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DEBT REPAYMENT CAPACITY OF LOCAL GOVERNMENT SECTOR IN POLAND DURING THE 2008-2013 ECONOMIC SLOWDOWN PERIOD

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ABSTRACT

The crisis, which began in 2008, had a negative impact on the financial condition of local governments across the European Union. In Poland, the debt of the local government sector increased from 2.3% of GDP in 2008 to 4.2% of GDP in 2013. The growing indebtedness influenced the scope of countercyclical policies of local governments. At present, such policies appear as hardly sustainable in the context of future debt repayments and the required deleveraging process. The paper shows simulations concerning the ability of local governments to service their accumulated debt. In a moderately optimistic scenario when there is no new borrowing, over 25% of local governments will need more than 15 years to repay their existing debts. Although in 2013 the financial indicators showed sufficient space for debt servicing for 95% of local governments, the sector remains highly vulnerable to future adverse scenarios. The use of random sampling computational algorithms (Monte Carlo method) applied to the local government financial ratios based on free operating cash flow and net debt confirms the sector's negative credit risk exposure. Even modestly adverse scenarios show that ca. 20% of local governments will reach alarmingly low levels of their debt service indicators in the near future. The larger municipalities appear to be the local government subcategory with the highest credit risk exposure.

JEL: C15, H72, H74, R50

KEYWORDS: Local Governments, Local Government Risk, Debt Repayment Capacity, Monte Carlo Method

INTRODUCTION

The crisis which began in 2008 had a negative impact on the financial condition of local governments (LGs) across the European Union. Their debt/GDP ratio grew from an average of 5.5% in 2008 to 7.7% in 2013. The adverse economic environment influenced in a negative way the financial standing of LGs and their ability to repay existing debts. As a result, some LGs may encounter difficulties in providing public services. This situation may hinder future economic growth from three basic perspectives: investment demand decrease, fiscal consolidation negative side effects and growth of credit risk and financial costs.

This paper investigates the ability of Polish local governments to repay their debts as well as their vulnerability to adverse economic scenarios. It shows LGs' credit risk exposure across different LGs' subcategories. The paper is organized in a following way. Firstly, there is a brief literature overview related to the topic. Secondly, the data and methodologies used in the research are described. Then, the research is presented, split in two parts. The first part is devoted to assessment of financial standing of LGs both from the perspective of statutory ratios and financial ratios based on operating surplus. It shows also a time horizon required to repay existing debts by specific LG subcategories. The second part of the research presents the simulations of LGs risk profile changes under specific scenarios. These involve different

patterns of changes in their revenues and expenses. The modelling is conducted with the use of the Monte Carlo method, developed by Metropolis and Ulam (1949).

LITERATURE REVIEW AND BACKGROUND

Several pieces of research shows that LGs' spendings have relatively high productivity (Blöchliger 2013), (Blöchliger, Égert 2013), (Fredriksen 2013) and thus effectively support economic growth. However, the historically high levels of LG investments became no longer sustainable – in relation to GDP they already dropped from 2.0% in 2009 to 1.6% in 2013, i.e. the lowest level since 2005. In addition, the current situation may require the implementation of stricter fiscal consolidation policies. The debate on how to implement fiscal consolidation to favor long-term growth is ongoing. The impact of fiscal policy tightening on growth is analyzed in (Barrell et al. 2012). It shows the possible adverse impact of fiscal consolidation on growth in the short-term horizon. Macroeconomic risks associated with deleveraging, including their impact on consumption, are modelled in (Eggertsson, Krugman 2012). There is also indicated a risk that increased productivity can reduce output in the case of the deleveraging process. Flaws of the fiscal austerity model for municipalities as a response to the crisis are shown (Peck 2014) and (Donald et al. 2014).

The economic slowdown also worsened the risk profile of local governments (Vammalle, Hulbert 2013). Since 2010, the local government sector in the European Union countries has experienced an overall decrease of its productivity, accompanied by a relative deterioration of its financial standing (Kluza 2014). This research further investigates the consequences of economic slowdown on the LG ability to service their current debt burden. Firstly, it conducts analysis of the financial standing of Polish LGs from the corporate finance perspective. That includes the calculation of ratios based on free operating cash flow, which are seldom considered by public sector entities. The constructed risk measures are based on (Palepu et al. 2004, ch. 9 and 14) and (Jajuga 2009) as well as (Peterson 1998), who describes a dedicated approach to measure and manage LG credit risk. The research also presents assessment of existing debt repayment capacity of LGs in Poland.

Simulations of changes in financial parameters are often conducted with the Monte Carlo method. This method is employed inter alia for estimating the value of real estate investments (Kelliher, Mahoney, 2000), risk of investments projects (Pawlak, 2012), valuation of companies (Białas 2012) as well as public sector policies evaluation for example in health care sector (CP Yeh et al. 2014). The method has also vast application in the banking sector in credit risk assessment (Chyliński, 1999). The method involves random sampling of variables representing probability distributions for particular financial parameters. In this research, it allows us to measure future changes of debt repayment capacity for LGs and their vulnerability to certain parameters.

DATA AND METHODOLOGY

The analysis encompasses all local governments (LGs) in Poland, i.e. 2,809 entities: rural boroughs (RB), municipal-rural boroughs (MRB), municipal boroughs (MB), towns with county rights (TWCR), counties and provinces. All data about Polish LGs used in this research comes from the BESTI@ system run by the Ministry of Finance of Poland. Data regarding the European Union countries comes from the Eurostat online database. Note that the analyzed debt of LGs does not include the liabilities of LGs' public health care entities which amounted to PLN 3.9 bn at the end of 2013 as well as liabilities of cultural entities and similar institutions (PLN 0.5 bn). Including these contingent liabilities in LG debt would raise the debt/revenue ratio in 2013 from 37.7% to 40.1% (without increasing the denominator by the revenues of these entities). The debt ratios also do not include the debt of utilities and other municipal companies which are separate legal entities.

Simulations of changes in the financial standing of LGs were carried out with the Monte Carlo method. A detailed description of the method and its vast applications can be found, for example, in (Hendry, 1984) and (Niemiro, 2013). In short, the method, instead of solving a numerical problem, is based on estimating a solution with the use of a random variable. The variable is chosen *n* times in a series of independent drawings. With the increasing number of repetitions, an obtained solution tends to be an effective estimator of a mean of simulated phenomenon. The random numbers used in simulations should reflect a relevant distribution consistent with the properties of the analyzed process. Calculations for the Monte Carlo method were conducted with Microsoft Excel 2010 and Microsoft Visual Basic for Applications 7.0. Random numbers were generated with the Excel RAND function (pseudorandom number generator).

ASSESSMENT OF FINANCIAL STANDING OF LOCAL GOVERNMENTS IN POLAND

During the recent economic slowdown, the debt of the local government sector in Poland increased from PLN 28.8 bn in 2008 to PLN 69.2 bn in 2013 with an annual growth rate (CAGR) of 19%. In relative terms, it grew from 2.3% of GDP in 2008 to 4.2% of GDP in 2013. This was a result of systematic factors such as a slowdown of revenue growth combined with an increased amount of carried out commissioned tasks as well as individual policies of each entity in both cost management and implementation of environmental and infrastructural projects.

Polish local governments implemented vast countercyclical policies. Their direct investments amounted on average to 13% of total investment in the Polish economy in the 2008-2013 period. However, the peak stage of investment spending took place in the 2009-2010 period with their 3.2% share in GDP. In 2013, LG investments dropped to 2.1% of GDP, the lowest for the last eight years. This trend confirms that former sizable investment policies of LGs appeared to be unsustainable in the context of servicing the accumulated debt burden. Higher debt is typically associated with increased credit risk. The standard approach to evaluate LG sector risk is by using the gross debt to total revenue ratios – see Table 1. However, such an approach delivers little information on debt repayment capacity.

Table 1: Ratio of Gross Debt to Total Revenues for Local Governments in Poland

	2008	2009	2010	2011	2012	2013	CAGR 2008-2013
MB	19.9%	26.7%	33.3%	36.5%	36.3%	35.0%	13.3%
MRB	19.2%	25.2%	33.2%	37.4%	36.4%	35.4%	12.0%
RB	14.5%	18.3%	26.6%	30.8%	29.5%	28.7%	13.0%
TWCR	25.8%	37.2%	43.5%	49.4%	48.3%	48.0%	14.6%
Counties	15.9%	19.5%	24.2%	26.1%	26.5%	25.5%	13.2%
Provinces	18.1%	15.6%	30.4%	36.9%	40.1%	41.1%	9.9%
Poland	**20.2%**	**26.0%**	**33.8%**	**38.4%**	**38.2%**	**37.7%**	**17.8%**

This table shows the growth of indebtedness of Polish LGs since 2008. The highest debt to revenue ratio persists in the towns with county rights
Source: (Kluza, 2013) updated

For the purpose of the LG financial standing assessment, two alternative indicators are proposed in this paper. They take into account the operating flows in LGs. They could be calculated using official budgetary reports presented by LGs as at the end of each quarter, LGs in Poland are obliged to prepare comprehensive financial statements such as RbNDS (the report on revenues, expenditures and financing flows), RbN (receivables), RbZ (liabilities), Rb27S (detailed revenues), Rb28S (detailed expenditures) etc. To allow exact reference, the formulas are also described with the use of this notation.

a. EBITDA / Gross Interest (EBITDA/GI ratio)

$$\frac{EBITDA}{Gross\ Interest} = \frac{RbNDS,A1-RbNDS,B1+Rb28S,par.801\_806\_807\_808\_809\_811\_812\_813\_814}{Rb28S,par.801\_806\_807\_808\_809\_811\_812\_813\_814} \quad (1)$$

Note, that in the case of LGs, EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization) is equal to EBIT (Earnings before Interest and Taxes) since LG reporting in Poland is based on a cash basis. The typical warning signal is generated if this indicator is below the value of 2.0 for a given entity. Values below 1.0 show alarmingly low debt service capacity, approaching Ponzi-schemes.
b. FOCF / Net Debt (FOCF/ND ratio)

$$\frac{FOCF}{Net\ Debt} = \frac{RbNDS,A1-RbNDS,B1+Rb28S,par.801\_806\_807\_808\_809\_811\_812\_813\_814}{RbZ,E-(RbN,N1+RbN,N3)} \quad (2)$$

In this indicator, the net debt should include only interest bearing liabilities. FOCF (Free Operating Cash Flow) is the equivalent of operating surplus as defined in par. 242 of Public Finance Law excluding accumulated historical budget surpluses, if any. For financially sound entities this indicator should amount to at least 20%. Indicators based on total debt service (encompassing both principal and interest payments), e.g. debt service to recurring revenues as proposed by (Peterson 1998), are not recommended due to the high level of refinancing loans and bonds each year by LGs in Poland. As a result, such indicators are highly distorted.

Table 2: Alternative Financial Ratios for the Local Government Sector

	2008	2011	2013
EBITDA/GI	13.76	4.94	5.96
% of LGs with EBITDA/GI below 2.0	5%	16%	5%
FOCF/ND	1.75	0.27	0.31
% of LGs with FOCF/ND below 0.2	7%	36%	21%
Net debt / total revenues	7.7%	29.3%	30.3%

This table shows weakening financial position of Polish LGs since 2008 from the perspective of debt service and related indicators.

The indicators in Table 2 show that the worst financial situation of Polish LGs was in 2011. Although in 2013 there was some improvement of indicators based on operational surpluses, yet the free resources of LGs were systematically reduced as the net debt grew, and in 2013 for the first time it exceeded 30% of their revenues. In addition, the improvement between the years 2011 and 2013 was to a large extent the effect of a drop in market interest rates. In 2011, the average WIBOR 1M rate amounted to 4.37% compared to 3.04% in 2013, which had a direct impact on EBITDTA/GI ratios.

The financial standing of LGs strongly differs between LG subcategories as presented in Table 3 below. Notably, the rural boroughs, which hold relatively low debt as well as adequately large operating surpluses to service it, have the best risk profile. The second subcategory of LGs with a relatively safe financial situation are the provinces. Like the rural boroughs, they have large operational surpluses compared to debt service levels. Data shows that TWCR have the worst financial standing among LGs from the perspective of debt service capacity. Their ND/R ratio already reached 40% in 2013 and their average FOCF/ND ratio is dangerously low – for the last four years it has fluctuated around the 20% level. As a result, more than half of TWCR do not exceed the 0.2 threshold regarded as a safe level for the FOCF/ND ratio. Moreover, 17% of TWCR have an EBITDA/GI ratio below 2.0.

The accumulated debt may be repaid by LGs with either operational surpluses or sale of fixed assets. The analysis of LGs' financial reports and long-term financial plans reveals that numerous LGs will not be able to repay fully their debts within a 15-year time horizon based on their current historical financial flows. Indirectly, this confirms that LGs need to diminish their investment activities. The results of this debt repayment simulation are presented in Table 4 and Table 5. In the very optimistic scenario, it is assumed that each entity will spend its total annual operating surplus and proceedings from sales of fixed assets on debt repayments and, in addition, it will not borrow any new debt. In the more realistic scenario, it is assumed that 40% of these resources will be spent on debt repayment and there will be no new borrowing.

For both scenarios, the annual operating surpluses and sales of assets are calculated as an average from the 2011-2013 values.

Table 3: Financial Standing Changes – Break Down by Local Government Subcategories

	2008	2011	2013	2008	2011	2013
	TWCR (65 entities)			**RB (1571 entities)**		
EBITDA/Gross Interest	10.39	3.42	4.33	24.06	7.84	10.05
% of LGs with EBITDA/GI below 2.0	3%	22%	17%	3%	14%	2%
FOCF/Net Debt	0.90	0.18	0.21	11.58	0.44	0.59
% of LGs with FOCF/Net Debt below 0.2	5%	62%	57%	5%	32%	15%
	MB (241 entities)			**Counties (314 entities)**		
EBITDA/Gross Interest	14.10	4.46	5.57	6.69	5.23	5.71
% of LGs with EBITDA/GI below 2.0	8%	22%	10%	15%	12%	9%
FOCF/Net Debt	2.15	0.25	0.30	1.58	0.39	0.35
% of LGs with FOCF/Net Debt below 0.2	8%	44%	31%	13%	25%	26%
	MRB (602 entities)			**Provinces (16 entities)**		
EBITDA/Gross Interest	14.33	5.05	6.50	32.77	7.52	7.20
% of LGs with EBITDA/GI below 2.0	4%	20%	5%	0%	6%	0%
FOCF/Net Debt	1.54	0.27	0.34	-	0.43	0.35
% of LGs with FOCF/Net Debt below 0.2	8%	44%	26%	0%	12%	12%

This table shows that financial standing is strongly differentiated among specific LG subcategories. The rural borough are the most sound subcategory. The towns with county rights and the municipal boroughs have the most inferior risk profile.

Even in the very optimistic scenario regarding budgetary policy of individual entities, it turns out that 112 LGs will require more than 15 years to repay their gross debts. This group is over-represented by the counties. Switching to the more realistic scenario (with 40% of free financial resources spent on debt repayment), reveals that over 600 Polish LGs, including 50% of towns with county rights, would not be able to repay their debt in the 15-year horizon.

Table 4: Minimal Period Required to Repay Existing Debts – the 'Very' Optimistic Scenario (100% of Annual Operating Surplus and Proceedings from Sale of Assets Spent on Debt Repayment and No New Borrowing)

	No. of LGs	Below 3 years	3-5 years	5-10 years	10-15 years	15-20 years	Above 20 years
MB	241	32%	29%	30%	6%	2%	1%
MRB	602	33%	28%	28%	8%	2%	2%
RB	1571	50%	23%	21%	4%	2%	2%
TWCR	65	12%	28%	45%	11%	2%	3%
Counties	314	37%	24%	24%	8%	2%	6%
Provinces	16	31%	44%	25%	0%	0%	0%
Poland	2809	42%	25%	24%	5%	2%	2%

Table 5: Min. Period Required to Repay Existing Debts – The Moderately Realistic Scenario (40% of Annual Operating Surplus and Proceedings from Sale of Assets Spent on Debt Repayment and No New Borrowing)

	No. of LGs	Below 3 years	3-5 years	5-10 years	10-15 years	15-20 years	Above 20 years
MB	241	7%	10%	33%	20%	13%	17%
MRB	602	10%	10%	28%	20%	13%	18%
RB	1571	19%	14%	29%	17%	9%	12%
TWCR	65	2%	5%	18%	25%	23%	28%
Counties	314	14%	9%	27%	16%	11%	23%
Provinces	16	6%	0%	44%	38%	13%	0%
Poland	2809	15%	12%	29%	18%	11%	15%

The Table 4 and Table 5 present the results of static simulation. They show how many years are required to repay existing debts by specific LGs subcategories under two distinctive scenarios. The simulations prove that the weakest operational surplus is in 6% of the counties, and in fact these entities are close to insolvency. In addition, the towns with county rights are strongly vulnerable to adverse scenario changes.

MONTE-CARLO SIMULATIONS OF DEBT SERVICE INDICATORS FOR LGs

The above analyses show that several local governments have a relatively constrained financial standing at the end of 2013. The important question is how their situation may change with different future economic scenarios. This could be modelled with Monte Carlo simulations. In this research, triangular distributions of variables were implemented in the simulations. Such distributions are preferred in simulating many phenomena in finance and risk areas due to their natural easiness of reflecting scenarios for which there are predicted both the asymmetric changes of variables and the most likely outcome (Chyliński, 1999). A triangular distribution is a continuous probability distribution with a probability density function shaped like a triangle. It is defined by three values: the minimum value (*min*), the maximum value (*max*), and the peak value (*mode*), where $min \leq mode \leq max$.

The probability density function is defined as:

$$f(x) = \begin{cases} \frac{2(x-min)}{(max-min)(mode-min)} & , \quad min \leq x < mode \\ 1 - \frac{2(max-x)}{(max-min)(max-mode)} & , \; mode \leq x \leq max \end{cases} \tag{3}$$

The cumulative distribution function is defined as:

$$F(x) = \begin{cases} \frac{(x-min)^2}{(max-min)(mode-min)} & , \quad min \leq x < mode \\ 1 - \frac{(max-x)^2}{(max-min)(max-mode)} & , \; mode \leq x \leq max \end{cases} \tag{4}$$

For the purpose of conducting the simulations, the inverse function of the cumulative distribution function is used. It has a form as follows:

$$F^{-1}(P) = \begin{cases} min + \sqrt{P(max-min)(mode-min)} & , \quad P < \frac{mode-min}{max-min} \\ max - \sqrt{(1-P)(max-min)(max-mode)} & , \; P \geq \frac{mode-min}{max-min} \end{cases} \tag{5}$$

In the simulations P is drawn randomly from the <0, 1> uniform distribution. In the case of the Monte Carlo method it is also important to determine the adequate number of iterations. The method assesses the estimation error based on the number of repetitions. So using the standard equation for the total error ($\varepsilon = \frac{3\sigma}{\sqrt{N}}$), where σ is the standard deviation of the random variable and N is the number of repetitions it is possible to derive the minimal required number of repetitions for a specific error level. For the triangular distribution the variance (σ) and the mean ($\bar{x}$) are defined as:

$$\bar{x} = \frac{min+mode+max}{3}, \quad \sigma = \frac{min^2+mode^2+max^2+min \cdot mode+min \cdot max+mode \cdot max}{18} \tag{6}$$

The distributions analyzed in this paper are generally within the range <80%·*mode*; 140%·*mode*>. That brings the required number of iterations to $N = 49$ for 5% expected value error, $N = 308$ for 2% expected value error or $N = 1230$ for 1% expected value error. Since this research is devoted to depicting some general trends in credit standing changes for local governments, it does not require the top precision (i.e. a very high number of iterations) which is time and capacity consuming. However, 50 iterations may not adequately reflect the desired distribution. To find an acceptably small value for the number of iterations there were conducted goodness of fit tests (χ^2) - the 5000-iteration distribution was compared with the distributions obtained with fewer iterations. The results of the tests, presented in Table 6, demonstrate that

50-iteration distribution is close to significant difference from a model distribution (5000 iterations): *p*-value 0.078, thus it does not have the properties of a desired triangular distribution. Increasing the number of iterations to 100 significantly increases certainty that the obtained distribution is not statistically different from the model distribution (*p*-value 0.222). As a result, all simulations of local government financial ratios were conducted with 100 drawings of the random variable.

Table 6: The Results of Goodness of Fit Tests (χ^2) between the Model Distribution (5000 Iterations) and Distributions Obtained with Smaller Number of Iterations

5000-iteration distribution compared to:	**χ^2 statistics**	***p*-value**
50-iteration distribution	15.52	0.0777
100-iteration distribution	11.84	0.2224
200-iteration distribution	7.70	0.5645

Note: all analyzed distributions have the same parameters, i.e. *mode* = 100 and the range: <80%·*mode*; 140%·*mode*>. Degrees of freedom = 9.
This table shows that 50 iterations in the Monte Carlo simulation may not be adequate to obtain an adequate triangular distribution. The proper number of iterations should amount to 100.

The Monte Carlo simulations were run for four financial categories: operating revenues, operating expenses (excl. debt service expense), debt service expenses, cash and cash equivalents (balance sheet category). Based on the simulation results, the ratios of *EBITDA/GI* and *FOCF/ND* were calculated for the *next* year. The simulated financial categories are independent from each other. In practice, some indirect dependence takes place between operating revenues and operating expenses, as decision makers take into consideration operating deficit among other key indicators during a budgeting process. However, the interdependence of these two categories is not strict since usually a larger proportion of expenses is fixed (in nominal terms or as indexed categories) compared to revenues, which are more flexible and subject to current managerial and political decisions.

Table 7 shows assumptions for each scenario. The basic scenario is relatively conservative, leading to an improved financial standing of local governments compared to the previous year. Other scenarios assume more relaxed spending policy of local governments, although the growths of expenses are also relatively modest, within realistic ranges. In addition, all scenarios assume a decrease of debt service costs, which reflects the current cycle of interest rates drops in Poland. The simulations for the scenarios in Table 7 were conducted for each local government in Poland. As a result 2 809 000 observations were obtained (for ratios *EBITDA/GI* and *FOCF/ND*).

Table 7: Scenario Assumptions for Monte Carlo Simulations

	1. Basic scenario			**2.A Scenario**			**2.B Scenario**		
	min	***mode****	***max***	***min***	***mode****	***max***	***min***	***mode****	***max***
Operating revenues	-10%	100	20%	-10%	100	20%	-10%	100	20%
Operating expenses (excl. debt service expenses)	-10%	100	20%	-10%	100	**25%**	-10%	100	**33%**
Debt service expenses	-10%	100	5%	-10%	100	5%	-10%	100	5%
Cash and cash equivalents	-20%	100	10%	-20%	100	10%	-20%	100	10%

	3.A Scenario			**3.B Scenario**		
	min	***mode****	***max***	***min***	***mode****	***max***
Operating revenues	-10%	100	20%	-10%	100	20%
Operating expenses (excl. debt service expenses)	-10%	**102**	20%	-10%	**102**	**28%**
Debt service expenses	-10%	100	5%	-10%	100	5%
Cash and cash equivalents	-20%	100	10%	-20%	100	10%

** mode = 100 denotes using as a mode the value from the previous year for the given financial category;*
mode = 102 denotes using as a mode the value from the previous year increased by 2%.
Note: min and max parameters are presented as % difference from mode value.
This table contains comparison of parameters for the simulations. The difference between scenarios is only in the operating expenses category.

The summary of simulation results is in Table 8. There are presented proportions of local governments which exceed warning levels for *EBITDA/GI* and *FOCF/ND* indicators. The warning levels of 2.0 and 0.2 for *EBITDA/GI* and *FOCF/ND,* respectively, are typical thresholds which, in the case of commercial entities, indicate high risk of non-repayment of the existing debt. However, in the case of public sector entities, which by definition do not face market risk and have legislative instruments to secure additional revenues, these levels are rather of an indicative nature, showing the overall financial strength of the sector. Thus, as it is presented in Table 8, even with modestly negative scenarios, like Scenario 2B and 3B, there will be created noticeable financial strains in ca. 40% of local governments.

The alarming levels for *EBITDA/GI* and *FOCF/ND* ratios amount to 1.0 and 0.1 respectively. As the Monte Carlo simulations show such levels may be crossed by 10%-20% of local governments, depending on the scenario. Comparing this with the current proportion amounting to ca. 2%-4%, the analysis indicates the potential for a deep credit risk deterioration of the local government sector in Poland. Comparison between the *EBITDA/GI* ratio distributions in the scenarios is presented in Figure 1. As the simulations reveal, for the 20th percentile the *EBITDA/GI* ratio is more than 2.5 times lower in Scenario 2B and 3B than in the basic scenario.

This indicates a high vulnerability of local governments with a currently weak financial standing to any adverse changes in their budgets. The adverse changes may be caused by, for example, interest rates increases, future macroeconomic slowdown, growth of local unemployment, increased local migrations or similar and quite likely events.

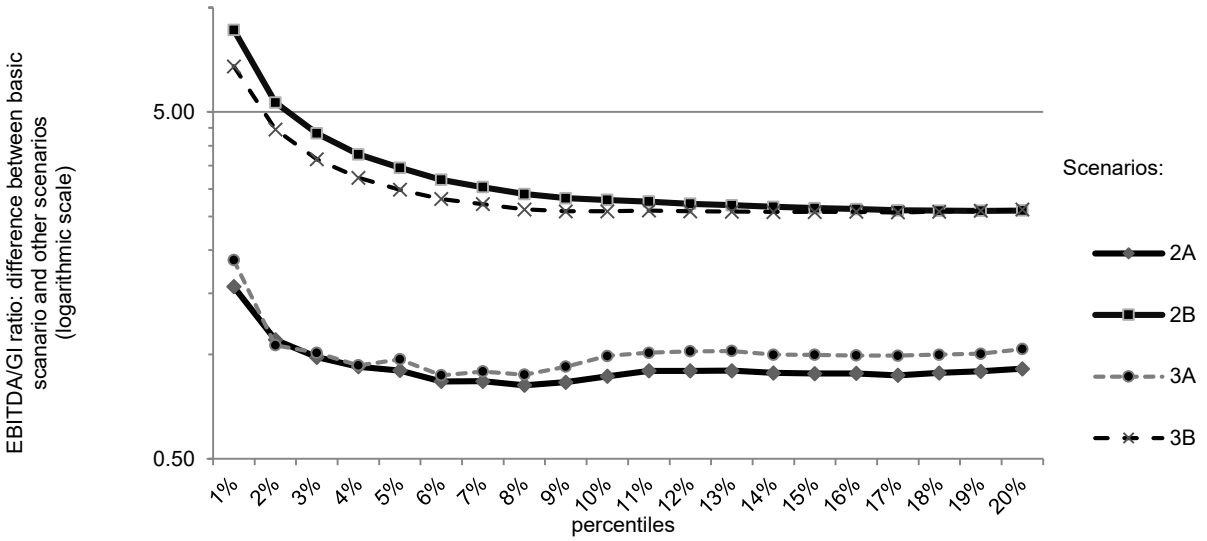
Table 8: Results of Monte Carlo Simulations for All Local Governments

	EBITDA/GI				FOCF/ND			
% of all LGs	**ratio below 1.0**	**hitting the 1.0 barrier**	**ratio below 2.0**	**hitting the 2.0 barrier**	**ratio below 0.1**	**hitting the 0.1 barrier**	**ratio below 0.2**	**hitting the 0.2 barrier**
Initial situation (real data for 2013)	1.4%	-	4.7%	-	4.8%	-	21.0%	-
1. Basic scenario	1.4%	1.4%	4.3%	4.7%	4.8%	6.1%	20.2%	25.6%
2.A Scenario	3.6%	10.0%	9.0%	17.8%	9.7%	17.4%	28.4%	35.2%
2.B Scenario	12.5%	22.2%	53.4%	62.3%	23.4%	59.9%	43.2%	70.7%
3.A Scenario	4.0%	4.4%	10.4%	11.1%	10.6%	13.3%	29.7%	35.4%
3.B Scenario	13.8%	39.1%	23.5%	48.9%	25.0%	47.0%	44.0%	60.8%

This table shows the results of the Monte Carlo simulations for all analyzed scenarios. The "hitting the barrier" ratios indicate the percentage of entities which have in their ratio simulated distributions at least one observation below the indicated ratio level. Although the average value of a given ratio for such entities may be above the warning level, there exists a perceptible probability that a specific scenario may end up for them with falling below the warning level. The simulations show that in the scenarios 2B and 3B ca. 40% of LGs may reach alarmingly low levels.
Note: the statistics are shown for the mean values of each entity's distribution.

The weakest financial standing is exhibited by TWCRs. These major municipalities are highly vulnerable to even mildly negative scenarios such as Scenario 2A and 3A. One third of them may have the analyzed indicators at alarming levels, regardless of the simulated scenario, and in the future they will require implementation of austerity plans or similar budgetary policies. Although this category consists of only 65 entities out of 2809 local governments, it covers 33% of Poland's population and 35% of all local government revenues. Thus, financial troubles of the towns with county rights may create systemic problems for the whole public sector. The simulation results for TWCR are shown in Table 9.

Figure 1: Comparison of EBITDA/GI Ratio between Basic Scenario and the Other Scenarios. Distribution of Results for the First 20 Percentiles



This figure shows differences between scenarios in the first 20 percentiles for total LG population. The comparison is presented for the simulated mean values of EBITDA/GI ratios.

Table 9: Results of Monte Carlo Simulations for the Towns with County Rights

	EBITDA/GI				FOCF/ND			
% of All LGs	**Ratio below 1.0**	**Hitting the 1.0 Barrier**	**Ratio below 2.0**	**Hitting the 2.0 Barrier**	**Ratio below 0.1**	**Hitting the 0.1 Barrier**	**Ratio Below 0.2**	**Hitting the 0.2 Barrier**
Initial situation (real data for 2013)	5%	-	17%	-	14%	-	57%	-
1. Basic scenario	3%	5%	17%	17%	14%	20%	55%	63%
2.A Scenario	12%	23%	25%	45%	32%	43%	65%	74%
2.B Scenario	29%	78%	51%	86%	55%	88%	82%	89%
3.A Scenario	14%	17%	29%	31%	34%	40%	65%	78%
3.B Scenario	32%	68%	52%	77%	58%	75%	82%	88%

This table shows the results of the Monte Carlo simulations for the towns with county rights. TWCRs' vulnerability to adverse economic scenarios is much bigger than in the case of other LG subcategories – see Table 8 for comparison.

CONCLUDING COMMENTS

The recent economic crisis had a negative influence on the financial standing of local governments. This paper investigates its impact on local governments' ability to repay the debts, which they accumulated as a result of their anticyclical policies during the economic slowdown. The analysis encompasses all local governments in Poland for the 2008-2013 period. The evaluation of their financial soundness is performed with the financial ratios based on operating surplus as well as the Monte Carlo simulations.

The research shows that over 25% of local governments in Poland will need more than 15 years to repay their debts even under relatively optimistic assumptions. Additionally, the conducted Monte Carlo simulations of the financial ratios based on free operating cash flow and net debt show that the sector remains highly vulnerable to future adverse scenarios such as an increase of operating expenses. Depending on the scenario, ca. 20% of Polish local governments cross significantly the warning levels for their *EBITDA/GI* and *FOCF/ND* ratios. The towns with county rights are the most unsafe entities from the credit risk perspective.

Weak operating surpluses combined with negative credit risk exposure indicate that local governments in Poland will not be able to continue their active investment policies which they carried out in the 2009-2012 period and the process of deleveraging is required. In addition, some local government categories like major municipalities may become a burden for central budget finances in the case of further negative macroeconomic shocks. This indicates a need of further research focused on both budgetary rules securing adequate financing for local governments as well on developing legal framework for municipal debt restructuring policies.

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