

The Impact of Maximum Allowable Debt Level of Local Government Units on their Investment Potential

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Abstract Keeping local government units' financial stability to run necessary projects is becoming a severe threat due to the remarkable increase of theirs' debt level. A question arises whether the application of debt limits excessively restrict municipalities' investment potential. Using the linear regression model, we proved that increasing the maximum allowable debt level decreases investment potential. We have challenged the relevance of using fiscal rules and presented liberalizing the fiscal rules' principles to assess the investment potential as an indicator to guarantee optimum use of the local government units' economic potential from different perspectives.

Keywords: • local government debt • investment potential • municipalities • fiscal rules

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[https://doi.org/10.4335/19.3.991-1014\(2021\)](https://doi.org/10.4335/19.3.991-1014(2021))

ISSN 1581-5374 Print/1855-363X Online © 2021 Lex localis

Available online at <http://journal.lex-localis.press>.

1 Introduction

The growing importance of the issue of investment potential of local government units (LGUs) observed in recent years results from progressing globalization processes and European integration. Keeping local government units' financial stability to run necessary projects is becoming a severe threat following a remarkable increase of LGUs' debt level, for example, in Poland. That is all the more important because the territorial self-government units are responsible for achieving integrated development governance. The implementation of investment projects by LGUs depends on selecting the optimum capital structure, including the possibility of obtaining external financing for the implementation of tasks assigned to LGUs. Debt financing contributes to the rapid implementation of the required actions. However, the consequence is always the impact of raising capital and the cost of financing upon future investment opportunities.

The paper aims to assess the impact of the debt ratio on the level of polish municipalities' investment potential. The authors intend to verify whether the applied fiscal rules, especially those concerning debt limitation, do not excessively restrict municipalities' investment possibilities. Fiscal rules should be understood as a rigid, statutory limitation imposed on decision-makers conducting fiscal policy by introducing a simple, numerical limit for the indicated fiscal aggregates (Kopits & Symansky, 1998). In this research group of all municipalities in Poland, fiscal authorities do not impose fiscal rules on individual administrative units. There is a uniform fiscal rule for the maximum allowable level of debt, which is the IDR ratio. The variables that make up the indicator are the same for all municipalities.

In our opinion, the maximum allowable debt level should reflect municipalities' ability to service their debts promptly. At the same time, it should prevent suboptimal use of local economic potential. Therefore, we analyzed the value of municipalities' debt ratio and investment potential for the same periods. A long time series was adopted from 2008 till 2019 when the debt reduction methodology was revised. However, the investment potential indicator was not subject to legislative restrictions, as it is not a fiscal rule. The regulation of LGUs' debt level and structure is based on indicators calculated ex-post with historical source data (fiscal rule). This information does not reflect the local governments' current and future financial situation, prevents LGUs that have not reached an operating surplus from incurring financial liabilities. That necessitates the postponement of the repayment of debt service expenditure by local governments to future years, which in turn results in an adverse increase in this expenditure and an accumulation of fixed expenditure in future years, thus accruing adverse burden on future generations (Checherita & Rother, 2012). LGUs must cover the debt

service expenditure every year, and the capitalization of interest is not allowed (Public Finances Act, 2009, Article 92).

Therefore, the usefulness of assessing municipalities' investment capabilities through the value of the investment potential was highlighted. By that, the possibility was noted of releasing municipalities' financial flows from selected fiscal rules, namely the maximum acceptable level of debt in this case.

The aim of the study is to verify whether the increasing restrictive fiscal rules brings about a reduction of investment potential. The research question arises: how does the level of the maximum allowable debt (expressed as the debt ratio) influence the investment potential of a given municipality. So, the maximum allowable level of debt, which is part of the fiscal rule, will still influence banks' perception of investment attractiveness. All the more so because the existence of obligatory fiscal rules often requires the use of accounting devices to maintain investment plans, seeking legal loopholes such as transferring the local government debt to the public and or public-private companies. It is not the case when evaluating the investment potential. Are we, therefore, starting a scientific polemic as to whether the assessment of the investment potential by the capital provider is not a satisfactory indicator to grant funding to LGU?

The paper structure includes section 2, presenting a literature review on the legitimacy of limiting public and local government debt. Section 3 introduces the methodology of surveying all municipalities on the example of Poland and the results obtained. In section 4, we conduct a polemic over the results obtained. We also present our collective interpretation of the advantages and disadvantages of the debt limit from the capital provider and the LGUs' perspectives.

1 Literature Review

The assessment of the legitimacy of using fiscal rules, including the debt ratio, to determine the possibility of financing and implementing capital investments has long been the subject of scientific analyses. The question we are asking is whether there is any need for such rules at all? Cannot the capital provider each time decide on its own to make capital available for municipals' investments?

Academia has analyzed various approaches to limiting the debt level of LGUs, including municipalities.

Numerous studies to date show that the introduction of fiscal rules has a positive impact on improving budgetary performance (Gras et al., 2014; Guichard et al., 2009). In contrast, fiscal rules directly related to obtaining maximum allowable debt levels result in lower debt service costs (Thornton & Vasilakis, 2018).

Another publication indicates that fiscal rules may restrict the pro-circularity of fiscal policy and reduce investment expenditure, especially in the period of economic slowdown (Dessus et al., 2013). The most frequently examined contexts include market factors, the cooperation of LGUs in the debt control system, debt limits, and administrative control (Ter-Minassian & Craig, 1997). Moreover, many analyzes prove that well-designed and credible fiscal rules significantly limit the accumulation of excessive budget deficits and public debt (Debrun et al., 2008; Feld & Kirchgässner, 2006; Kiewiet & Szakaty, 1996).

The Bunch study (1991) concludes that it is better to increase these limits to prevent debt avoidance loopholes. That allows for greater freedom of management consistent with the real needs of particular units. Elliot, among others, believes that the very fact of limiting the debt strongly restricts the LGUs' investment possibilities, understood as the ability to provide public services at the expected level (Elliot & Kearney, 1988). We agree with the conclusions drawn by these authors, pointing out the possibility of self-limitation of LGUs' debt based on the investment potential indicator and the capital providers' willingness to provide financing. Limiting debt is not rational because, through the development of investments, the debt positively impacts modernization and local economies' progress, including job creation (Dafflon & Beer-Tóth, 2009).

Several studies examine the level of local government debt, its growth, and factors influencing it, such as the structure of income and expenditure that affects the level of debt (Veiga & Veiga, 2014; Horvat et al. 2020). Considering the economic, fiscal, social, and political conditions of incurring debt, they showed that local government debt increases with GDP growth. At the same time, the amount of debt to be repaid did not increase with the amount of obtained income (Wassmer & Fisher, 2011). This finding may suggest that the debt positively influenced the GDP growth, and the generated income (economic growth) provided funds for debt service.

The subsequent research results show that no single local government may be privileged over all the others. Limiting the debt may be enforced in various ways without indicating the priority (Plekhanov & Singh, 2007). However, there is also a statement that there is no direct relationship between debt limits and debt absorption capacity (Levine et al., 2013). Therefore, the debt limits, individually constructed depending on the fiscal categories of each budget of a local government unit, could be considered in a broader context as an opportunity to maintain the investment potential at an unchanged level.

We do not address political risks in our study. However, attention should be drawn to the research results achieved by the authors, who stress that debt management, including debt level manipulation, is also dictated by political factors, such as

improving the competitive position in elections (Barreyre & Delalande, 2020; Benito et al., 2015; Moszoro & Spiller, 2019). That is all the more important because, as these authors indicate, there is an intention to look for ways to use fiscal rules for the decision-makers' specific purposes. Our study, therefore, begins with a polemic as to whether the lack of statutory limits of debt would reduce the desire for political rent-seeking, first analyzed by Anne Krueger (1974). The relationships between debt level capturing and the level of investment potential that we have verified indicate the possibility of limiting the political rent-seeking. That will happen in a situation where it is not the adjustment of debt policy (investment expansion) to maximum debt levels but the assessment of investment projects by capital providers that will contribute to obtaining financing. In our opinion, it is the decisions of the capital providers, who, as profit-oriented units, cannot undertake projects that expose them to losses that will directly impact the investment potential level. Thus, decisions made not by public decision-makers but by capital providers would reduce the impact of political risk upon incurring debt liabilities. Obtaining maximum debt level would then result from an assessment of the financial institution and not a particular pursuit, including short-term public/government decision-makers. The possibility of short-term fulfillment of the debt limits would not affect the local government employee's popularity.

An essential element in the discussion on the legitimacy of limiting the LGUs' debt level is its impact on public debt and economic growth. Fiscal rules, under which the permissible debt should have an investment objective, allow for the claim that it is beneficial and positively impacts local infrastructure. Debt allocated to increase investment opportunities is acceptable and allowable because its service costs will also be borne by future generations, beneficiaries of municipal infrastructure (Schwarcz, 2002).

In practice, many industrialized countries have enacted fiscal rules in which debt must stand out as an investment objective. This concept indicates that only such borrowing is beneficial (Liu & Waibel, 2010). Since debt is to have an investment goal, does debt reduction not limit the investment potential?

Limiting the level of debt through the existing fiscal rules concerning debt is quite easy to monitor. However, it carries the risk of financial manipulation. This often applies to the reclassification of current expenditure into capital, transfer of some activities, and borrowing to LGUs of enterprises or using debt instruments (e.g., sale and leaseback contracts) that are not covered by debt limits (Schwarcz, 2002). Such a situation took place in Poland; therefore, the individual allowable debt ratio was modified.

The World Bank also addressed fiscal rules regarding debt (Liu & Waibel, 2010). A safe level of debt should be consistent with long-term investment goals, the implementation of which will contribute to the assumed economic growth. The World Bank mentions that research/analyses of a representative sample of local governments would determine the value of the limits of indebtedness by LGUs.

The authors carried out a genuinely in-depth study in this area (Chen & Li, 2019), and their results support our research. The authors proved that it is necessary to differentiate policies from one region to another to manage public debt effectively but broadening the sources of LGUs' funding should be promoted. Over-restrictive rules on debt limitation will force the search for possible "debt hiding." That does not increase the transparency of territorial LGUs' financial management, and therefore the phenomenon should be marginalized. Nevertheless, it does not, in our opinion, mean that it is impossible to take on debt, for example, through public-private companies and to exclude such debt from the public debt level. It seems that a liberal approach to the possibility of incurring debt may help increase the transparency of local government finances. The capital provider and the borrower (LGU) seek to maintain debt at a reasonable level adequate to the long-term level of investment potential.

Ostry et al.'s (2015) study presents a similar stance. The authors stress creating no mechanical rules or thresholds. They recommend an intuitive approach to regulate the debt level based on dividing the fiscal space into zones. For example, in the red area, the debt level would threaten national security. In contrast, in the green area, on the contrary, its reduction would even have adverse effects on the development of this region. Kiewiet and Szakaty (1996) draw similar conclusions. They point out that restrictions force the search for ways to circumvent them, either through off-balance financing or by transferring tasks to the local government level and increasing the debt level there without such restrictive limits.

Jimenez (2018) more broadly suggests that external fiscal discipline institutions are forcing reliance on short-term debt and asset sales in response to the fiscal crisis. Instead, of promoting fiscal discipline, they force cities to shift the burden of ongoing services to future taxpayers. This author has provided evidence that cities with strict external fiscal institutions have problems with long-term fiscal solvency.

Also, analyses should highlight where the authors prove the opposite hypothesis, i.e., they argue that economic concentration and coordination between LGUs essentially provide a broader analytical approach to the public and local government debt management. They demonstrate the legitimacy of interference in assessing the LGU's ability to repay its debts without overburdening future

generations with debt levels (Hildreth & Miller, 2002). In presenting the different approaches, the authors stress the long-term effects of the potentially excessive debt burden on future generations. From the perspective of the capital provider, the long-term perspective of the ability to repay liabilities is always a current element of assessing the LGU's financial situation (Kluza, 2016). In case of any turbulence, preventive measures should be taken in advance. Therefore, it seems not entirely unjustified for the legislator to interfere with the administrative setting of the limits.

In conclusion, there is a clear research gap regarding the rationale for applying fiscal rules such as maximum allowable debt level and its influence on municipal investment potential, which requires proving. The ongoing discussion oscillates mostly around the local government debt management and the limitation of decision-making autonomy in LGUs' financial management. The background to the application of the limits is the maintenance of financial security for local communities. However, are the units assessing the investment potential, e.g., banks, not interested in local societies' security, and can they overuse the LGUs' investment potential to achieve their own operational goals?

3 Research

The analyses cover all 2,477 municipalities and 66 cities with powiat (county) rights according to Poland's administrative division from 2008 to 2019. The statistical data employed in the study have been taken from the database of regional accounting chambers, the Ministry of Finance, and the local data bank of the Central Statistical Office. conducting the study, we verified whether we can treat counties in mixed models as variables responsible for the random effect, and whether we can use p-value, due to the fact that we actually have a "population" of all (except municipal) counties in Poland and not a typical random sample. Such an approach, however, is justified - treating poviats in Poland as elements of a wider population of similar administrative units in the world. We cite this view on: Freedman D. A. (2005).

The study aimed to answer the following question: how does the level of the maximum allowable debt (expressed as the debt ratio) influence the investment potential of a given local authority unit?

To verify this hypothesis, we have adopted the following methodology for calculating debt ratios and investment potential.

The debt ratio was calculated according to the applicable rules, which changed in subsequent years, 2008–2013

Formula 1

$$\frac{R + O}{D} \leq 15\% D$$

where the symbols mean:

- R - the total amount for repayment of installments of loans and credits, and redemptions of securities issued (excluding amounts of short-term loan repayments and redemptions of short-term securities, i.e., borrowing and repayments during the same financial year), planned for the financial year
- O - interest on loans and borrowings, interest and discount on securities issued, and repayment of amounts resulting from guarantees and sureties granted, planned for the financial year
- D - the total budget revenue for the financial year,

Formula 2

Formula IDR 2014–2019

$$\left(\frac{R + O}{D}\right)_n \leq \frac{1}{3} * \left(\frac{Db_{n-1} + Sm_{n-1} - Wb_{n-1}}{D_{n-1}} + \frac{Db_{n-2} + Sm_{n-2} - Wb_{n-2}}{D_{n-2}} + \frac{Db_{n-3} + Sm_{n-3} - Wb_{n-3}}{D_{n-3}}\right)$$

where the symbols mean:

- R - the total amount for repayment of installments of loans and credits and redemptions of securities issued (excluding amounts of short-term loan repayments and redemptions of short-term securities, i.e., borrowing and repayments during the same financial year), planned for the financial year
 - O - interest on loans and borrowings, interest and discount on securities, and repayment of amounts resulting from guarantees and sureties granted, planned for the financial year
 - D - the total budget revenue for the financial year,
 - Db - current income,
 - Sm - income from assets sold,
 - Wb - current expenses,
 - n - financial year for which the relation is determined
 - n-1 - the year preceding the financial year for which the relation is determined
 - n-2 - the year preceding the financial year by two years,
 - n-3 - the year preceding the financial year by three years,
- Legal basis: Art. 243 of the Act of 27 August 2009 on Public Finances

Formula 3

IDR 2020–2025

$$\left(\frac{R + O}{D}\right)_n \leq \frac{1}{3} * \left(\frac{Dbei_{n-1} + Sm_{n-1} - Wbei_{n-1}}{Db_{n-1}} + \frac{Dbei_{n-2} + Sm_{n-2} - Wbei_{n-2}}{Db_{n-2}} + \frac{Dbei_{n-3} + Sm_{n-3} - Wbei_{n-3}}{Db_{n-3}}\right)$$

where the symbols mean:

- R - the total amount for the repayment of installments of liabilities included in the debt title under the Public Finances Act Art. 72 sect. 1 item 2 and buy-backs of securities (excluding amounts of repayments of short-term debt liabilities and buy-backs of short-term securities, i.e., those incurred and repaid in the same financial year), planned for the financial year
 - O - current expenditure on debt service, including interest on debt liabilities under the Public Finances Act Art. 72 sect. 1 item 2, interest and discount on securities and repayment of amounts resulting from guarantees and sureties granted, planned for the financial year
 - Db - planned current budget income fewer subsidies and amounts allocated to current needs,
 - Sm - income from assets sold,
 - Dbei - current income reduced subsidies and monies of current nature for implementing a program, project or task financed with European funds under the Public Finances Act Art. 5 Sect. 1 item 2
 - Db - current budget income fewer subsidies and amounts allocated to current needs,
 - Wbei - current expenditure less current expenditure on repayment of installments of liabilities classified as debt liabilities under Public Finances Act Art. 72 sect. 1 item 2 and current expenditure on implementing a program, project or task financed with European funds under Public Finances Act Art. 5 Sect. 1 item 2
 - n - financial year for which the relation is determined
 - n-1 - year preceding the financial year for which the relation is determined
 - n-2 - the year preceding the financial year by two years,
 - n-3 - the year preceding the financial year by three years,
- Legal basis: Article 243 of the Act of 27 August 2009 on Public Finances after taking into account the provisions of Article 9 of the Act of 14 December 2018 amending the Act on Public Finances and certain other acts (Off. J. of 2018, item 2500)

Formula 4

IDR formula since 2026

$$\frac{(R + O)}{Db} \leq \frac{1}{7} \times \sum_{i=1}^7 \frac{(Dbei - Wbei)}{Dbi}$$

where the symbols mean:

- R - the total amount for the repayment of installments of liabilities included in the debt title under the Public Finances Act Art. 72 Sect. 1 item 2 and buy-backs of securities (excluding amounts of repayments of short-term debt liabilities and buy-backs of short-term securities, i.e., those incurred and repaid in the same financial year), planned for the financial year,

- O - current expenditure on debt service, including interest on debt liabilities under the Public Finances Act Art. 72 sect. 1 item 2, interest and discount on securities and repayment of amounts resulting from guarantees and sureties granted, planned for the financial year
- Db - current budget income fewer subsidies and amounts allocated to current needs, planned for the financial year
- Dbei - current income in the year preceding by i-years the year for which the relation is determined, fewer subsidies and monies of current nature for implementing a program, project, or task financed with European funds under the Public Finances Act Art. 5 Sect. 1 item 2
- Db - current budget income in the year preceding by i-years the year for which the relation is determined, fewer subsidies and amounts allocated to current needs,
- Wbei - current expenditure in the year preceding by i-years the year for which the relation is determined, less current expenditure on repayment of installments of liabilities classified as debt liabilities under Public Finances Act Art. 72 Sect. 1 item 2 and current expenditure on debt service, and current expenditure on implementing a program, project, or task financed with European funds under Public Finances Act Art. 5 Sect. 1 item 2

Legal basis: Article 243 of the Act of 27 August 2009 on Public Finances after amendment by the Act of 14 December 2018 amending the Act on Public Finances and certain other acts (Off. J. of 2018, item 2500)

Total investment potential = operating surplus + property income + total revenues - expenses due to repayment of liabilities

The analysis was based on data from the Central Statistical Office and the Ministry of Finance on LGUs' budgets. These data included variables that allowed the calculation of the total investment potential of a given municipality (used as dependent variable) as well as the following explanatory variables: current income, property income, current expenses for salaries, current expenses related to sureties and guarantees, current expenditure on debt servicing, property expenses, debt ratio. The explained variable is investment potential.

We searched for a stimulant and a debilitation among the explanatory agents. The debt ratio is first a stimulant and then a debilitation; it will behave like a nominee. Thus, empirical research will verify whether guided by the nominee's evaluation is wrong and limits the investment potential on the example of powiats.

The mixed-effects linear model was used to investigate the relationship between the variables. The reason for using this type of method was the interdependence between observations: annual measurements of a given variable for individual municipalities.

The fixed effects analysis provided us with model coefficients showing how the value of the dependent variable increases or decreases with a unit increase of the explanatory variable. On the other hand, the comparisons of the model’s random effects indicate to what extent the municipalities differed in terms of the value of the dependent variable.

The quality of the presented models’ predictions was calculated and assessed using the cross-validation “leave-one-out cross-validation” method. The data was divided into the training (teaching) assembly, and each test set consisted of observations for one municipality. For each iteration, the model was fitted to the training set based on data from other municipalities, and this model’s mean absolute error (MAE) was calculated. The evaluation of predictions produced by such a model was based on comparing the obtained mean values of absolute errors with the standard deviation of the dependent variable, indicating the number of municipalities for which the value of MSE exceeded the standard deviation of the dependent variable. The MAE values for the test sets were also compared with the mean values of the absolute errors for the training data (for the models constructed on training sets) to check whether there are no underfitting or overfitting phenomena that negatively affect the predictive effectiveness of a model.

The mean absolute error was calculated using the formula:

Formula 5

$$MAE = \frac{\sum_{i=1}^n |y_i - y_i^p|}{n}$$

Where n was the number of observations for a given municipality, y_i , was the actual value of the endogenous variable for the i -th observation for a given municipality, and y_i^p was its value forecast based on the model.

All calculations were made using the R package, version 3.5.3.

Based on the model:

$$Total\ investment\ potential \sim Debt\ ratio + (1|Commune),$$

The total investment potential of a given municipality showed a significant relationship between the value of the debt ratio and the total investment potential of a given municipality ($p < 0.001$). As the debt ratio increased by one percentage point, the value of the total investment potential decreased on average by PLN 804,894. The reduction of the error standard deviation associated with isolating the municipality’s variability was 73.2% for the model created.

Figure 1: Graph showing the relation between maximum allowable debt ratio value and the total investment in 2008–2011 ¹

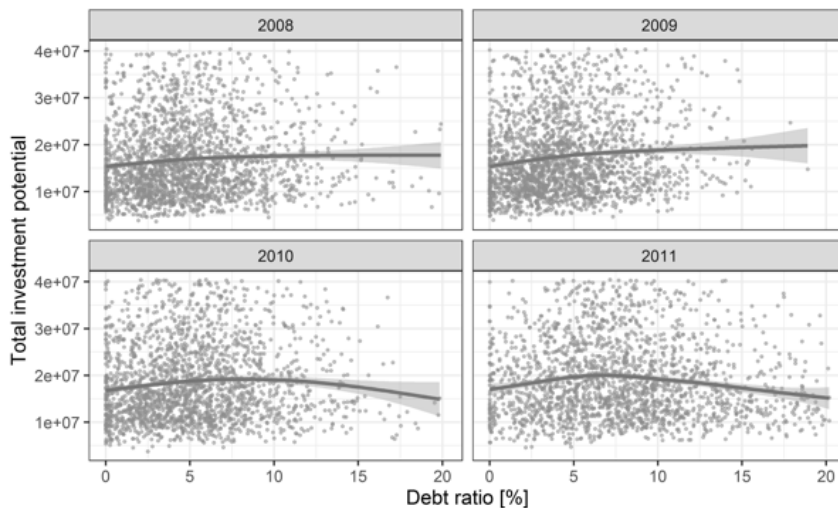


Figure 2: Graph showing the relation between the allowable debt ratio value and the total investment potential value in 2012–2015

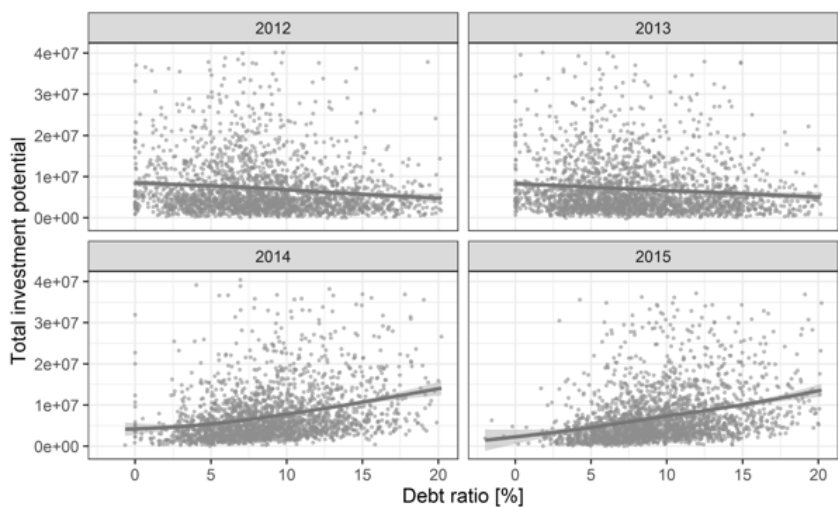
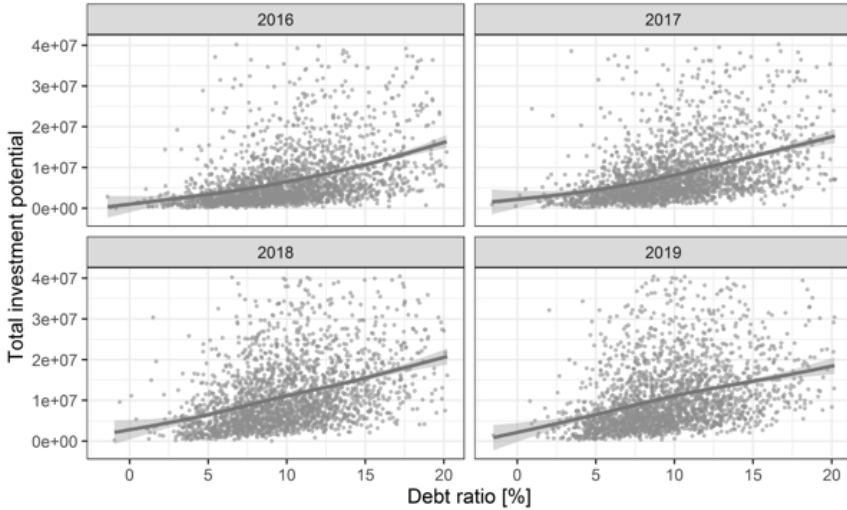
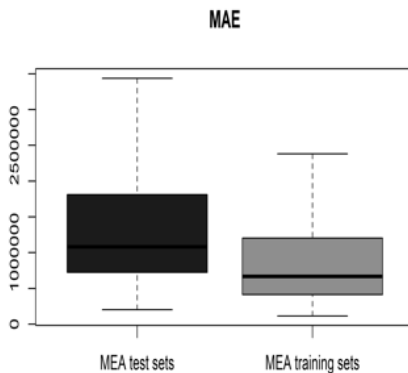


Figure 3: Graph showing the relation between the total investment potential and debt ratio value in 2016–2019



Differences of cross-validation distributions performed on test and training sets allow excluding the occurrence of model underfitting and overfitting phenomena in the case of this model. These phenomena would be indicated by very similar and low results in both cases (underfitting) or inferior test sets results compared to very high results of test sets.

Figure 4: Comparison of the distribution of cross-validation score values on test and training sets



Based on the model with the formula:

$$\begin{aligned} \text{Total investment potential} \sim & \text{Year} + \text{Current income} \\ & + \text{Current expenses due to sureties and guarantees} \\ & + \text{Current expenditure on debt service} \\ & + \text{Property expenses} + \text{Debt ratio} + (1|\text{Commune}) \end{aligned}$$

the total investment potential of a given municipality showed a significant relationship between current income and debt service expenses., property expenses (in all cases $p < 0.001$) on the explained variable.

- (a) **An increase in the value of *current income* and *property expenses* by one thousand PLN increased the total investment potential of a given municipality by approximately 77 PLN (*current income*) and 1016 PLN (*property expenses*), respectively. The same increase in the variable's value relating to expenses on servicing public debt decreased the explained variable's value by 1352 PLN.**
- (b) **The standard deviation of error reduction associated with isolating within-community variability was 31% for this model.**

Figure 5: A graph showing the relationship between total investment potential and current income values between 2008 and 2011

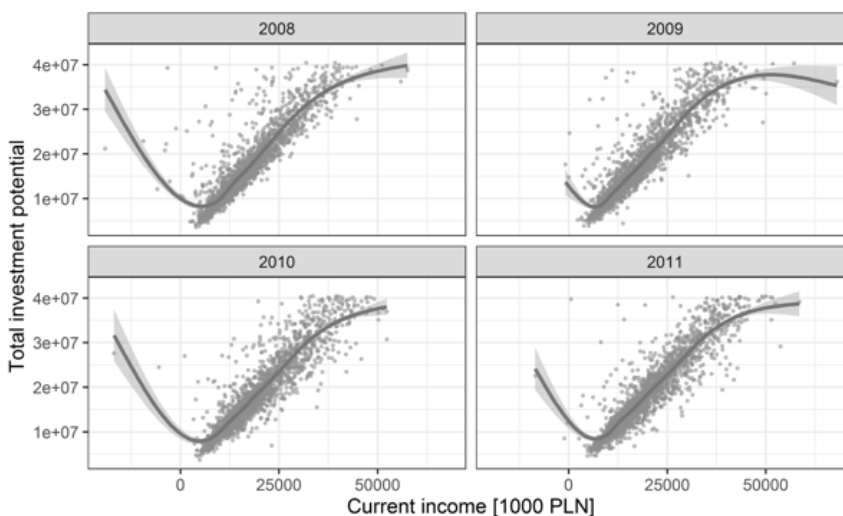


Figure 6: A graph showing the relationship between total investment potential and current income values between 2012 and 2015

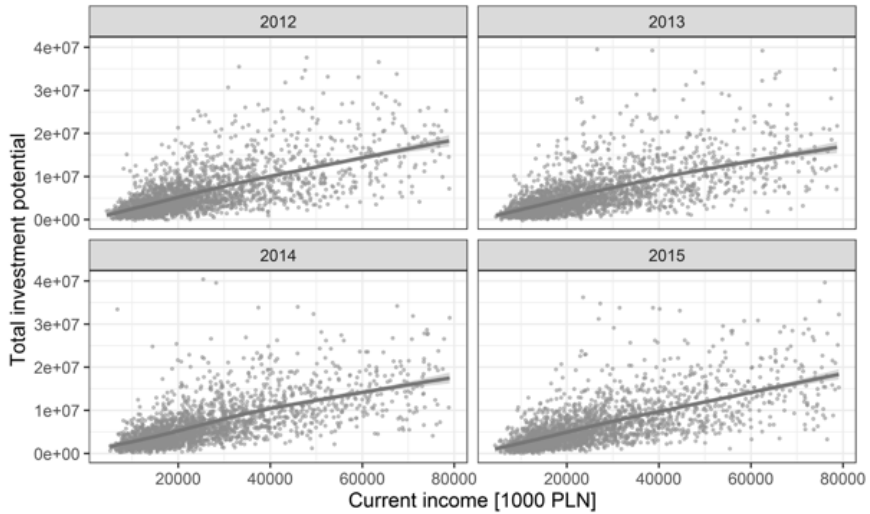
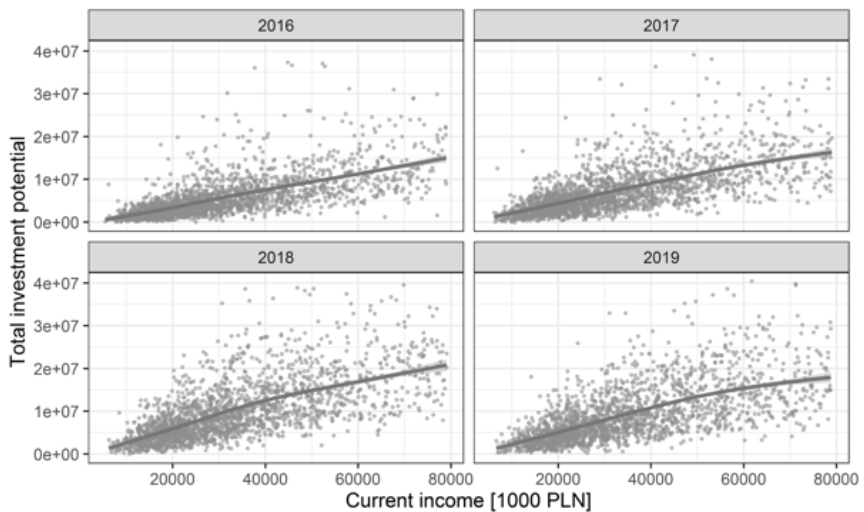
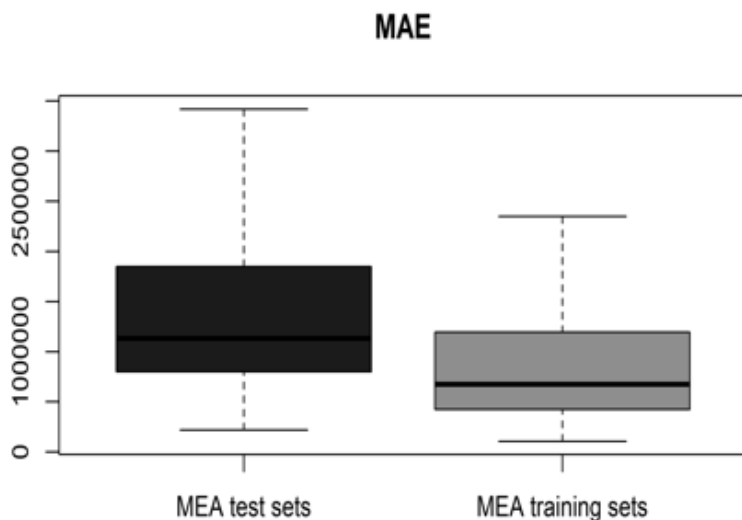


Figure 7: A graph showing the relationship between total investment potential and current income values between 2016 and 2019



In the case of this model, a comparison of the MAE distributions resulting from the cross-validation performed on the test and training sets indicated that no model underfitting or overtraining phenomena occurred for this model as well.

Figure 8: Comparison of the distribution of cross-validation score values on test and training sets



The tables in the appendix show each variable's correlation with the variable relating to the year of data and the explanatory variable for subsequent years.

Upon the results from mixed-effects linear models, a significant impact of current income, property income, current expenditure on salaries, servicing public debt, property expenditure, and the year have been shown on the total investment value potential of a given municipality. Model created to test the influence of debt ratio on the investment potential proved that the value of the dependent variable decreases with unit growth of debt ratio.

Based on comparing the distributions of the MAE of the two constructed models, the possibility of mismatch occurrence and overtraining phenomena was excluded. The constructed models' predictive abilities were compared based on a table showing the number of municipalities for which the MAE value exceeds 100 and 50% of the dependent variable's standard deviation. The constructed models

showed a similar predictive value. As the debt ratio increased by one percentage point, the value of the total investment potential decreased on average by PLN 804,894. The reduction of the error standard deviation associated with isolating the municipality's variability was 73.2% for the model created.

4 Discussion

Evaluating the literature research and the results of our study, we point out the critical drawbacks of maximum allowable debt level (one of the fiscal rules) for LGUs from the point of view of municipalities themselves. This study verifies how the existing fiscal rules of the maximum allowable debt level determine the investment potential of the municipalities. The assessment of the added value of an individual debt ratio in the context of determining the municipalities' investment potential should answer the question to what extent the defined legal limit corresponds to the actual creditworthiness. The existing legal framework limiting allowable debt level makes its maximum level dependent on the individual level of municipalities-generated financial flows, which are the source of its future repayment.

Based on the results from mixed effects linear models, a significant impact of current income, property income, current expenditure on salaries, expenditure on servicing public debt, property expenditure and year has been shown on the value of the total investment potential of a given municipality. Model created in order to test the influence of debt ratio on the investment potential proved that the value of the dependent variable decreases with unit growth of debt ratio.

Based on the comparison of the distributions of the MAE of the two constructed models, the possibility of mismatch occurrence and overtraining phenomena was excluded. The predictive abilities of constructed models were compared on the basis of a table showing the number of municipalities for which the MAE value exceeds 100 and 50% of the standard deviation of the dependent variable, respectively. The constructed models showed a similar predictive value.

Ter-Minassian and Craig (1997) proved that fiscal rules relating to debt can be enforced through: a market discipline mechanism - a free and open financial market that ensures an appropriate lender-borrower relationship and individual responses to market signals; cooperation between the central and territorial levels, and through a system of adopted regulations and administrative supervision. Our research focuses on the fact that the issue of maximum allowable debt level should be decided by the market and the capital giver, not administratively, and this is what we show. Moreover, we indicate that local governments should have flexible access to instruments for financing investment projects, consistent with the thesis Minassian, T. (2007).

We consider whether too restrictive maximum allowable debt limits estimated individually for each municipality limit the investment potential and thus the possible effect of economic growth. We also express our view, agreeing with the World Bank's principle that optimal fiscal rules, as a rule, should not limit the implementation of medium- and long-term investment plans with the use of available repayable financing. In our opinion, according to the arbitrary regulations in force in Poland, the debt limit is the maximum debt ceiling set by the legislator and a measure of creditworthiness, which means that investment orientation toward debt is required. Lack of creditworthiness, tantamount to reaching the maximum debt ceiling, means it is impossible to obtain financing for investment projects.

Most of all, the fiscal rules are causing the strictness of the regulation for incurring new debt by LGUs. Furthermore, it increases the cost of financing: the original debt service rules did not address the issue of debt early repayment beyond the calculated ratio, even when the units had the funds to do so. This also entails the lack of the possibility of debt restructuring by 2019. Debt consolidation is possible if the total cost of debt servicing over the entire repayment period is reduced, which is difficult to achieve with the extension of the financing period. Wishing to maintain the possibility of developing the algorithm for calculating the individual debt ratio encourages local governments to design such transaction structures that allow them to service the debt in the long term by using long-term financing or long-term grace periods for capital repayments.

From the financial institution's perspective, the individual debt ratio has disclosed the hidden debt scale. Financial liabilities did not include all cash flows paid for leasing, factoring, securitization, public-private partnership, debt buyout. The investments could be finalized by purchasing receivables and purchasing the necessary infrastructure by leasing. Therefore, the information about debt serviceability was unreliable and did not include the actual debt level and the need to service it. Furthermore, the primary advantage of the fiscal rules' functioning is the possibility to diversify the maximum debt limit for each local government unit, depending on the surplus funds generated in historical periods, which are a source of repayment of future debt. However, in our view, the disadvantages prevail in this solution. The most essential of them include financial engineering, indicator time horizon, asset income policy, moral gambling, the upper limit of the debt absorption, algorithm inadequacy.

The value of the debt service ratio depended on current income and expenses and income from the sale of assets. That allowed financial engineering tools to be used and influenced by any algorithm elements; LGUs could consciously manipulate financial data and set the maximum acceptable debt level.

The algorithm for calculating the debt service indicator value was based on historical time series, without considering current and forecasted future trends. That means the measure is biased and inflexible due to the lack of reference and correction for the current and forecast changes in the economic situation.

Achieving the indicator's optimal value meant there was indeed a danger of selling off municipal assets, which made it possible to increase the right side of the algorithm inequality.

LGUs that did not meet the operating surplus ratio could postpone current expenses related to debt service to subsequent periods with the option of future debt service. Ultimately, they optimized the individual indicator value on the one hand. On the other hand, such action meant increasing the debt cost and accumulating fixed expenditures in the future.

The individual debt service indicator did not define a maximum debt limit. Thus, a financial strategy could be implemented that included the choice of appropriate financial instruments and, simultaneously, allowing for an excessive issue of interest-bearing debt necessary for the operation of the local government unit.

The algorithm's shortcomings for calculating the ratio should be referred to as the relation between the numerators of the right-hand and left-hand side of the inequality. On its basis, new debt instruments could not be obtained by those local authorities that did not achieve an operating surplus, even in a situation where they had the ability to timely service their debt.

The analyses are based on legal regulations in one country. Nevertheless, regardless of their model, the essence of fiscal rules is present in many states' legislation. Therefore, we recognize that the context of the country, Poland, in this case, is only an example of empirical analysis. However, the conclusions drawn may be universal, based not only on the analysis of literary sources but also on empirical evidence.

5 Conclusion

The methodology for calculating the individual debt ratio and its modifications, as indicated in the study, allow for a claim that the existing legal framework of the fiscal rule we are discussing has many shortcomings and controversies. It allowed circumventing fiscal rules and seeking alternative solutions to using other non-standard debt instruments actively. Therefore, not only was this mechanism ineffective in the context of reducing the level of LGU's local debt, but it also significantly diminished the transparency of their finances. As no non-standard debt instruments created before 2019 are shown in the debt level, it can be argued

that it is difficult to indicate what the optimum and safe level of LGUs' debt is. We agree that applying fiscal rules that limit the debt level is not sound. On the other hand, applying fiscal rules that consider the reasonable expectations of both lenders and borrowers in the light of debt repayment capacity would undoubtedly contribute to the greater effectiveness of the implemented fiscal and investment policy. Thus, the legally defined debt limit does not correspond to the actual creditworthiness and the debt service potential. Implementing the restrictive fiscal rules discussed in the study must make pursuing an optimal investment policy impossible, thus significantly reducing the LGUs' investment potential, therefore. However, the financial indicators determining the possibility of indebtedness should correspond to the LGUs' long-term investment objectives, whose achievement will contribute to the assumed economic growth of LGUs. We are aware of the challenges and difficulties we have encountered in our analyses. These involve, among other things, changes in legislation in the context of the individual debt ratio algorithm. Significant research problems include changes in the presentation of financial data disclosed in the individual debt ratio, making the results obtained in the audited time series incomparable. We can only hope that the thesis proposed in the study regarding the lack of legitimacy for implementing restrictive fiscal rules limiting the LGUs investment potential is a challenge for other solutions, studies, and analyses of the grounds for the existence of the debt limits concerning the LGUs' investment potential.

Notes:

¹In the graph, the line shows the smoothed local average of a given subset of points, determined using the *gam()* function (*Generalized Additive Models*). The grey band around the line reflects the precision of the average estimate (standard error).

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Appendix:

Table 1: Debt ratio model - random effects

		Variance	Standard deviation
Code	Absolute term	2.036e+16	142687707
Residue	-	7.473e+15	86445775

Table 2: Debt ratio model - permanent effects

		Coefficient	2.5 %	97.5 %	p-value
Absolute term	32650541,03	26668152,42	38633284,48	<0,001	
Debt ratio	-804894,134	-1018437,327	-591331,054	<0,001	

Table 3: Model without the variable included in the investment potential formula and current income - random effects

		Variance	Standard deviation
Code	Intercept	2.33e+13	4826591
Residual	-	4.608e+13	6788430

Table 4: Model without the variable included in the investment potential formula and current income - fixed effects

	Coefficient	2.5 %	97.5 %	p-value	R²
Intercept	-112272573.534	-172348517.023	-52189984.722	<0.001	0,878
Year	55926.446	26041.911	85807.415	<0.001	
Current expenses for salaries	221.512	200.426	242.596	<0.001	
Current expenses due to sureties and guarantees	-1333.667	-2794.971	127.179	0.074	
Current expenses on debt service	-1456.347	-1770.101	-1142.961	<0.001	
Property expenses	1017.302	1010.037	1024.581	<0.001	
Debt ratio	1718.972	-16633.265	20101.967	0.854	

Table 5: Model without the variable included in the investment potential formula and current expenses for salaries - random effects

		Variance	Standard deviation
Code	Intercept	2.059e+13	4538140
Residual	-	4.591e+13	6775361

Table 6: Model without the variable included in the investment potential formula and current expenses for salaries – fixed effects

	Coefficient	2.5 %	97.5 %	p-value	R²
Intercept	43414336.598	-18348989.373	105270298.961	0.168	0,88
Year	-21459.17	-52219.362	9254.774	0.17	
Current income	76.803	71.516	82.094	<0.001	
Current expenses due to sureties and guarantees	-872.334	-2327.401	582.518	0.24	
Current expenditure on debt service	-1351.604	-1646.203	-1057.588	<0.001	
Property expenses	1016.261	1009.09	1023.439	<0.001	
Debt ratio	-6113.976	-24395.315	12193.634	0.512	

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