Debt Dynamics Among European Municipalities and Their Organizations: Comparative Analysis with Focus on Hungary

Submitted 13/11/20, 1st revision 16/12/20, 2nd revision 08/01/21, accepted 16/02/21

László Vasa[1], Szilárd Hegedűs[2], Csaba Lentner [3]

Abstract:

Purpose: This paper analyzed the debt of municipal subsystems of public finances and the organizations they own compared to EU member countries' GDP during the 2013-2018 period. Our study's essence is to characterize the EU member states based upon the two areas of investigation. We also analyzed the relationships between the liabilities of the entities, and, through the use of statistical methods, we compared the respective values and examined the effect on debt from both local government system models and geopolitical location.
Design/Methodology/Approach: Three hypotheses were formulated, and we conducted our research with statistical methods (regression, cluster and variance analyses, LGCEshare variables). We utilized a case study on Hungary to explore the development of the two areas over time and examined how debt value was affected by the regulatory environment.
Findings: Between the two areas of the local system's economic management, a statistical connection can be identified. The liabilities as a percentage of the GDP of local government-owned businesses are considering it has been established. This is especially true in Germany and Scandinavian countries. However, it must be noted that the results of the statistical analyses and the theoretical division are different from each other. Another unique element of this study is considering the debt dynamics of municipalities and their corporations following the comprehensive fiscal reforms post-2010.
Practical Implications: The research results can be used to assess the related financial positions of local governments and their economic organizations, to which the European Union is also paying increasing attention.
Originality/Value: We examined the relationship between the liabilities of local governments and their economic organizations, and we showed a relationship between the two areas by using statistical methods. We found that the effect of the local government system model and geopolitical location on the debt stock is fundamentally determinant, but not in every case.

Keywords: Debt, territorial local government subsystem, public service organizations.

JEL Classification: H32, H63, H7, O2, O52.

Paper Type: Research study.

[1]Prof., Széchenyi István University, Hungary and senior researcher and chief advisor, Institute for Foreign Affairs and Trade, Hungary. Corresponding author, vasa.laszlo@sze.hu
[2]Associate Prof., Faculty of Finance and Accounting, Budapest Business School - University of Applied Sciences, Hungary. Corresponding author (2nd) Hegedus.Szilard@uni-bge.hu
[3]Prof., Faculty of Governance and International Studies, National University of Public Service, Hungary, Lentner.Csaba@uni-nke.hu

1. Introduction

Great emphasis is placed by the European Union on its Member States' gross government debt, the elements of this debt, and the correct management of it. From country to country and, indeed, region to region, there is considerable variation in the structure of public finances of both the state budget and municipalities. This is determined by historical customs and the evolution of the applied public finance management model. Instead of involving budgetary institutions directly, in many cases, economic organizations owned by them (public utility companies and non-profit organizations) perform the public finance duties, especially in municipalities. The reason for this being that when it comes to performing public duties, it is a fact that the local level is better at establishing a closer relationship with its population.

As feedback is more direct, this leads to a more efficient assignment of duties; thus, public services' quality can be improved. As one would expect with economic management, organizations incur liabilities in performing their duties, and the amount of these liabilities is a component determining financial sustainability. This paper explores the EU countries' local government subsystems, municipally owned economic organizations, and their issues. Namely, our study focuses on the trends and characteristics of the debt that influences public duties' performance by municipalities and their enterprises. Additionally, albeit indirectly, we contemplate the chances of the provision and sustainability of tangible shared public services to the communities.

2. Literature Review

In the financing of European local government subsystems, assuming payment obligations, that is, borrowing and bond issuance, has generally gained a more substantial role. Among the various local level funding options, obtaining loans prevail due to the relative ease at which funds can be raised from local banks (Vértesy, 2019). The reasons for this are that the municipalities are typically able to provide sufficient coverage, and financial intermediaries usually perceive local units positively.

Denison and Guo (2015) state that following the 2007 subprime crisis and the subsequent EU debt crisis, increased attention was drawn to the significance of managing debt. To achieve this management, several regulatory techniques exist command over the local budget deficit (e.g., Austria, Italy, the Netherlands, Poland, Spain, and Sweden), authorization for borrowing being required (particularly Belgium, France, and Romania), or a combination of the two previous measures as found in Denmark, Germany, Hungary, and Ireland. As one would expect, municipal debt was significantly impacted by the debt crisis. Also affected, via economic and social variables, was the accounting principle of going concerned, i.e., the sustainability of financial management and the simultaneous risk of default (Cohen *et al.,* 2017; Li *et al.,* 2019; Khan *et al.,* 2020)

The factors influencing municipal debt in several European countries (Austria, Belgium, France, Germany, Italy, and Spain) were studied by Bellot and Martí Silva (2017). They concluded that the countries in question shared features in common in the practices of their local and central governments. The authors also observed that the municipal subsystems' budgets were anti-cyclical and subscribed to the number one rule of budgeting: investments with increased payback periods are financed from longer-term sources and equity, whereas short-term loans finance investments in current assets. They highlighted intriguing developments that show that the expectable budget deficit is lower in the local subsystems in areas with increased government debt to GDP ratio. An Argimón and Hernandez (2008) paper is also noteworthy. In it they uncovered a negative connection between GDP growth and local debt. Ergo, the slower the growth of GDP is, the higher the value of debt becomes.

Plósz (2019), in his analysis, identifies the factors in municipal budget structure that might assist the "grow out" of local government debt in Central and Eastern European Member States that joined the European Union after 2004. The study concluded that revenue from income-type taxes and social contributions distorts economic growth and inhibits the processes of catching up. The author believes the dominance of turnover taxes to be more favorable. In view of convergence, the salient parts include the kind of local government systems and – regarding budgetary expenditures – social protection, economic activities, and culture. Plósz also states that the structure of revenue (in particular) and expenditure in Hungarian public finances supports the Hungarian catching up process i.e., budget sustainability processes both on the central and local stages.

Therefore, in the European Union's local government systems, a lowering of debt could be witnessed because of stronger control after the crisis. Bröthaler *et al.* (2015) considered the effects of this in the case of Austria. The impact of the EU cohesion policy on the debt of Polish and Hungarian municipal subsystems was analyzed by Medve-Bálint and Bohle (2016). They concluded that there was a link between using EU funds and the local level; the projects delivered with EU co-financing had a substantial debt-increasing effect caused by the recipient municipalities having to obtain either their own contribution or pre-financing from external sources for projects. It must be said that to fund investments by themselves, settlements across Europe mostly have limited financial capacities. Medve-Bálint and Bohle (2016) conclude that the independence of municipalities is undermined by the EU sources while their dependence on the central budget is increased. Pálné Kovács (2019) pointed out in her analysis that Hungary's municipalities were only able to make limited use of EU sources. Vasvári (2020) established in his research between 2006 and 2018 that Hungarian local governments in opposition were underfinanced. According to his study, this was caused by the limited access they had to the credit market.

However, in our opinion, the explanatory power of the author's model is limited. Vasvári concluded that the municipalities which had a much higher ability to involve

external financial sources (particularly for development) were likely to be pro-government. Research carried out by Lentner (2014) state the opposite conclusion. Municipalities' being either pro-government or in opposition had no significant role in the processes that paved the way to over-indebtedness between 2004 and 2008 or in the 2011 consolidation of municipal debt. The local governments' political affiliation when compared to the political character of the government did not play a significant part in either the processes of over-indebtedness or in the extent of the subsequent state consolidation. Nor was it a significant component of the incurrence of liabilities or participation in the bailout processes of the government. This rings particularly true when we consider that the central government's political affiliation differed from most of the municipalities at the time of going into over-indebtedness.

During the 2011-2014 consolidation period, the overlap of political affiliation of the government and municipalities was around 90%. The central budget eventually assumed all the municipalities' debt and therefore, according to Lentner's study, political selection hardly played an important role. Following the consolidation in Hungary, finance management has been controlled by strong normative provisions. That said, it is important to note the fall in GDP caused by COVID-19 and the resultant reduced state revenues will likely cause problems in the provision of utility type and administrative public services in the areas of municipalities. This is due to the Hungarian system becoming quite centralized in both financing and the performance of public administrative duties. In addition, a fall in municipal tax revenues (business tax) is to be expected. Traditional administrative tasks have mostly been removed from municipalities and central administrative-territorial organizations (county government agencies and district offices) that belong directly to the central government have been set up instead. The decrease of direct municipal revenues because of the crisis will likely cause disruption to the operation of municipally owned economic organizations. In the areas of utility-type public services of a financial nature, problems might occur in the sharing and performance of tasks. Furthermore, a decrease in the ability of the population to pay for utilities is a phenomenon to be expected across Europe.

To return to the focus of this study, we wish to make clear that another phenomenon intrinsic to our area of research is the increasing number of attempts made by the public sector to establish businesses, that is corporatization. Using examples from the UK, the reason for this is that such enterprises have increased opportunities to gain financial support and funding. Additionally, the managerial attributes of such companies are thought to be an asset. Andrews et al highlighted in their analysis that municipalities in poor and disadvantaged regions mostly use this opportunity (2020). Several studies agree that public services provision via enterprises is mainly a trend visible at the local level (Aars and Ringkjøb, 2011; Zéman and Hegedűs, 2014; Zéman *et al.,* 2018; Rechnitzer *et al.,* 2019). The finding is reinforced by the fact that the Hungarian State Audit Office did not maintain control over corporations owned by municipalities until 2011, which encouraged both the high number of municipally owned corporations being established and outsourcing utilities. Hence, hidden behind the screen of insufficient control, a loose public utility company practice bloomed,

and municipalities regularly disguised their losses in their less stringently controlled companies.

3. Materials and Methodology

Our main aim of this research involved grouping the liabilities as a share of the GDP at local government subsystems and economic organizations owned and controlled by municipalities in the European Member States based on several aspects. The research questions are:

1) Does a statistical relationship exist between the liabilities as a share of the GDP of municipalities and municipally owned organizations?
2) What is the ratio of liabilities as a share of the GDP of economic organizations to municipal debt?
3) How could EU Member States be sorted according to the investigated variables?
4) Is it possible to identify regional differences in as far as the variables examined are concerned?
5) Among the examined variables regarding local government system models, can significant differences be detected?

H1: Municipalities and municipally owned organizations have considerable debt, yet, within the European Union, the amounts differ by both country and regulatory environment.
H2: A correlation exists between the municipalities' liabilities and those of the corporations owned by them.
H3: Concerning the variables examined, the public law/regional system model and the mathematical-statistical categorization are mismatched.

Variables, methods:
- LGdebt represents the average liabilities as a share of local government subsystems' GDP among the EU Member States for the 2013-2018 period. The source of this data was Eurostat and OECD. To ensure comparability, we examined each country's local level liabilities and chose to ignore the mid-level local government entities' liabilities (provinces and regions):
- LGCEdebt stands for the average liabilities as a share of the GDP of local government subsystems-controlled enterprises in the EU Member States between 2013 and 2018; we sourced Eurostat data.
- Given the two variables examined, the average value, it can be concluded, is suitable for the representation of debt. This is because both variables in the 2013-2018 time series are very close to a normal distribution supported by the median value being a short distance from the average.
- LGCEshare stands for the ratio of average LGCEdebt and average LGdebt in the time series of 2013-2018. The volume of liabilities is shown as a share of the GDP of municipally owned corporations compared to the liabilities as a share of local governments' GDP.

To achieve the first aim, we carried out correlation and then regression analysis to examine the statistical relationship. The objective of the second aim was reached through the establishment of categories and cartographic design. We explored the third aim with the aid of cluster analysis. Variance analysis assisted in testing the accuracy of the cluster. The hierarchical procedure, the Ward Linkage, was used to carry out the cluster analysis. The centers of the clusters were then fixed with the K-means procedure. The research aims four and five were addressed through variance analysis. The Scheffé test was used during the post hoc tests. We made use of SPSS and MS Office software to analyze the data.

4. Research Results: The Structure of Public Indebtedness

Before giving an in-depth presentation of our findings, a comprehensive overview of the gross government debt as a share of the GDP between 2008 and 2019 is worth having. This period extends beyond the 2013-2018 research period and focuses on municipalities' debts and their corporations. This is primarily down to us wishing to illustrate the 2008 financial crisis impacts at scale. That aside, we shall examine the recent conditions at municipalities and municipally owned corporations only. Based on the trend, it can be surmised that the volume of public debt grows as a result of the crisis in the EU 28 and the Member States of the monetary zone until 2014. After that, a downward trend is observable.

**Figure 1.** *General government debt among EU members (2013-2018)*
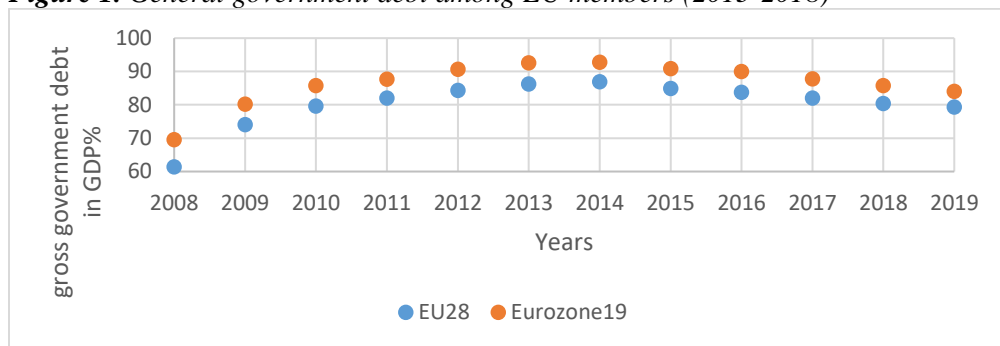
Source: Eurostat (2020).

In Figure 1 we can see that the debt in the Eurozone is greater than the EU-28 Member States' debt-to-GDP ratio. It also exceeds the threshold defined by the Maastricht criteria (60%). From this figure we can conclude that the crisis of 2008 created an adverse situation among EU Member States, and this was most discernable in the growth of debt. The post-2014 decrease is because of stricter fiscal regulations and a growing GDP which resulted from the economic recovery. However, it is important to note that the downturn brought about by the COVID-19 epidemic will unquestionably derail the agreeable direction of decreasing debt in both the long and short term.

As a share of the GDP of the municipal subsystem, the debt falls considerably behind the central budget's debt, although this, to a large extent, depends on the state system as well as the local government models. In Figure 2's data, we can see that the local level debt decreased from 2014, thus analogous processes can be recognized that were in connection to gross government debt. Likewise, the debts as a share of the GDP of municipalities within the Eurozone exceeds the value of debt in the EU-28, The debt dynamics incurred by municipalities and their economic organizations were measured in relation to both the EU-28 and the Euro-zone.

Figure 2. *Local government debt and local government-controlled entities' liabilities in GDP% among EU members (2013-2018)*
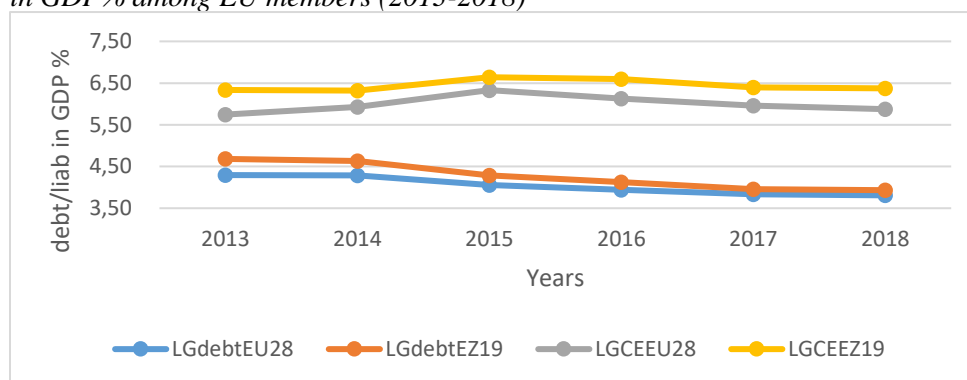
Source: *OECD, Eurostat (2020).*

The municipal subsystem's debt as a percentage of the GDP does not exceed 11% in any EU Member State in the time and background data series. Sweden reached the maximum value of 10.6%. Between 2013 and 2018, the municipal subsystem's average debt was 4.04%, and 4% was the median. Analyzing the data leads us to conclude that the municipal level's debt is greater in the countries where the local level has a bigger role in public duties performance within public finances (Lentner - Hegedűs, 2020). The list of such countries includes aforementioned Sweden, Denmark, Finland, France, Italy, and the Netherlands. During the examined time series for the EU, we witnessed a decline in municipal debt. When compared to 2013 in the time series, the rate of debt at the local level had decreased by 11% by 2018. In Hungary, a significant reduction can be observed between 2013 and 2015 because of the municipal debt consolidation that entailed the assumption of local governments' total debt by the central government. Also, the municipal subsystem's debt-to-GDP ratio decreased in 2018 compared to the values in 2013 in Portugal, Ireland, Greece, and Spain (where the decrease generally began from a low base). In Sweden, the debt increased by 17.7% in the time series and Finland by 9.43%.

The EU's statistical system measures the value of gross government debt, the subnational level's debt, and other contingent liabilities affecting the whole picture. These contingent liabilities become actual government liabilities only under certain conditions if the original debtor is unable or unwilling to repay the debt. According to the European Union methodology, these include the following:

- state guarantees,
- non-performing loans in the public finances system,
- liabilities derived from operating state or municipally owned corporations. We evaluate the latter in greater detail in our study.

Figure 2 shows that the debt as a share of municipally owned economic organizations' GDP increased slightly between 2013 and 2018, topped out in 2015-2016, and then decreased slightly afterward. It can be concluded, therefore, that the liabilities do not reflect the observations made on debt as a share of the GDP of economic organ organizations only noteworthy fact is that the value of debt in the Eurozone exceeds both the value of municipalities and even that of corporations which are municipally owned in the EU-28 Member States. In other words, municipally owned economic organizations' debt in the Eurozone is higher than that in the EU-28, i.e., positioning is similar to that of public debt.

The debt of organizations subject to the municipal subsystems' ownership control is greater than the local governments' debt. This is because the average GDP of the EU-28 countries is 6%. During the period examined, the median was 5.95% of the GDP. There is one outlier among the values it was concluded: Germany. The debt of locally owned entities exceeds 10% of the GDP in Denmark, Finland, the Netherlands, and Sweden. Compared to 2013, the liabilities as a share of municipal organizations' GDP grew by 1% by 2018. Fourteen countries underwent a decrease, Cyprus and Poland in particular. Meanwhile, Sweden, Denmark, and the United Kingdom experienced an increase.

4.1 Multivariable Analysis - Regression

Multivariable statistical analysis was performed with regards to two variables of the 2013-2018 examined time period. Specifically, the average debt values as a share of the GDP of local subsystems and the liabilities as a share of organizations' GDP controlled by municipalities in European Union countries. We are seeking out connections between the two variables through the application of correlation and regression analyses in our research. Using our analysis results, we will answer our first research question and evaluate the second hypothesis.

Because of the outlier, Germany's data were excluded from the regression model. Therefore, the regression model is drawn from data from 27 countries. Had Germany also been considered, the total value of R2 would have been 0.272. To build the regression model, first, the existence of the connection must be established. This can be done with the help of the ANOVA analysis of the variance table. The table shows both regression and residual variance and total variance. The ratio explained by the regression line is 64.7%. The F-test value determines that significance is under 5%, so the statistical relationship is confirmed. The lower part of the table shows R = 0.805 and R2 = 0.647 values, which means that the two variables have a strong connection. The estimation error is low, so it is suitable for modeling. Based on the

Durbin-Watson test results, there is no autocorrelation; the value close to 2 signifies the lack of autocorrelation. Conditions for regression analysis are met.

Table 1. *Regression model*
  ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	663.897	1	663.897	45.869	**.000**[b]
	Residual	361.842	25	14.474		
	Total	1025.738	26			

a. Dependent Variable: LGCEdebt
b. Predictors: (Constant), LGdebt

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.805[a]	.647	.633	3.8044	.647	45.869	1	25	**.000**	1.970

a. Predictors: (Constant), LGdebt
b. Dependent Variable: LGCEdebt
Source: *Own research, 2020.*

Table 2. *Regression coefficients*

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.075	1.190		-1.744	**.033**
	LGdebt	1.705	.252	.805	6.773	**.000**

a. Dependent Variable: LGCEdebt
Source: *Own research, 2020.*

The value of the regression line is shown in Table 3. Both the constant and the dependent variables' values are significant since the significant level of the t-test is under 5%, and the dependent variable is already relevant at 1%. The estimation error provides information on the value with which we must calculate the confidence interval (0.252) to model the expected value. Therefore, the regression line equation is:

$$LGCEdebt = -2.075 + 1.705 * LGdebt \tag{1}$$

Figure 3. *Linear regression curve*
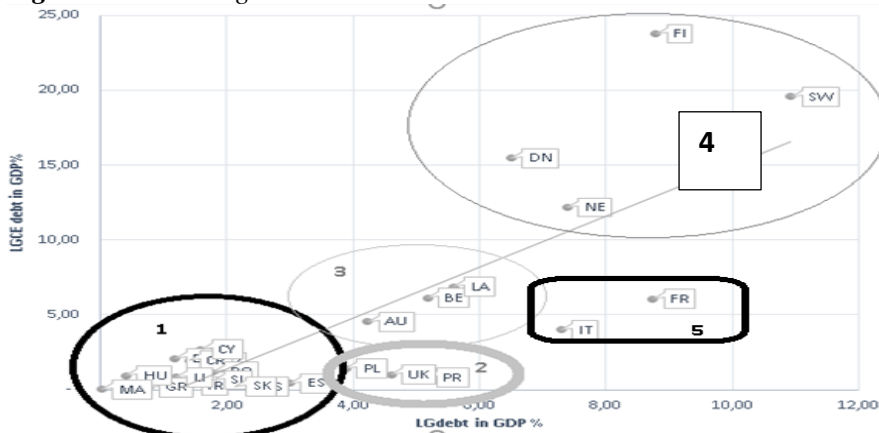
Source: *Own research, 2020.*

The different countries are indicated next to the regression line. Countries, based on these data, can be grouped into four categories. The grouping is based on the examined variables' average values between 2013 and 2018. Municipal debt is low in Group 1. Likewise, the debt of municipally owned corporations and organizations is low too. The following countries are included in Group 1: Malta, Hungary, Greece, Lithuania, Bulgaria, Spain, Slovakia, Cyprus, Estonia, Romania, Ireland, Slovenia, Croatia, and the Czech Republic.

The municipal subsystem debt is higher in Group 2, which is made up of Poland, the United Kingdom, and Portugal. However, the municipally owned organizational units are lower. Regarding Group 3 (Austria, Belgium, and Latvia), it can be stated that it fits the regression line, yet the municipal subsystem's debt levels and the municipal organizations are close to being the same. Denmark, Finland, Sweden, and the Netherlands (typically Northern and Western European countries) are contained in Group 4, where municipal companies' debt is significantly higher than that of the municipalities that own them. Below the regression line is Group 5. In these countries (Italy and France), the municipal debt level dominates.

As previously mentioned, Germany's data were excluded from this analysis due to the outliers. Among the examined countries, the liabilities of Germany's municipally owned organizations are the highest. According to Eurostat, it is above 50% of GDP in the relevant time series. Municipally controlled organizations in Germany play a significant part in carrying out public duties. This is because organizations usually provide services with sole or over 50% municipal ownership. By the 1990s, traditional public plants were reorganized as business associations that usually continued operating as municipal property. Among German practices, privatization was not a typical feature (Horváth, 2013). From the middle of the 2000s, several market economy operators (the energy sector, for example) were taken over by municipalities. Their operation was reconfigured and a framework of both complex and comprehensive (Wagner and Berlo, 2015).

4.2 Cluster Analysis

There were two variables examined during cluster analysis:
- the average value of debt as a share of the GDP of local subsystems in EU Member States between 2013 and 2018 (LGdebt),
- the average value of debt as a share of the GDP of municipally owned organisations in EU Member States between 2013 and 2018 (LGCEdebt).

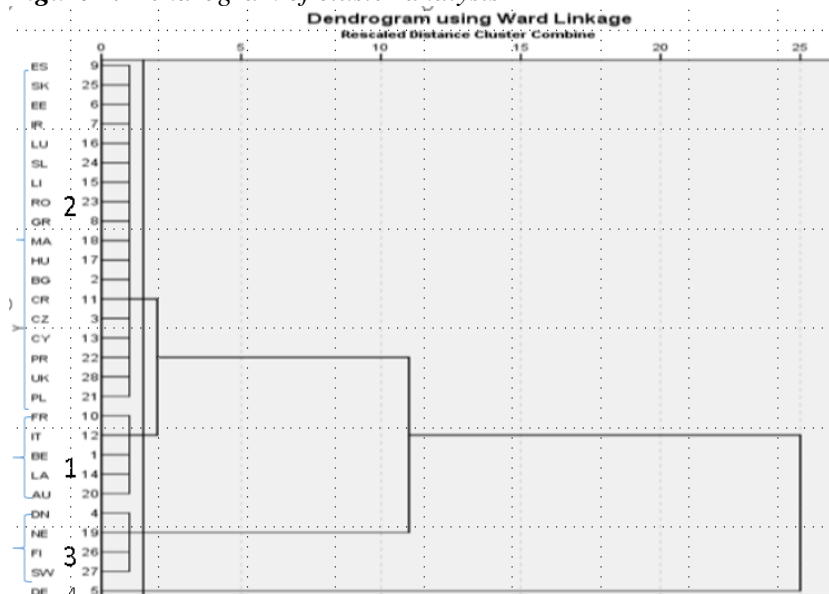With the examination we aim to answer the third research question and evaluate our third hypothesis.

A cluster analysis was carried out about the two examined variables (Graph 1) where Ward Linkage was applied using z-scores at standardization. Here, Germany's data, which were not used in the regression analysis, were included for the sake of completeness. The above decision was taken because our 3rd question and 3rd hypothesis can be better answered. Based on the data, we considered that creating 4 groups is justified with 1.5 height. The figure also supports Germany's exclusion from regression analysis since Germany was placed into a separate cluster here.

To test the appropriateness of cluster analysis, we carried out variance analysis, the precondition of which was met. Based on the results of the variance analysis, it can be stated that significant differences can be detected between both examined variables since the F-test value is below 5%. A descriptive statistical analysis of the groups was carried out to sophisticate the data. Thus, mean, median, standard deviation, minimum and maximum values were examined.

The first group is composed of France, Italy, Belgium, Austria, and Latvia. This group is characterized by almost equal debt as a share of the GDP at both the municipalities and their organizations, but the maximum value is higher in the municipal subsystem (France). The group is named 'Equal Local Government (LG) and Local Government Controlled Entities' (LGCE) debt.'

The other group contains the majority of EU Member States; altogether, 18 countries belong here due to the cluster analysis. The characteristic feature of this group is that both examined indicators are below the values of the EU-28. Interestingly, in this group, the debt of municipal organizations in Bulgaria, Croatia, Cyprus, and Hungary (all of them newly acceded to the EU) is higher than the municipal subsystem's debt. Because of its size, this group is obviously less homogenous as far as statistical indicators are concerned. The country group's name is 'Low Local Government (LG) and Local Government Controlled Entities' (LGCE) debt.'

In their study, Hegedűs - Lentner (2020) grouped the municipal subsystems in the EU-28 Member States considering budgetary variables (revenue, expenditure, balance, tax capacity - fiscal factors). They proved that the specificities described based on fiscal indicators do not match the public law based municipal system models. Moreover, they proved the existence of four municipal models in their paper. A parallel between the two studies is provided by the fact that Scandinavian countries formed a separate group, namely group 3, during cluster analysis.

Table 4. *Case Summaries*

Case Summaries		LGdebt	LGCEdebt
1	N	5	5
	Mean	6.21	5.52
	Median	5.59	6.06
	Minimum	4.23	3.98
	Maximum	8.75	6.87
	Std. Deviation	1.80	1.20
2	N	18	18
	Mean	2.00	0.94
	Median	1.64	0.82
	Minimum	0.03	0.00
	Maximum	5.15	2.68
	Std. Deviation	1.37	0.78
3	N	4	4
	Mean	8.41	17.75
	Median	8.09	17.52
	Minimum	6.51	12.18
	Maximum	10.93	23.78
	Std. Deviation	1.93	5.03
4	N	1	1
	Mean	5.08	52.48
	Median	5.08	52.48
	Minimum	5.08	52.48
	Maximum	5.08	52.48
	Std. Deviation	.	.
Total	N	28	28
	Mean	3.77	6.00
	Median	2.66	1.62
	Minimum	0.03	0.00
	Maximum	10.93	52.48
	Std. Deviation	2.92	11.00

Source: Own research, 2020.

Regarding the cluster analysis results, it can be concluded that the first and third groups of countries and Germany (because of the excessively high debt of its municipally owned organizations) have homogenous features. The common feature of these countries is that municipalities play a significant role in performing public

duties, so the degree of decentralization impacts mathematical-statistical grouping through the examined indicators.

4.3 LGCEshare Variable as Displayed in the Cartographic Illustration

Important information is provided when comparing the two segments of municipal economic task performance. Through the use of a map illustration, the proportions are grouped along with four different categories. Besides volume, the liabilities' relative weight is also decisive, i.e., the LGCE debt value compared to LG debt (LGCEshare variable). As Eurostat does not give a cartographic illustration, its graphic presentation can be thought of as a novel result. We are seeking answers to the third and fourth research questions with the grouping.

There are four countries in the group with the lowest debt (marked in gold). Here the debt level of economic entities remains under 20% of municipal debt. Where the debt is between 20% and 50%, there are three countries. Therefore 25% of the countries have a 50% debt share. Municipally owned organizations' debt exceeds municipal debt in the case of nine countries. One of the highest values is in Denmark, which is double the municipal debt. The highest value (where LGCE debt is ten times the LG debt) is found in Germany.

Table 5. *Grouping of countries based on the ratio of liabilities of municipally owned economic entities to that of municipalities (LGCEshare)*

LGshare ratio						
0-20%		21-50%	51-100%	100-200%		over 200%
Ireland	Greece	UK	France	Belgium	Hungary	Germany
	Slovakia	Poland	Italy	Netherlands	Croatia	Finland
Spain	Estonia	Slovenia	Romania	Czech Republic	Bulgaria	
Portugal	Malta	Luxembourg	Lithuania	Austria	Cyprus	Denmark
				Latvia	Sweden	

Source: Own research.

As shown by the coloring, the examined indicator has no determination geographically. Therefore, from a public policy viewpoint, it does not have a significant effect on the examined variable. That said, it can be concluded that in most countries lying East of the line created by UK-France-Italy, municipally owned organizations, debt exceeds the debt of municipalities (Figure 3). Therefore, a geographical pattern cannot be observed about the municipal system or the geographical position (e.g., newly acceded countries versus Western-European countries); differences exist between each group. Though, we can conclude that countries situated to the East of the UK-France-Italy line do have higher debt. However, in the values of the indicator, these countries still differ.

4.4 Variance Analysis

Three groups were created along geographical divides the Northern and Western group containing countries situated West of the France-Finland line, the Southern Europe group consisting of Cyprus, Malta, Italy, Spain, Greece, and Portugal, and the Post-Soviet region, which contains those countries that had a planned economy before 1990. Using variance analysis, we attempt to answer the fourth and fifth research questions and reject or prove the third hypothesis.

Table 5. *ANOVA table and post-hoc test of the geographical division*

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
LGdebt	Between Groups	77.741	2	38.871	6.381	**.006**
	Within Groups	152.279	25	6.091		
	Total	230.020	27			
LGCEdebt	Between Groups	1084.725	2	542.363	6.215	**.006**
	Within Groups	2181.584	25	87.263		
	Total	3266.309	27			

Post-hoc test

Scheffé

Dependent Variable	(I) geographic	(J) geographic	Mean Difference (I-J) *	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LGdebt	Western and Northern Europe	**Post-Soviet members**	3.96	1.11	**0.01**	1.07	6.84
		Southern Europe	2.40	1.20	0.16	-0.72	5.52
	Post-Soviet members	**Western and Northern Europe**	- 3.96	1.11	**0.01**	-6.84	-1.07
		Southern Europe	- 1.55	1.15	0.41	-4.54	1.43
	Southern Europe	Western and Northern Europe	- 2.40	1.20	0.16	-5.52	0.72
		Post-Soviet members	1.55	1.15	0.41	-1.43	4.54
LGCEdebt	Western and Northern Europe	**Post-Soviet members**	13.38	4.20	**0.01**	2.45	24.30
		Southern Europe	13.26	4.54	**0.03**	1.45	25.07
	Post-Soviet members	**Western and Northern Europe**	- 13.38	4.20	**0.01**	-24.30	-2.45
		Southern Europe	- 0.12	4.34	1.00	-11.42	11.17
	Southern Europe	**Western and Northern Europe**	- 13.26	4.54	**0.03**	-25.07	-1.45
		Post-Soviet members	0.12	4.34	1.00	-11.17	11.42

*. The mean difference is significant at the 0.05 level.
Source: *Own research, 2020.*

	Total	3266.309	27				

Post-hoc test

Scheffé

Dependent Variable			Mean Difference (I-J) *	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
LGdebt	Mediterranean/Southern	**Scandinavian/Northern**	-4.50	1.21	**0.01**	-8.12	-0.87
		Rhine/German	-1.68	1.46	0.72	-6.06	2.70
		Mixed	1.11	1.01	0.75	-1.91	4.13
	Scandinavian/Northern	**Mediterranean/Southern**	4.50	1.21	**0.01**	0.87	8.12
		Rhine/German	2.82	1.64	0.41	-2.10	7.73
		Mixed	5.61	1.25	**0.00**	1.86	9.36
	Rhine/German	Mediterranean/Southern	1.68	1.46	0.72	-2.70	6.06
		Scandinavian/ Northern	-2.82	1.64	0.41	-7.73	2.10
		Mixed	2.79	1.49	0.34	-1.69	7.28
	Mixed	Mediterranean/Southern	-1.11	1.01	0.75	-4.13	1.91
		Scandinavian/Northern	-5.61	1.25	**0.00**	-9.36	-1.86
		Rhine/German	-2.79	1.49	0.34	-7.28	1.69
LGCEdebt	Mediterranean/Southern	**Scandinavian/Northern**	-12.71	4.74	**0.09**	-26.96	1.53
		Rhine/German	-19.37	5.72	**0.02**	-36.56	-2.17
		Mixed	0.10	3.95	1.00	-11.77	11.97
	Scandinavian/Northern	**Mediterranean/Southern**	12.71	4.74	**0.09**	-1.53	26.96
		Rhine/German	-6.65	6.42	0.78	-25.94	12.63
		Mixed	12.81	4.90	0.11	-1.92	27.54
	Rhine/German	**Mediterranean/Southern**	19.37	5.72	**0.02**	2.17	36.56
		Scandinavian/ Northern	6.65	6.42	0.78	-12.63	25.94
		Mixed	19.46	5.86	**0.03**	1.86	37.07
	Mixed	Mediterranean/Southern	-0.10	3.95	1.00	-11.97	11.77
		Scandinavian/ Northern	-12.81	4.90	0.11	-27.54	1.92
		Rhine/German	-19.46	5.86	**0.03**	-37.07	-1.86

*. The mean difference is significant at the 0.05 level.
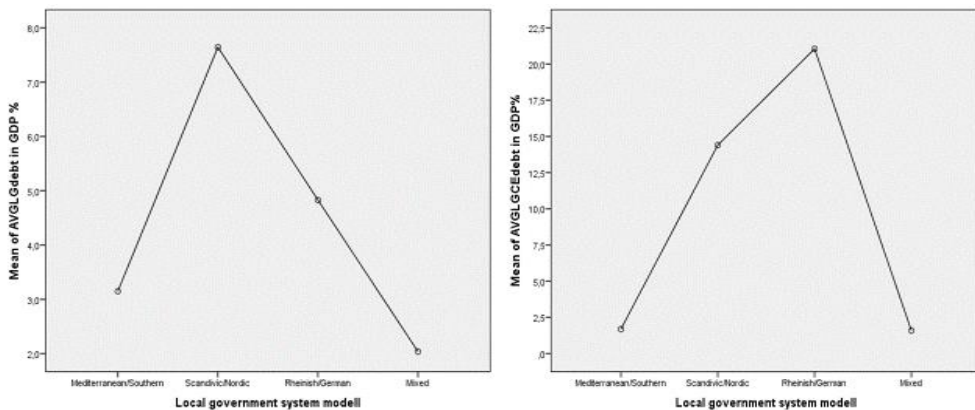
Source: *Own research, 2020.*

Municipal system models categorize the countries along with the municipality's size and the structure of municipal tasks. Accordingly, special literature identifies four main models, such as:

- The Scandinavian model (Finland, Sweden, Denmark, the Netherlands, the UK)
- The Rhenish model (Austria, Belgium, Germany)
- The Mediterranean model (France, Italy, Spain, Greece, Cyprus, Portugal)
- The remaining countries represent a mix of the previous models (for example, Hungary, Slovakia, Poland)

When it came to defining the municipal categories, we contemplated the typologies of Page and Goldsmith (1987), Hesse and Sharpe (1991), and Swianiewicz (2014). We also considered the OECD (2017), other special literature references, and our own ideas.

The F-test showed a significant difference in the case of both variables. This is because the significance level is below 5%. As before, the Scheffé Test was applied for the post-hoc test. Regarding the municipal subsystem variable's debt, the Scandinavian system model countries display significant differences from both the Mediterranean model countries and the mixed type ones. Municipally owned organizations' debt in Mediterranean countries shows significant difference from the values of countries that belong to the Rhenish and Scandinavian models. Meanwhile, the countries described by the Rhenish municipal model differ significantly from countries with the mixed type or Mediterranean municipal model.

Figure 6. *Means plot between the municipal system models and the examined variables*

Source: *Own research, 2020.*

The means plot visually represents post-hoc test results. The left-hand side of the figure illustrates municipal debt, and the right-hand side shows the debt of municipally owned organizations. Municipal debt, as the figure clearly shows, is

highest in the Scandinavian countries. As far as the same variable is concerned, the lowest value is found in countries with a mixed model. With the debt of municipally owned organizations, the Rhenish type countries reached the highest average value. If we look at the Mediterranean and mixed type countries, the difference is obvious (Figure 5).

5. Hungarian Case Study

As a country located in the post-socialist region, Hungary had a lax budgetary and municipal management policy when transitioning to a market economy. In the time between 2004 and 2010, substantial growth in municipal debt could be observed. The municipalities incurred the main portion of this debt by issuing foreign-currency-denominated bonds (CHF and EUR).

Consolidating all bonds, credit, and other liabilities, the state took over the total amount from 2012. This is visible in Figure 7 (Kovács-Csillik, 2012, and Fábián, 2017 for further details). Although consolidation is considered quite a drastic measure in fiscal governance, it is not without precedent. Indeed, similar steps were also taken in Germany and Italy. Csaba László (2013) concluded that the market's regulatory power could not work properly in every case. This was demonstrated by the experience of those countries affected by the EU debt crisis. This factor can be thought of as why the debt of the local level in Hungary decreased compared to the highest value in 2013. A fundamental transformation took place parallel to this in the regulation of public finance. The government introduced, from 2011, central debt management, which restricts, by law, the over-indebtedness of municipalities. One characteristic feature of this is how only investments from external sources approved by the central budget and that can be paid off from revenues can be financed. This has essentially implemented a regulation even stricter than the golden rule of public finance. The regulation operates by specifying the debt service cap; the annual debt service ratio can be a maximum of 50% of the municipality's own revenues (mainly derived from local taxes). Focusing on debt type fundraising, the regulation does not extend to other types of liability such as salaries payable or money owed to suppliers.

The regulation does expand to borrowing performed by municipally owned organizations, as it is bound to a positive evaluation of the requested authorization initiated and put forward by the municipalities to the Ministry of Finance. The regulatory mechanism's purpose is to prevent municipalities from achieving over-indebtedness due to their organizations, from the generation of significant contingent liabilities. As represented in Figure 7, since 2014, municipal debt and municipally owned organizations' debt have been decreasing. In 2016, however, there was a slight increase owing to growth in investment activity. Additionally, it can be concluded that the debt as a share of the GDP of municipally owned organizations is greater than that of the municipalities which own them.

Figure 7. *Data of liabilities of the municipal subsystem and municipally owned organizations 2013-2018*
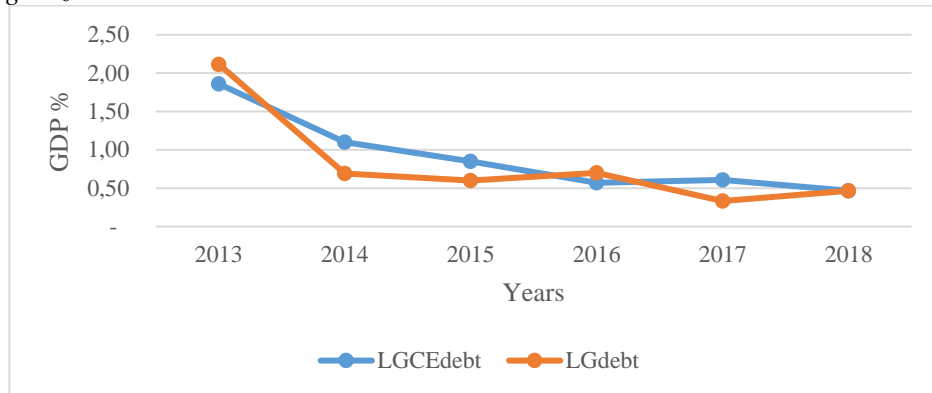
Source: OECD, Eurostat (2020).

In nominal values from 2016, the liabilities of municipalities and their organizations grew. However, the indicators expressed as a share of the GDP decreased. The robust GDP dynamics can explain this phenomenon in 2017 and 2018. In these two years, the GDP growth rate exceeded the liabilities' growth rate.

Hungary's values with regards to both variables are below average within both the EU-28 and the Eurozone. Resulting from analyses, it can be surmised that Hungary belongs in the lower quartile concerning the data distribution. This means a low level of debt as a share of the GDP and liabilities of organizations. The cluster analysis and the variance analysis results show that the Hungarian data significantly differ from the Scandinavian countries and, geographically speaking, from the countries of Northern and Western Europe. However, regarding characteristics, the data of Hungary also differ from the data of the post-socialist countries. As shown in Figure 6, in those countries, municipal and the debt of municipally owned organizations are higher.

6. Conclusion

Following the early years of the crisis (2007-2008), public debt increased among the Member States of the European Union. These debt dynamics disseminated across to the municipal subsystem and its economic entities in the EU-28, which resulted in over-indebtedness affecting the whole general government sector. 2014 was a turning point, though. From that year on, the gross government debt as a share of the GDP and the municipal subsystem's debt followed a decreasing trend in both the European Union and the Eurozone. This trend continued until the outbreak of the COVID-19 pandemic derailed it. It is noteworthy that in the Eurozone, the debt is greater in respect of all the variables. The research set out that the debt of economic organizations owned by municipalities exceeds municipal debt across the European Union during the examined period. However, from one country to another, there is considerable variation. The analysis shows that among EU Member states, the debt-

to-GDP ratio of municipally owned economic organizations is different from the trend of gross government debt and municipal debt. A trend reversal has not occurred there since 2014, and only in 2017-2018 can a slight decrease be observed (when, in most EU Member States, there was a strong economic recovery). Taking contingent liabilities, it can be ascertained, is highest in Scandinavian countries and Germany. The reality can explain this that besides municipalities, municipally owned economic entities in these countries play a much greater role in public duties.

Based on the correlation analysis, it can similarly be established that a strong, positive connection is detectable between the debt as a share of the GDP of the municipal level and the liabilities of municipal organizations. The regression model and its graph show that the liabilities of the two segments are dependent on decentralization. A major share of EU Member States has low municipal debt and municipally owned organizations' liabilities. In such countries, the degree of municipal involvement is also lower in terms of duties as a share of the GDP.

On both the basis of public law inspired municipal system models and the geopolitical position, the conducted analyses point to the same conclusion: the highest debt is found in Nordic, Scandinavian countries. However, the mathematical-statistical categorization results show a difference. As is presented in the cartographic analysis, the relative weight of the debt (LGCEshare) is highest in Central and Eastern European countries. In municipal economic management, taking contingent liabilities is present. However, it is necessary to draw attention to the accounting principle of going concerned and, through that, to the perpetual provision of public services. Should this principle not be adhered to, the municipal owner has a liability, and a considerable off-budget risk is incurred regarding the owner's operations. Consequently, the municipal organizations' debt must be monitored continuously at the regulatory level, which can considerably impact the municipal level's debt. Moreover, if a state consolidation takes place, it can impact the level of government debt.

Given that the municipally owned organizations' liabilities are not considered in the Maastricht debt calculations (unless the central budget or the owner provides a substantial share of revenue), the municipalities can become over-indebted through their organizations, and this poses a threat to transparency. While the EU directives prescribe contingent liabilities, a risk analysis is not contained in reports. GCA opinions, therefore, can be influenced significantly.

The COVID-19 pandemic-induced economic crisis will likely present major challenges for the EU Member States' public sectors. This includes the local government subsystem too. The predicted GDP decline presumed growth of government deficit, and public debt will surely break the trend of decreasing debt. Both the liabilities of municipalities and municipal economic organizations will increase as a result; the social risks of this cannot be considered insignificant.

References:

Aars, J., Ringkjøb, H. 2011. Local Democracy Ltd: The Political Control of Local Government Enterprises in Norway. Public Management Review, 13(6), 825-844. doi: 10.1080/14719037.2010.539110.

Andrews, R., Ferry, L., Skelcher, C. Wegorowski, P. 2020. Corporatization in the Public Sector: Explaining the Growth of Local Government Companies. Public Administration Review, 80, 482-493. doi:10.1111/puar.13052.

Argimón, I.I., Hernández de Cos, P. 2008. The Determinants of Budget Balances of the Regional (Autonomous) Governments Banco de España. Working Paper No. 0803. Available at SSRN: https://ssrn.com/abstract=1088652.

Bellot, J.N., Marti Silva, M.L., Garci Menedez, L. 2017. Determinants of Sub-Central European Government Debt. The Spanish Review of Financial Economics, 15(2), 52-62. DOI: 10.1016/j.srfe.2017.04.001.

Bergh, A., Erlingsson, G., Gustafsson, A., Wittberg, E. 2018. Municipally Owned Enterprises as Danger Zones for Corruption? How Politicians Having Feet in Two Camps May Undermine Conditions for Accountability. Public Integrity. doi: 10.1080/10999922.2018.1522182.

Becker, S. 2017. Our City, Our Grid: The Energy Remunicipalisation Trend in Germany: Kishimoto, S. – Petitjean, O. (eds): Reclaiming Public Services: How Cities and Citizens are Turning Back Privatisation, 117-130.

Bröthaler, J., Getzner, M., Haber, G. 2015. Sustainability of Local Government Debt: A Case Study of Austrian municipalities. Empirica, 42, 521-546. https://doi.org/10.1007/s10663-014-9261-3.

Buendía-Carrillo, D., Lara-Rubio, J., Navarro-Galera, A. 2020. The Impact of Population Size on the Risk of Local Government Default. Int Tax Public Finance. https://doi.org/10.1007/s10797-020-09591-9.

Csaba, L. 2013. Válságkezelés Európában – új gazdaságfilozófia felé? (Crisis Management in Europe – Towards a New Economic Philosophy?) Köz-Gazdaság, 8(2), 1-15.

Cohen, S., Karatzimas, S., Naoum, V. 2017. The Sticky Cost Phenomenon at the Local Government Level: Empirical Evidence from Greece. Journal of Applied Accounting Research, 18(4), 445-463.

Denison, D.V., Guo, Z. 2015. Local Government Debt Management and Budget Stabilization. in Yilin Hou ed.: Local Government Budget Stabilization. Springer International Publishing, 121. https://doi.org/10.1007/978-3-319-15186-1_7.

Fábián, A. 2017. Local Self-Government in Hungary: The Impact of Crisis. In: Silva, Carlos Nunes - Buček, Ján eds.: Local Government and Urban Governance in Europe. Cham, Springer, 71-87.

Gardini, S., Grossi, G. 2018. What is Known and What Should be Known about Factors Affecting Financial Sustainability in the Public Sector: A Literature Review. In: M. P.R. Bolívar & M.D.L. Subires (Eds.), Financial Sustainability and Intergenerational Equity in Local Governments, 179-205.

Greer, R.A. 2016. Local Government Risk Assessment: The Effect of Government Type on Credit Rating Decisions in Texas. Public Budgeting and Finance, 36(2), 70-90.

Grossi, G., Reichard, C. 2008. Municipal Corporatization in Germany and Italy. Public Management Review, 10(5), 597-617. doi: 10.1080/14719030802264275.

Hegedűs, S., Lentner, C. 2020. Comparative Analysis of Budgetary Indicators of European Municipal Subsystems in the Post-Crisis Term between 2009–2018. Public Finance Quarterly, 65(1), 112-133.

Hesse, J.J., Sharpe, L.J. 1991. Local government in international perspective: some comparative observations. In: J.J. Hesse, ed. Local government and urban affairs in international perspective. Bade-Baden: Nomos Verlagsgesellschaft, 603-621.

Horváth, M.T. 2013. Kiszervezés-visszaszervezés (Outsourcing - Backsourcing). In: Horváth M. Tamás (2013): Kilengések - Közszolgáltatási változások. In: Horváth M. Tamás (2013): Kilengések - Közszolgáltatási változások. (Cliff effects - Changes in Public Services). Dialóg Campus Kiadó Budapest, 39-247.

Khan, M.A., Gu, L., Oláh, J. 2020. Natural resources and financial development: The role of institutional quality. Journal of Multinational Financial Management, 56, 100641, 1-20. doi: 10.1016/j.mulfin.2020.10064.

Kovács, L., Csillik, P. 2012. Adatok és tendenciák az önkormányzati hitelezés területén. (Data and Trends in Municipal Lending) Jegyző és Közigazgatás, 14. (2), 21-23.

Lara-Rubio, J., Rayo-Canton, S., Navarro-Galera, A., Buendia-Carrillo, D. 2017. Analyzing Credit Risk in Large Local Governments: An Empirical Study in Spain. Local Government Studies, 43(2), 194-217.

Laurence, F., Andrews, R., Skelcher, C., Wegorowski, P. 2018. New Development: Corporatization of Local Authorities in England in the Wake of Austerity 2010-2016. Public Money & Management, 38(6), 477-80.

Lentner, C. 2014. The Debt Consolidation of Hungarian Local Governments. Public Finance Quarterly, 59(3), 310-325.

Li, C., Pervaiz, K., Asif Khan, M., Ur Rehman, F., Oláh, J. 2019. On the asymmetries of sovereign credit rating announcements and financial market development in the European region. Sustainability, 11(23), 1-14. doi: 10.3390/su11236636.

Loughlin, J., Hendriks, F., Lidström, A. (eds) 2010. The Oxford Handbook of Local and Regional Democracy in Europe. Oxford: Oxford University Press.

Medve-Bálint, G., Bohle, D. 2016. Local Government Debt and EU Funds in the Eastern Member States: The Cases of Hungary and Poland. MaXCaP Working Paper Series, 22.

Navarro-Galera, A., Lara-Rubio, J., Buendía-Carrillo, D., Rayo-Cantón, S. 2017. What Can Increase the Default Risk in Local Governments? International Review of Administrative Sciences, 83(2), 397-419.

OECD. 2017. Subnational Government Country Profiles for Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom

Page, E.C., Goldsmith, M. (eds) 1987. Central-Local Government Relations: A Comparative Analysis of West European Unitary States. London: Sage.

Pálné Kovács, I. 2019. Önkormányzati lehetőségek és korlátok a helyi gazdaságfejlesztésben. (Opportunities and Obstacles of Municipalities in Local Economic Development) Tér és Társadalom, 33(2) 4-21. https://doi.org/10.17649/TET.33.2.3088.

Plósz, D.J. 2019. Helyi önkormányzatok és konvergencia európai perspektívából (Local Governments and Convergence from a European Perspective) Köz-gazdaság, 14(3), 83-98.

Papenfuss, U., Van Genugten, M, De Kruijf, J., Van Thiel, S. 2018. Implementation of EU Initiatives on Gender Diversity and Executive Directors' Pay in Municipally Owned Enterprises in Germany and The Netherlands. Public Money & Management, 38(2), 87-9.

Rechnitzer, J., Berkes, J., Filep, B. 2019. The most important city development initiatives of Hungary Regional Statistics, 9(2), 20-44.

Sharikova, G.A, Sitenko, D.A, Vasa, L. 2019. Audit of Efficiency of the Use of Budgetary Funds int he Process of Conducting a State Audit. Bulletin of the Karaganda University, Economy Series, 2(94), 262-273.

Swianiewicz, P. 2014. An Empirical Typology of Local Government Systems in Eastern Europe, Local Government Studies, 40(2), 292-311. DOI: 10.1080/03003930.2013.807807.

Vasvári, T. 2020. Beneficiaries and Cost Bearers: Evidence on Political Clientelism from Hungary. Local Government Studies, 46, 1-28.

Vértesy, L. 2019. Local Debt Burden at LAU2 level in EU countries. Proceedings of the 16th International Scientific Conference. Masaryk University ISBN 978-80-210-9337-1.

Voorn, B., Van Thiel, S., Van Genugten, M. 2018. Debate: Corporatization as More than a Recent Crisis-Driven Development. Public Money & Management, 38(7), 481-482. doi: 10.1080/09540962.

Voorn B., Borst T.R., Blom, R. 2020. Business techniques as an explanation of the autonomy-performance link in corporatized entities: evidence from Dutch Municipally owned corporations. International Public Management Journal. DOI: 10.1080/10967494.2020.1802632.

Wackenbauer, J. 2009. Water sector in Germany. Working paper CIRIEC N° 2009/11.

Wagner, O., Berlo, K. 2017. Remunicipalisation and Foundation of Municipal Utilities in the German Energy Sector: Details about Newly Established Enterprises, Journal of sustainable development. Energy Water Environmental Systems, 5(3), 396-407.

Zéman, Z., Hegedűs, S. 2014. Financing municipality development projects in Hungary. In: Zéman, Zoltán (ed.) Controller Info Studies. Copy & Consulting Publishing, Hungary.

Zéman, Z., Hegedűs, S., Molnár, P. 2018. Analysis of the Creditworthiness of Local Government-owned Companies with a Credit Scoring Method. Pénzügyi Szemle/Public Finance Quarterly, 63(2), 176-195.