Fiscal Stability of Local Government Systems in EU Member States, in Light of the COVID-19 Pandemic, with Special Focus on Hungary

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Abstract: *This study aims to examine the impact of the pandemic, on the subsystems of local government in the European Union Member States (including Hungary). We analyzed the evolution of operating revenues, debts, tax revenues and financial assets of local governments between 2018 and 2022. We conducted a two-step cluster analysis to identify countries with similar and different fiscal characteristics. The results show that, despite the pandemic, the budgetary position of local government systems remained relatively stable, although some countries faced significant fiscal challenges. Our research highlights that fiscal policy developments played an important role in maintaining the stability of local governments, especially in Hungary. The Hungarian case study, highlights that the over-centralization of public finances and the dominance of central government control, negatively impacts the fiscal capacity of local governments.*

Keywords: local governments, financial stability, COVID-19, European Union, Hungary

JEL-codes: H72, H63, E62, R51, F45

1 Introduction

Our study focuses on the financial analysis of municipal subsystems across EU Member States, specifically examining how the pandemic altered their financial capacities during the COVID period (2020-2022) compared to a relatively consolidated period (2018-2019) and identifying emerging trends within the population involved in the study.

The COVID-19 pandemic has significantly impacted both the central fiscal position of European Union Member States and the financial stability of local governments. During the crisis, individual national economies implemented compensatory fiscal measures within their own competence. The examination of these measures concerning the eurozone, the European Union, and Hungary promises new scientific insights. EU authorities and Member States introduced extraordinary financial measures to support Member States. Expert studies have also emphasized the necessity of fiscal expansion and economic recovery, as well as the inevitable accompanying increase in public debt in the post-pandemic period. Research has highlighted that maintaining fiscal stability in the post-COVID-19 period will be a critical task for EU Member States. Although numerous studies have examined the local fiscal consequences of the COVID-19 crisis, comprehensive cross-country comparisons based on harmonised data remain scarce. The existing literature has not yet provided an EU-wide, data-driven comparative assessment of municipal subsystems before, during, and after the pandemic period.

Therefore, the aim of this study is to identify how the COVID-19 crisis affected municipal fiscal structures across the EU and how these effects differ from the case of Hungary.

The research framework addresses three specific objectives:

(1) To analyse the evolution of debt, revenue, tax income, and net financial assets within EU municipal systems

(2) To identify statistically significant fiscal profiles through a two-step cluster analysis

(3) To explore the degree of Hungary's deviation from European fiscal trajectories.

The structure of this article is as follows: Section 2 reviews the relevant literature; Section 3 describes the variables, data sources, and methodology applied; Section 4 presents the empirical findings and cluster outcomes; and Section 5 discusses the conclusions and future research implications.

2 Literature Review

During the COVID-19 crisis, the core and peripheral eurozone countries progressively implemented counter-cyclical discretionary fiscal policies, signaling an evolution in response strategies [1-2]. EU authorities introduced extraordinary fiscal and monetary measures to support Member States [3]. The academic literature emphasized the necessity of budgetary expansion, public debt increase, and economic recovery principles in the post-pandemic period [4].

Research has highlighted that maintaining fiscal stability in the post-COVID-19 period represents a critical challenge for EU Member States [5]. Furthermore, studies have examined the impact of pandemic measures, monetary responses, and fiscal policies on financial markets, emphasizing their interconnections [6]. Corporate responses to the crisis were also dependent on government fiscal policies, which had a significant role in promoting green recovery in the post-pandemic economy [7].

The legal and policy aspects of the EU's economic response were also analyzed, evaluating their impact on the economic and monetary union [8]. The Next Generation EU plan, representing a significant fiscal and policy response to the pandemic, received particular attention regarding inter-Member State conflicts and redistributive dimensions [9]. Furthermore, the pandemic raised concerns about fiscal health, governance, debt levels and the socio-economic implications of long-term policy decisions [10].

The financial position of local governments in EU member states after COVID-19 is a widely researched topic. Studies have emphasized the need to increase support and accelerate fiscal transfer funds for local governments to effectively address pandemic-related challenges [11]. Concerns have also emerged regarding the financial resilience of local governments, particularly in the post-pandemic period, and questions have been raised about the reliability of the central government funding framework designed to meet the specific needs of individual local authorities [12].

Research has also examined the pandemic's impact on subnational finances, particularly focusing on financial solutions and flexible fiscal rules for maintaining the local economic base [13]. Studies highlighted the significant role of Medicaid in alleviating pandemic-related fiscal pressure for local governments, emphasizing local governments' key role in financing pandemic response and economic recovery [14].

Furthermore, studies analyzed the global COVID-19 pandemic's impact on local government resource utilization, examining the budgets of selected local government units and measuring the pandemic's effect on resource allocation, particularly in the security sector [15]. The relationship between local government debt and corporate debt financing was also explored, indicating that increases in local government debt may lead to decreased levels of debt financing for local companies [16], demonstrating how municipal governments attempt to alleviate local businesses' financing tensions both directly and indirectly.

Bohlel (2021) examines the role of Hungarian municipalities in managing the COVID–19 crisis. The research analyzes the preventive and protective measures implemented by local authorities to limit the transmission of the virus and maintain public safety. The study emphasizes that, despite operating with restricted resources and limited competences, local governments were able to respond effectively to the

crisis and achieved notable results in controlling the pandemic through cooperation with the central state [17].

Fekete et al. [18] investigate crisis management practices of local governments within the Lake Balaton Priority Resort Area during the first wave of the COVID–19 pandemic. The authors place particular emphasis on the economic impacts, especially the loss of tourism tax revenues and its implications for the financial position of municipalities. The study highlights the specific challenges faced by the region and the strategies employed by local governments to mitigate the negative effects of the pandemic [18].

Baranyai et al. [19] in crisisprovide an extensive analysis of the crisis management practices and operational frameworks of Hungarian municipalities during the COVID–19 pandemic. The study offers a comprehensive account of how local governments addressed pandemic-related challenges, what resources they utilized, and how the balance between local autonomy and centralization evolved. The findings suggest that municipalities' operational flexibility was considerably constrained by centralizing government measures, while resilience – the capacity to withstand crisis – displayed heterogeneous patterns across localities. The study further underlines that the effectiveness of crisis management largely depended on the quality of cooperation between local leaders and the central government, as well as access to information and resources. The authors also provide recommendations to improve future crisis management, including the strengthening of decentralization and more efficient use of local resources [19].

3 Material and Methods

Fiscal stability represents a core dimension of public finance sustainability and refers to the capacity of local government systems to maintain long-term financial balance, avoid structural deficits, and manage debt exposure and fiscal volatility. In the international literature, fiscal stability is closely associated with the ability of municipal authorities to finance public service functions without structural indebtedness or the continuous deterioration of financial reserves.

The indicators selected in this research – debt-to-GDP ratio, revenue-to-GDP ratio, tax-to-GDP ratio, budget balance, and net financial balance – are widely recognised measures of fiscal stability. They reflect fiscal capacity, resilience to budgetary shocks, and the ability of local governments to generate autonomous income. Their expression as a share of GDP ensures comparability across Member States and mitigates structural economic size differences, which justifies their methodological relevance in EU-wide analysis.

The typology of municipal government systems provides an institutional framework for interpreting cross-country differences. The literature generally distinguishes four models: (1) the Nordic model, characterised by high decentralisation and strong local autonomy; (2) the Rhine model, defined by tighter central oversight; (3) Mediterranean systems, having limited local fiscal space; (4) transitional Central and Eastern European models, combining diverse institutional characteristics. Incorporating these typologies in the empirical analysis is essential, because fiscal stability strongly depends on institutional design, revenue assignment, service functions, and borrowing frameworks

The fiscal stability variables selected in this study (debt-to-GDP, revenue-to-GDP, tax-to-GDP, budget balance, and net financial balance) follow established international practice in assessing the fiscal resilience of municipal systems. Previous literature confirms that these indicators capture the essential dimensions of local fiscal capacity, debt sustainability, revenue autonomy, and financial buffers (Lentner & Hegedűs, 2020; Ahrens & Ferry, 2020; Patrzałek & Gałecka, 2022). Expressing them relative to GDP ensures cross-country comparability and controls for economic size differences.

The two cluster dimensions—EU accession timing and municipal system model—were selected because prior research finds both factors to be structurally influential determinants of fiscal performance, decentralisation levels, and local revenue capacity (Kornai, Maskin & Gérard, 2022; Vasvári, 2020). Accession year reflects integration depth and fiscal governance traditions, while the system typology captures institutional structure and expenditure responsibility.

We acknowledge certain limitations: GDP-based indicators are sensitive to macroeconomic fluctuations, especially during crisis years, and do not reflect service efficiency or political constraints. To address these issues, we limited the analysis to a harmonised period (2018–2022) and employed multivariate and descriptive robustness checks to reduce distortion effects

The importance of this topic is justified by the fact that public finances, including local-level subsystems, came under pressure due to the pandemic. The scope of tasks on the list increased due to lockdowns and pandemic response measures, resulting in significant additional budget expenditures. Therefore, it is of particular interest to examine the budgetary position of local governments in the post-pandemic period. Variables examined:

- Revenue as % of GDP (R_t)
- Debt as % of GDP (DBT_t)
- Balance as % of GDP (BL_t)
- Local tax revenue as % of GDP (TX_t)
- Net financial balance as % of GDP (NFB_t)

The examined time horizon spans between 2018 and 2022, with data sourced from the Eurostat database. Our analytical methods include a descriptive statistical

analysis of the examined variables, and a two-step cluster analysis to typify countries. This method was chosen as it provides more precise grouping and demonstrates which variables influence cluster membership. EU countries were typified from two aspects: the date of accession and the application of local government system models. These variables, as well as the cluster-derived variable, were tested using cross-tabulation analysis.

The empirical clustering was performed using the IBM SPSS TwoStep clustering algorithm, which enables efficient grouping of continuous variables in large multivariate datasets without requiring a predefined number of clusters. The optimal number of clusters was determined using the Bayesian Information Criterion (BIC) and further validated through the Silhouette coefficient to assess cluster cohesion and separation. This technique is appropriate given the continuous structure of the fiscal indicators and the need to avoid arbitrary classification thresholds.

To validate the clustering structure, we applied cross-tabulation combined with Pearson's chi-square tests to examine the relationship between cluster membership and EU accession timing, as well as municipal system typologies. Statistical significance was assessed at the 5% alpha level.

A methodological limitation is that the TwoStep algorithm can be sensitive to the internal distribution and scaling of the fiscal variables. We addressed this by standardising the variables and expressing them as a percentage of GDP to mitigate comparability distortions related to country size differences. Another assumption concerns the approximate continuity and distributional stability of fiscal indicators over time; therefore, we complemented the analysis with robust descriptive statistics and excluded extreme outlier distortions.

4 Research Findings

While the eurozone cannot be considered homogeneous beyond its use of the Euro, its level of development accounts for a substantial proportion of EU27 GDP. Consequently, it is valuable to evaluate three main macroeconomic indicators of municipal subsystems before and during the pandemic. Although the time series is relatively short, it is suitable for capturing certain effects of the pandemic crisis. The selection of the 2018–2022 period follows two methodological principles. First, the years 2018–2019 represent a stable pre-pandemic baseline period in the European Union, characterised by balanced macroeconomic and fiscal conditions. These years provide a reliable reference frame for isolating and measuring the fiscal shock associated with the COVID-19 outbreak.

Second, the research objective focuses on identifying the effects of the pandemic between 2020 and 2022; therefore, a comparative structure contrasting pre-crisis and crisis-period indicators was necessary and justified.

While a longer historical reference period could have incorporated additional macro-structural changes—such as shifts in long-term interest rates, inflation dynamics, or inward FDI flows—the homogeneity and data consistency provided by Eurostat limit fully harmonised municipal-level datasets to 2018 onward. The selected time horizon therefore ensures methodological coherence and directly supports the analytical purpose of measuring pandemic-related developments within European municipal systems.

While municipal revenues declined following the pandemic, they peaked in 2020, representing a sort of carry-over effect from the preceding favorable baseline period (Figure 1).

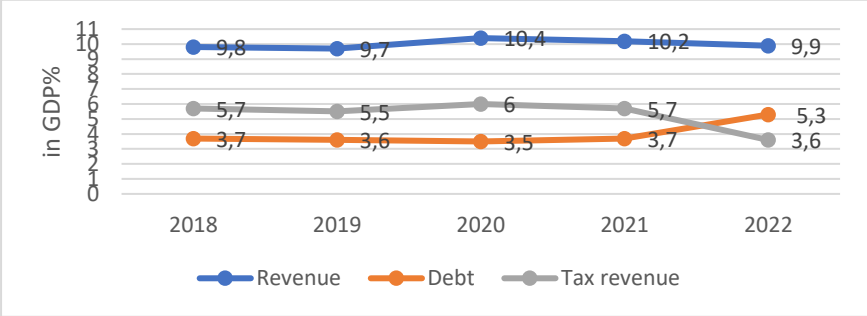

Figure 1
Eurozone data for the examined variables based on Eurostat database [1]

Municipal subsystems across EU27 countries consistently demonstrate trends similar to those seen in the eurozone. Revenue as a percentage of GDP increased in the first year of the pandemic and has declined since. However, debt levels increased significantly, a trend that continued through 2022, with debt exceeding tax revenues across the EU27 as a whole. During the pandemic years, municipalities experienced substantial growth in revenue-to-GDP ratios, followed by a decline after 2021. The two figures indicate that similar processes and trends were observed throughout the EU and in the eurozone during both the pandemic years and the preceding period (Figure 2).

[1]https://ec.europa.eu/eurostat/databrowser/view/gov_10a_main/default/table?lang=en&category=gov.gov_gfs10.gov_10a

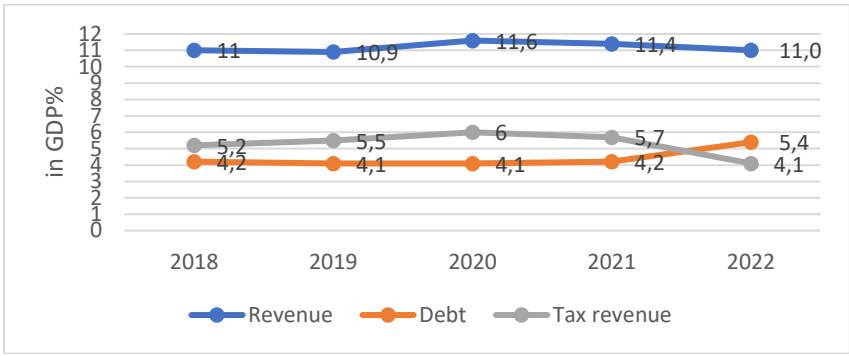

Figure 2
EU-27 Data for examined variables based on Eurostat database [2]

The marked similarity between the two figures reflects the economic predominance of eurozone countries within the European Union.

In contrast with the EU-27 and eurozone countries, Hungary exhibited significantly different patterns and trends. Most notably, there was a decline in municipal revenues and tax receipts during the two years of the pandemic, a process that has persisted. These factors can be attributed to both restrictive government measures and the decrease in local business tax revenues serving as the tax base, and the decline in tourism and hospitality tax receipts. The only positive effect was that, despite the pandemic, debt levels did not begin to rise, which can be explained by central government debt restrictions and centrally administered regulations inhibiting debt assumption (Figure 3). The COVID-19 pandemic had a significant economic impact on Hungary's municipal system. As a result of the pandemic, numerous local governments experienced substantial budget reductions, affecting local expenditures and development strategies. During the pandemic, the Hungarian government implemented various resource-withdrawal measures that influenced local taxation and decision-making, further reducing the financial autonomy of municipalities [20].

While the declining trend in revenues and tax receipts aligns with European patterns, the pace and extent of debt growth remain below European levels due to the application of debt-brake regulations. It is apparent that the Hungarian municipal system's revenue-to-GDP ratio, tax revenues, and debt levels represent only a fraction of both eurozone and EU-27 averages. This indicates that the financial capacities of municipalities in Hungary and their role in the national economy in specific, are significantly more modest than European averages (Figure 3).

[2]https://ec.europa.eu/eurostat/databrowser/view/gov_10a_main/default/table?lang=en&category=gov.gov_gfs10.gov_10a

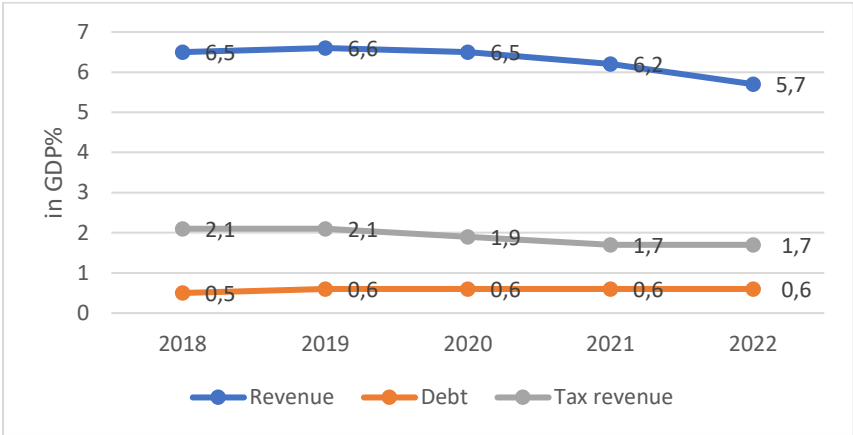

Figure 3
Data for the examined variables in Hungary based on Eurostat database [3]

Given that the examined variables are measured as proportions of GDP, it is important to address real GDP developments. In 2018, the EU-27 economy grew by 2.1%, while the eurozone economy expanded by 1.8%. Following this modest increase, growth rate declined in both regions in 2019, dropping to 1.6% in the EU-27 and 1.3% in the eurozone. With the outbreak of the COVID-19 pandemic in 2020, both economic regions experienced severe downturns. EU-27 real GDP decreased by 6%, and the eurozone's by 5.6%, reflecting the depth of the pandemic-induced economic crisis. This represented the most significant decline during the period under analysis and had dramatic implications for European economies. In 2021, as the pandemic subsided and economies reopened, a robust recovery emerged (notably, compared to the weak base year). GDP growth rose to 5.3% in the EU-27 and 5.1% in the eurozone. This rapid growth indicated the gradual return of economic activity to normal conditions and successful adaptation of European countries to the post-crisis environment. By 2022, growth rates moderated in both regions while remaining positive. Real GDP increased by 3.5% in both the EU-27 and the eurozone.

Hungary's economy achieved significantly more dynamic growth than EU and eurozone averages in 2018 and 2019 (5.6% and 5.1%), with these years characterized by economic overheating. The 2020 downturn (-4.3%) was less severe than the European average, while the pace of recovery in 2021 was exceptional, resulting in 7.1% growth compared to the particularly weak 2020 base year. Although growth rate dropped to 4.3% in 2022, Hungary economic performance still exceeded EU and eurozone growth rates (Figure 4). Although beyond the

[3] https://ec.europa.eu/eurostat/databrowser/view/gov_10a_main/default/table?lang=en&category=gov.gov_gfs10.gov_10a)

study's temporal scope, Hungary entered a severe recession in 2023, experiencing a -1.1% GDP downturn compared to 2022, along with an average annual consumer price inflation of 17.6%, following the already significant 14.5% national currency depreciation in 2022, representing Europe's weakest economic indicators in these areas. This significantly constrains central government financial transfers to municipal governments, particularly in real terms (Figure 4).

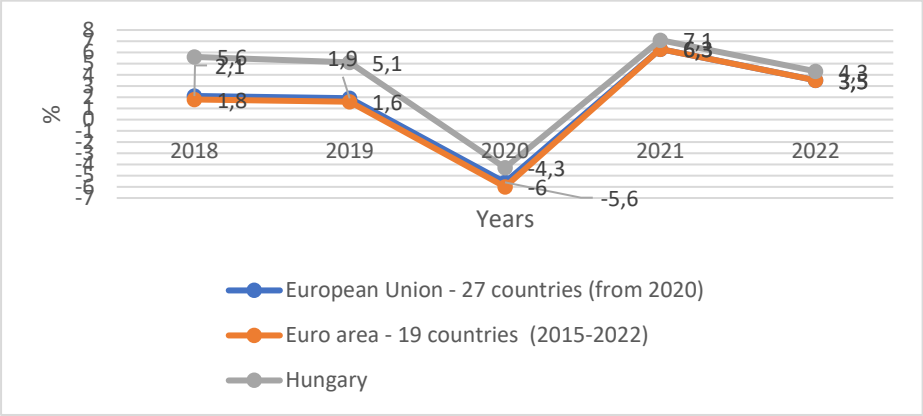

Figure 4
Real GDP growth rates in the EU, the Eurozone and Hungary based on Eurostat database [4]

Table 1 shows the descriptive statistics of macroeconomic indicators presenting local government systems in the EU-27 member states. The first third of the table addresses debt-to-GDP ratio. Looking at the average, it can be determined that no significant change occurred in debt levels, though the highest average debt level was notably observed in 2020. The standard deviation and the median's relationship to the mean indicates significant dispersion, explained by the increase in maximum values, where debt rose substantially compared to previous years. Debt did not increase in the quartile with the lowest debt, while in the upper quartile, an increase occurred only in 2020. The second third of the table shows the budget balance as a percentage of GDP. The average budget balance measured in the EU's local government systems remained positive except for 2019 and notably did not enter deficit territory even during the pandemic. This may be attributed to the introduction of budgetary rules in numerous countries, with the implementation of the golden rule of balanced budgets being a key element. While the median does not differ significantly, the standard deviation shows considerable variation from the mean value, thus this variable also demonstrates significant standard deviation. The lowest values declined due to the pandemic, as did those in the lower quartile. Values in the upper quartile remained unchanged, while maximum values showing

[4] https://ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

budget surplus increased. Examining tax revenues, it can be established that local subsystem revenues as a proportion of GDP declined in Member States during crises, as expected. The modest extent of this decline is evident from the evolution of average values. This indicator also demonstrates significant variance when comparing the median and standard deviation to the mean. Local tax revenues as a percentage of GDP remained unchanged at minimum levels, and stagnated in the lower quartile, while showing decline in both upper quartile and maximum values. Analysis of EU municipal financial indicators reveals that average debt levels (DBT2022) stand at 3.7% of GDP, which can be considered low, although the high standard deviation indicates substantial differences between countries: some are entirely debt-free, while others have accumulated debt up to 12.8%. The budget balance (BL2022) averages zero, indicating that most municipalities maintain financial equilibrium, although minor variations exist.

Tax revenue (TX2022) amounts to an average of 3.3% of GDP; however, significant variability is observed, indicating substantial differences in revenue-raising capacity among local governments.

Table 1
Descriptive statistical analysis of study variables I. (N=27) based on Eurostat

Descriptive statistics	DBT2018	DBT2019	DBT2020	DBT2021	DBT2022	BL2018	BL2019	BL2020	BL2021	BL2022	TX2018	TX2019	TX2020	TX2021	TX2022
Mean	3.9	3.8	4.1	3.9	3.7	0	0	0	0.1	0	3.4	3.4	3.4	3.3	3.3
Standard deviation	3.3	3.4	3.7	3.5	3.4	0.4	0.4	0.3	0.3	0.3	3.5	3.4	3.6	3.5	3.4
Minimum	-	-	-	-	0	-0.9	-1.3	-1	-0.3	-0.4	-	-	-	-	0.2
Maximum	11.7	12.4	13.3	13	12.8	0.9	0.6	0.5	0.9	1	13	12.5	12.8	12.6	12
Lower quartile	1.4	1.4	1.4	1.3	1.4	-0.2	-0.1	-0.1	-0.1	-0.2	0.8	0.8	0.8	0.8	0.8
Median	2.1	2.1	2.6	2.6	2.2	0.1	-	-	0.1	-	2.1	2.1	2.2	2	2.2
Upper quartile	6.8	6.7	7	6.6	5.7	0.2	0.2	0.2	0.2	0.2	5	5	5	4.4	4.8

Next, we examine revenue as a percentage of GDP, a key variable describing municipal fiscal autonomy. Looking at the sample mean, paradoxically, revenues reached their highest value in 2020. This development is particularly interesting given that local taxes, which determine own revenues, decreased on average across the EU. The standard deviation and mean differ significantly from the average value, indicating substantial dispersion in this variable. While the minimum value remained stagnant throughout the time series, the maximum value increased in GDP-proportional revenue during the first year of the COVID pandemic. Growth

was observed in both lower and upper quartiles. GDP-proportional measures may show distortion during crises. Specifically, declining GDP due to the pandemic may increase revenue-to-GDP ratios even with constant revenue levels.

The net financial balance as a % of GDP indicates whether a municipal system maintains a financial surplus in terms of financial assets, or whether the banking sector or financial institutions are financing the given municipal subsystem. The data shows increased GDP-proportional financial assets in EU municipal systems, with equivalent standard deviation and approaching upper quartile values. The minimum value indicates a further decline, while the maximum value shows a slight increase. This may also be explained by the base effect resulting from GDP decline. Total revenue (R2022) is significantly higher at an average of 10%, while the standard deviation is substantial here as well, suggesting that revenue structures and sources vary considerably across municipal systems in different countries. The net financial balance (NFB2022) shows a minimal surplus, averaging 0.3%. This value, however, also demonstrates strong fluctuation, indicating that while most municipalities are financially stable, they can only accumulate limited reserves (Table 2).

Table 2
Descriptive statistical analysis of study variables II. (N=27) based on Eurostat

Descriptive statistics	**R2018**	**R2019**	**R2020**	**R2021**	**R2022**	**NFB2018**	**NFB2019**	**NFB2020**	**NFB2021**	**NFB2022**
Mean	10.1	10	10.7	10.5	10	0.2	0.2	0.3	0.3	0.3
Standard deviation	7	7	7.5	7.3	6.7	0.2	0.2	0.3	0.3	0.4
Minimum	0.5	0.5	0.5	0.5	0.4	-0.1	-0.1	-0.2	-0.2	-0.2
Maximum	33.1	33.1	34.8	33.9	30.1	0.7	0.9	1.2	1	1.2
Lower quartile	6.4	6.3	6.5	6.7	6.4	0.1	0.1	0.1	0.1	-
Median	8.3	8.4	9	9	8.8	0.2	0.1	0.2	0.2	0.2
Upper quartile	12.2	12.4	13.5	13.7	13.1	0.3	0.2	0.3	0.3	0.3

The boxplot analysis was employed to identify outliers across the previously examined variables. The analysis reveals that Finland demonstrated the highest debt surges, while Sweden exhibited the most substantial positive fiscal balance. The most significant budget deficits were observed in Finland and, specifically for 2020, in Croatia. Regarding revenue and tax receipts, Denmark and Sweden consistently appear as outliers, typically representing the highest values. In terms of net financial wealth, the Nordic countries predominantly show positive outliers, while Southern European and New Member States display negative outliers. Notably, Hungary

recorded the highest net financial balance, at the local government level, in 2018 (Figure 5).

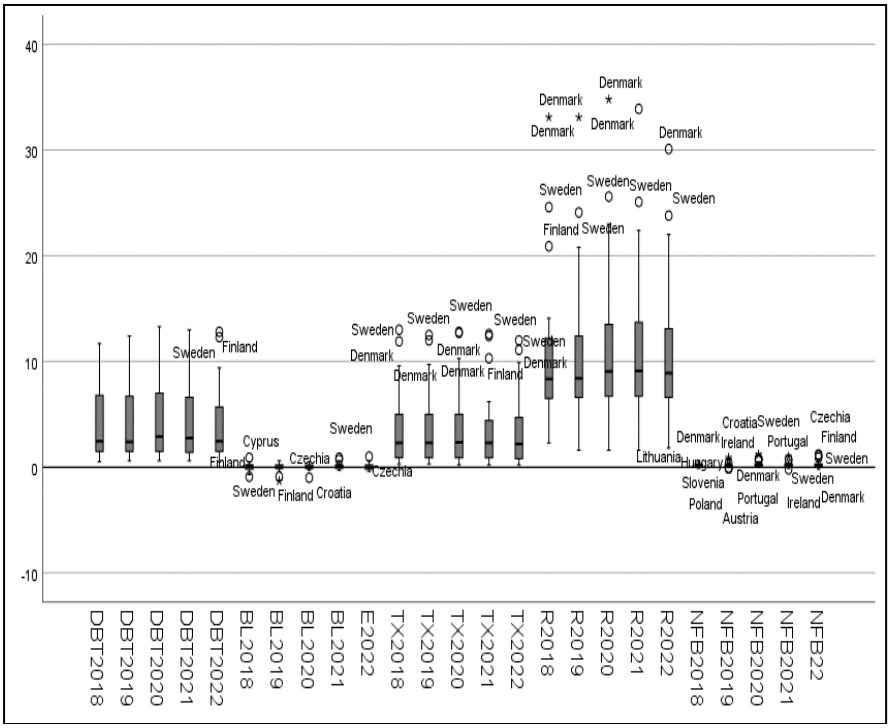

Figure 5
Boxplot analysis of variables under study based on: Eurostat[5]

4.1 Multivariate statistical methods

Among multivariate statistical methods, high-quality cluster analyses were successfully conducted for 2018, 2020, and 2022. The two-step cluster analysis was unsuccessful for 2019 and 2021; therefore, these results are not reported. The unsuccessful clustering attempts for 2019 and 2021 are attributable to methodological limitations. For both years, the TwoStep procedure generated cluster solutions with very low Silhouette statistics (–0.01 to 0.15), indicating insufficient cohesion and separation between clusters.

In 2019, the fiscal indicators demonstrated considerably lower dispersion compared to 2018 and 2020, reflecting a period of fiscal stability across EU Member States.

[5] y axis represents GDP %

This high degree of homogeneity prevented the emergence of meaningful cluster patterns.

In 2021, post-pandemic fiscal rebalancing generated temporary volatility, particularly in the tax-to-GDP and balance-to-GDP variables, leading to excessive within-cluster variance. Under these conditions, the Bayesian Information Criterion consistently indicated a one-cluster optimal solution, which is not meaningful for comparative typology.

Therefore, the TwoStep outputs for 2019 and 2021 did not provide empirically distinguishable, reproducible, or statistically robust cluster structures, and were consequently excluded from the analysis

We characterize 2018 as a 'calm before the storm', a period marked by stable economic growth and favorable prospects across the EU. The Silhouette score measuring the 2018 cluster analysis quality was 0.7, indicating well-formed clusters. The most influential variables are tax revenues as a percentage of GDP and total revenues as a percentage of GDP. The figure presents the results of a TwoStep Cluster Analysis. The model was built on five input variables (TX2018, R2018, DBT2018, BL2018, NFB2018), resulting in the identification of two distinct clusters. The silhouette measure of cohesion and separation indicates a moderate clustering quality, suggesting that the clusters are reasonably well separated, although not perfectly homogeneous.

In terms of predictor importance, TX2018 and R2018 emerged as the dominant variables, both carrying nearly maximum weight in driving the clustering solution. DBT2018 plays a moderate role, while BL2018 is of lower relevance, and NFB2018 contributes only marginally to the cluster differentiation.

The clusters were identified to be designated best according to their most influential variables. The data indicates that revenue as a percentage of GDP and tax revenue as a percentage of GDP are highest in the first cluster (Cl 1), while debt and net financial assets also significantly exceed the average. However, the budget balance is substantially below average in negative territory. Therefore, this cluster was designated as the above-average revenue group (Table 3). The second cluster falls below average values across all variables, with only the budget balance showing positive values, thus, this factor influenced the cluster designation (Cl 2).

Table 3
Descriptive statistics of cluster analysis for 2018 data

		DBT2018	BL2018	TX2018	R2018	NFB018
Member states with above-average revenue (Cl 1)	N	3	3	3	3	3
	Mean	10.1	-0.5	11.5	26.2	0.4
	Standard deviation	2.4	0.5	1.7	6.3	0.2
	Median	11.3	- 0.7	11.9	24.6	0.3
Countries with a positive balance (Cl 2)	N	24	24	24	24	24
	Mean	3.1	0.1	2.4	8.1	0.2
	Standard deviation	2.5	0.3	1.9	3.6	0.2
	Median	2.0	0.1	1.9	8.1	0.2
Total	N	27	27	27	27	27
	Mean	3.9	0.0	3.4	10.1	0.2
	Standard deviation	3.3	0.4	3.5	7.0	0.2
	Median	2.1	0.1	2.1	8.3	0.2

The cluster analysis results for 2020 data (show many similarities to the 2018 analysis results, with matching variable influence patterns and an identical Silhouette score (S=0.7). The figure presents the results of a TwoStep Cluster Analysis. According to the Model Summary, the model identified two distinct clusters, based on five predictor variables. The Cluster Quality indicator suggests a moderate level of model fit, indicating that the separation between clusters and the within-cluster homogeneity are acceptable but not strong.

The Predictor Importance bar chart displays the relative contribution of the predictor variables to the formation of clusters. The findings demonstrate that T2020 and BL2020 were the most influential variables in determining cluster membership,

In summary, the analysis highlights that indicators related to the year 2020 played a decisive role in shaping the cluster structure, whereas other factors exerted a comparatively weaker differentiating effect.

Data from the first cluster (Cl 1) demonstrates above-average values across all variables under analysis. Conversely, the second cluster (Cl 2) shows consistently below-average values across all variables. Cluster names were designated according to the two variables demonstrating the highest discriminatory power. A notable consistency between both cluster analyses is the stable composition of the 1st cluster across both years, including Finland, Denmark and Sweden (Table 4).

The resulting clusters were tested along two dimensions in relation to the 2020 cluster analysis, i.e., EU time of accession and municipal system model typology.

Table 4
Descriptive statistics of cluster analysis for 2020

		DBT2020	BL2020	TX2020	R2020	NFB2020
Countries with above-average government revenue (Cl 1)	N	3	3	3	3	3
	Mean	11.1	0.2	11.9	27.8	0.8
	Standard deviation	3.6	0.2	1.4	6.2	0.4
	Median	13.0	0.2	12.7	25.6	0.7
Countries with below-average government revenue (Cl 2)	N	24	24	24	24	24
	Mean	3.2	-0.0	2.3	8.5	0.2
	Standard deviation	2.6	0.3	1.9	4.1	0.2
	Median	2.2	-	1.8	8.8	0.2
Total	N	27	27	27	27	27
	Mean	4.1	0.0	3.4	10.7	0.3
	Standard deviation	3.7	0.3	3.6	7.5	0.3
	Median	2.6	-	2.2	9.0	0.2

Cross-tabulation analysis demonstrated a significant relationship between the time of EU accession and cluster membership. The analysis shows that all three countries with above-average revenue joined after 1973. Countries with below-average revenue are predominantly composed of founding Member States and those that joined post-2004 (Table 5).

Table 5
Cross-tabulation analysis of 2020 clusters and EU accession

Chi-square test	Value	df	Szig.
Pearson's chi-square	8.016	2	0.018
EU accession/Cluster 2020	Countries with above-average government revenue	Countries with below-average government revenue	Total
Founding Members	0	6	6
Countries that joined after 2004	0	13	13
Countries that joined between1973 and 2003	3	5	8
Total	3	24	27

Our analysis established with statistical significance that countries implementing the Nordic model maintain higher revenue levels, while those operating under alternative municipal systems demonstrate below-average revenues. Ireland represents the only exception among countries traditionally associated with the Nordic model, being categorized in the below-average revenue cluster (Table 6).

Table 6
Cross-tabulation analysis of 2020 clusters and municipal system models

Chi-square test	**Value**	**df**	**Szig.**
Pearson's chi-square	19.406	3	0.00
Systemic framework/cluster 2020	Countries with above-average government revenue	Countries with below-average government revenue	Total
Northern model	3	1	4
Rhine model	0	6	6
Mediterranean model	0	6	6
Transitional models	0	11	11
Total	3	24	27

The cluster analysis effectively established two well-differentiated and coherent clusters, validated by the Silhouette coefficient. The analysis identified NFB23 as the primary predictor with substantial influence on cluster formation, whereas TAX2022 demonstrated minimal variable importance. These analytical approaches facilitate the identification of key clustering determinants and the logical segmentation of data into distinct clusters.

Cluster 1 exhibits higher mean values across all variables under analysis, particularly in the R2022 and TX2022 categories, indicating members with more substantial financial activity and expenditure. Cluster 2 demonstrates lower mean values across all variables under analysis, notably in the B2022 and TX2022 categories, suggesting members with more limited financial activity and expenditure. The analysis identifies two distinct clusters: the Above-Average Revenue Cluster and the Below-Average Revenue Cluster (Table 7).

Table 7
Descriptive statistics of cluster analysis for 2022

Two-step cluster number		**R2022**	**BL2022**	**TX2022**	**NFB22**	**DBT2022**
Countries with above-average government revenue (Cl 1)	N	5	5	5	5	5
	Mean	20.4	0.4	8.8	0.9	6.9
	Standard deviation	7.4	0.5	3.2	0.3	5.5
	Median	22.0	0.4	9.9	0.9	6.1
Countries with below-average government revenue (Cl 2)	N	21.0	21.0	21.0	21.0	21.0
	Mean	8.0	0	2.1	0.1	3.1
	Standard deviation	3.4	0.2	1.7	0.2	2.3
	Median	8.7	- 0.1	1.4	0.1	2.2
Total	N	26.0	26.0	26.0	26.0	26.0
	Mean	10.4	0.0	3.3	0.3	3.9
	Standard deviation	6.5	0.3	3.4	0.4	3.4
	Median	8.9	-	2.2	0.2	2.5

Based on the Chi-square test results, there is a significant relationship between the different economic models (Northern, Rhine, Mediterranean, Transitional) and the difference in revenues of each country. Countries belonging to the Northern model generally demonstrate a larger role for local governments, while countries associated with the Rhine, Mediterranean, and Transitional models show a smaller one. These findings indicate that certain economic models may be more advantageous in terms of revenue generation and can provide valuable insights for developing economic strategies and policies (Table 8).

Table 8
Cross-tabulation analysis based on the 2022 cluster and systems framework

Chi-square test	**Value**	**df**	**Szig.**
Pearson's chi-square	10.441	3	0.015
Systemic framework/cluster 2020	**Countries with above-average government revenue**	**Countries with below-average government revenue**	**Total**
Northern model	3	1	4
Rhine model	1	5	6
Mediterranean model	1	5	6
Transitional models	0	10	10
Total	5	21	26

4.2 Comparative Analysis of Hungarian Municipal Financial Changes Against European Trends and Divergences

To thoroughly understand Hungarian municipal financial status, which showed significant divergence from the eurozone and other municipal finances of European Union Member States during the pandemic, it is essential to outline several fundamental relationships from previous decades. In the early 2000s, Hungarian municipal operations were characterized, beginning from the 1990s, by increasingly insufficient resources for service delivery, with this resource deficit intensifying particularly after 2006. Municipalities were compelled to secure undertakings with pecuniary interest, primarily through loans and the issuing of foreign currency bonds, to finance infrastructure development and other operational commitments. The resulting indebtedness presented a severe problem necessitating state consolidation intervention. Between 2011 and 2014, the government initiated a central debt consolidation program aiming to alleviate municipalities' bank-based financial burdens. The state assumed the entirety of municipal bank debt, thereby stabilizing local budgets, an illustrative example of soft budget constraints (state resolution of local government overspending). [21] However, state consolidation came with conditions, including introducing stricter financial oversight and restrictions on new borrowing [22]. Following debt consolidation, the government centralized several municipal public services, effectively withdrawing them from local government control [23]. This meant the transfer of numerous previously locally administered functions to the central administration or newly established territorially-based central management (government offices, district offices). Consequently, municipalities now perform fewer functions, reducing financial capacity and national economic significance. While financial consolidation and the process of function centralization somewhat alleviated their financial difficulties, it simultaneously diminished their economic autonomy [24].

Hungary introduced 'debt brake' regulations aimed at restricting local governments' borrowing capabilities to prevent future financial difficulties. These regulations stipulated that local governments could only take out loans with central government approval, provided the commitment does not exceed a certain threshold value. This ensured responsible financial management but simultaneously limited the flexibility of local governments, making it more difficult to respond quickly to local needs.

During the COVID-19 pandemic, the Hungarian government implemented numerous measures that significantly impacted the financial position and operational scope of local governments while simultaneously serving to mitigate the spread of the pandemic. Vehicle tax revenue was fully transferred to the central budget, and jurisdiction over the tax authority was also transferred to the national tax authority. This measure effectively eliminated the institution of shared central taxes, as the remaining items became marginal. Even in the decade before the pandemic, the government had withdrawn the 40 percent share of personal income tax that remained at the local level, considered shared public authority revenue and

had enhanced local governments' financial capacities and represented a significant item in the decades following the democratic transition. Act XC of 2020 made the complete withdrawal of vehicle tax permanent, leaving local governments entitled only to fines, surcharges, and enforcement revenues.

In 2021, the government reduced the local business tax for small and medium-sized enterprises to 1% in cases where municipalities had imposed a higher rate, effectively halving the maximum rate of 2% of net business revenue as stipulated by local tax legislation. Tax advances were also reduced by 50% for businesses that submitted declarations and requests to their municipalities. This measure was extended into 2022.

Additional measures included the suspension of tourist tax payments to municipalities until 31 December 2020, which was subsequently extended to 30 June 2021. Municipalities did not receive central government compensation for these uncollected taxes. Until the end of 2021, other municipal administrative fees were frozen, and municipalities were prohibited from increasing service charges or introducing new fees.

Following the outbreak of the pandemic, the legislative process accelerated, and centralization within the Hungarian public finance system intensified further. Special economic zones were established. The government removed businesses located in the administrative territories of certain well-industrialized municipalities from municipal taxation and tax administration jurisdiction. Specifically, prosperous industrial and commercial enterprises were transferred from municipal tax authority to state tax administration. Essentially, the government redirected the industrial areas with more heavily industrialized municipalities and the local tax obligations of businesses operating within them from municipal to central budget authority. Municipal fiscal autonomy was further reduced due to the fixing of itemized taxes, adversely affecting operational independence and the quality of public services at hand.

The government justified these measures by noting that municipalities must own a share in crisis management responsibilities. These measures significantly diminished municipal financial capacities, whose inadequacy makes it difficult to generate local development funds, with such funding often dependent on individual government decisions. These factors led to the erosion of municipal fiscal autonomy and the quality of public services. The reduction in economic capacity automatically triggers a weakening of municipal autonomy. Several researchers indicated this as their main critique of the emerging new municipal system.[25] It is crucial to note that the government provides substantial state subsidies to establish international companies within municipal territories, and the benefits municipalities have enjoyed, though increasingly less so, through local business tax collected based on corporate net revenue. Thus, the government not only took over (attracted) companies to municipalities through high state subsidies but also secured a permanent local business tax revenue for these settlements. The reallocation of these

local business taxes for central crisis management purposes nuances the allegedly 'unfair' nature of the government's resource withdrawal policy to a certain degree.

Financial discipline is further reinforced by municipalities' inability to secure additional funding from credit markets, as borrowing is prevented by debt-brake regulations and the inherently low level of development opportunities. These factors are clear indications of the marked decline in national municipal economic significance and financial capacity, particularly since the pandemic. It should be emphasized, however, that the Hungarian municipal system functioned effectively during periods of economic prosperity, having undergone financial consolidation and the transfer of institutional maintenance responsibilities to the state. Nevertheless, crises, municipal fiscal autonomy has decreased substantially, and current economic conditions exhibit signs of crisis (low growth, critical inflation, weak forint exchange rate). Over the past decade and a half, Hungarian municipalities that had accumulated debt until 2010 were financially consolidated by the central budget, and a significant portion of their public service responsibilities was also transferred away. Until the end of the 2010s, the system remained operational under restricted municipal autonomy, stringent state oversight, and debt-brake regulations. However, financial capacities significantly shrunk due to additional government resource withdrawal measures implemented during the COVID-19 period.

While EU countries uniformly faced similar challenges during the pandemic, the situation of Hungarian local governments was particularly distinct due to centralization, state-imposed financial restrictions, and indeed, the withdrawal of central resources. The reduction in local economic autonomy resulted in municipalities having fewer resources and less flexibility to manage the crisis, a situation that appears to be becoming permanent even after 2022. Contrary to the European practice of government support expansion discussed in the literature review [11][12], the opposite was implemented in Hungary. Specifically, during the pandemic, the central government withdrew resources and tax revenue opportunities from local governments, and although the majority of pandemic crisis management was funded by the central budget, the response was essentially managed centrally. As a combined effect of these measures, the financial position of Hungarian local governments weakened. Their economic autonomy decreased, making it more difficult to provide quality public services, even though these services are more modest in scope than before 2010, before comprehensive public finance reforms. Thus, in Hungary, there is an ongoing process of withdrawal of resources, tasks, and competencies, which was only exacerbated by the COVID-19 pandemic response policy. The centralization of tasks, borrowing restrictions, and revenue withdrawals due to COVID-19 have further diminished local governments' future financial and public service delivery capacities. Overall, however, it can be concluded that while the extractive central government policy is not necessarily harmful, appropriate proportions, taxation powers, and financing allocation will

need to be established following the recovery of the world economy and, within it, the Hungarian economy.

5 Conclusions

This study demonstrates that while the average municipal debt-to-GDP ratio temporarily increased across the EU, this rise in debt levels was neither sustained nor substantial. Debt increases did not reach critical levels in EU municipal subsystems due to the two years of crisis. Fiscal discipline is present in municipal subsystems across EU Member States regarding budget balance trends, as despite fiscal latitude, no widespread deficit emergence occurred. This may, however, be attributed to the implementation of restrictive budgetary regulations in many countries.

One symptom of crisis periods is a decline in tax revenues, as a percentage of GDP. EU economic performance decreased significantly in 2020 in particular, due to lockdowns and forced production shutdowns. In contrast, the revenue-to-GDP ratio, even accounting for the evident GDP volume reduction, actually increased during the pandemic years compared to preceding years. This can be attributed both to the base effect and to central budget transfers compensating for lost local revenues.

Multivariate analysis confirmed that no significant restructuring occurred in the local government subsystems of the EU, including the Eurozone, with budget figures not differing substantially from the pre-pandemic period. In this respect, the Northern group of countries with strong local governments (Finland, Sweden, Denmark) is clearly distinguishable, as the role of local governments is most significant there, evident in both their financial capacities and service delivery. To summarize the EU component of the research, it can be concluded that EU local government subsystems were able to weather the pandemic crisis period without significant deterioration to their fiscal positions.

In contrast, in Hungary, where financial capacities (revenues, local taxes, debt) were already more limited, the local government subsystem recorded a decline in several indicators, including revenues and tax revenues, fitting into the systematic regression of the domestic local government system, due to government resource-withdrawal measures manifested during the crisis as well. As a positive aspect, however, the budget balance remained positive, no wave of indebtedness similar to that observed following the 2007-2008 subprime crisis emerged, and the net financial assets of local governments also remained positive. Our interpretation of the Hungarian case is grounded primarily in the observed fiscal trends; however, we acknowledge that a more detailed pre- and post-pandemic comparison could further reinforce the argument. Nevertheless, the empirical patterns presented in this study – notably the decline in revenue-to-GDP and tax-to-GDP ratios, combined

with the stagnation of municipal debt levels – clearly reflect a contraction in local fiscal capacity.

The pre-pandemic years (2018–2019) show a stable path of revenue growth and fiscal strength, whereas (2020–2022) illustrate revenue and tax base deterioration. This development, together with central government revenue withdrawals and borrowing restrictions, reduced local autonomy and created a structural break compared with pre-crisis conditions. Although the length of the observable post-pandemic period is limited, the divergence from EU-wide tendencies – particularly the decline in fiscal revenue indicators while most EU countries experienced stability or improvement – provides sufficient empirical basis to support the argument that the crisis period led to persistent fiscal regression in Hungary

Based on the study's conclusions, it can be established that the pandemic did not cause significant and sustained debt increase in EU municipal subsystems. The maintenance of budgetary discipline and compliance with fiscal rules contributed to preserving financial stability. Despite declining tax revenues, transfers from central budgets ensured municipal operations continued. The analysis indicates that, Nordic municipal systems (Finland, Sweden, Denmark) demonstrated superior financial performance during crisis periods, while countries adhering to the Rhine, Mediterranean and Intermediate models showed relatively weaker economic performance.

However, there is a significant deviation in the case of Hungary, where a decline in revenues and tax revenues was observed during the pandemic, indicating further regression and diminishing national economic significance of the Hungarian local government system. This is a Hungary-specific phenomenon, whereby, contrary to general trends in EU member states, the Hungarian government implemented resource restrictions and even revenue withdrawal instead of resource expansion during the pandemic crisis. Public tasks performed at the municipal level are thus increasingly being removed from the jurisdiction of local governments, placing enormous responsibility on central government. Empirical findings are consistent with existing studies showing that municipal fiscal systems within EU Member States largely preserved stability during the COVID-19 period, supported by temporary fiscal expansion and central government transfers that cushioned revenue shocks (Ahrens & Ferry, 2020; Permanasari et al., 2022). Our results also confirm the widely documented strength of the Nordic municipal model, where local autonomy and a strong revenue base, provide greater resilience to fiscal shocks [13].

The Hungarian results, however, diverge from these European patterns. The observed contraction in local revenue ratios and decreasing fiscal autonomy align with previous research stating that ongoing centralisation and borrowing restrictions had already weakened the Hungarian municipal system before the pandemic (Vasvári, 2020; Bouhlel, 2021). This stands in contrast with many EU Member States, where central transfers expanded during the crisis, making the Hungarian trajectory comparatively unique.

This study has several limitations:

- The short time period and limited post-pandemic data availability constrain long-term evaluation
- The GDP-based fiscal indicators are sensitive to macroeconomic shocks and do not include service-quality or welfare-based metrics.
- The clustering procedure did not produce robust outcomes for 2019 and 2021 due to insufficient variable differentiation, limiting temporal comparability.

Future research could incorporate a longer time series, additional variables (such as expenditure composition and human-service indicators) and extend the model towards panel regression techniques to identify causal fiscal mechanisms. Further qualitative municipal case studies may also improve understanding of how institutional autonomy and economic structure shaped local fiscal responses to the pandemic.

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References

[1] Heimberger, P. (2023). This time truly is different: The cyclical behaviour of fiscal policy during the COVID-19 crisis. *Journal of Macroeconomics, 76*, 103522. https://doi.org/10.1016/j.jmacro.2023.103522

[2] Olaoye, O. (2023). Mitigating the impact of a pandemic: A time-varying-parameter structural VAR (TVP-SVAR) and time-varying Granger causality estimations. *African Journal of Economic and Management Studies, 15*(1), 104-131. https://doi.org/10.1108/ajems-05-2023-0179

[3] Canelli, R., Fontana, G., Realfonzo, R., & Passarella, M. (2021). Are EU policies effective to tackle the COVID-19 crisis? The case of Italy. *Review of Political Economy, 33*(3), 432-461. https://doi.org/10.1080/09538259.2021.1876477

[4] Milovanović, G., Radisavljević, G., & Milanović, S. (2022). Changes in fiscal deficit and public debt of the Republic of Serbia during the COVID-19 pandemic period. *Facta Universitatis Series Economics and Organization, 213*. https://doi.org/10.22190/fueo220203016m

[5] Stawska, J., & Miszczyńska, K. (2022). The impact of monetary and fiscal policy variables on the EU economic growth: Panel data analysis. *Journal of Entrepreneurship and Sustainability Issues, 9*(4), 380-395. https://doi.org/10.9770/jesi2022.9.4(20)

[6] Abakah, E., Caporale, G., & Gil-Alana, L. (2023). The impact of containment measures and monetary and fiscal responses on US financial markets during the COVID-19 pandemic. *Heliyon, 9*(5), e15422. https://doi.org/10.1016/j.heliyon.2023.e15422

[7] Zhang, D. (2021). Fiscal policy benefits and green recovery of firms: An experimental exploration of Chinese listed firms in post-COVID-19. *Economic Change and Restructuring, 56*(5), 2921-2942. https://doi.org/10.1007/s10644-021-09344-6

[8] Fabbrini, F. (2021). The legal architecture of the economic responses to COVID-19: EMU beyond the pandemic. *JCMS Journal of Common Market Studies, 60*(1), 186-203. https://doi.org/10.1111/jcms.13271

[9] Porte, C., & Jensen, M. (2021). The Next Generation EU: An analysis of the dimensions of conflict behind the deal. *Social Policy and Administration, 55*(2), 388-402. https://doi.org/10.1111/spol.12709

[10] Jong, M., & Ho, A. (2020). Emerging fiscal health and governance concerns resulting from COVID-19 challenges. *Journal of Public Budgeting Accounting & Financial Management, 33*(1), 1-11. https://doi.org/10.1108/jpbafm-07-2020-0137

[11] Permanasari, V., Nadjib, M., Sjaaf, A., Besral, B., & Anjani, A. (2022). The response of local governments in financing related to the COVID-19 pandemic: A literature review. *Journal of Public Health Research, 11*(2), jphr.2021.2620. https://doi.org/10.4081/jphr.2021.2620

[12] Ahrens, T., & Ferry, L. (2020). Financial resilience of English local government in the aftermath of COVID-19. *Journal of Public Budgeting Accounting & Financial Management, 32*(5), 813-823. https://doi.org/10.1108/jpbafm-07-2020-0098

[13] Patrzałek, D., & Gałecka, M. (2022). The impact of the COVID-19 pandemic on subnational finance: Polish experience. *Studies in Logic Grammar and Rhetoric, 67*(1), 499-516. https://doi.org/10.2478/slgr-2022-0025

[14] Perez, V., Benitez, J., & Ross, J. (2021). Too small to fail: The role of Medicaid in mitigating pandemic-related fiscal strain on local governments. *Public Budgeting & Finance, 41*(3), 74-97. https://doi.org/10.1111/pbaf.12298

[15] Šoltés, V., Stofkova, Z., & Durica, J. (2021). Impact of the global COVID-19 pandemic on the use of local government funds. *SHS Web of Conferences, 129*, 01028. https://doi.org/10.1051/shsconf/20211290102

[16] Kong, W. (2023). Research on the influence of local government debt on enterprise debt financing. *Frontiers in Business Economics and Management, 7*(2), 65-70. https://doi.org/10.54097/fbem.v7i2.4792

[17] Bouhlel, S. (2021). *Role of Hungarian Local Governance in Responding to COVID-19 Crisis*. Institutes Administrationis, 1(1), 104-113. https://doi.org/10.54201/iajas.v1i1.12

[18] Fekete, K., Dombi, G., & Oláh, M. (2021). Önkormányzati válságkezelés a Balaton Kiemelt Üdülőkörzetben, a COVID-19-járvány első hullámában. *Területi Statisztika*, 61(3), 337–355. https://doi.org/10.15196/TS610304

[19] Baranyai, N., Barsi, B., Finta, I., Kovács, K., & Pálné Kovács, I. (2021). Önkormányzati szerepvállalás, mozgástér és reziliencia a COVID-19 járvány során. (Local government engagement, room for maneuver and resilience during the COVID-19 pandemic) KRTK Regionális Kutatások Intézete.

[20] Lentner, C., & Hegedűs, S. (2022). The Development History and Economic Characteristics of the Hungarian Local Tax System from the Change of the Regime until the Pandemic. *International Journal of Administrative Science*, 2(2), https://dx.doi.org/10.54201/iajas.v2i2.53

[21] Vasvári, T. (2018). Bailout of local governments in Hungary: short- and long-term effects. Conference Paper. https://www.researchgate.net/publication/323416100_Bailout_of_local_governments_in_Hungary_short-_and_long-term_effects

[22] Vasvári, T. (2020). Hardening the budget constraint: Institutional reform in the financial management of Hungarian local governments. Acta Oeconomica, 70(4), 571–592. https://doi.org/10.1556/032.2020.00037

[23] Pocsai, E & Vasvári, T.,. (2024). Kontrollok az önkormányzati hitelezésben – az elmúlt évtized tanulságai. Közgazdasági Szemle. https://doi.org/10.18414/KSZ.2024.9.881

[24] Kornai, J., Maskin, E., Gérard, R. (2022). A puha költségvetési korlát I-II. Közgazdasági Szemle, 69 : 1 pp. 94-132.

[25] Hegedűs Sz.., & Lentner, C. (2020). Comparative analysis of budgetary indicators of European municipal subsystems in the post-crisis term between 2009–2018. Pénzügyi Szemle/Public Finance Quarterly (1963-), 65(1), 112–133.