STUDY ON THE IMPACT OF LOCAL PUBLIC DEBT ON THE TOTAL PUBLIC DEBT AT EU LEVEL

CANDALE VIRGIL
PHD STUDENT AT "LUCIAN BLAGA" UNIVERSITY OF SIBIU, ROMANIA
e-mail: virgilcandale@yahoo.com

OPREAN MARIUS IOAN
PHD STUDENT AT "LUCIAN BLAGA" UNIVERSITY OF SIBIU, ROMANIA
e-mail: mariusioan.oprean@ulbsibiu.ro

OCOLIŞANU ANDREEA
PHD, "LUCIAN BLAGA" UNIVERSITY OF SIBIU, ROMANIA
e-mail: aocolisanua@gmail.com

Abstract
Local public debt and total public debt exert a significant influence on the financial sustainability of the public budgets. The impact of the local public debt on the total public debt is little addressed in the published literature, these two indicators being rather treated individually or in relation to other influencing factors. This study starts from the research hypothesis that supports a weak or non-existent financial dependence between the local public debt and the total public debt at the level of the EU states. In a first stage, the influence of DPL on DPT was analyzed for Sweden, Denmark and Finland, being states with high financial autonomy, in opposition to states showing low financial autonomy and high financial dependence on national governments, such as Romania, France. A second part of the study focused on the impact of DPL on DPT at the level of EU member states. The statistical methods used, namely the simple linear regression carried out at the EU level, show that there is no statistical link between the increase in local public debt and the total public debt.

Keywords: local public debt, total public debt, financial autonomy, decentralization

Clasificare JEL:

1. Introduction

A component of the total public debt (DPT), the local public debt (DPL) presents a high importance that requires a distinct assessment in the context of the migration process from centralization to decentralization. The total public debt of the government (DPT) will be understood in this study as Government consolidated gross debt, according to the COFOG classification.

Both local public debt and total public debt are considered determining factors or with significant influence on the financial sustainability of public budgets. To prevent the adverse effects of a potential increased appetite for debt, the Maastricht Treaty (1992) and the Stability and Growth Pact adopted by the European Council (1997) established a maximum level of public debt for EU member states, which must not exceed 60% of GDP. Therefore, this level of public debt limits governments' ability to borrow, which is however directly influenced by the level of local public debt, even if it is not an obligation of the government. In this context, by observing the European debt limits, governments have been able to establish various control instruments in terms of accessing loans at the local level.

Exemplifying the case of Romania, at the local level access to loans or the guarantee of any loan is authorized if the rates of existing loans and those related to the requested loan, including interest and associated commissions, do not exceed 30% of the average of own income obtained in the last 3 years prior to the year in which it is funding authorization requested. [4]

According to the data presented in Figure 1, the average share of Local public debt in Government consolidated gross debt in EU member countries is 6.47% in 2021. It is observed that in most states, Local public debt in Government consolidated gross debt represents below 10%, which means that most debts belong to central governments. The highest values are recorded in Sweden (33.95%), Denmark (18.26%), Finland (17.95%), unlike the states with low values of the Local public debt in Government consolidated gross debt (%), such as Romania (3.37%), or even with values close to 0 (eg Malta with 0.03% and Greece with 0.32%).
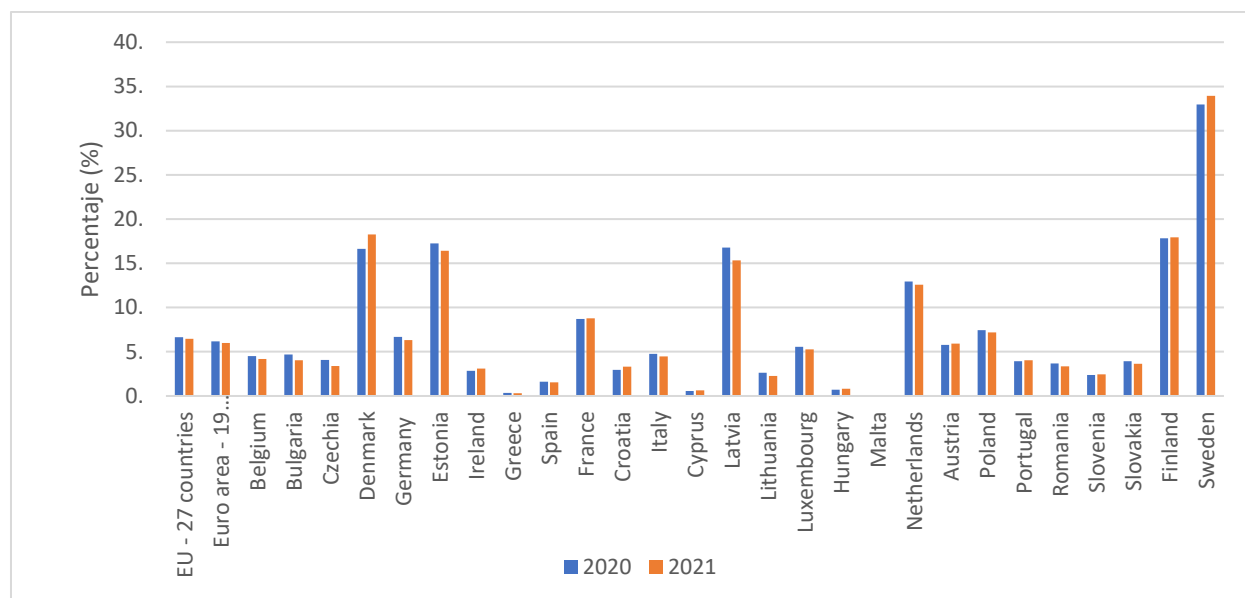
Figure 1. Evolution of the share of Local public debt in Government consolidated gross debt in the EU 27 (2020-2021)
Source: own representation based on Eurostat data, available at https://ec.europa.eu/eurostat/web/government-finance-statistics/data

The lowest levels recorded are explained by the high financial dependence of local public authorities on central governments, corresponding to their low financial autonomy, suggesting at the same time a low impact of Local public debt on Government consolidated gross debt.

An analysis over a longer time horizon of the evolution of the share of Local public debt in Government consolidated gross debt for the states that register the highest levels, including Romania for comparability, shows that Sweden reports the highest values, well above the EU27 average and above the average of the other 4 analyzed states, according to the data represented in Figure 2.

The peak reached in 2019 of 34.9% is almost 5 times higher than the E27 average of the same year. In Sweden, no local debt approval is required by the state and loans are provided by local bank Kommuninvest, the Swedish local government funding agency founded in 1986 and owned by Swedish local authorities, which is by far the largest lender to local governments local.

Structurally, Swedish local debt consists of loans and a significant and growing share of securities, the share of the latter increasing significantly in recent years, especially among metropolitan municipalities that concentrate and develop a high number of property housing.

Although comparably higher than the level of other EU states and with an important increase between 2000 and 2016, reaching almost 20%, local government debt is not considered a serious problem in Denmark, local governments not being able to freely decide on loans, except for investments in public utilities. [7] And in the period 2017-2018, Danish Local public debt was increasing, registering a downward trend starting from 2019, standing at 18.3% in 2021 of the Government consolidated gross debt.
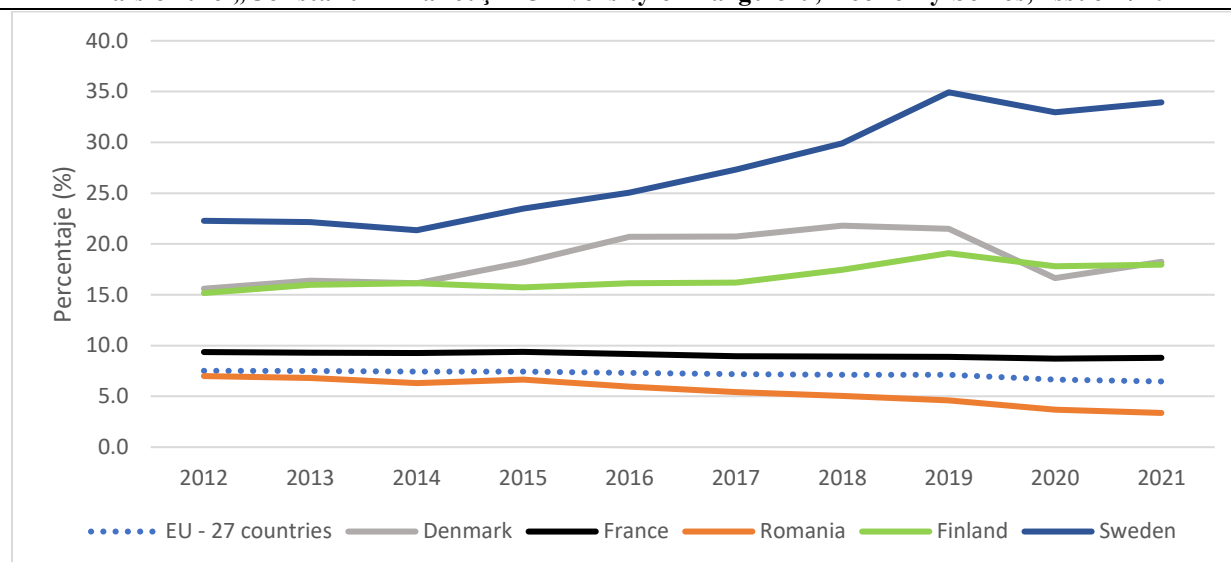
Figure 2. Evolution of the share of Local public debt in Government consolidated gross,
several countries (2012 – 2021)
Source: own representation based on Eurostat data, available at
https://ec.europa.eu/eurostat/web/government-finance-statistics/data

Finnish municipalities have seen a rising level of indebtedness since 2017, peaking at 19.1% of total public debt in 2019 due to pressures on spending and the volatility of the municipal tax base. A large part of the municipal debt is financed through MuniFin, a public credit institution that grants loans to achieve environmentally and socially responsible investment objectives, such as public transport, hospitals and health centers, schools, centers day care and homes for people with special needs. [10]

Local government debt in France amounts to an annual average of 9.1% of Total public debt between 2012 and 2021 and is slightly above the EU27 average. Compared to other European countries, the Local public debt as a share of the Total public debt is constant throughout the analyzed period, not registering important annual variations.

Local government debt in France amounts to an annual average of 9.1% of Total public debt between 2012 and 2021 and is slightly above the EU27 average. Compared to other European countries, the Local public debt as a share of the Total public debt is constant throughout the analyzed period, not registering important annual variations.

The local public administrations in Romania have the lowest share in the Total public debt compared to the other analyzed states, with an annual average of 5.5% in the period 2012-2021, being even below the EU27 average, in each of the years presented. In structure, the Local public debt mainly consists of medium and long-term loans contracted in the national currency from credit institutions and commercial banks. [9] Romanian local authorities can take out loans for the purpose of executing public investments aimed at the well-being of the local community, as well as for the purpose of repaying the existing Local public debt.

2. Literature Review

The impact of the Local public debt on the Total public debt is little addressed in the the published literature, these two indicators being rather treated individually or in relation to other influencing factors.

Balaguer-Coll et al. (2016) believe that the level of Local public debt has become a threat to the solvency of local public administration and that it could additionally have a negative effect on macroeconomic financial stability. [2]

Another approach, Aczél and Homolya (2011) explores the risks that arise as local governments become indebted and may create solvency problems as a result of significant exchange rate exposure, declining local government revenues and deteriorating economic prospects. The analysis highlights the availability and capacity of the banking sector in managing these risks, in parallel with a reorganization of central and local public administration responsibilities, due to the increase in risks related to local public debt in Hungary, without proposing concrete measures. [1]

László (2019) demonstrated through an impact study that at the EU level, for the year 2017, there is no determining correlation between the level of debts of local public administrations and the Total public debt. In the small and central countries of southern Europe, more than 90% of the debts belong to the central government, with local authorities in Eastern Europe being heavily financially dependent on central state transfers. In the case of Finland, Sweden and Denmark, the proportion of Local public debt in Total public debt is higher, as municipalities in these countries have strong fiscal autonomy. [3]

The research hypothesis on which the study is based is the following:

There is a weak or non-existent financial dependence between the Local public debt and the Total public debt at the level of the EU states.

In a first stage, the influence of DPL on DPT was analyzed for Sweden, Denmark and Finland, being states with high financial autonomy, in opposition to states showing low financial autonomy and high financial dependence on national governments, such as Romania, France. The second stage of the study focused on the impact of DPL on DPT at the level of EU member states.

3. Research methodology

3.1. In order to highlight the influence of the Local public debt (DPL) on the Total public debt (DPT) for Romania, Denmark, France, Finland and Sweden, the percentage influence of the Local public debt on the Total public debt was calculated for the period 2019- 2021.

The influence of Local public debt on nominal Total public debt was calculated by adapting the formula used by Robjohns (2007) to assess the influence of individual GDP components on the annual GDP growth rate, using the equation:

$$C_t = w_{t-1} \left(\frac{DPL_t - DPL_{t-1}}{DPL_{t-1}} \right) * 100 \tag{1}$$

where:
- C_t is the influence at time t of the Local public debt on the annual increase of the Total public debt,
- w_{t-1} is the previous year's share of Local public debt in Total public debt.

3.2. In support of the hypothesis regarding the weak or non-existent financial dependence between DPL and DPT, the testing of this relationship was carried out through a simple linear regression with cross-sectional series and calculating the influence of DPL in the annual change of the Total public debt in the year 2021.

The research sample for the simple linear regression includes EU member states (27 states) and refers to the change in DPT and DPL in the year 2021 compared to the year 2020. The values are adjusted with the Harmonised Index of Consumer Prices, using a chosen fixed base (the year 2015 [8]) (equation 2).

$$DPR_i = \frac{Nominal\ public\ debt_i}{Inflation_i} \times Inflation_{2015} \tag{2}$$

where DPR_i is the real public debt at time i, the raw data being taken from the Eurostat database.

Subsequently, the obtained data were logarithmized and the first difference was applied to obtain the annual changes.

Simple linear regression is expressed using the following equation:

$$Y = \propto + \beta \times X + \varepsilon \tag{3}$$

where Y - the dependent variable (change in Total public debt), explained according to the independent variable X (Local public debt in this study), α - the constant, β - the regression coefficient, and ε represents the error term.

The estimation within the simple linear regression was carried out by the method of least squares, which involves the minimization of the squared residuals. These are the squared differences between the values of Y and the estimated values of Y (ŷ), using the following equation:

$$minim\ (SSR) = minim\ \sum_{i=1}^{n} u_i^2 = minim \sum_{i=1}^{n}(Y_i - \hat{y}_i)^2 \tag{4}$$

where SSR is the Sum of Squared Residuals, u_i are the residuals, and $\hat{y}_i$ comprises the estimated values of Y.

The null hypothesis is:

β_0 Local public debt does not influence total public debt,

indicating that the regression parameter is null, that is, it is statistically insignificant.

To test the null hypothesis, the F test was calculated, as follows:

$$ESS = \sum_{i=1}^{n}(\hat{y}_i - \bar{Y})^2 \tag{5}$$

$$MSE = \frac{ESS}{k} \tag{6}$$

$$MSR = \frac{SSR}{n-k-1} \tag{7}$$

$$F = \frac{MSE}{MSR} \tag{8}$$

where ESS is the sum of squares explained by the regression and MSR is the mean squared residuals.

A measure of the statistical relationship between the studied variables is given by the coefficient of determination, R2. This indicator shows in what proportion the variance of the dependent variable (Y) is explained by the independent variable. It is calculated by squaring the Pearson's correlation coefficient, R (equation 9 for the correlation coefficient). This coefficient takes values between 0 and 1. To calculate the regression, we used the Eviews 12 program.

$$R = \frac{\sum_{i=1}^{n-k}(Xi-Xm)(Yi-Ym)}{\sqrt{\sum_{i=1}^{n}(Xi-Xm)^2 \sum_{i=1}^{n}(Yi-Ym)^2}} \tag{9}$$

4. Analysis of the influence of local public debt on total public debt

The largest increases in the total public debt occurred, for all the analyzed states, in 2020, as can be seen in Table 1.

However, in the case of Romania in 2020, Local public debt contributed only 0.26 percent of the 31.49 percent increase in total public debt. And at the level of the other analyzed states, the Local public debt has a small effect on the Total nominal public debt.

Thus, in Denmark, in 2020 the Local public debt had a negative influence, and in the year 2021 it had a positive influence while the Total public debt decreased by more than 6%. In Finland, in 2019 the Local public debt registered a significant influence on the increase of the Total public debt (2.17 percent of the increase of 2.77 percent), but in the years 2020 and 2021 the influence of the Local public debt on the change of the Total public debt is reduced.

Local public debt in Sweden has the most important influences on Total public debt, with Swedish local budgets also having the highest degree of indebtedness of the states in the sample, as a result of this state's high decentralization.

Table 1. The influence of Local public debt on the nominal Government consolidated gross debt

Type of public debt	Country	2019	2020	2021
Local debt	Romania	0.014	0.265	0.135
Government consolidated gross debt	Romania	10.180	31.490	13.651
Local debt	Denmark	0.017	-0.447	0.454
Government consolidated gross debt	Denmark	1.516	26.568	-6.454
Local debt	France	0.205	0.873	0.613
Government consolidated gross debt	France	2.772	11.841	6.240
Local debt	Finland	2.170	1.271	0.537
Government consolidated gross debt	Finland	2.787	14.321	2.237
Local debt	Sweden	2.282	3.526	0.096
Government consolidated gross debt	Sweden	7.629	10.095	0.293

Source: own representation based on Eurostat data available at
https://ec.europa.eu/eurostat/web/government-finance-statistics/data

In conclusion, the calculation of the influence of the local public debt on the total public debt highlights, in most cases for Romania, Denmark, France and Finland, a reduced influence of the local public debt on the accumulation of the total public debt.

5. Impact study of the local public debt on the total public debt at the EU level

As we can see in Figure 3 for the 27 EU member states there is no correlation between the increase of the real local public debt and the total public debt. But to confirm we will perform and interpret the regression results.
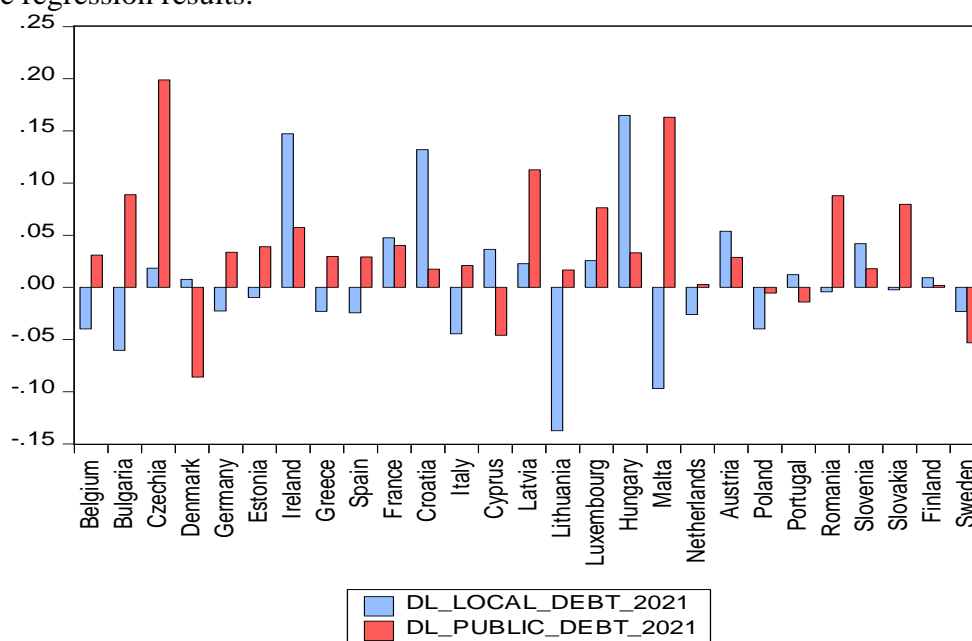
Figure 3. Annual increases in real Local public debt and real Total public debt
(logarithmic series and applied first difference)
Source: Calculations made by the author, Eviews 12 output

Local public debt has a small and negative effect, as can be seen from Figure 4. Thus, the 1% increase in Local public debt leads to a 0.06% decrease in Total public debt. But the probability associated with the F-test is 0.72, that is, higher than the chosen significance level of 0.05, indicating that we can accept the null hypothesis that Local public debt does not influence Total public debt.

```
Dependent Variable: DL_PUBLIC_DEBT_2021
Method: Least Squares
Date: 03/08/23   Time: 22:56
Sample: 1 27
Included observations: 27
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.037501	0.011916	3.147174	0.0042
DL_LOCAL_DEBT_2021	-0.064088	0.181531	-0.353040	0.7270

R-squared	0.004961	Mean dependent var		0.037109
Adjusted R-squared	-0.034841	S.D. dependent var		0.060601
S.E. of regression	0.061647	Akaike info criterion		-2.663584
Sum squared resid	0.095010	Schwarz criterion		-2.567596
Log likelihood	37.95839	Hannan-Quinn criter.		-2.635042
F-statistic	0.124637	Durbin-Watson stat		2.397685
Prob(F-statistic)	0.727018			

Figure 4. Results of the regression study
Source: Calculations made by the authors, Eviews 12 output

6. Results of the empirical analyses

The statistical methods used, namely the simple linear regression carried out at the EU level, show that there is no statistical link between the increase in local public debt and the total public debt.

This low impact is explained by efforts to balance local public revenues and expenditures due to the legislation in force and transfers from the central to the local level to compensate for fiscal imbalances, thus reducing the future need for local governments to borrow. This point is confirmed by a recent study based on empirical evidence, which argues that when fiscal decentralization increases vertical fiscal imbalances, local governments become more dependent on transfers and both local and central debts increase. [6] The authors of the study applied a dynamic two-level governance model to the case of fiscal decentralization, showing that wider vertical fiscal imbalances make local governments rely more on transfers and exacerbate the problem of weak budget constraint, so that local government debt increases. As transfers increase, the central government must borrow more, causing central government debt to rise.

7. Conclusions

A distinct importance was given to structural, dynamic and comparative empirical analyses, through aggregated and integrated indicators in the European system of accounts, both at the level of the European Union and at the level of the countries included in the sample. These analyzes allowed formulating an overview of the degree of financial autonomy, respectively of decentralization of local administrations, highlighting the weight of local budgets' revenues and expenses in the general budgets, also carrying out detailed analyzes regarding the type and weight of each source of financing in total revenues, as well as the destination and share of each category of expenditure in the total of public expenditure carried out at the local level.

In this sense, the countries of the Scandinavian group (Denmark, Sweden and Finland) register a very high degree of local financial autonomy, the share of local budget revenues in the total of general public budget revenues having high percentages during the analyzed period (Denmark

with an annual average of over 60 %, Sweden approaching 50% and Finland exceeding 40%) in contrast to Romania (with an annual average of 28%) and France (with an annual average of 21%). Naturally and with regard to the degree of decentralization of local administrations, the local budget expenditures of the countries of the Scandinavian group have a high weight in the total public expenditures, following the high trajectory of those recorded by revenues. Romania and France still show a high degree of centralization of activities and services delegated to the local level compared to the other analyzed states.

Considering the fact that public debt, both at local and consolidated level, is considered one of the determining factors or with significant influence on the financial sustainability of public budgets, the influence of Local public debt on Total public debt was calculated, resulting in most cases, for the countries in the sample, namely Romania, Denmark, France, and Finland, a reduced influence of the local public debt on the total public debt.

At the same time, the study of the impact of the Local public debt on the Total public debt at the EU level highlighted the fact that there is no statistical link between the increase of the Local public debt and the Total public debt, confirming the formulated research hypothesis.

8. References

[1]. Arrow Aczél, Á., Homolya, D., Risks of the indebtedness of the local government sector from the point of view of financial stability, MNB Bulletin, October 2011

[2]. Balaguer-Coll, T.M., Prior, D., Tortosa-Ausina, E., On the Determinants of Local Government Debt: Does One Size Fit All?, International Public Management Journal, 2016, 513-542, DOI: 10.1080/10967494.2015.1104403

[3]. László, V., Local Government Debts in the EU countries. In 27th NISPAcee Annual Conference, May, 2019

[4]. Law 273 of June 29, 2006 on local public finances, published in the Official Monitor no. 618 of July 18, 2006, art. 63 para. 4

[5]. Robjohns, J., Methods explained: Contributions to growth rates under annual chain-linking. Economic & Labour Market Review, 1(6), pp. 53-56, 2007

[6]. Si Guo, Yun Pei, Zoe Xie, A dynamic model of fiscal decentralization and public debt accumulation, Journal of Public Economics, Vol. 212, 2022, https://doi.org/10.1016/j.jpubeco.2022.104692

[7]. Sorensen, E., M., Austerity and the dynamics of ap centraliw cascade – in the case of Danish municipalities. Paper for presentation at the 2016 EGPA Conference, Panel V on Local and Regional Government, Utrecht, 24–26th August, 2016

[8]. https://insse.ro/cms/files/statistici/comunicate/ipc/a18/precizari_metodologice.pdf

[9].https://mfinante.gov.ro/static/10/Mfp/buletin/executii/EvdatguvconformUERonoiembrie2022.pdf

[10]. https://www.munifin.fi//about-us/