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# The issue of sustainability in a highly centrally regulated fiscal model of local governments: an empirical study

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## Abstract

**Purpose** – This study aims to assess the sustainability of local governments in a highly centrally regulated fiscal model.

**Design/methodology/approach** – This paper uses a novel approach, a broad data set of almost 3,200 local governments and network methods. This paper analyses financial data from annual reports and other socio-economic sources using cluster analysis.

**Findings** – Even in this model, local governments show significant differences in terms of long-term sustainability. Investments do not compensate for the depreciation of tangible assets at a significant part of local governments. A specific type of soft budget constraint can be noticed. Heads of local governments do not “play” for subsequent *ad hoc* bailouts by the central government, but rather engage themselves in political competition for development subsidies. A further finding of this study is that shrinking populations itself does not explain the differences in local governments’ financial management.

**Research limitations/implications** – Further directions of research include the application of an extended approach to sustainability that gives an account of the availability and quality of local services, as well as aims to identify the qualitative social characteristics (success criteria) of the local government financial management.

**Practical implications** – The findings can be useful for policymakers, state audit offices, auditors, voters, users of public services and other stakeholders.

**Social implications** – The paper argues in favour of moving away from the financial balance in its narrow sense to a long-term and broader term of financial sustainability.

**Originality/value** – The findings provide new empirical evidence about the accounting-based measurement of financial sustainability in local governments.

**Keywords** Local government, Public accounting, Fiscal balance, Soft budget constraint, Shrinking population

**Paper type** Research paper



## Introduction

After the 2008 economic crisis, financial sustainability (Banai and Kolozsi, 2018), and essentially indebtedness and liquidity (Kolozsi and Horváth, 2020) became a vital issue of the public sector management not only at the central level but also on the level of subnational governments. In general central governments responded to the recession with austerity, local government system and local government responses were varied (Kim and Warner, 2020).

The concept of local fiscal sustainability is based on two separate approaches: financial sustainability in its narrow sense (fiscal balance, avoidance of bankruptcy at the local government) and maintenance of programme-like (basically service-based) commitments (Dadayan, 2009). Some authors (Coronado, 2009) subdivide financial sustainability into fiscal sustainability (the ability to generate sufficient resources) and debt sustainability (meaning that the level of indebtedness does not create solvency problems).

One approach to long-term sustainability is to take trend indicators excluding short-term cyclical effects into account for both the revenues and the expenditures of the local government. The other important issue concerning long-term effects is resilience to various external shocks. Resilience to shocks is significantly influenced by the local government's revenue/expenditure structure, the flexibility of this structure and the level of financial reserves.

The target of debt sustainability can generally be interpreted as the objective of asset retention, where keeping and increasing assets come into focus. Such an approach helps to understand the effects of longer-term socio-economic and other fundamental factors on sustainability (Zhao and Coyne, 2013). A great example of an extended approach is that of the National Audit Office (NAO) in the UK. Besides financial sustainability, NAO examines how and on what quality level local governments fulfil their statutory duties and how financial sustainability objectives affect the sustainability of local services (NAO, National Audit Office, 2018). Another long-term aspect of public services is the issue of intergenerational transfers (WCED [Brundtland Commission], 1987; IFAC, 2014).

The 2008 financial crisis and the ensuing crisis management have reinforced the concept of rule-based budgeting which increasingly gained ground in the subnational government level as well. This was often complemented by strengthening the tools of central administrative control. The third element of the response given to the crisis was that the duties and finances of local governments have partly been centralised, hence local governments' fiscal space was narrowed down.

In this study, we examine a highly centrally regulated fiscal model of local governments. This model is characterized by a narrow economic autonomy over own revenues and expenditures, a central financing system that is shifting towards task-based resource allocation, and by rule-based budgeting and limited borrowing. The tasks of the local government sector are, to a large extent, centrally defined. Our research questions were the following:

- Q1. In a highly regulated local government system, can sustainability issues arise at a sector level, and if so, in what form?
- Q2. One of the essential theories in the literature regarding centralisation is the soft budget constraint concept. Does stronger centralisation aggravate the problem of a soft budget constraint?

- 
- Q3. Even if such a system ensures the financial sustainability of the sector, can we distinguish groups of local governments with different characteristics within the sector?
- Q4. A shrinking population is a feature of many settlements in Hungary and in other countries. We also wanted to examine the differences in the financial management of these settlements

The empirical part of our study is based on the accounting and socio-economic data of the Hungarian local government system characterised by the above-described model. Only a few study analyses high granularity of local government data, or their geographical distributions (Bulai *et al.*, 2020; Akram and Rath, 2020).

In terms of methodology, we apply a novel technique in the field of research into local governments: network theory. The development of the network theory conceptually changed the method of modelling the behaviour of interacting nodes. In addition to statistical and econometric problems, the problems of grouping, quantification of similarities and analysis of group stability appeared. As part of our research, we investigated the network of Hungarian settlements by using cluster analysis. We have compared the different settlements through the correlation of their metrics, and then we created categories of similar local governments with the use of a normalised modularity matrix. The study approach was intended to expand the literature.

This study is structured in the following way: after a literature review, we describe our methodology. This is followed by the descriptive statistics of Hungarian local governments and the presentation of the results of our cluster analysis. The study is concluded by a summary of the results.

## Literature review

### *Local government models changed in response to the economic crisis*

The crisis also meant an opportunity to launch major reforms. In practice, however, experience in this area is somewhat mixed (Randma-Liiv and Kickert, 2017). This section presents the main directions of long-term changes in the operative model of local governments, instead of temporary crisis management tools.

As already mentioned in the introduction, the most common response to the crisis was to reinforce the concept of rule-based budgeting. Besides numerical fiscal rules, regulations on the fiscal procedures and accounting methodology have been reinforced. The transparency has been increased as well because of more stringent data reporting obligations to the central government. Many countries took similar measures. Without intending to be all-inclusive, we can say that many European countries have introduced changes in accounting rules for local governments (e.g. Belgium, Denmark, France, Romania and the UK switched to accrual-based accounting), adopted the “golden rule” (e.g. Poland) or reinforced central control over local financial processes (Slovenia, the UK).

The other type of instrument was administrative regulations on borrowing and the introduction of central authorisation for it. Several countries had applied this instrument already before the 2008 crisis to prevent excessive indebtedness of local governments. In the majority of cases, it meant that borrowing was subject to authorisation of a central body and included reporting obligations (Sutherland *et al.*, 2005). After the crisis, many countries have reinforced this instrument.

The third element of the response given to the crisis was centralisation of local governments’ duties and finances, and narrowing down their leeway. As part of this, central state intervention in duties with local implications has been strengthened. In terms of

centralisation, one of the most robust responses to the crisis was given by Hungary and Ireland. Other countries (Italy, the Netherlands, Norway) have also introduced similar measures, albeit with a more limited scope (for example, in the area of policing and health care only; [Curry et al., 2014](#)).

*Does stronger centralisation aggravate the problem of a soft budget constraint?*

Stronger central decision-making and control in the financing and fiscal matters of local governments, and narrowing down local governments' playing field weakens the responsibility and accountability of local decision-makers and strengthens paternalism. These may exacerbate the soft budget constraint syndrome well-known from literature ([Kornai et al., 2003](#)). Theoretically, if a local government system moves into this direction, the risk of local fiscal sustainability is increased.

According to the soft budget constraint theory, local governments in a difficult financial situation can count on the help of the central budget, which is integrated into the expectations of local decision-makers. Local government leaders are basically always interested in alleviating the burdens of the settlement's current population ([Vasvári, 2019](#)). However, the motivation of the aid organisation (central budget) is more complex: it can also be motivated by fear of reputational and economic and political spillover effects ([Kornai et al., 2003](#)). That is why Kornai and other authors ([Beck and Stone, 2017](#)) argue for the need for market discipline in the case of local governments as well. The situation when local governments cannot credibly count on the help of the central government is called hard budget constraint (Kornai) or "credible no-bailout regime" ([Jenkner and Lu, 2014](#)) in the literature. At the same time, [Wildasin \(1997\)](#) has pointed out that soft budget constraints are size-dependent as well. Small local governments have harder budget constraints.

As a consequence of a soft budget constraint, some of the local governments need to be bailed out by the central budget from time to time, and, for that purpose, various procedures – institutionalised (special financial fund) or less institutionalised (background political bargaining processes) ones – are established.

The following tools can be used to manage the phenomenon of soft budgeting: the abolishment of government instruments of softening (such as soft taxation, *ad hoc* subsidies, soft bank credits, allowing supplier credits above a certain level) and the reduction of expectations for a bailout and the reinforcement of market discipline ([Heidi et al., 2019](#)). Based on practical experience, relying solely on market discipline, which is attractive in theory, would fail in many cases to produce satisfactory results in this area of public finances ([Ter-Minassian and Craig, 1997](#)).

Besides the soft budgeting problem, political competition at the local level is a key predictor of the debt of local governments ([Chatterjee et al., 2019](#)).

In the past decades, two practical solutions emerged. One is applying a system of conditional bailouts, which has positive long-term fiscal effects, based on Dutch and Swedish experience ([Allers, 2014](#); [Dietrichson and Ellegård, 2012](#)). The other is the introduction of fiscal rules necessary to restrict local governments' financial management (numerical targets, procedural and transparency rules). Out of these, the so-called "golden rule" and rules on borrowing are described below in more detail.

*Literature on the "golden rule" and the regulation of borrowing*

According to the so-called "golden rule", local governments can plan budgets in which only investment expenditures can cause budget deficit (borrowing), they are not allowed to take loans to finance current expenditures ([Vigvári, 2010](#)). In general, the central supervision of a local government sector that has a huge amount of actors cannot be fully exercised based on

detailed analyses done at the level of individual local governments, and therefore, from a practical point of view, simple fiscal rules play a very crucial role.

However, the “golden rule” approach is not restrictive enough in some cases. It allows investments that do not have sufficient economic and social returns. Also, the local government can bend the rule by indicating some items of operating expenses as investments. The golden rule does not limit the allowable amount of borrowing, and therefore, usually, separate rules are applied for the indebtedness (Dafflon, 2010).

In addition to the approach based on the market discipline, there are three other models for regulating borrowing. There are three other approaches: cooperative, rule-based and administrative control. The cooperative control approach is the closest to the market disciplinary power. According to this approach, the limits on subnational governments’ borrowing are not determined by law or central power, but through a negotiation process between the central and lower levels of government. In a rule-based model, local governments’ borrowing is limited by control rules: the maximum loan amount to be borrowed is determined based on a benchmark (e.g. debt servicing capacity), or borrowing can only serve a specific loan purpose (typically investment). The third approach is direct administrative control of borrowing by the central government. An extreme case of this type of control is when local borrowing is prohibited (for example, in many of the former Commonwealth of Independent States countries). In practice, the three models are often mixed up: rules on local government borrowing in a given country use elements from various models (Ter-Minassian and Craig, 1997).

#### *Narrowly interpreted financial sustainability indicators*

The “golden rule” takes the operating balance as the key indicator. Central governments, audit bodies and also financial institutions generally apply several indicators or a system of indicators to define financial sustainability. Scorecard systems for local governments contain key financial and asset indicators. In this approach, sustainability/risk indicators are traced back to certain types of risks that are specific to local governments. One possible categorisation of risk types and key indicators is as follows (Györfy *et al.*, 2009; Hegedűs, 2016):

- operating;
- resource structure (revenue capacity);
- asset composition;
- indebtedness; and
- liquidity.

When evaluating the indicators, analysts can usually define long-term trends (the average of several years) as well. Because of comparisons between local governments of different sizes, relative indicators are preferred, and one type of them is the value per inhabitant.

Most of the studies to categorise local government systems are all based on pre-crisis data and do not take into account post-crisis measures. Hungarian local government system has changed significantly after the crises. Hungary now stands closer to Southern European ones (Vasvári, 2020). That is the reason why we summarised studies on micro-data of Italian and Spanish local governments (Table 1).

Looking at the summary of the empirical literature, we could see that both our research questions and our methodology are novel.

**Table 1.**  
Summary of  
empirical studies  
concerning  
sustainability in Italy  
and Spain

Study	Research objective	Local government micro-data	Dependent variables of sustainability	Explanatory variables of sustainability	Methodology
<a href="#">Bolívar <i>et al.</i> (2014)</a>	To identify the main economic and social factors that may influence the financial sustainability of local governments.	Spanish local governments with a population of over 50,000 inhabitants (110 local governments) from the period of 2008–2011	Adjusted income, net debt per capita	11 indicators for local finances and demography	Pooled ordinary least squares (OLS) regression model and panel data
<a href="#">Navarro-Galera <i>et al.</i> (2016)</a>	To identify influential factors of the local government income statement.	Spanish local governments with a population of over 50,000 inhabitants (130 local governments) from the period of 2006–2011	Indicators for adjusted income	Debt, revenues and services	Generalised method of moment (dynamic panel data)
<a href="#">Bisogno <i>et al.</i> (2018)</a>	To investigate budgetary solvency of local governments	Italian local governments with a population of over 50,000 inhabitants (132 local governments) from the period of 2005–2014	Budgetary solvency indicator	Financial autonomy, current equilibrium, indebtedness, investment, population density, unemployment, GDP	Panel regression
<a href="#">Brusca <i>et al.</i> (2015)</a>	To analyse the influence of socio-economic, political and financial factors on the financial condition of local governments	Italian and Spanish local governments with more than 60,000 inhabitants (102 Italian and 123 Spanish), based on data from 2011 to 2012	Long-term financial situation and financial situation indicators	Size, socio-economic, political and financial factors	Multiple linear regressions

## Methodology

We examined our research questions empirically by using a Hungarian local government database. The indicators can be found in Annex 1. The source of local governments' financial data (annual reports) is the Hungarian State Treasury, whereas the rest of the data comes from the Hungarian Central Statistical Office.

Until 2013, Hungary applied the modified cash-flow approach to the accounting of public finances. However, from 2014, fundamental changes have been made in public sector accounting: the accrual-based accounting system was introduced. Accordingly, the annual financial statements of local governments have changed fundamentally.

By 2014, the debt consolidation and regulatory reform of the Hungarian local government sector (described in the next chapter) created a completely new situation for the sector. Therefore, for the sake of comparability in terms of accounting and because of the structural changes in the sector, our timeline starts in 2014.

Our methodology is based on descriptive statistical analysis and cluster analysis.

To find patterns that exist between individual local governments, the data have been cleaned. Based on the dispersion of the indicators, we have maximized the values of each indicator to eliminate potential data errors and to avoid distortion of outliers.

$$M = median + 5(3rd\ quartile - 1st\ quartile) \quad (1)$$

The values were then centred with the median and then normalised with the maximum value

The similarity between settlements was captured by the correlation ( $|C|$ ) of scaled metrics. In line with the literature (Bolla, 2013), we used eigenvectors corresponding to the largest eigenvalues (in absolute value) of the normalised modularity matrix ( $M^D$ ) to separate cliques in dense graphs.

$$M^D = (d \cdot I)^{-\frac{1}{2}} (|C| - dd^T) (d \cdot I)^{-\frac{1}{2}} \quad (2)$$

where  $d$  denotes the vector of the row sums of the correlation matrix and  $I$  denotes the  $n \times n$  identity (or unit) matrix.

## Descriptive statistics

Hungary is a medium-sized European country, yet it has a large number of local governments (3,197). The Hungarian local government system consists of 19 counties, 23 cities with county rights, 322 cities, 128 large villages and 2,681 small villages. The average size of the Hungarian local governments is relatively small. At the time of the democratic transformation, the local government sector was significantly decentralized. Local governments, regardless of their size, were given considerable autonomy and delegated powers. Local government spending amounted to 13% of the gross domestic product (GDP), which is considered to be the European Union (EU) average. In principle, local governments in Hungary enjoyed considerable financial freedom. The Act on Debt Consolidation of Local Governments stipulated that in the event of insolvency, there is no state bailout. At the same time, local governments in a disadvantaged position could receive additional state subsidies if they were in financial trouble because of reasons beyond their control. This is considered to be one of the remaining elements of the soft budget constraint (Vigvári, 2010; Bethlendi and Lentner, 2018).



According to [Rodden \(2002\)](#), large and persistent deficits are most likely to occur when subnational governments are simultaneously dependent on intergovernmental transfers and are free to borrow. The Hungarian system was exactly like that. The reasons for the indebtedness of the Hungarian local government sector in the 2000s (mainly in foreign currency) and the subsequent steps of debt consolidation are described, for example in [Bethlendi and Lentner \(2018\)](#).

Parallel to debt consolidation, the central government significantly changed the tasks and the fiscal model of local governments. The reform declared that local governments have to deal with local issues and services only, and all other non-related matters are to be put under the supervision of the central government. Some public service tasks formerly performed by local governments became the responsibility of government offices ([Vasvári, 2019](#)). A significant part of tasks related to education (primary and secondary) and health care (in-patient and specialist care institutions) has been transferred to the central government.

As a result of the above, the total expenditure of the local government sector as a percentage of GDP decreased by about one third (from 12% to 8%).

In addition to the above passive and active regulatory elements on the area of borrowing were introduced:

- a local government is allowed to incur new debt only with the prior approval of the central government;
- it is not allowed to borrow unless it has introduced local taxes on its territory; and
- A local government's debt service burden cannot exceed 50% of its own revenue in any year.

Moreover, planning of the operating deficit was prohibited. These measures were intended to prevent the sector from becoming heavily indebted again.

We present descriptive statistics of the Hungarian local government sector for the 2014–2017 period in Annex 1. On the whole, we conclude that the situation of local governments has improved during this period. The sector as a whole – according to the median value, for example – is maintaining sustainable financial management. Favourable external conditions, such as dynamic economic growth and a positive budgetary situation of the country, played a significant role in this. However, if we analyse the quartiles, we would see that the model cannot homogeneously ensure financial sustainability. While, in conformity with the legislative purpose, most local governments' operating profit turned into positive, the total profit is negative for more than a quarter of local governments. In terms of long-term sustainability, quite problematic is the fact that investments do not compensate for the depreciation of tangible assets in almost half of the local governments.

Because of the above, in our cluster analysis, we look into the relative changes, and the situations and changes of local governments relative to each other. With this approach, we can also control the favourable economic cycle. At the same time, for many indicators, we have already seen significant differences between the lower and upper quartiles, indicating the heterogeneity of the sector.

## Results

The correlation matrix of the scaled indicators (presented above in the section about the methodology) differs from the original data correlation matrix by 1% on average, with a deviation of 13%. In line with our intuition, the correlations of metrics capturing similar phenomena are high. Therefore, out of the initial 37 indicators, 22 representants were considered for cluster analysis.

Based on the largest eigenvalues (in absolute value) of the normalised modularity matrix calculated from 2014 data, five clusters were established. The spectra of 2015, 2016 and 2017 show that the network is slightly changed, one of the clusters decreased considerably. The clusters of each year were identified through the maximum cross-sectional permutation of the clusters of 2014, which is the base year of the analysis, therefore, the results have become comparable. The number of local governments in clusters is stable, with the exception of Cluster 1 (Figure 1).

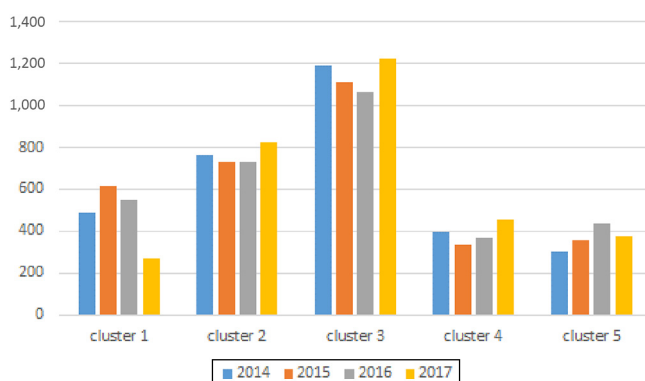
The characteristics of the five clusters obtained are evaluated based on relative indicators, meaning that the median value of the given cluster is compared with the median value of the whole statistical population. The difference is measured on a five-degree scale: very weak/very low (1), weak/low (2), medium (3), good/high (4), very good/very high (5) [1]. As for the indicators with similar economic content, we took the arithmetic mean of them. Therefore, our examination was based on 14 criteria. After evaluating the characteristics of the 2014 clusters, we compared them with those of the 2017 clusters to see if there was any significant change.

The large settlements can be found primarily in the first and third clusters. The second cluster includes only very small settlements. In Clusters 4 and 5, there are some large settlements as well besides small ones that dominate these clusters.

We examined the geographical location of the clusters. We divided Hungary into nine regions using longitudes and latitudes. The area between latitudes 46.5° and 47.5° was considered as the centre, and settlements to the north and south from this were considered northern and southern settlements. Similarly, we made an east–west division as well, with the area between longitudes of 19° and 20° as the centre.

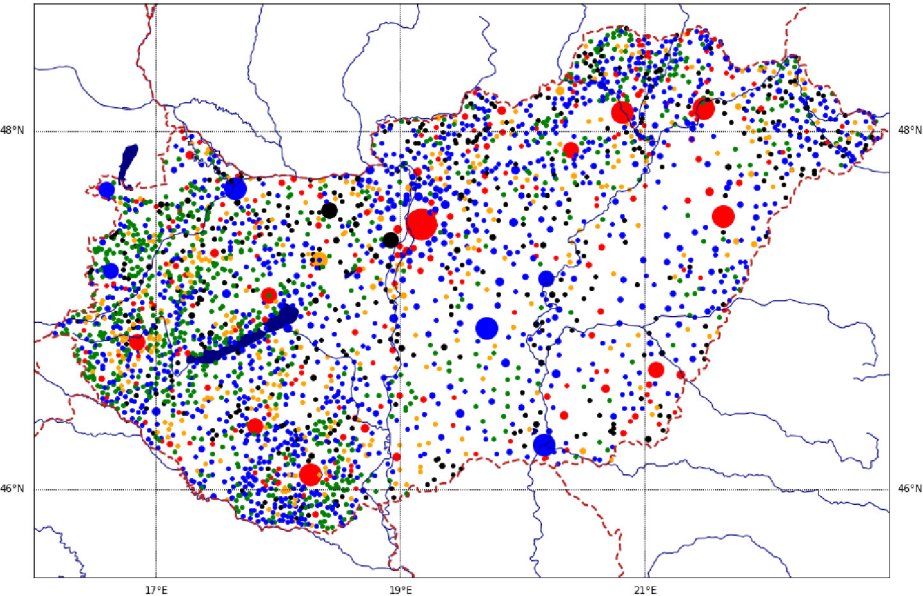
When calculating the Spearman correlation between clusters and regions determined according to geographical coordinates, we found that the correlation is weak, below 5%, but  $p$ -values are significant at 10%. This suggests that geographical location and cluster classification are not independent of each other, but do not significantly influence the prosperity of a given local government (Figure 2).

Firstly, we used the chi-square test to determine whether the regional distribution of each cluster differs from the regional distribution of all settlements. We found that the distribution of each cluster is significantly different from the geographical distribution of the whole statistical population, except for the orange cluster's distribution by latitude and longitude and the red cluster's distribution by latitude.



**Figure 1.**  
Number of elements  
in the clusters

**Figure 2.**  
Cluster map of  
Hungarian  
settlements based on  
normalised  
modularity obtained  
from indicators  
measured in 2017



Subsequently, we examined the geographical locations of local governments in clusters with a distribution different from that of the whole statistical population using frequency tables normalised with the number of settlements in the region. Normalisation with the number of elements in a region was important because we wanted to filter out the effect that a region with a large number of elements incorporates a relatively large proportion of a given cluster.

The red cluster is dominant in Central and Eastern Hungary, the green cluster in Central and Western Hungary, the blue cluster in the Northern-Central, the North-Eastern, the Central-Southern, and the South-Eastern parts of Hungary, and the black cluster in North-Central and North-Eastern Hungary. The orange cluster is dispersed relatively evenly.

Figure 3 shows the differences between the 2017 and 2014 values of the clusters.

*Cluster 1 (red):* Wealthy settlements with moderate (medium-level) financial and economic parameters, weak liquidity and renewed indebtedness (but within statutory limits); a lot of the larger settlements belong here.

This cluster consists of settlements with moderate financial management parameters. At the same time, their own-revenue capacity is high. However, their asset and liability structures are less favourable: besides above-average levels of fixed assets (mainly real properties), they have low liquid assets ratios and above-average third-party liabilities. Their liquidity is weak. The level of replacement of fixed assets is medium. At the same time, their equity per inhabitant is very high. The number of jobseekers and registered companies is at the medium level.

**Figure 3.**  
Stability of cluster  
characteristics

	Total profit	Capital subsidy	Own revenue	Revenue capacity	Asset structure	Replaceme nt of fixed assets	Liability structure	Equity per inhabitant	Liquidity	Debt consolida tion	New long- term borrowing	Size	Jobseekers	Business associatio ns
cluster 1	→ 0	→ 0	→ 1	→ -1	→ 1	→ -0.5	→ -0.5	→ -1	→ 0	→ 0	→ -2	→ 0	→ 1	→ 0.5
cluster 2	→ -1	→ -0.5	→ 1	→ 0	→ 0	→ 0	→ -1	→ 1	→ 0	→ 0	→ 0	→ 0	→ 0	→ -0.5
cluster 3	→ 1	→ 0.5	→ 0	→ 0	→ 0	→ 0.5	→ -0.5	→ 0	→ 0	→ 0	→ 0	→ 0	→ -1	→ 0.5
cluster 4	→ 0	→ 0	→ 0	→ 0	→ 0	→ -0.5	→ 0	→ 0	→ -1	→ 0	→ 0	→ 0	→ 0	→ 0
cluster 5	→ 0	→ 1	→ 0	→ 2	→ -0.5	→ 0	→ 0.5	→ 0	→ 1	→ 0	→ 0	→ 0	→ 0	→ -0.5

This is the only cluster in which the number of elements changed (decreased) very significantly. From here, local governments migrated primarily to the third cluster with weaker characteristics. However, the remaining and the newly arrived settlements represent a distinct group (Table 2).

By 2017, this is the only cluster where long-term loans were raised. The level of equity per inhabitant is high, but not outstandingly high, as it was before. The settlements in this cluster have relatively good socio-economic indicators (low number of jobseekers, a high number of registered business associations).

*Cluster 2 (green):* Conservative wealthy small settlements.

Cluster 2 and Cluster 3 are the most stable over time. They dominate the network of local governments. This second cluster consists of small settlements which, in spite of their small size, are in an overall favourable asset and liquidity position. This is proven by the fact that this is the only cluster which did not take part in the debt consolidation process. The settlements in this cluster have good local economic indicators (low number of jobseekers, a high number of registered business associations), although their financial management indicators are at a medium or low level (except for their very low level of third-party liabilities and very good liquidity position).

In 2017, financial management weakened in this cluster. At the same time, the level of equity per inhabitant can be considered very high.

Illéssy *et al.* (2019) evaluated Hungarian settlements in terms of their socio-economic characteristics, institutions and infrastructure (but not financial management). Their study distinguishes a positive group of small settlements which, in spite of their shrinking populations, live in relative economic welfare and have a well-established institutional network. In Illéssy *et al.*, this group is characterised with the same geographical locations as in our study. This suggests a higher quality of local government financial management deeply embedded in economic and social structures.

*Cluster 3 (blue):* Settlements with weak financial management that do not receive a central capital subsidy and deplete their assets; many of the large settlements belong here.

This cluster, with the highest number of elements encompasses both small and large settlements. The settlements in this cluster have very weak results. The amount of capital subsidy they receive is very low. They can only partially compensate for this by an above-average level of own resources. Their liquidity is weak. The level of replacement of fixed assets is also very low. The settlements have moderate local economic parameters.

In 2017, the financial management of local governments in this cluster had relatively improved, at the same time, the number of jobseekers in these settlements relatively increased. In the study of Illéssy *et al.* (2019) mentioned above, the geographic location of the groups of lagging small settlements and disadvantaged settlements significantly overlaps with that of our cluster.

			2017		
	Cluster 1 (%)	Cluster 2 (%)	Cluster 3 (%)	Cluster 4 (%)	Cluster 5 (%)
2014					
Cluster 1	18	14	43	14	10
Cluster 2	4	75	0	8	13
Cluster 3	8	0	65	17	11
Cluster 4	10	27	31	20	13
Cluster 5	7	24	40	15	14

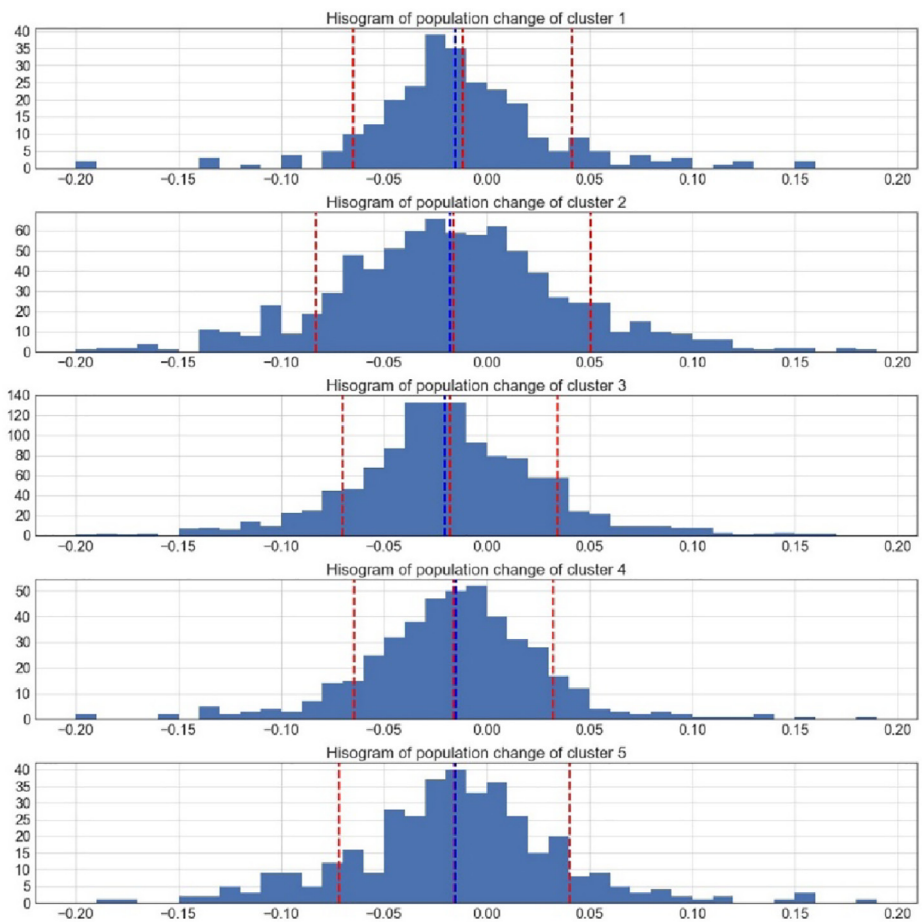
**Table 2.**  
Inter-cluster  
migration

*Cluster 4 (black):* Settlements driven by a high level of central capital subsidies. The main feature of this cluster is that its local governments received a significant amount of capital subsidies in the year under review, which had a positive effect on their revenues, balance structure and liquidity position as well. They have a medium level of equity per inhabitant. They replaced the majority of their fixed assets. At the same time, as central support fades, these settlements migrate into Cluster 2 or Cluster 3.

The cluster characteristics practically remained unchanged. Their liquidity position is average.

*Cluster 5 (orange):* Settlements making investments from resources other than central budgetary funds.

Because of investment support, their overall results are also very positive, and the level of replacement of fixed assets is very high. They realise their investments out of their own resources or direct EU support [2]. From other aspects, their situation is moderate or a bit worse than that. The share of own revenues is at a medium level. Their revenue capacity is weak. Their asset and liability structures are also at a medium level. Their liquidity is



**Figure 4.** Histograms of population changes in Hungarian settlements, for each cluster

moderate. Their equity per inhabitant is weak. The number of jobseekers and registered companies is at a medium level.

Few local governments can sustain a highly positive, investment-driven financial management in the medium term, most of the settlements merge into Cluster 2 or Cluster 3. At the same time, many Clusters 2 and 3 settlements move into this cluster.

The migration of population does not correlate with the metrics and individual local government's balance sheet figures and geographical location, therefore, further studies are needed to understand the changes in the number of inhabitants. Histograms of cluster-level population migration show that the populations of Cluster 2 settlements are the least stable compared to other clusters. Clusters 1, 3, 4 and 5 have similar population distribution patterns. The reason for this is that Cluster 2 includes small settlements (with a population of fewer than 5,000 inhabitants) only, which are very sensitive to changes.

Based on the above, population change itself does not explain differences in financial management. A local government's financial management can remain stable in spite of a falling population and, reversely, even if a settlement has a growing population, its financial management can become unsustainable (Figure 4).

## Summary

The 2008 financial crisis and the ensuing crisis management have reinforced the concept of rule-based budgeting in the level of subnational governments as well. This was often complemented by strengthening the tools of central administrative control. The third element of the response given to the crisis was that the duties and finances of local governments have partly been centralised, hence local governments' fiscal space was narrowed down. A combined application of these tools leads to a model of a highly centrally regulated fiscal model of local governments. Our study examines the issue of the sustainability of such a model. The empirical basis of our study is the micro accounting and socio-economic data of Hungarian local governments.

Our first research question was to confirm whether sustainability problems occur at the level of individual local governments in this highly centrally regulated fiscal model and if yes, in what forms. This local government model cannot ensure long-term sustainability in a homogeneous way, even in favourable economic conditions. While, in conformity with the legislative purpose, most local governments' operating profit turned into positive, the total profit is negative in the case of more than 25% of local governments. The fact that investments do not compensate for the depreciation of tangible assets in almost half of the local governments constitutes a risk in terms of long-term sustainability. The strictly and centrally controlled management system categorises the majority of local government assets as national assets, which means that their depreciation is allowed, but their sale is not allowed by law.

The advantage of a highly centrally regulated fiscal system can be captured by the fact that the financial situation of local governments in Clusters 1 and 3 cannot turn into excessive indebtedness and an unsustainable situation. However, this comes at a price, which might be the depreciation of intangible and tangible assets, i.e. insufficient levels of asset replacement. Based on the above, we cannot speak about a classical "soft budget constraint" phenomenon, as heads of local governments do not "play" for subsequent *ad hoc* bailouts by the central government. At the same time, in this fiscal model, larger-scale development investments obviously have more significant positive (albeit short-term) impacts. This could strengthen political competition for central development subsidies. According to Vasvári (2020), politically favoured local governments have more access to additional central funds.



Our third research question was to examine whether we can distinguish groups of local governments with different characteristics within the sector? We found that two clusters dominate the network of local governments. One of them (Cluster 2) consists of relatively wealthy small settlements with conservative financial management, which aim for sustainable finances regardless of the highly rigid municipal management system. This can be interpreted in a way that the leaders of such communities and the “social consensus” of the community itself are committed to sustainable financial management. The other dominant cluster (Cluster 3) consists of settlements with weak financial management in spite of the strict system, which depletes their assets and does not receive a central capital subsidy. The separation of the two dominant clusters is reflected by the practically zero migration between them.

The group of wealthy settlements with moderate financial and economic parameters and, at the same time, newly raised indebtedness (but within statutory limits; Cluster 1) is small and decreasing in size.

Furthermore, two other, investment-driven groups can also be identified. One is using state subsidies (Cluster 4), the other is using EU funds, own revenues or other sources (Cluster 5) to make considerable capital investments, which, however, can only have a temporary positive effect on the settlement’s finances. Upon completion of the investment, most of these settlements merge into Cluster 2 or Cluster 3.

Our fourth research question concerned the problems of settlements with decreasing populations. In our opinion, it is a very important finding that this phenomenon itself does not explain the differences in the financial management of local governments. Financial management can remain stable in spite of a shrinking population and, reversely, even if the population of a settlement is growing, its financial management can become weak.

As local governments’ borrowing is subject to strict statutory restrictions, in this study, we captured long-term sustainability mainly through the level of compensation for depreciation and the renewal rate of tangible assets. Further directions of research include the application of an extended approach to sustainability that gives an account of the availability and quality of local services as well as aims to identify the qualitative social characteristics (success criteria) of the group of local governments with more successful financial management.

## Notes

1. The two dummy indicators related to indebtedness take a value of 3 (mean) if indebtedness was not, and a value of 1 if indebtedness was incurred.
2. Financial support received from the national budget or the financial intermediary system (not directly from the EU) has to be reported as central budgetary support, which appears at the previous Cluster 4.

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## Appendix

Issue of  
sustainability

Quartiles (%)	Operating profit as a percentage of total operating revenue (%)	Total profit as a percentage of total revenue (%)	Capital subsidy* / as a percentage of total revenue (%)	Capital subsidy per capita* (the HUF)	Ratio of capital subsidy* / depreciation
<i>2014</i>					
25	-15	-12	0.0	0.0	0.0
50	-1	0	2.1	3.7	0.2
75	9	13	12.2	21.0	1.3
<i>2015</i>					
25	-3	-7	0.0	0.0	0.0
50	5	3	4.4	8.8	0.4
75	14	16	14.4	32.3	1.5
<i>2016</i>					
25	2	-10	0.0	0.0	0.0
50	11	0	0.5	0.9	0.0
75	22	11	4.1	8.4	0.3
<i>2017</i>					
25	1	-8	0.0	0.0	0.0
50	10	4	2.5	5.2	0.2
75	22	23	13.6	32.6	1.2

**Notes:** \* Accrual-based

**Table A1.**  
Operating and  
capital indicators

Quartiles (%)	Own public authority and other operating revenues within total budget revenue (%)	Proportion of local business tax and property tax within total revenue (%)	Local business tax per registered business association (the HUF)	The local government's total revenue per inhabitant (the HUF)
<i>2014</i>				
25	9	3	27.8	127.3
50	16	7	65.9	183.8
75	27	16	128.7	262.4
<i>2015</i>				
25	4	3	31.1	142.2
50	10	7	72.5	204.4
75	19	16	145.1	299.2
<i>2016</i>				
25	10	3	33.4	141.4
50	18	8	74.2	195.0
75	30	18	145.8	284.5
<i>2017</i>				
25	7	3	35.8	160.4
50	13	7	76.0	225.4
75	24	15	152.1	336.5

**Table A2.**  
Revenue indicators

**Table A3.**  
Indicators for the  
balance sheet  
structure – the asset  
side

Quartiles (%)	Fixed assets as a percentage of the balance sheet total (%)	Proportion of real properties and related property rights (%)	National assets as a percentage of the balance sheet total (%)	Renewal rate of intangible and tangible assets (%)	Ratio of investment/ depreciation	Financial assets (invested and short-term) as a percentage of the balance sheet total (%)	Financial assets (not categorised as national assets) as a percentage of the balance sheet total (%)
2014							
25	91	75	91	1	0.32	2	2
50	94	86	95	4	1.24	4	3
75	97	92	97	10	3.05	7	6
2015							
25	90	75	91	2	0.49	3	2
50	94	85	94	5	1.40	5	4
75	96	91	97	13	3.49	8	7
2016							
25	88	74	89	1	0.24	4	3
50	93	85	93	3	0.74	6	5
75	96	91	96	9	2.10	10	9
2017							
25	81	66	82	2	0.41	5	5
50	89	79	89	4	1.02	10	8
75	93	87	94	10	2.28	16	15

Quartiles (%)	Equity as a percentage of the balance sheet total (%)	Liability as a percentage of the balance sheet total (%)	Equity-to- fixed-assets ratio (%)	Equity per inhabitant (the HUF)	Net financial assets as a percentage of the balance sheet total (%)	Net financial assets per inhabitant (the HUF)
<i>2014</i>						
25	95	1	100	434	1	5
50	98	1	103	625	3	18
75	99	2	107	931	6	38
<i>2015</i>						
25	94	1	100	461	2	11
50	98	1	103	662	4	26
75	99	2	107	973	7	48
<i>2016</i>						
25	93	1	100	495	2	20
50	97	1	104	707	5	39
75	99	2	109	1032	9	69
<i>2017</i>						
25	87	1	100	540	4	35
50	97	1	105	765	9	72
75	99	2	114	1089	15	135

**Table A4.**  
Indicators for the  
balance sheet  
structure – the  
liability side

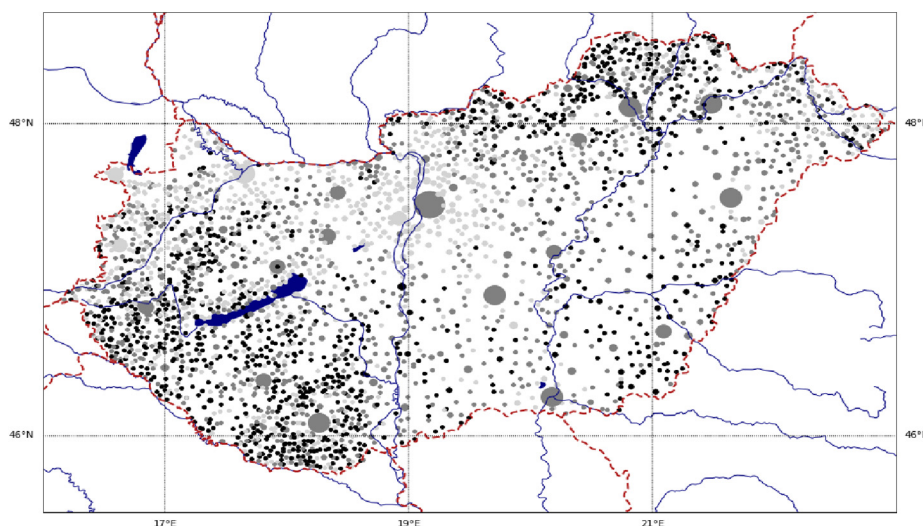
Liquidity and debt

For liquidity, we introduced three indicators. The overall liquidity position of local governments is very good. For indebtedness, we used the following dummy indicators:

- Whether a debt settlement procedure was implemented in the settlement before 2011, if yes, its value is 1, otherwise it is zero. A total of 68 local governments were affected in this area.
- Whether the local government participated in the 2011-2014 debt consolidation process, if yes, its value is 1, otherwise it is zero. Nearly two-thirds of the local governments participated.
- Whether the local government raised any long-term loan in the past four years. If yes, its value in the year of borrowing and in subsequent years is 1, otherwise it is zero. 351 local governments were affected in this area.

Quartiles (%)	No. of inhabitants as a percentage of the national population (%)	No. of jobseekers per 100 inhabitants	No. of registered business associations with a legal entity per 100 inhabitants	No. of registered business associations per 100 inhabitants
2014				
25	0.00	2.9	1.4	10.9
50	0.01	4.7	2.1	14.8
75	0.02	7.6	3.5	20.1
2015				
25	0.00	2.4	1.3	11.1
50	0.01	4.0	2.1	15.0
75	0.02	6.6	3.3	20.1
2016				
25	0.00	1.9	1.3	11.4
50	0.01	3.3	2.1	15.3
75	0.02	5.4	3.3	20.4
2017				
25	0.00	1.7	1.3	11.6
50	0.01	3.1	2.1	15.6
75	0.02	5.7	3.3	20.8

Table A5.  
Socio-economic  
indicators



**Figure A1.**  
Changes in the  
number of  
inhabitants of  
Hungarian  
settlements between  
2014 and 2017 (black  
dots: rate of  
population decrease  
is higher than  $-3.5\%$   
(1,043), dark grey  
dots: the rate of  
decrease is between  
 $-3.5\%$  and  $-0\%$   
(1,088), light grey  
dots: settlements with  
a growing population  
(1,023)

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