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The EU's Concern About the Influence of Demographic Factors on Financial Sustainability

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1 Introduction

The European Union financial and economic crisis that started in 2008 (European Commission—EC 2016) caused a sharp drop in public revenues, together with an increase in public expenditures that provoked a large public budget gaps and an increase of public debt levels (Pérez-López et al. 2015; EC 2016). It has made the discussions in the

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assessment of the sustainability of public finances to become a relevant issue in (EC 2016), especially in local governments, since they play a critical role in the economic recovery by maintaining the level of public investments and launching new projects (Council of Europe 2011).

In this context, although the concept of sustainability covers three dimensions (environmental, social and economic) (Global Reporting Initiative—GRI 2012), the financial sustainability becomes the main dimension for managing public administrations (Afonso and Jalles 2015; Rodríguez et al. 2014). This financial dimension could help support an efficient process of making appropriate decisions in order to help the economic recovery and to maintain the capacity of governments to continue providing public services in the future (Chapman 2008). So, the implementation of sustainable policies are necessary (Canadian Institute of Chartered Accountants—CICA 2009; EC 2011; EU 2012a; International Federation of Accountants—IFAC 2012) in order to achieve the financial health and ensure the intergenerational equity defined by Governmental Accounting Standards Board—GASB (1990) (Cabaleiro et al. 2013; Honadle 2003).

In this line, international organizations (EU 2012a, b; IFAC 2012, 2013; National Audit Office—NAO 2013) and previous studies (Rodríguez et al. 2014; Navarro-Galera et al. 2016) have recognized the usefulness of government financial statements for reporting on the public financial sustainability. In particular, the income statement has been considered as a key tool, which can be useful to policymakers and public managers for planning short- and long-term public finances strongly linked to the intergenerational equity concept (EU 2012a, b; IFAC 2012, 2014) and financial sustainability (IFAC 2014; Navarro-Galera et al. 2016; Rodríguez et al. 2014).

Indeed, the analysis of financial sustainability can help politics, managers and other stakeholders to assess the impact of its funding decisions as well as to manage financial risk and opportunities (IFAC 2013; NAO 2013). In this line, EU (2012), IFAC (2013) and EC (2011) have indicated that the demographic variables can influence on the achievement of financial sustainability in governments, which may be of overriding importance, even more at the local level.

Therefore, the policymakers and public managers should also know which factors could influence on the financial sustainability in order

to manage it. Thus, having information about the behaviour of these influential factors could assess their risk and opportunities, making appropriated decisions on financial sustainability. Indeed, international organizations have recognized the demographic variables as the principal influential factors of public sustainability (EC 2011; EU 2012a, b; IFAC 2013).

Concretely, the UE considers that the current demographics changes are new challenges for social policy which likely become even more important in the future (Eurostat 2015). Furthermore, the UE classifies the municipalities taking into account their economic and demographic characteristics and typologies. The different typology of the nuts (small regions of UE studies) such as urban, intermediate and rural regions (Eurostat 2016) or metropolitan areas could also influence on the financial sustainability of the municipalities.

Nonetheless, although demographic variables have been considered relevant for financial sustainability (EC 2011, 2016; EU 2012a, b; IFAC 2013), scarce research has been prefunded regarding this item in EU. Therefore, this work seeks to analyse the influence of demographic changes and nut typologies on financial sustainability, since identifying the demographic factors which affect it could help public leaders to design public policies with the aim at managing and maintaining the financial sustainability over time.

To achieve these goals, our study follows a data panel of the large municipalities of Spain during a 9-year period which covers the period before, during and after the crisis, showing the timely and relevancy of this study. Therefore, our findings have been able to suggest that variables such as the dependent population and employment rate affect negatively in financial sustainability, meanwhile the immigrant population, the typology and metropolitan areas influence positively on it. This work has the following structure. The next section deals with the financial sustainability and demographic variables. In the third section is explained the research design, the sample, the dependent and independent variables and the analysis of our results. Finally, the last section reports the conclusions and discussions.

2 Financial Sustainability and Demographic Variables. Hypotheses Formulation

Although there is no consensus about the definitions of financial sustainability of local government, the main international organizations understand the financial sustainability as the ability to meet service delivery and financial commitments, applying current policies and maintaining them in the future without causing the debt to rise continuously (IFAC 2012, 2013; EU 2012a, b; EC 2006, 2011; CICA 2009).

According to this definition, one of the crucial issues of the sustainability is the intergenerational equity (World Commission on Environmental and Development—WCED 1987; EC 2006), or "inter-period equity" (IFAC 2011; Pezzy and Toman 2002). The EU (EC 2006) has pointed out that, although there are some indicators regarding sustainability taking into account the budgetary balance or debt, they do not assess the intergenerational equity. Therefore, to measure the financial sustainability, it is necessary to use a concept closely linked to the intergenerational equity such as the income statement (IFAC 2011, 2012; GASB 1990). In fact, based on the concept of inter-period equity, the income statement is a representative indicator of financial sustainability of government policy and it can include its three dimensions (services, revenues and debt) (IFAC 2014; Navarro-Galera et al. 2016).

So, this financial statement, which refers to all items of revenue and expenditures based on the accrual basis (IFAC 2012), plays a fundamental role in assessing financial sustainability because it reflects the three dimensions which compose the financial sustainability (revenues, services and debt) (IFAC 2013). The income statement reflects a direct approach to the revenue and service dimensions of the financial sustainability and, indirectly, to the debt dimension, due to its link with the volume of expenditure. Thus, this statement it useful to provide a two-fold information: (a) the capacity of the entity to continue providing at least the same volume of goods and services; (b) the level of resources that will be needed in the future to continue to fulfil its public services delivery obligation (IFAC 2012; Rodríguez et al. 2014).

Therefore, according to international organizations (IFAC 2011, 2012; GASB 1990) and some authors (Navarro-Galera et al. 2016; Rodríguez et al. 2014), we understand the income statement adjusted as the more comprehensive standpoint to measurement the financial sustainability.

Nonetheless, international organizations have indicated that long-term fiscal sustainability information should be broader than information derived from the financial statements (IFAC 2013; EC 2006; Eurostat 2015; Williams et al. 2010). In fact, the organizations of the European Union (EC 2006, 2011, 2016; EU 2012b; Eurostat 2015) and other international organizations such as the IFAC (2013) have focused on the influence of the demographic changes on public finances, becoming essential to analyse the effect of the demographic factors on financial sustainability. Accordingly to the EU and international organizations, the main demographic factors that are considered in public finances are dependent population over 65, the birth rate, the immigration and the level of unemployment (Eurostat 2015; IFAC 2012).

The dependent population over 65 is the main factor which worries international organizations (EC 2006; Eurostat 2015; IFAC 2012). This population is expected to have a significant impact upon future revenues and expenditures of public administrations, since the elderly population is growing faster than the rest, and thus could influence public financial sustainability (Eurostat 2015; IFAC 2012; EC 2016). Moreover, previous studies have demonstrated the negative influence of this population on public finances because of its effect on the financial capacity of local authorities (Zafra-Gómez et al. 2009; Carr and Karuppusamy 2009) and the per capita spending and taxation, and therefore the budget balance (Choi et al. 2010; Gonçalves Veiga and Veiga 2007). So, it seems interesting to determine whether the dependent population could affect financial sustainability of local governments. In this regard, we propose this hypothesis:

H.1 The dependent population over 65 could affect the financial sustainabilityFinancial Sustainability.

Considering the above mentioned, the EU points out the importance of the birth rate, since due to the low birth rate and the increase

of the life expectancy, the EU's population is growing elder (Eurostat 2015; EC 2016). This demographic context, which is characterized by a lowering proportion of the working-age population combined with the increasing number of retirees, adding pressure on public finances (Eurostat 2015). Therefore, the demographic changes are new challenges for public administration in order to establish sustainable policies (Eurostat 2015; EC 2016). In this regard, the increase of the birth rate could help cover, in the future, the cost of the population ageing, becoming a driver for financial sustainability, although it could also cause more expenditures to bear the public services demand.

H.2 The birth rate could influence on financial sustainability

Moreover, the EU has considered as another influential variable on public finances the immigration, since, in some countries on account of the rising elder people and the low birth rate, they are the most important factor for population growth. The EU explains that the immigrant population could contribute to the economy through their work and taxes (Eurostat 2015). So, the immigrant population could soften the negative effect of the great increase of elderly population, helping to maintain the sustainability of pension system and having a positive effect on public finances (Eurostat 2015; EC 2016). However, prior research has explained theoretically and empirically that migration flows tend to raise the level of accumulated debt (Guillamón et al. 2011; Schultz and Sjostrom 2004) and public expenditures (Chapman 2008; Choi et al. 2010) and have a negative influence on financial performance of public administrations (Zafra-Gómez et al. 2009). Therefore, it seems interesting to analyse the influence of this variable on the financial sustainability of local governments and, therefore, we propose the following hypothesis:

H.3 The immigration population could have repercussions on financial sustainability

On the other hand, the level of unemployment is another significant aspect studied in public finances, especially in the context of international crisis. The EU has highlight that a high and persistent

unemployment can provoke slow economic growth (Eurostat 2015) and has a negative influence on the country's productivity and on the revenues of the social security system (EU 2012a). Moreover, prior research has discovered that it does not only provoke an increase of social spending and changes in employment patterns (Zafra-Gómez et al. 2009; Rodríguez et al. 2014; Benito et al. 2010) and debt (Guillamón et al. 2011), but also a decrease of the revenues available to the public treasury. So, the unemployment rate could be included as a possible risk factor for financial sustainability. Therefore, we propose this hypothesis:

H.4 The unemployment rate has an impact on financial sustainability

In addition, it could be interesting to analyse whether the typology of the municipality and the metropolitan areas (Eurostat 2016) could affect financial sustainability, since prior research have discovered that public organizations in urban areas could be more efficient (Grosskopf and Yaisawarng 1990; Andrews 2015). The urban municipalities could reap scale economies by offering multiple services from the same site and could reduce cost, sharing computing facilities and central administrative staff (Grosskopf and Yaisawarng 1990; Andrews 2015). In this regard, the EU classifies the most desegregated level of the European region (nuts 3), considering the population and the population density, in urban regions, intermediate regions and rural regions (Eurostat 2016) and points out their metropolitan areas. So, taking into account the previous mentioned studies the metropolitan and urban region could be a driver for the financial sustainability and the following hypotheses are proposed:

H.5 The typology of the municipality could affect financial sustainability.

H.6 The metropolitan areas could influence on financial sustainability.

In brief, it is of great current importance using accounting methods to measure sustainability jointly with the identification of the influential demographic factors, since politicians and managers can be provided with the necessary information for perceiving, reacting and preventing situations of imbalance in the financial sustainability of public administrations, making the most appropriated decisions.

Table 1 Main studies with dependent variables, independent variables and results achieved

Independent variables	Authors	Dependent variables	Results	Expected influence on FS
Dependent population (H.1)	EC (2006), Eurostat (2015), IFAC (2012)	Public finances	– influence	–
	Choi et al. (2010), Gonçalves Veiga and Veiga (2007)	Public expenditure	Public finances	
	Carr and Karuppusamy (2009), Zafra et al. (2009)	Financial condition	– influence	
Birth rate (H.2)	EU (Eurostat 2015)	Public finances	Public finances	+
Immigrant population (H.3)	EU (Eurostat 2015)	Public finances	+ influence	?
	Schultz and Sjöström (2004), Guillamón et al. (2011)	Debt	+ influence	
	Zafra-Gómez et al. (2009)	Financial performance	– influence	
	Choi et al. (2010), Chapman (2008)	Public expenditure	+ influence	
Unemployment rate (H.4)	Zafra-Gómez et al. (2009), Benito et al. (2010)	Financial performance	– influence	–
	Eurostat (2015), EU (2012b)	Public finances	– influence	
	Guillamón et al. (2011)	Debt	+ influence	
Typology and metropolitan areas (H.5 and H.6)	EU (Eurostat 2016) Grosskopf and Yaisawamg (1990), Andrew (2015)	The UE identifies different typologies of municipalities Urban areas could be more efficient		+

Source Own elaboration

A summary of the authors who have examined these demographic variables and their influence on public finances are reported in Table 1, where the expectation of its influence on financial sustainability appears for each variable.

3 Empirical Research

3.1 Sample

As noted previously, the current crisis has provoked the deterioration of a government's financial position and a sharp increase of debt (EU 2012b), making financial sustainability a key issue in the future of public sector organizations. So, studying the financial sustainability is particularly timely and relevant to the public sector in countries like Spain, whose sustainability gap indicator is above the European Union average, in the short, medium and long term (EU 2012b). Indeed, its public income and expenditure had increased very significantly, as a result of the increasing functions undertaken, duplication in the delivery of services by local and regional governments and the expanding role of the public sector in economic activity (Bank of Spain 2014).

In addition, the present study focuses on the financial sustainability of local governments because they are considered as key agent in the adoption and implementation of sustainable development policies (Hawkins 2011) and they play a key role in the economic recovery by maintaining the level of public investments and launching new projects (Council of Europe 2011). On the one hand, local government in this country is well placed to be aware of citizens' information needs (Watt 2004) due to legislative reforms of administrative structures carried out in the 1990s (Gallego and Barzelay 2010) and the managerial devolution process implemented in Spain (Bastida and Benito 2006). Moreover, local governments manage very large budgets and provide a wide variety of services (Sáiz 2011). And finally, the accumulated deficit and debt in large municipalities in Spain, mainly provoked by the 'property bubble' (Bastida et al. 2014), had have very significant effects on the public sector (Muñoz-Cañavate and Hípola 2011).

According to numerous previous studies about local public finance (Zafra-Gómez et al. 2009; Bastida and Benito 2010; Guillamón et al. 2011; Rodríguez et al. 2014), we decide to analyse exclusively municipalities with relatively large populations (over 50,000 habitant) for several reasons. Firstly, they account for more than 50% of the Spanish population (*Fundación La Caixa* 2013), and therefore a broader range of stakeholders are involved (EU 2012a, b). Secondly, their available resources and public services provided are greater than in smaller ones, so sustainability analyses have greater scope and impact. Thirdly, the accounting model used by local governments with large populations is considerably more complete and detailed than the simplified version used by small municipalities, which is expected to be more useful for measuring sustainability. And, finally, the professional training of managers in large municipalities is usually more complete than that available in municipalities with smaller populations (Rodríguez et al. 2014), which could favour the implementation of local economic development programmes (Morgan 2010) and the innovation regarding the relevance of financial statements for measuring sustainability.

However, although the whole sample of our study considers in total 148 Spanish large municipalities, we have been unable to get the data of all of these municipalities. So, we only have been able to analyse 138 municipalities which have the most of the date of the period studied (2006–2014) (1242 observations).

3.2 Methodology

To achieve the aim of our study we collected, from national organizations (The Court of Auditors, Spanish Institute of Statistics—INE—and the Spanish Public Employment Service—SEPE) and international organizations (Eurostat), the dependent and independent variables for 138 local governments over 9 years period (2006–2014), which over the period before, during and after the boom and burst in the housing

market (Benito et al. 2015), to analyse the influence of the demographic explanatory variables on the financial sustainability.

Considering the measurement of the financial sustainability (dependent variable), firstly we have to distinguish between the concepts of budget expenditures and revenues (they contribute to the annual budget) and financial expenditures and revenues (they fall within the area of financial accounting). The differences between these concepts arise, on the one hand, from their content, and on the other, from the criteria applied for their allocation. Thus, following the accounting system defined by IFAC (2014) some items are defined as budget expenditures or revenues and are not considered financial expenditures or revenues.

Furthermore, in Spain, based on this accounting system, while expenses and income are allocated to the income statement in accordance with the accrual basis of financial accounting, the allocation of budget expenditure and revenue is primarily cash-based or follows a mixed cash-accrual criterion in determining the budget results. Therefore, according to international organizations (IFAC 2012; GASB 1990) and prior research (Navarro-Galera et al. 2016; Rodríguez et al. 2014), we use the income statement to measure the financial sustainability since the criteria which is closely linked to the intergeneration equity is the accrual basis.

Once chosen the income statement, it is necessary to make some adjustments, because this financial statement includes the extraordinary activities which are not expected to be repeated in the foreseeable future. Consequently, we have adjusted the annual income statements avoiding the effect of revenues and expenditures deriving from extraordinary activities in order to maximize their utility of the income statement for assessing financial sustainability (Navarro-Galera et al. 2016; Rodríguez et al. 2014). Thus, the dependent variable is represented by the total amount of the adjusted income statement, as shown in Table 2.

Table 3 shows the definition and the calculation method for the dependent and each independent variable (demographic variables).

Table 2 Adjusted income statement

Concept	Amount
Income statement for the financial year obtained by applying the current IPSAS	(1)
+ Negative entries for extraordinary activities	(2)
− Positive entries for extraordinary activities	(3)
Corrected income statement for the financial year (intergenerational equity for financial sustainability)	(1) + (2) − (3)

Source Rodriguez et al. 2014

Accordingly the above mentioned, we propose the following equation model to test:

$$\mathrm{FS}_{it} = \alpha + \beta_1 \mathrm{DP65}_{it} + \beta_2 \mathrm{BR}_{it} + \beta_3 \mathrm{IP}_{it} + \beta_4 \mathrm{UR}_{it} + \beta_5 \mathrm{TYPE}_{it} + \beta_6 \mathrm{METRO}_{it} + e_i,$$

where "i" is the ith transversal unit (State Government) and "t" is the time (year), and the error (u_{it}) is composed by e_{it} (the error term) and α_i (unobservable heterogeneity designed to measure unobservable characteristics of the local governments).

To test this model, we use a panel data technique which is the most used statistical technique by the latest research in the public finances (Zhu 2013) because it reduces multicollinearity and improves the efficiency of the model (Wooldridge 2009).

To determinate the specific model to follow, we consider the possible existence of endogeneity, so we estimate our model by the two-step System-Generalized Method of Moment (GMM) (Arellano and Bover 1995; Blundell and Bond 1998), which is the most powerful tool to control the possible endogeneity between the variables and the error term (Baltagi 2008; Wooldridge 2009; Prillaman and Meier 2014). This technique uses the lagged levels of the endogenous regressors as instrumental variables although we applied the collapse option in order to reduce the instruments (Roodman 2009).

Furthermore, we perform the Arellano–Bond test (m) to check the inexistence of second serial correlation ($p = 0.700$) and the Hasen test to verify the adequacy of the instruments utilized ($p = 0.522$) (Arellano and Bond 1991) (Table 4). Therefore, we have obtained robust results that allow us to properly support the findings related to the purpose of the paper, controlling any type of endogeneity and multicollinearity that may exist between the variables.

Table 3 Summary of the variables

Variables	Acronym	Description	Source	Calculation
Financial Sustainability	FS	Adjusted results per capita 2006–2014 (Euros)	Local government financial statement (Court of Auditors)[1]	Corrected income statement for the financial year per capita
Dependent population over 65 years	DP65	Population aged over 65 years residing in the municipality	INE[2]	Population aged over 65 years/labour force
Birth rate	BR		INE[2]	
Immigrant population	IP	Immigrant population residing in the municipality	INE[2]	% Immigrant population
Unemployment rate	UR	Unemployment rate in the municipality	Public Employment Service (SEPE)[3]	Unemployed population/labour force
Typology region	TYPE	Typology of the nuts	Eurostat	0 = rural region; 1 = intermediate region; 2 = Urban region
Metropolitan area	METRO	Metropolitan area	Eurostat	0 = no metropolitan area; 1 = metropolitan area

Source Own elaboration

Notes [a]www.rendiciondecuentas.es and the web page of each municipality

[b]www.ine.es

[c]www.sepe.es

Table 4 Tests

Test			
Hansen test	Test $chi^2(86)$	82.34	$Pr > chi^2 = 0.592$
Arrellano–Bond test	Ar(1)	$z = -2.80$	$Pr > z = 0.005$
	Ar(2)	$z = -0.34$	$Pr > z = 0.733$
Sample	N = 1242	$n = 138$	$T = 9$
Instruments	101		

Source Stata 12

3.3 Results Analysis

We can observe in Table 5 that the demographic variables, which have experimented a greater heterogeneous change over time (within standard deviation), are the immigrants, the unemployment rate and the dependent population over 65, the two most critical concerns for UE (EU 2012b; EC 2016; Eurostat 2015). However, the only variable that has a more heterogeneous behaviour over time than among municipalities is the financial sustainability. Thus, the behaviour of the demographic variables was more homogeneous between each local government over this period (within) than among local governments (between). This means that regarding financial sustainability, there was a common turning point similar to all local governments, and this suggests that the negative effects of the crisis have been generalized.

Regarding the financial sustainability, the mean of this variable is 112.34, so considering the whole sample, the mean of the financial sustainability of the local governments is positive. However, the standard deviation of the variable "financial sustainability" is the highest, so the mean score of the financial sustainability could be the result of the joint effect of the negative sign of financial sustainability of local governments during the crisis and the positive sign of the financial sustainability before and after the crisis. In this regard, the mean of this indicator suffered a sharp drop when the crisis started although it was positively maintained (from 105.93 in 2006 to 84.51 in 2008), and currently, thanks to the normative reforms such as the law 27/2013 about the rationalization and sustainability of the Local Administration, it can be observed a recovery since the mean of this indicator was 145.59 in 2014.

Table 5 Statistical analyses

		Mean						
Variable		2006	2008	2014	Overall	Std. dev.	Min	Max
Financial sustainability	Overall	105.9381	84.5128	145.5976	112.3424	217.1185	−1040.953	2517.888
	Between					113.8477	−258.4299	625.4617
	Within					187.5232	−869.6793	2004.769
Dependent population over 65	Overall	20.2213	20.3874	24.4317	21.8223	6.5546	5.2089	43.1236
	Between					6.3509	6.0774	36.7379
	Within					1.6998	15.5009	29.0517
Birth rate	Overall	11.6443	12.0351	9.5102	10.8005	2.2691	5.4763	21.003
	Between					1.9817	6.8862	18.3559
	Within					1.1167	6.9184	14.6053
Immigrant population	Overall	10.8885	13.0175	12.225	12.8916	9.52	0.9416	53.5426
	Between					9.4573	1.2198	51.6375
	Within					1.3294	4.9366	16.6982
Unemployment rate	Overall	7.641703	7.8036	16.6433	12.3887	4.9826	3.1201	27.3782
	Between					3.1237	5.0018	21.1375
	Within					3.8899	3.34	20.2759
Type area	Overall	1.4927	1.4927	1.4927	1.4928	0.6513	0	2
	Between					0.6534	0	2
	Within					0	1.4928	1.4928
Metropolitan area	Overall	0.1376	0.1376	0.1376	0.1377	0.3447	0	1
	Between					0.3458	0	1
	Within					0	0.1377	0.1377

Source Own elaboration based on STATA12
Note $N = 1242$, $n = 138$, $T = 9$

Turning to the demographic variables, Table 5 shows that the dependent population over 65 represents the 21.82% of the labour force. However, the dependency ratio over 65 has been increasing from 20.22 (mean in 2006) to 24.43 (mean in 2014), so the EU's concern about the increase of the ageing cost is justified, since the increase of this ratio means an increase in the burden of the labour force to support the dependent population.

Furthermore, the birth rate and the immigrant population are decreasing since the economic and financial crisis, so the cost of the elder population cannot be borne by them. The birth rate increased from 2006 to 2008 (11.64–12.03), but due to the economic crisis it decreased to 9.51 in 2014. The immigrant rate increased from 2006 to 2010 (10.88–13.82%), and since 2010 the crisis provoked that this variable decreased to 12.22% in 2014. Therefore, currently, due to the effect of the economic and financial crisis on these two variables, the burden of the elder population that this population could support is reduced.

The unemployment rate has had a similar behaviour. It was around 7.6 from 2006 to 2008, but although a slight recovery can be appreciated in 2013 (16.89), from 2009 to 2014 this variable has been increasing to 16.65. Therefore, the public revenues from the income taxes could be less and the public expenditure from the public services provided to the unemployed could increase.

Finally, in Table 5 we can see that the majority of the local governments studied are considered as urban regions (80/138 municipalities), followed by the intermediate regions (46/138 municipalities). Furthermore, from 80 urban municipalities of our study, 19 are considered as a metropolitan area.

On the other hand, our empirical results (Table 6) led us to identify two types of influences on the evolution of financial sustainability. First, we identified a positive influence of the immigrant population (0.089), the typology of the municipality (0.024) and the metropolitan areas (0.020). By contrast, we identified as possible risk factors the dependent over 65 (0.039) and the unemployment rate (0.000) because of their negative influence on the behaviour of financial sustainability. However,

Table 6 GMM regression analyses of explanations for financial sustainability

Variable	Coefficient	
L1. Financial sustainability	0.3975247	***
Dependent population over 65	−2.072368	**
Birth rate	−4.864193	
Unemployment rate	−5.735319	***
Immigrant population	1.085588	*
Typology	21.27854	**
Metro region	83.88982	**
_cons	209.6458	***

Source Own elaboration based on the test performed in STATA12
Significant at 1%*** Significant at 5%**; significant at 10% level*
Fixed effect of time considered
All variables are treated as endogenous, except for the year dummies

our findings do not show empirical evidence to support an influence of the birth rate on financial sustainability.

Moreover, our empirical research has demonstrated that the financial sustainability of the previous year could influence on the financial sustainability of the current year. Therefore, local governments which achieved a positive financial sustainability try to maintain and improve it in the current year. However, a negative financial sustainability could be maintained over time when it was provoked by the implemented policies.

Regarding the dependent population over 65, following our results, it influences negatively on financial sustainability. Therefore, H.1 is supported and must be accepted. So, the EU's concern about the negative influence of the ageing population on financial sustainability is justified. Moreover, our results are in the same line with that of prior research which establish a negative influence of the dependent population on the financial capacity (Zafra-Gómez et al. 2009; Carr and Karuppusamy 2009) and the public expenditure and revenues (Choi et al. 2010; Gonçalves Veiga and Veiga 2007). This finding goes further than prior research, since we have found the influence of the population over 65 on financial sustainability, not on specific dimensions.

However, results have not identified a significant influence of the birth rate (H.2 must be refused) on local governments' financial sustainability in Spain, and this finding which could be due to the effect

of the birth rate could be compensated with the increase of the rate of ageing population, since the rate of ageing population has been increasing from 2006 (107.39) to 2014 (112.24); meanwhile, the birth rate has been decreasing from 2006 (10.84) to 2014 (9.17). So, we cannot ratify that an increase of the birth rate could help maintain the financial sustainability of local governments, although this variable could help cover the future ageing population cost and maintain the sustainability of the pensions system (Eurostat 2015; EC 2016). Therefore, this result does not allow us to determine whether the negative effects of this variable (higher public expenditure due to the demand of public services) can compensate the positive effect in the financial sustainability.

On the other hand, we can verify that there is a slight positively influence of the immigrant population (H.3 must be accepted) on financial sustainability. So, we can ratify that the immigrant population could weaken the negative effect of the ageing population on financial suitability, as the EU points out (EC 2016; Eurostat 2015). Hence, this result extends the prior research because, taking into account the studied period, this variable is positively significant for the financial suitability, although prior research has established that this variable could increase the public expenditures (Chapman 2008; Choi et al. 2010) and debt (Guillamón et al. 2011; Schultz and Sjostrom 2004) or decrease the financial performance of public administrations (Zafra-Gómez et al. 2009). So, these results indicate that the increase of the immigrant population could favour the financial sustainability inasmuch as their contribution to generate revenues exceeds the increase of its social expenditure.

Accordingly to EU (Eurostat 2015), we can affirm that the unemployment influence negatively on financial suitability (H.4 must be accepted) since it could increase public expenditure (Zafra-Gómez et al. 2009; Benito et al. 2010) and decrease the public revenues. This result goes further than prior research, since it shows the specific influence on the financial suitability which includes the services, revenues and debt dimensions.

Considering the typology of the municipalities and the metropolitan areas (H.5 and H.6 must be accepted) our results go further than the studies of Grosskopf and Yaisawamg (1990) and Andrews (2015), who

determined that the urban areas are more efficient thanks to the scope economies, because we can confirm that the urban and metropolitan areas are more likely to achieve and maintain the financial sustainability.

4 Discussion and Conclusions

Due to the economic and financial crisis, the international organizations, especially the EU, have pointed out the necessity of studying government financial sustainability focusing on the demographic changes. Indeed, based on an analysis of the Spanish local governments during a 9-year period, we have been able to empirically justify the EU's concern regarding demographic changes.

Our findings show that the dependent population is a risk factor for financial sustainability. The dependent population over 65 could be considered as free riders, that is, they benefits from public resources but they do not pay for them and thus could provoke an increase of expenditures (Choi et al. 2010; Gonçalves Veiga and Veiga 2007) or change the structure of services. At the same time, they generate less revenues for the government than the working-age population, so that, they could damage the financial capacity of local authorities (Zafra-Gómez et al. 2009; Carr and Karuppusamy 2009) and financial sustainability. In addition, we can justify the international organizations' concern about the cost of ageing population (EC 2016; Eurostat 2015; IFAC 2014). So, all levels of government should establish sustainable policies with the aim at facing the problem regarding the adequate and sustainable pensions system.

In this regard, the EU explains that there are two variables that could help soften the negative influence of the elder population on financial sustainability: the birth rate and the immigrant population. However, we have been unable to find a significant relationship between the birth ratio and the financial sustainability, and the influence of the immigrant population, although it is positive, is a weak influence. This slight influence on the immigrant population on the financial sustainability could be explained by the behaviour of the migrant population during the crisis. In 2013, Spain reported the highest number of emigrants (532.3 thousand) and was one of the European countries with more emigration

than immigration (Eurostat 2015). Therefore, the immigrant population that could weaken the effect of the elder population could be compensated by the emigrant working-age population who left Spain. Indeed, following the data from Eurostat (2016), while the immigrant population of Spain had a variation change of −66.61% from 2006 to 2013, the variation change of the emigrant population was 274.1%.

Therefore, considering these findings, as the EU suggests, the public administrations should establish new policies with the aim at increasing the participation of older workers in the labour market in order to maintain a sustainable pensions system (Eurostat 2015), helping to achieve the financial sustainability in all public administration levels.

Moreover, analysing the unemployment rate, our finding confirms that not only a high and persistent unemployment can provoke slows economic growth (Eurostat 2015) and a decrease of the country's productivity and of the revenues of the social security system (EU 2012b), but also jeopardize the financial sustainability, that is, the unemployment is a risk factor for financial sustainability. So, we can affirm that the increase of unemployment affects public revenues, due to the decrease on the collection of income taxes and public expenditures, which tend to rise (Zafra-Gómez et al. 2009; Benito et al. 2010) because of the increase of the amount of money used for unemployment benefits and debt (Guillamón et al. 2011), since there is a disproportionate growth between revenues and expenditure that have to be covered. Therefore, the Spanish public administration should concentrate in establish new sustainable policies with the aim at creating employment, which could help achieve and maintain the financial sustainability of local governments.

These findings allow us to suggest that the usage of management tools, which combine accounting and demographic information, is necessary to handle financial sustainability in order to provide useful information to policymakers and managers for making appropriate decisions about financial sustainability. They could identify the drivers and risk factors improving their management of the opportunities and risks and implementing appropriate policies to maintain financial sustainability.

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