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Testing the Reliability of Financial Sustainability. The Case of Spanish Local Governments

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Abstract: Local Governments (LGs) have strengthened the financial control as a consequence of mandatory requirements to ensure financial sustainability in their management. The aim of this study is to determine whether financial indicators about financial conditions defined in Spanish regulation are backed by worldwide generally accepted financial benchmarking indicators. For this purpose, we analyze the relationship between Spanish indicators of financial sustainability based on European Union (EU) regulations and Financial Trends Monitoring System Indicators (FTMS) of the International City/County Management Association (ICMA). For this purpose, two methodologies are applied: discriminant analysis and logistic regression, where the dependent variables are each of the Spanish financial indicators and the independent variables are ICMA indicators. The evidence supports that variables that are related to the control of expenditures, debt and the revenues show a greater explanatory power of financial sustainability, being the most important elements which offer relevant information about the financial sustainability measurement of LGs.

Keywords: financial sustainability; local governments; financial condition; benchmarking; financial indicators

1. Introduction

The decline of public finances due to the global crisis in 2008 highlighted the lack of fiscal discipline of different levels of administration, emerging situations of financial instability. The financial crisis provided an opportunity to define the bases of financial sustainability good practice guidelines in order to control the use of public funds and indebtedness of governments around the world. Sustainability management is introduced to transform how governments implement public policies and deliver public services [1]. It opens a new financial scenario for all administration layers including Local Governments (LGs) based on a universally accepted principle: financial sustainability, which is related to the likelihood of failure for LGs with liabilities and debts. The mechanism, applied by countries at the international level to control LGs' financial health, is a benchmark, distinguishing between a *voluntary local self-management*, without intervention from the state, *compulsory hierarchical management*, in which the design of the performance indicators takes place under the supervision of the central government and a *vertically co-ordinated management* with a co-operating between central and local governments [2]. The mandatory requirements seek the reduction of public sector costs and debt by achieving responsible management through the periodical assessment of the financial position. Nowadays, a challenge for governments is to define indicators that can provide a reliable measurement of the financial condition to be calculated, disclosed and reported to the central government by municipal managers. Next to the evaluation of fiscal health, governments also establish corrective actions to redirect financial situations.

The International City/County Management Association (ICMA) produced a prestigious publication in the 1980s [3] about the evaluation of financial condition for LGs of the United States

(US), based on the financial condition defined by Groves et al. [4], which refers to the capacity of a government to provide the level and quality of services required for the welfare of a community. In the fourth edition (in 2003) of *Evaluating Financial Condition: A Handbook for Local Government* [5], the publication revised the Financial Trend Monitory System (FTMS), offering a tool composed of 42 indicators to be considered for a comprehensive evaluation of the financial condition in LGs that includes the calculation of indicators and how to read them, providing interesting information to local administration managers, which have become a worldwide benchmark applied on most relevant empirical works to measure financial condition.

European Union (EU) policymakers have also chosen financial sustainability as a tool to track the fiscal condition of countries that belong to the Eurozone, establishing requirements for setting up the limits for governments' deficit and debt, by the reform of the agreement of Stability and Growth Pact (SGP) in 2011, in order to ensure the stability of the Economic and Monetary Union (EMU). The SGP establishes the due process for the monitoring of the fiscal conditions of State members, which includes the procedure to be followed when a member breaches the SGP, with the adoption of an Excessive Deficit Procedure (EDP) that requires corrective actions in the case of exceeding the budget deficit allowed by the EU.

In Spain, LGs have full fiscal autonomy to approve their own budget of expenditures and revenues, establishing and collecting taxes, and borrowing from banks and markets. Therefore, in order to maintain LGs finance within the framework of SGP-EU requirements, the Spanish central government has transposed the financial sustainability requirements established by the EU to the Spanish LG arena (The Organic Law on Budgetary Stability and Financial Sustainability, 2012) with the purpose of monitoring how each LG performs across several financial indicators. Regulatory requirements establish how and when to evaluate the situation. The Spanish Ministry of Finance website publishes a set of financial indicators for each LG, and makes them available in an online database, as a category of Open Government Data (OGD).

The objective of this article is to evaluate whether the way to measure the financial condition of LGs in Spain by transposing the SGP of the EU requirements is a fair and reliable tool for measuring the LGs' financial condition. For this purpose, the relationship between the Spanish financial sustainability indicators for LGs and the ICMA worldwide generally accepted benchmarking indicators is analyzed. For this reason, we identify what common concepts are evaluated by generally accepted benchmarking in order to measure the financial sustainability and the research question of the analysis is to test if Spanish financial indicators are in line with worldwide definitions of financial sustainability.

Discriminant analysis and logistic regression methodology are applied to identify the ICMA indicators which have a higher discriminant power to define the financial condition of Spanish municipalities in a database which consists of four Spanish indicators and 18 ICMA financial indicators produced annually by 143 local governments from 2010 to 2017.

This paper can contribute to country policymakers not only to assist managers in the design of indicators that measure financial sustainability, but also to allow the comparison at the international level using benchmarking.

The article is organized as follows: Firstly, the background regarding the assessment of LG financial risks. Secondly, the variables and methodology are described. Thirdly, the analysis of the results is shown. Finally, discussion and conclusions are drawn.

2. Literature Review

For López-Subirés et al. [6], the financial sustainability is a key dimension in the management of governmental organizations in many parts of the world, the monitoring of financial risk being one of the most important challenges to promote the transparency of local administration. Therefore, LG's managers and/or governments aim to find a fair and reliable model based on indicators to be able to measure the financial condition in order to achieve an alert system tool. They are also interested in determining the factors that most influence disclosure about sustainability because this

information would help them to design measures to improve their management and communication of sustainability [7].

Academic literature shows multiple approaches to define financial risk in LGs such as: financial condition [8], fiscal health [9], or fiscal distress [10]. The common factor in all definitions of financial risk is that when LGs have liabilities and debts, a likelihood of failure exists. To face that likelihood, supranational institutions, such as Eurostat for the European Union (EU) countries, have set up deficit and indebtedness limits to EU countries. Consequently, some EU central governments have issued domestic legal requirements and/or transposed the Eurostat requirements to their own domestic legal framework in order to limit the indebtedness of LG based on the European System of Accounts' (ESA) concept of net lending/net borrowing, and other broader concepts such as solvency or liquidity of LGs.

There are several countries that have developed Performance Measurement Systems (PMS). The most used is the Financial Trends Monitoring System (FTMS) of the International City/County Management Association (ICMA) from the United States, which explains the financial condition as the ability to maintain existing service levels, resistance to local and regional disruptions, and meeting the demands of natural growth, decline, and change. FTMS classifies indicators in six groups: revenues, expenditures, operating position, debt, unfunded liabilities and capital plant.

Other accepted benchmarking tools are the alert system of the Canadian Institute of Chartered Accountants, next to the Ministry of Municipal Affairs and Housing of Canada which produced the Financial Information Returns (FIR) to measure the financial condition through a schedule of reporting requirement or the ratios included in the Comprehensive Annual Financial Report of the GASBS 34 (Governmental Accounting Standards Board), which measures financial assets, debt limit, surplus and relationship between expenses and revenues.

Several authors seek to explain what variables reveal useful information about the financial condition in LGs. Ryan et al. [11] analyze the case of Australia, where the financial framework of local governments is mainly composed of the Australian Accounting Standard 27 (AAS 27) Financial Reporting by Local Governments, and conclude that the key financial performance indicators about fiscal sustainability should encompass four dimensions: own source revenue reliance, revenue flexibility/intensity, indebtedness and liquidity.

Andrews [12] studies the amalgamations the case of England and Wales, defining the indicators of financial sustainability such as expenditures per capita, fiscal risk: analyzing the proportion of the overall expenditure that is funded via local property tax rather than central government transfers, or the "self-income ratio" [13], fiscal slack: absorbed or unabsorbed resources that can be appropriated by senior managers to meet new demands of the organization [14] and fiscal balance.

In the case of local councils in Ireland, Turley et al. [15,16] apply the Brown's assessment tool [17] used to measure the financial condition of small cities in the US composed of 14 financial indicators, which measure: liquidity, autonomy, operating performance, collection efficiency and solvency, obtaining a classification of the financial performance of councils, providing interesting results as some entities considered as "good" performers in the media appear as those in the best-performing group overall.

Table 1 shows a collection of studies aimed at determining the variables which better explain the financial condition in LGs. On one hand, Blore et al. [18], Kioko [19], Navarro-Galera et al. [20] and Gorina et al. [21], conclude that indicators which relate revenues and expenditures provide better predictive power of the financial condition. Cabaleiro et al. [22] find that the function that best allows for the classification of municipalities according to their financial health includes those indicators related to debt and revenues, while Cabaleiro and Buch [23] reveal the relationship between the tax effort and financial condition. Trussel and Patrick [24] support that financial risk is related to debt service, and other authors such as Bulai et al. [25], suggest that the level of affluence can be an essential component of a measure of financial sustainability. The literature also shows a solvency approach as a good instrument for evaluating financial conditions, as Zafra et al. [26] support, applying short-run solvency, budgetary flexibility solvency and service-level solvency as elements of the financial

condition. Another way of measurement is developed by Navarro-Galera et al. [27,28], who propose a system based on Basel II criteria, establishing four aspects to measure the probability default (PD) of LGs: cash surplus for overheads, legal borrowing limit, solvency (current assets/current liabilities) and gross budget savings (current revenue/current liabilities). However, Clark [29] asserts that the Financial Condition Index (FCI), which is a framework for evaluating financial condition developed by Groves et al. [4] based on cash solvency, budget solvency, long-run solvency and service solvency, is not the most appropriate tool for measuring financial condition at the local level.

Table 1. Significant variables included in the conclusion of financial condition study by author.

Author	Significant Variables
Bulai et al. (2019)	level of affluence: entities that are more fluent may be better equipped to handle a potential downturn in local government finances
Blore et al. (2012)	revenues mobilisation, or how mobilise more money (enhancing tax revenues and exploiting charges better) expenditure management through budgeting and expenditure management and cost management and control
Cabaleiro et al. (2012)	long-term debt, net current budgetary revenues divided by budget obligations from nonfinancial current expenditures minus debt service, net current budgetary revenues divided by net budget obligations, direct and indirect taxes and fees divided by net budget obligations from current expenditures, direct and indirect taxes and fees divided by net budgetary revenues from current operations
Cabaleiro and Buch (2014)	tax effort
Gorina et al. (2018)	cash solvency, long-term solvency, revenue structure
Groves et al. (1981)	cash solvency budget solvency long-run solvency service solvency
Kioko (2013)	revenues, expenses, assets and liabilities
Navarro-Galera et al. (2016)	income statement
Navarro-Galera et al. (2017, 2020)	Default 1: cash surplus for overheads Default 2: legal borrowing limit (capital or current debt) Default 3: solvency (current assets/current liabilities) Default 4: gross budget savings (current revenue/current liabilities)
Trussel and Patrick (2017)	debt service
Zafra et al. (2009)	short-run solvency budgetary flexibility solvency service-level solvency

The revision of previous literature allows us to conclude that there are similarities in the different financial measurement systems, because the indicators studied, strive to measure the same concepts. The different ways to measure financial sustainability, distinguish four main groups of indicators: evaluation of expenditures, evaluation of revenues, evaluation of debt and evaluation of cash, which is in line with the main groups of evaluation that ICMA establishes in the definition of the financial indicators applied on LGs. Table 2 shows a summary of four elements that can be defined, as a conclusion from the previous review, that are applied by authors and are accepted worldwide financial sustainability tools.

Table 2. Main groups of indicators to evaluate financial sustainability by author and worldwide systems.

Expenditures	Revenues	Debt	Cash
Cabaleiro et al. (2012) Kioko (2013)	Blore (2012) Cabaleiro et al. (2012) Kioko (2013) Cabaleiro and Buch (2014)	Cabaleiro et al. (2012) Trussel and Patrick (2017) Navarro-Galera et al. (2017, 2020)	Groves et al. (1981) Gorina et al. (2018) Zafra et al. (2009) Navarro-Galera et al. (2017, 2020)
ICMA indicators (US) FIR indicators (Canada)	ICMA indicators (US) FIR indicators (Canada) AAS 27 indicators (Australia)	ICMA indicators (US) FIR indicators (Canada) AAS 27 indicators (Australia)	ICMA indicators (US) AAS 27 indicators (Australia)

3. The Spanish Legal Framework

The legal financial framework of Spanish LGs is made up of a set of regulations that have developed requirements from different perspectives to control the financial sustainability of LGs. It consists of a package of actions introduced after the 2008 financial crisis in order to curb public expenditure and to reduce the annual deficit and debt. As a Eurozone member, Spain had to approve a regulatory framework consistent with EU requirements to achieve specific commitments towards getting back on the road to growth. As a consequence of pressure from the EU, Article 135 of the Spanish Constitution was modified by socialist president Zapatero and the Organic Law on Budgetary Stability and Financial Sustainability was enacted in 2012. This act establishes the requirements to be met by LGs in order to ensure their financial sustainability. It provides important requirements based on a set of principles about budgetary stability and financial sustainability, and establishes a legal basis applicable to the different layers of the public administration. According to the Organic Law on Budgetary Stability and Financial Sustainability, all Spanish public sector entities have to meet the following principles: budgetary stability, financial sustainability, multi-annuity investments, transparency, efficiency in allocation and use of public resources, responsibility, institutional loyalty, and the development of mechanisms for the coordination and application of the law.

Budgetary stability is linked to the present control of financial risks which arose in the context of the 2008 financial crisis as an important requirement for LGs, assuming that is a challenge to LGs, which are introducing reforms in order to better manage [30].

The Organic Law on Budgetary Stability and Financial Sustainability establishes a legal mechanism called reporting requirements which provides a schedule for different analyses of the financial position of LGs for monitoring their financial health. LGs have to report about budgetary stability and financial sustainability over the year. LGs must upload the information shown onto the Ministry of Finance's website entitled "Virtual office of financial coordination of local entities" using the XML taxonomy.

Therefore, budgetary stability offers another scenario composed of three indicators: *Budgetary Stability*, *Expenditure Rule* and *Public Debt*. *Budgetary Stability* is defined as the net lending or net borrowing adjusted, i.e., the higher the surplus, the better the issuer can cope with debt payments [31]. *Expenditure Rule* measures the growth of the expenditure of public administrations cannot exceed the reference rate of growth of the medium-term GDP of the Spanish economy. *Public Debt* represents the nominal value of outstanding liabilities of public administrations at the end of the fiscal year which is made up of: deposits, debt bonds and loans, according to ESA 2010 definitions. When a breach occurs, the law imposes corrective actions to avoid a relapse into financial instability. In these cases, the entities which fail to meet the cap limit of each indicator must elaborate an *Eco-financial Plan* aimed at recovering financial stability over the next two fiscal years to be approved by a fiscal authority.

4. Variables

According to the Organic Law on Budgetary Stability and Financial Sustainability, the analysis is focused on *Budgetary Stability*, *Expenditure Rule*, *Public Debt* and *Eco-financial Plan* indicators.

These indicators will be the variable dependents, which are dummy variables with value 1 if the variable indicates that the LG fails to meet the limits of the indicators, and 0 otherwise.

The selection of independent variables was approached with the indicators developed by the International City/County Management Association (ICMA) with the Financial Trends Monitoring System (FTMS). ICMA defines the financial condition as the ability to maintain existing service levels, resistance to local and regional disruptions, and meeting the demands of natural growth, decline, and change. The set of ICMA indicators is a procedure recommended to monitor the financial trends in LGs being a tool to help decision-making processes. ICMA's tool consists of a total of 42 quantifiable indicators (Table 3) used to evaluate the financial condition, categorized into different areas: financial, environmental and organizational factors.

Table 3. Financial Trends Monitoring System Indicators of International City/County Management Association (ICMA).

Area	Factors	Indicator
Financial Indicators	**Factor 1 Revenue Indicators**	*Indicator 1 Revenues per Capita* *Indicator 2 Restricted Revenues* Indicator 3 Intergovernmental Revenues Indicator 4 Elastic Revenues *Indicator 5 One-Time Revenues* Indicator 6 Tax Revenues *Indicator 7 Uncollected Property Taxes* Indicator 8 User Charge Coverage *Indicator 9 Revenue Shortfalls or Surpluses*
	Factor 2 Expenditure Indicators	*Indicator 10 Expenditures per Capita* Indicator 11 Expenditures by Function Indicator 12 Employees per Capita *Indicator 13 Fixed Cost*
	Factor 3 Operating Position Indicators	Indicator 14 Fringe Benefits *Indicator 15 Operating Deficit or Surplus* Indicator 16 Enterprise Operating Position Indicator 17 Fund Balances *Indicator 18 Liquidity*
	Factor 4 Debt Indicators	*Indicator 19 Current Liabilities* *Indicator 20 Long-Term Debt* *Indicator 21 Debt Service* Indicator 22 Overlapping Debt
	Factor 5 Unfunded Liability Indicators	Indicator 23 Pension Obligations Indicator 24 Pension Assets Indicator 25 Post Employment Benefits
	Factor 6 Capital Plant Indicators	Indicator 26 Maintenance Effort Indicator 27 Capital Outlay
Environmental Indicators	**Factor 7 Community Needs and Resources Indicators**	*Indicator 28 Population* *Indicator 29 Population Density* *Indicator 30 Population under 18 and over 64* *Indicator 31 Personal Income per Capita* Indicator 32 Poverty Households or Public Assistance Recipients Indicator 33 Property Value Indicator 34 Top Five Taxpayers Indicator 35 Home Ownership *Indicator 36 Vacancy Rates* *Indicator 37 Crime Rate* Indicator 38 Employment Base Indicator 39 Business Activity

Table 3. *Cont.*

Area	Factors	Indicator
Environmental Indicators	**Factor 8 Intergovernmental Constraints**	Indicator 40 Mandated Activities Indicator 41 Restrictions on Fiscal Powers
	Factor 9 Disaster Risk	Indicator 42 Disaster Risk
	Factor 10 Political Culture	
	Factor 11 External Economic Conditions	

Financial factors show different sections defining a set of indicators aim at capturing from different perspectives the concepts of revenues, expenditures, operating position, debt structure, unfunded liabilities or condition of capital plant. The relevance of each indicator may be different according to the legal and economic framework of LGS. Environmental factors provide us with information about community needs and resources, intergovernmental constraints, disaster risk, political culture and external economic conditions. Financial and environmental factors are linked to management practices and legislative policies.

ICMA debt indicators are similar to the Spanish *Public Debt* indicator, particularly *Indicator 21 Debt Service*, which relates debt with revenues. ICMA indicators study revenues, on the one side, and expenditures, on the other side, but do not have an indicator that connects the difference between them, so it is not possible to find an indicator similar to *Budgetary Stability*. As for the *Expenditure Rule indicator*, there is not an ICMA indicator that links the expenditure of the current year with the expenditure in the previous year.

In the study, we use the ICMA indicators for Spanish LGs by using the formula provided by ICMA's book—*Evaluating financial condition: A Handbook for Local Government* [5]. It is not possible to calculate the totality of 42 ICMA indicators because, in the case of some indicators, there is not an equivalence of the indicator in Spanish financial reports; consequently, 22 ICMA indicators were estimated. Table 3 show in italics the 18 ICMA indicators which were applied in the analysis, after removing four indicators because of high multicollinearity. Descriptive statistics (see Table 4) were calculated for every indicator, where we can appreciate on average that *Revenues per Capita* is 957,372 Euros and *Expenditures per Capita* is 278,906 Euros.

Table 4. Descriptive Statistics.

	N	Mean	Std. Dev.	Min.	Max.
Revenues Per Capita	996	957.372	1142.672	0.000	36200.764
Restricted Revenues	996	0.079	0.089	−0.028	0.523
One-Time Revenues	996	0.027	0.056	−0.071	0.468
Uncollected Property Taxes	996	0.324	4.800	0.000	144.498
Revenue Shortfalls or Surpluses	996	1.407	0.881	0.000	27.054
Expenditures Per Capita	996	278.906	1445.815	−1715.464	37517.232
Fixed Cost	995	0.410	0.086	0.000	0.907
Operating Deficit or Surplus	996	0.144	0.099	−0.529	0.889
Liquidity	993	0.703	2.024	−2.675	45.702
Current Liabilities	996	0.498	0.629	−0.925	6.469
Long-Term Debt	996	635.377	921.917	0.000	25489.469
Debt Service	996	0.106	0.083	0.000	1.807
Population	996	1252.710	2466.863	0.000	18894.934
Population Density	996	64158.552	119889.214	0.000	1314474.000
Population Under 18 and Over 64	996	10554.222	1807.597	0.000	13436.000
Personal Income Per Capita	996	0.170	0.081	0.020	0.499
Vacancy Rates	996	46.232	11.946	0.000	68.000
Crime Rate	996	957.372	1142.672	0.000	36200.764

As a result, Table 5 includes a summary of the dependent and independent variables which were determined for the models.

Table 5. Variables included in the models.

Variables	Model-Indicator Number	Indicator	Abbreviation
Dependent variables	Model 1	*Budgetary Stability*	*BudStab*
	Model 2	*Expenditure Rule*	*ExpRule*
	Model 3	*Public Debt*	*PubDebt*
	Model 4	*Eco-financial Plan*	*EFP*
Independent variables	*Indicator 1*	*Revenues per Capita*	*RevCap*
	Indicator 2	*Restricted Revenues*	*RestRev*
	Indicator 5	*One-Time Revenues*	*OneTRev*
	Indicator 7	*Uncollected Property Taxes*	*UncollPropTax*
	Indicator 9	*Revenue Shortfalls or Surpluses*	*RevShortSurp*
	Indicator 10	*Expenditures per Capita*	*ExpCap*
	Indicator 13	*Fixed Cost*	*FixedCost*
	Indicator 15	*Operating Deficit or Surplus*	*OpDefSurp*
	Indicator 18	*Liquidity*	*Liq*
	Indicator 19	*Current Liabilities*	*CurrLiab*
	Indicator 20	*Long-Term Debt*	*LTDebt*
	Indicator 21	*Debt Service*	*DebtServ*
	Indicator 28	*Population*	*Pop*
	Indicator 29	*Population Density*	*PopDens*
	Indicator 30	*Population under 18 and over 64*	*Pop1864*
	Indicator 31	*Personal Income per Capita*	*PersIncomCap*
	Indicator 36	*Vacancy Rates*	*VacRates*
	Indicator 37	*Crime Rate*	*CrimeRate*

In this way, the models which link Spanish and ICMA indicators are:

$$\begin{aligned} M1: BudStab_i = {} & \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax \\ & + \beta_5 RevShortSurp + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq \\ & + \beta_{10} CurrLiab + \beta_{11} LTDebt + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens \\ & + \beta_{15} Pop1864 + \beta_{16} PersIncomCap + \beta_{17} VacRates + \beta_{18} CrimeRate \end{aligned}$$

$$\begin{aligned} M2: ExpRule_i = {} & \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax \\ & + \beta_5 RevShortSurp + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq \\ & + \beta_{10} CurrLiab + \beta_{11} LTDebt + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens \\ & + \beta_{15} Pop1864 + \beta_{16} PersIncomCap + \beta_{17} VacRates + \beta_{18} CrimeRate \end{aligned}$$

$$\begin{aligned} M3: PubDebt_i = {} & \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax \\ & + \beta_5 RevShortSurp + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq \\ & + \beta_{10} CurrLiab + \beta_{11} LTDebt + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens \\ & + \beta_{15} Pop1864 + \beta_{16} PersIncomCap + \beta_{17} VacRates + \beta_{18} CrimeRate \end{aligned}$$

$$\begin{aligned} M4: EFP_i = {} & \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax \\ & + \beta_5 RevShortSurp + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq \\ & + \beta_{10} CurrLiab + \beta_{11} LTDebt + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens \\ & + \beta_{15} Pop1864 + \beta_{16} PersIncomCap + \beta_{17} VacRates + \beta_{18} CrimeRate \end{aligned}$$

The sample contains Spanish LGs with a population greater than 50,000, a total of 143 local entities with information from 2010 to 2017; the main sources of information were the "Virtual office of financial coordination of local entities" website and the Spanish National Audit Office website. For each LG, ICMA indicators were calculated and Spanish indicators were gathered from 2010 to 2017. The statistical software used in the empirical research was SPSS Statistics 24.

Hypotheses Tested

From the main conclusion of the revision of previous literature, we identify different ways to measure financial sustainability and distinguish four main groups of indicators, which allows us to base the study on the following hypotheses which are verified by empirical analysis:

Hypothesis 1 (H1). *Financial sustainability of LGs may be measured by the evaluation of expenditures.*

Hypothesis 2 (H2). *Financial sustainability of LGs may be measured by the evaluation of revenues.*

Hypothesis 3 (H3). *Financial sustainability of LGs may be measured by the evaluation of debt.*

Hypothesis 4 (H4). *Financial sustainability of LGs may be measured by the evaluation of cash.*

5. Methods

The methodology applied is discriminant analysis to test the discriminant power of indicators, because this methodology is recommended for models which have categorical character in their dependent variables and allow us to analyze the differences between groups and classify the LGs. The discriminant analysis aims to explain the belonging of each entity to one pre-established group or another. The concept of discrimination is established by Fisher [32], although the origin begins with Pearson [33] and Mahalanobis [34]. Discriminant analysis is useful to obtain classifiers to distinguish groups using variances and co-variances, already having predefined categories of response in order to build a model that helps in predicting the category or group, existing as a multivariate technique that studies the differences of categories established a priori, which allows a user to analyze the variables that contribute to discriminate subjects in the different groups. The model is composed of a discriminant function based on linear combinations of predictor variables.

The discriminant function is:

$$\begin{aligned} D = {} & \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax + \beta_5 RevShortSurp \\ & + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq + \beta_{10} CurrLiab + \beta_{11} LTDebt \\ & + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens + \beta_{15} Pop1864 + \beta_{16} PersIncomCap \\ & + \beta_{17} VacRates + \beta_{18} CrimeRate \end{aligned}$$

where $\beta_0 \ldots \beta_{18}$ are the discriminant coefficients.

The requirements of discriminant analysis are that the grouping variables (dependent variables) should be categorical variables with two values at least—in our study, default or non-default— while the independent variables should be continuous. This study seeks the relationship between the categorical variables: *Budgetary Stability*, *Expenditure Rule*, *Public Debt* and *Eco-financial Plan*, and the ICMA indicators (independent variables). In the analysis, we introduced all independent variables and applied the stepwise procedure in the discriminant analysis which shows only important variables selected based on Wilk's lambda, while redundant variables are discarded.

The previous assumptions of discriminant analysis to apply this methodology are: normality in the independent variables, linearity, no multicollinearity and equal variances. We assume, as a limitation, that financial variables are more likely to be highly skewed, and for these reasons, the variables would be transformed in order to achieve the previous assumptions. Although discriminant analysis is considered a robust technique that is not altered if any of the previous assumptions are not applicable, we also apply the methodology of logistic regression with panel data in order to complement the analysis of the variables. This methodology is less stringent than discriminant analysis and it is not necessary that independent variables are normally distributed or equal variances are assumed. In this way, in binary logistic regression, the dependent variable can only take two values: 1 if the LG defaults, 0 otherwise.

The formula of the linear function of the logistic regression model is:

$$Y = \beta_0 + \beta_1 RevCap + \beta_2 RestRev + \beta_3 OneTRev + \beta_4 UncollPropTax + \beta_5 RevShortSurp + \beta_6 ExpCap + \beta_7 FixedCost + \beta_8 OpDefSurp + \beta_9 Liq + \beta_{10} CurrLiab + \beta_{11} LTDebt + \beta_{12} DebtServ + \beta_{13} Pop + \beta_{14} Pop\ Dens + \beta_{15} Pop1864 + \beta_{16} PersIncomCap + \beta_{17} VacRates + \beta_{18} CrimeRate$$

where Y is each one of the dependent variables, and $\beta_0 \ldots \beta_{18}$ are the estimated coefficients and the logistic function is:

$$p = \frac{1}{1 + e^{-Y}}$$

where Y is the lineal function of the logistic regression model and e is the base of the Napierian logarithms (2.718).

6. Results

6.1. Robustness Test

The previous assumptions of discriminant analysis to apply this methodology are: normality in the independent variables, linearity, no multicollinearity and equal variances. This means that these requirements must be checked in order to analyze the appropriateness of the sample in the application of methodology. To verify the normality for independent variables, we apply the Kolmogorov–Smirnov test. The result indicates a rejection of the null hypothesis, which means that the independent variables of our study do not follow a normal distribution, which is corrected with the log transformation of the variables that allow us to obtain a normal distribution. As for multicollinearity in the independent variables, we removed the indicators that show significant correlations: *Tax Revenues*, *Poverty Households* or *Public Assistance Recipients*, *Employment Base* and *Business Activity*. Furthermore, we run Box's M test in order to observe the covariance matrices; the null hypothesis being the equality in the variance–covariance matrix, this test is sensitive in the absence of normality. The results confirm that the variance–covariance matrices are different, which indicates that this condition is not met (Table 6).

Table 6. Box's M test.

	Model 1 Budgetary Stability	**Model 2 Expenditure Rule**	**Model 3 Public Debt**	**Model 4 Eco-Financial Plan**
Box's M	215.137	88.140	202.078	64.349
F-value	2.314	8.775	7.096	10.504
Significance	0.000	0.000	0.000	0.000

Having made this verification we have obtained a satisfactory sample which meets the previous assumptions of discriminant analysis.

6.2. Analysis of Results

Discriminant analysis is a statistical procedure that offers several interesting outputs to study. Firstly, the Eigenvalue value indicates how well the function differentiates the groups, where the greater the value, the more effective the power of classifying the groups. Table 7 shows the results of this parameter for each model in which the highest value is for *Model 3 Public Debt* with 0.538, being also the highest value of canonical correlation which ranges from 0 to 1, with a value of 0.591.

Secondly, the main parameter which characterizes the study of the database in the discriminant analysis is represented in Table 8 with Wilk's Lambda test that measures the discriminative power independent variables. The range of plausible values is between 0 and 1. A value close to 0 would mean that groups are different and the discriminant function based on the ICMA variables can adequately predict financial health defined by financial indicators based on the Spanish legislation.

Of the four models, *Model 3 of Public Debt* shows the value closest to 0, Chi-square reveals that it is statistically significant.

Table 7. Eigenvalues.

	Model 1 Budgetary Stability	**Model 2 Expenditure Rule**	**Model 3 Public Debt**	**Model 4 Eco-Financial Plan**
Eigenvalue	0.160	0.097	0.538	0.128
% of Variance	100	100	100	100
Cumulative %	100	100	100	100
Canonical correlation	0.371	0.297	0.591	0.337

Table 8. Wilk's Lambda.

	Model 1 Budgetary Stability	**Model 2 Expenditure Rule**	**Model 3 Public Debt**	**Model 4 Eco-Financial Plan**
Wilks' Lambda	0.862	0.912	0.650	0.887
Chi-Squared	143.702	90.154	416.102	117.473
Significance	0.00	0.00	0.00	0.00

Standardized Canonical Discriminant Function Coefficients (see Table 9) show the ICMA indicators with a higher power for each model. The biggest recurring ICMA indicator in different models is *Indicator 1 Revenues per Capita*, *Indicator 9 Revenue Shortfalls or Surpluses*, *Indicator 10 Expenditures per Capita*, *Indicator 15 Operating Deficit or Surplus*, *Indicator 19 Current Liabilities*, *Indicator 20 Long-Term Debt* and those related to population. This means that there is a powerful relationship between Spanish indicators and these indicators of ICMA, which could be pooled into three main groups of indicators: that link revenues (*Indicator 1* and *Indicator 9*), that link expenditures (*Indicator 10* and *Indicator 15*) and that link debt (*Indicator 19* and *Indicator 20*), which means that Hypothesis 1, 2 and 3 are accepted. This result is consistent with the previous reviewing of the comparison of the meaning of both kinds of indicators as Cabaleiro et al. [22], Kioko [19], Navarro-Galera [27,28], Trussel and Patrick [24] and Gorina et al. [21] support in their analysis. ICMA indicators with a higher power of discrimination are those whose definition is in line with Spanish indicators, which supports the idea that the default or non-default concept of Spanish indicators is supported by the ICMA indicator system, i.e., the definition of financial condition by the Spanish legislation is consistent with the empirical evidence and with the financial condition standards at the international level. Both the Spanish legislation and the ICMA show common components in their own formulas, therefore, although ICMA and Spanish indicators do not have the same label, the study reveals that the informational content is similar and shares a common view about the representation of financial risk.

Table 9. Standardized Canonical Discriminant Function Coefficients.

	Model 1 Budgetary Stability	**Model 2 Expenditure Rule**	**Model 3 Public Debt**	**Model 4 Eco-Financial Plan**
Indicator 1 Revenues per Capita	−0.318	−0.080	−0.211	−0.413
Indicator 2 Restricted Revenues		0.284		
Indicator 5 One-Time Revenues	−0.375	0.407		
Indicator 7 Uncollected Property Taxes	0.245	−0.035		
Indicator 9 Revenue Shortfalls or Surpluses	0.374	0.733	−0.371	
Indicator 10 Expenditures per Capita	0.903	0.042		0.881
Indicator 13 Fixed Cost	−0.261	0.103		
Indicator 15 Operating Deficit or Surplus	−0.170	−0.407		
Indicator 18 Liquidity		−0.001		
Indicator 19 Current Liabilities	0.363	0.074	0.355	
Indicator 20 Long-Term Debt	0.347	−0.143	0.837	
Indicator 21 Debt Service	−0.217	−0.146		

Table 9. *Cont.*

	Model 1 Budgetary Stability	Model 2 Expenditure Rule	Model 3 Public Debt	Model 4 Eco-Financial Plan
Indicator 28 Population	−0.529	0.028	0.636	
Indicator 29 Population Density	0.423	0427	0.134	
Indicator 30 Population under 18 and over 64		0.016	−0.815	−0.286
Indicator 31 Personal Income per Capita	0.494	0.154		
Indicator 36 Vacancy Rates				
Indicator 37 Crime Rate	−0.356	0.094		

The Standardized Canonical Discriminant Function Coefficients also provide the discriminant functions:

$$\begin{aligned} D_{BudStab} = {} & -0.318\ RevCap - 0.375\ OneTRev + 0.245\ UncollPropTax \\ & + 0.374\ RevShortSurp + 0.903\ ExpCap - 0.261\ FixedCost \\ & - 0.170\ OpDefSurp + 0.363\ CurrLiab + 0.347\ LTDebt - 0.217\ DebtServ \\ & -0.529\ Pop + 0.423\ PopDens + 0.494\ PersIncomCap - 0.356\ CrimeRate \end{aligned}$$

$$\begin{aligned} D_{ExpRule} = {} & -0.080\ RevCap + 0.284\ RestRev + 0.407\ OneTRev - 0.035\ UncollPropTax \\ & + 0.733\ RevShortSurp + 0.042\ ExpCap + 0.103\ FixedCost \\ & - 0.407\ OpDefSurp - 0.001\ Liq + 0.074\ CurrLiab - 0.143\ LTDebt \\ & - 0.146\ DebtServ + 0.028\ Pop + 0.427\ PopDens + 0.016\ Pop1864 \\ & + 0.154\ PersIncomCap + 0.094\ CrimeRate \end{aligned}$$

$$\begin{aligned} D_{PubDebt} = {} & -0.211\ RevCap - 0.371\ RevShorSurpluses + 0.355\ Current\ Liabilities \\ & + 0.837\ LongTerm\ Debt + 0.636\ Population + 0.134\ Population\ Density \\ & - 0.815\ Population\ under\ 18\ and\ over\ 65 \end{aligned}$$

$$D_{EFP} = -0.413\ RevCap + 0.881\ ExpCap - 0.286\ Pop1864$$

After analyzing all independent variables, we applied the stepwise procedure which shows the number of steps and the variables introduced in the regressions with the value of Wilk's Lambda in brackets (see Table 10). In this technique, the variables are incorporated one by one to the discriminant function in order to build a function using only the useful variables for the classification, also being possible to evaluate the individual contribution of each variable to the discriminant model. In the case of *Budgetary Stability*, there are thirteen steps, in *Expenditure Rule* there are four steps, with seven steps in *Public Debt* and three in *Eco-financial Plan* model. The more steps the model has, the higher the number of significant variables are included. The conclusion of this table is the same as in the previous analysis with all independent variables (Table 9) because the variables with a higher discriminant power are the same.

Table 10. Stepwise Procedure of Discriminant Analysis.

Steps	Model 1 Budgetary Stability	Model 2 Expenditure Rule	Model 3 Public Debt	Model 4 Eco-Financial Plan
1	Revenue Shortfalls or Surpluses	Revenue Shortfalls or Surpluses	Long Term Debt	Expenditures per Capita
2	Revenue Shortfalls or Surpluses (0.972) Current Liabilities (0.969)	Revenue Shortfalls or Surpluses (0.983) Population Density (0.951)	Long Term Debt (0.890) Current Liabilities (0.722)	Expenditures per Capita (0.984) Revenues per Capita (0.913)
3	Revenue Shortfalls or Surpluses (0.963) Current Liabilities (0.954) One-Time Revenues (0.952)	Revenue Shortfalls or Surpluses (0.959) Population Density (0.945) Operating Deficit or Surplus (0.931)	Long Term Debt (0.828) Current Liabilities (0.712) Revenue Shortfalls or Surpluses (0.700)	Expenditures per Capita (0.972) Revenues per Capita (0.904) Population under 18 and over 64 (0.895)

Table 10. *Cont.*

Steps	Model 1 Budgetary Stability	Model 2 Expenditure Rule	Model 3 Public Debt	Model 4 Eco-Financial Plan
4	Revenue Shortfalls or Surpluses (0.943) Current Liabilities (0.940) One-Time Revenues (0.937) Population (0.936)	Revenue Shortfalls or Surpluses (0.941) Population Density (0.940) Operating Deficit or Surplus (0.921) One-Time Revenues (0.920)	Long Term Debt (0.827) Current Liabilities (0.702) Revenue Shortfalls or Surpluses (0.695) Population under 18 and over 64 (0.677)	
5	Revenue Shortfalls or Surpluses (0.932) Current Liabilities (0.926) One- Time Revenues (0.930) Population (0.924) Personal Income per Capita (0.921)		Long Term Debt (0.815) Current Liabilities (0.690) Revenue Shortfalls or Surpluses (0.686) Population under 18 and over 64 (0.675) Population (0.670)	
6	Revenue Shortfalls or Surpluses (0.921) Current Liabilities (0.922) One-Time Revenues (0.916) Population (0.911) Personal Income per Capita (0.920) Crime Rate (0.909)		Long Term Debt (0.815) Current Liabilities (0.677) Revenue Shortfalls or Surpluses (0.682) Population under 18 and over 64 (0.669) Population (0.663) Revenues per Capita (0.661)	
7	Revenue Shortfalls or Surpluses (0.910) Current Liabilities (0.918) One-Time Revenues (0.913) Population (0.908) Personal Income per Capita (0.917) Crime Rate (0.904) Operating Deficit or Surplus (0.897)		Long Term Debt (0.815) Current Liabilities (0.674) Revenue Shortfalls or Surpluses (0.678) Population under 18 and over 64 (0.665) Population (0.659) Revenues per Capita 0.659) Population Density (0.654)	
8	Revenue Shortfalls or Surpluses (0.903) Current Liabilities (0.916) One-Time Revenues (0.903) Population (0.905) Personal Income per Capita (0.905) Crime Rate (0.897) Operating Deficit or Surplus (0.894) Population Density (0.892)			
9	Revenue Shortfalls or Surpluses (0.894) Current Liabilities (0.903) One-Time Revenues (0.894) Population (0.901) Personal Income per Capita (0.903) Crime Rate (0.893) Operating Deficit or Surplus (0.888) Population Density (0.889) Uncollected Property Taxes (0.887)			
10	Revenue Shortfalls or Surpluses (0888) Current Liabilities (0.895) One-Time Revenues (0.890) Population (0.897) Personal Income per Capita (0.896) Crime Rate (0.886) Operating Deficit or Surplus (0.883) Population Density (0.887) Uncollected Property Taxes (0.883) Revenues per Capita (0.882)			

Table 10. *Cont.*

Steps	Model 1 Budgetary Stability	Model 2 Expenditure Rule	Model 3 Public Debt	Model 4 Eco-Financial Plan
11	Revenue Shortfalls or Surpluses (0.883) Current Liabilities (0.892) One-Time Revenues (0.885) Population (0.896) Personal Income per Capita (0.888) Crime Rate (0.879) Operating Deficit or Surplus (0.877) Population Density (0.884) Uncollected Property Taxes (0.878) Revenues per Capita (0.878) Fixed Cost (0.877)			
12	Revenue Shortfalls or Surpluses (0.880) Current Liabilities (0.877) One-Time Revenues (0.880) Population (0.894) Personal Income per Capita (0.885) Crime Rate (0.875) Operating Deficit or Surplus (0.871) Population Density (0.881) Uncollected Property Taxes (0.873) Revenues per Capita (0.875) Fixed Cost (0.874) Long Term Debt (0.872)			
13	Revenue Shortfalls or Surpluses (0.875) Current Liabilities (0.873) One-Time Revenues (0.876) Population (0.891) Personal Income per Capita (0.879) Crime Rate (0.871) Operating Deficit or Surplus (0.865) Population Density (0.878) Uncollected Property Taxes (0.868) Revenues per Capita (0.872) Fixed Cost (0.869) Long Term Debt (0.871) Debt Service (0.867)			

As the previous assumptions of discriminant analysis are not flexible to analyze the adequacy of the model and considering that is insufficient to study the behavior of dependent and independent variables, we complement the analysis with the application of logistic regression models with panel data whose main results are in Table 11.

Table 11. Logistic Regressions.

	Model 1 Budgetary Stability	Model 2 Expenditure Rule	Model 3 Public Debt	Model 4 Eco-Financial Plan
LR of rho	0.49	1	0.00	0.00
Classification matrix	75.91	63.21	92.49	91.95

We focused this part of the analysis in a set of magnitudes of different tests that are usually applied in logistic regression models. The likelihood-ratio test of rho = 0 (LR of rho), which explains the independence of equations is statistically significant in Model 3 and Model 4, so the null hypothesis is rejected, which means that estimated panel data explain an important proportion of the total variance. The matrix classification represents the correct classification, providing us with the percentage of the level of success: *Model 1*: 75.91%, *Model 2*: 63.21%, *Model 3*: 92.49% and *Model 4*: 91.95%, which reaffirms the goodness of fit of models, particularly in Models 3 and 4, and the higher discriminant power of independent variables.

We also applied a stepwise logistic regression method (forward LR) to compare results between discriminant analysis and logistic regression, obtaining the independent variables with a higher discriminant power (Table 12). In this way, we check if the application of a different methodology shows similar conclusions, identifying the significant independent variables in the models and helping to study if Spanish indicators respond to the default classification according to ICMA indicators.

Table 12. Variables in the equation in logistic regression. Forward LR Method.

	Steps	Model 1 Budgetary Stability						Model 2 Expenditure Rule				
	Indicators	**B**	**S.E.**	**Wald**	**Sig.**	**Exp (B)**	**Indicators**	**B**	**S.E.**	**Wald**	**Sig.**	**Exp (B)**
1	Current Liabilities	0.00	0.00	27.45	0.00	1.00	One- Time Revenues	0.00	0.00	38.63	0.00	1.00
	Constant	−1.55	0.10	224.42	0.00	0.21	Constant	−0.32	0.07	19.18	0.00	0.72
2	Expenditures per Capita	0.00	0.00	16.39	0.00	1.00	One- Time Revenues	0.00	0.00	26.51	0.00	1.00
	Current Liabilities	0.00	0.00	31.28	0.00	1.00	Revenue Shortfalls	0.00	0.00	18.72	0.00	1.00
	Constant	−1.54	0.10	210.50	0.00	0.21	Constant	−1.86	0.36	26.28	0.00	0.15
3	Expenditures per Capita	0.00	0.00	22.12	0.00	1.00	One- Time Revenues	0.00	0.00	32.01	0.00	1.00
	Operating Deficit or Surplus	0.00	0.00	11.17	0.00	1.00	Revenue Shortfalls	0.00	0.00	21.67	0.00	1.00
	Current Liabilities	0.00	0.00	33.69	0.00	1.00	Expenditures per Capita	0.00	0.00	9.31	0.00	1.00
	Constant	−1.16	0.15	57.98	0.00	0.31	Constant	−2.00	0.37	28.92	0.00	0.13
4	Expenditures per Capita	0.00	0.00	23.50	0.00	1.00	One time revenues	0.00	0.00	31.71	0.00	1.00
	Operating Deficit	0.00	0.00	10.59	0.00	1.00	Revenue Shortfalls	0.00	0.00	18.72	0.00	1.00
	Current Liabilities	0.00	0.00	34.32	0.00	1.00	Expenditures per Capita	0.00	0.00	11.77	0.00	1.00
	Debt Service	0.00	0.00	4.989	0.02	1.00	Operating Deficit	0.00	0.00	5.50	0.01	1.00
	Constant	−0.86	0.20	18.45	0.00	0.42	Constant	−1.62	0.40	16.31	0.00	0.19
5	Revenues per Capita	0.00	0.00	4.46	0.03	1.00						
	Expenditures per Capita	0.00	0.00	25.02	0.00	1.00						
	Operating Deficit	0.00	0.00	9.04	0.00	1.00						
	Current Liabilities	0.000	0.000	30.30	0.00	1.000						
	Debt Service	0.00	0.00	5.00	0.025	1.000						
	Constant	−0.12	0.40	0.09	0.72	0.88						
6	Revenues per Capita	0.00	0.00	7.25	0.00	1.00						
	Expenditures per Capita	0.00	0.00	27.57	0.00	1.00						
	Operating Deficit or Surplus	0.00	0.00	6.63	0.01	1.00						
	Current Liabilities	0.00	0.00	24.73	0.00	1.00						
	Long- Term Debt	0.00	0.00	5.93	0.01	1.00						
	Debt Service	0.00	0.00	8.19	0.00	1.00						
	Constant	0.00	0.40	0.00	0.99	1.00						
	Steps	**Model 3 Public Debt**						**Model 4 Eco-Financial Plan**				
	Indicators	**B**	**S.E.**	**Wald**	**Sig.**	**Exp (B)**	**Indicators**	**B**	**S.E.**	**Wald**	**Sig.**	**Exp (B)**
1	Long- Term Debt	0.00	0.00	117.54	0.00	1.00	Expenditures per Capita	0.00	0.00	26.88	0.00	1.00
	Constant	−3.29	0.19	289.89	0.00	0.03	Constant	−3.55	0.37	92.25	0.00	0.03
2	Revenues per Capita	0.00	0.00	49.29	0.00	1.00	Expenditures per Capita	0.00	0.00	27.81	0.00	1.00
	Long- Term Debt	0.00	0.00	173.07	0.13	1.00	Population under 18 and over 64	0.00	0.00	5.25	0.02	1.00
	Constant	−0.78	0.52	2.28	0.00	0.45	Constant	−3.65	0.36	104.63	0.00	0.03

Table 12. *Cont.*

Steps	Model 3 Public Debt					Model 4 Eco-Financial Plan					
	Indicators	B	S.E.	Wald	Sig.	Exp (B)	Indicators	B	S.E.	Wald	Sig.	Exp (B)
3	Revenues per Capita	0.00	0.00	34.94	0.00	1.00	Expenditures per Capita	0.00	0.00	26.21	0.00	1.00
	Current Liabilities	0.00	0.00	20.09	0.00	1.00	Fixed Cost	0.00	0.00	5.87	0.02	1.00
	Long- Term Debt	0.00	0.00	161.21	0.00	1.00	Population under 18 and over 64	0.00	0.00	7.32	0.01	1.00
	Constant	−1.75	0.57	9.38	0.00	0.17	Constant	−5.69	0.96	34.77	0.00	0.00
4	Revenues per Capita	0.00	0.00	35.89	0.00	1.00						
	Current Liabilities	0.00	0.00	14.81	0.00	1.00						
	Long- Term Debt	0.00	0.00	156.82	0.00	1.00						
	Crime Rate	0.00	0.00	9.94	0.00	1.00						
	Constant											

In *Model 1 Budgetary Stability*, the *Indicator 19 Current Liabilities* is included in the first step, while in the discriminant analysis, it is included in the second step. *Indicator 10 Expenditures per Capita* is included in the second step, while in the discriminant analysis, it is not included in any. *Indicator 1 Revenues per Capita* is included in the fifth step, while in the discriminant, it is in step number ten. *Model 2 Expenditure Rule* shares the same number of steps in logistic regression and discriminant analysis, coinciding also with a higher discriminant power the same independent variables: *Indicator 5 One-Time Revenues*, *Indicator 9 Revenue Shortfalls or Surpluses* and *Indicator 15 Operating Deficit or Surplus*. In *Model 3 Public Debt*, logistic regression shows four steps, while in the discriminant analysis, there are seven, including the *Indicator 20 Long-Term Debt*, the independent variable with a higher discriminant power included in the first step in both analyses. Finally, in *Model 4 Eco-financial Plan*, three steps in both analyses are observed, showing *Indicator 10 Expenditures per Capita* and *Indicator 30 Population under 18 and over 64* as independent variables with more discriminant power.

The independent variables that discriminate better are Indicator 1 Revenues per Capita, Indicator 10 Expenditures per Capita, Indicator 9 Revenue Shortfalls or Surpluses, Indicator 19 Current Liabilities and Indicator 20 Long-Term Debt, in other words, we obtain the same conclusion of discriminant analysis: the independent variables with a higher discriminant power are those indicators that have a similar meaning to Spanish indicators. The similarity of results provides robustness to our study.

Both analyses conclude that the indicators that better explain the default of Spanish LGs are those related to expenditures, revenues and debt. Furthermore, in logistic regression, the percentage of success is very high for the models of *Public Debt* and *Eco-financial Plan*, which means that the classification about default and non-default is correct in almost 90% of cases. ICMA indicators that measure the revenues, expenditures and debt classify correctly almost all Spanish LGs in default according to the Spanish legislation, based on transposing Eurostat requirements. That is, there is a direct relationship about the concept of default in Spanish legislation and the ICMA model/system.

7. Discussion

The main objective of this article was to analyze whether the way to measure the financial condition of LGs in Spain is a fair representation and a reliable tool for the measurement of the LG financial condition under international standards. After the reform of the Spanish Constitution in 2011 as a consequence of the Stability and Growth Pact (SGP) requirements of the EU, the financial control of LGs has increased by fixing debt and deficit limits. In absence of general patterns of the definition of financial indicators for LG financial sustainability, our research is focused on verifying if Spanish LGs' financial indicators show common factors of the definitions of financial sustainability which are universally accepted. For this reason, we analyze the previous literature about different ways of measuring financial sustainability (such as ICMA, FIR, or AAS 27 indicators), that are also

used by authors who try to explain the best way to derive useful information and evaluate the financial condition, obtaining common factors which are evaluated in order to achieve a good tool which allows us to test the financial sustainability of LGs. From this study, we conclude that four common factors are evaluated in financial sustainability, which reveals the application of four hypotheses in the analysis: evaluation of revenues, evaluation of expenditures, evaluation of debt and evaluation of cash. The methodology applied aims at providing a model to test if financial ratios adopted by countries to control financial sustainability are backed by the generally accepted benchmarking international standards. In particular, we apply ICMA financial indicators because they represent a consistent tool of benchmarking, defining them as independent variables in the models, whose dependent variables are the indicators that we want to test the reliability of (each one the Spanish LGs financial indicators). Our results are consistent with previous literature because the indicators are associated with the control of expenditures and debt, and the revenue development is the variables that better explain the financial sustainability of LGs that may also support evaluations of the credibility of financial indicators.

Access to public information is crucial to develop a robust study; unfortunately, there are still obstacles in order to obtain all the information that a researcher would like to obtain, and it has become extremely complex to gather the information of worldwide LGs. Because of this, the progress in transparency of LG information must be a tool in order to be enhanced by governments which would allow for the identification of synergies among different ways to measure financial sustainability in the search for the most reliable financial indicators. It would be desirable not only to know the financial sustainability or instability of a local entity, but also to know that financial indicators would give enough information about the degree of instability of the LG.

8. Conclusions

LGs in Spain have the autonomy to manage the delivery of public services under their responsibility, collecting their own taxes, borrowing from banks and markets, and receiving transferences and grants from the central government, regional governments, and/or supranational organizations.

The EU has established a set of financial requirements to be met by the Eurozone countries in order to ensure the sustainability of public sector finances. Those requirements are monitored by Eurostat, which controls the financial position of Eurozone countries. Some Eurozone countries have transposed the binding EU regulation to their own domestic framework. In the Spanish case, the freedom of LGs to borrow from banks and markets and the introduction of new taxes have led the central government to transpose the EU regulations at its domestic local level, in order to ensure that LGs stay within the EU financial requirements related to the sustainability of public services delivered. Notwithstanding, we wonder to what extent these EU financial requirements and the indicators designed in Spain to transpose EU financial requirements are able to faithfully represent the actual financial condition of local.

The aim of this study is to determine whether financial indicators about financial conditions defined in Spanish regulation are backed by worldwide generally accepted financial benchmarking indicators. For this purpose, we analyze the relationship between Spanish indicators of financial sustainability based on EU regulations and Financial Trends Monitoring System Indicators of the ICMA. In this study, two methodologies are applied: discriminant analysis and logistic regression, where the dependent variables are each of the Spanish financial indicators and the independent variables are ICMA indicators.

The similar results of both analyses allow us to conclude that the ICMA variables, which endorse Spanish financial requirements, are those related to the financial indicators categories of: revenues, expenditures, operating position indicators and debt indicators, which is consistent with previous literature. The unfunded liability indicator category is not applicable to the Spanish case because pension plans and other retirement liabilities are centralized at the central government level for the whole Spanish public administration. Capital Plant indicators are also not applicable because Spanish

LG are sovereign entities with democratic elections of the council of the city and the Mayor and, therefore, they do not contain contributed capital from parent entities.

Within each category, the ICMA defines a set of indicators and ratios. In the Spanish LG case, the indicators that better capture and summarize the substance of the transposition of the EU financial requirements to the Spanish LG legislation are *Revenues per Capita* and *Revenues Shortfalls or Surpluses*, *Expenditure per Capita*, *Operating Deficit or Surplus*, *Current Liabilities* and *Long-Term Debt.*

The measurement of financial condition is related to revenues (*Budgetary Stability*), expenditures (*Expenditure Rule*) and debt (*Public Debt*), which is aligned with the ICMA system and previous literature.

At present, efforts of municipal managers must be focused on ensuring financial sustainability; otherwise, the liquidity and the solvency of LG would be affected. To avoid a situation where LGs are not able to meet their future financial obligations, robust quality tools of financial indicators are necessary not only to give information to policymakers, but also to be able to predict instability situations and provide a classification of the financial performance of local administrations. Therefore, the consistency of Spanish transposition of Eurozone requirements with international standards is positive evidence that gives reliability to all economic players and provides additional tools to managers for benchmarking purposes. Each country might adopt financial thresholds in accordance with its own administrative and legal framework, but the different forms of transposing Eurozone financial sustainability requirements should represent the same generally accepted concepts of financial sustainability, solvency and liquidity. The congruence between Spanish financial indicators and worldwide generally accepted financial benchmarking indicators enable us to provide an interesting contribution: these conclusions allow others countries to test the reliability of their own domestic regulation, providing a model that allows them to test their own domestic measurement of financial condition against worldwide generally accepted benchmarking standards. Moreover, the ICMA indicator system may become a benchmark reference to compare the financial sustainability of LGs at the EU- and international level which entails a reference framework for the financial controllers in LGs. As a result, this article provides two contributions to the financial sustainability arena: on one hand, Spanish financial indicators are in line with worldwide accepted benchmarking, and on the other hand, we suggest a model to test the reliability of financial sustainability indicators of LGs.

The control process of financial condition in LG and the demands for transparency after the global financial 2008 and Covid-19 crises is defining a new paradigm in LG management, which is powering ahead in Spain with the launch of regulation based on EU standards that establishes a schedule of reports concerning the financial situation of LGs. This achieves more responsible management in local administration, providing public services with quality.

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