS	overall	2.884139	3.75103
	between		3.331813
	within		0.0430491
DEPEND_POP	overall	0.3130613	0.0230923
	between		0.0234372
	within		0.0045343
INMIGR	overall	0.0639464	0.0472752
	between		0.0476649
	within		0.0023402
ABS_MAJ	overall	0.4965517	0.5008524
	between		0.5018983
	within		0
POLITICAL_SIGN	overall	0.6137931	0.4877206
	between		0.488381
	within		0.0657667
IPC	overall	1.231219	0.4491911
	between		0.393127
	within		0.1425054
UNEMPLOYMENT	overall	0.0894002	0.025558
	between		0.0244454
	within		0.0069973
FIN_AUT	overall	0.6862914	0.12634
	between		0.121662
	within		0.0571061
FIN_STRUCT	overall	0.3070332	6.25732
	between		2.634042
	within		5.565611
COMP_DEBT	overall	1.073625	1.709694
	between		1.354287
	within		1.176829
SOURCE_DEBT	overall	1.64875	1.111184
	between		0.8751105
	within		0.6656325

**Table 7.** Statistical description of independent variables (failed group).

Variable		Mean	Std. Dev.
POP_SIZE	overall	0.1718225	0.378761
	between		0.3167192
	within		0.0031541
POP_DENS	overall	2.067553	2.304288
	between		2.333328
	within		0.0420772
DEPEND_POP	overall	0.3080686	0.0268293
	between		0.0265009
	within		0.0049279
INMIGR	overall	0.0615726	0.0424731
	between		0.0459007
	within		0.0026745
ABS_MAJ	overall	0.410596	0.4927585
	between		0.4977827
	within		0
POLITICAL_SIGN	overall	0.5066225	0.5007859
	between		0.4927573
	within		0.0998337
IPC	overall	1.083218	0.2785464
	between		0.2988562
	within		0.1367725
UNEMPLOYMENT	overall	0.0940697	0.0252148
	between		0.0232202
	within		0.0082161
FIN_AUT	overall	0.6835122	0.1183846
	between		0.0957874
	within		0.0788981
FIN_STRUCT	overall	0.9985396	3.599717
	between		4.933676
	within		1.322863
COMP_DEBT	overall	1.787883	3.350562
	between		2.495647
	within		1.790158
SOURCE_DEBT	overall	1.610473	2.752519
	between		1.389871
	within		2.250305