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FISCAL DISCIPLINE ASSESSMENT MODEL FOR BULGARIAN MUNICIPALITIES

This article examines the fiscal stability of Bulgarian municipalities in conjunction with financial discipline, which is crucial for carrying out the criteria and indicators set up by Bulgarian Public Finance Act (2017). An evaluation model has been developed to assess the propensity of municipalities to observe fiscal discipline, which is a prerequisite for their financial stability. The study covers all municipalities in Bulgaria (265 municipalities in total) irrespective of their population size and economic potential. The evaluation in the model is complex and dependencies are drawn between the financial indicators that characterize the municipalities' financial state and the fiscal discipline. The findings and the results of the model contribute to the existing literature on local public finance by empirically developing indices for assessment of the dependency of fiscal stability and fiscal discipline.
JEL: H10; H11; H7

Introduction

Two major components stand out in the structure of the study – the correlation between the economic situation of the municipality, the financial stability and the financial discipline, i.e. the fulfilment of the defined indicators on the fiscal condition of the municipalities. The purpose of the study is to evaluate the fiscal discipline of the municipalities in the short term according to a certain methodology based on developed complex indexes. The subject matter of this study is an assessment of financial stability through the impact of economic and demographic indicators and the observance of fiscal discipline for Bulgarian municipalities.

The study is tailored to the intended purpose, which is the following: 1) an overview of opinions expressed in the economic literature on interrelated concepts that characterize local finances and their management, such as financial stability, fiscal stability and fiscal discipline: 1) An overview of the criteria developed within the Ministry of Finance methodology for identifying municipalities facing financial difficulties; 2) The methodology and the hypotheses of the study are presented; 3) The main characteristics of the study and the relevant impact assessment results for economic and demographic factors are presented through the development of the K1 index for assessing the economic, social

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and administrative potential of the municipality and the K2 and K3 indices for Tendency for violation of fiscal discipline; 4) Identifying of the main results of the model and formulating conclusions concerning the reliability of the financial situation of the municipalities according to the conditions/criteria established by the Public Finance Act and whether they can help to better present the real financial situation of the municipalities and compliance with financial discipline can be a means of managing local finances.

Understanding financial stability and fiscal discipline in the study context

In the framework of this study, basic concepts, such as financial stability and fiscal discipline, are used. In view of the different content of these concepts in the scientific literature, the applied analyzes and the regulatory framework, it is correct to specify their content and scope.

Financial stability in a broad sense is the ability of a local authority to ensure the sustainability of its incoming and outgoing cash flows over time, while at the same time achieving its goals in the short and long term. In this sense, in the context of municipal finances, this should mean that the municipality has the ability to provide financial resources to cover its core operating costs and policy implementation by properly planning its costs and revenue over time. At the same time, however, the Bulgarian municipalities and the Ministry of Finance provide information on their financial characteristics only related to the budget of the municipality in individual years. Thus, for some of the key indicators needed to analyze the stability of municipal finances over time, such as the total credit exposure of municipalities and the maturity of their liabilities, there is no quantitative information. Another issue relevant to the availability of public data is related to investment activity and sources of funding, as projects funded with targeted available funds (from different EU funds or Council of Ministries) are not directly reflected in municipal budgets. All these limitations, related to the lack of relevant information, are explained to a big extent by the lack of research in the scientific literature devoted to municipal financial stability in particular. In order to avoid this problem, within the framework of the present study we will understand financial stability as „the ability of the municipality to provide sufficient financial resources within the separate budget year in order to fulfil its legal functions, including policy implementation at a local level“, using data and financial indicators for the annual implementation of municipal budgets in Bulgaria.

Fiscal discipline is usually associated with the ability of budget municipalities to comply with the rules for forming and implementing their budgets. The legal definition in the PFA involves the implementation of a set of specific criteria that constitute the legal framework of the concept and its scope. It should be noted that some of them are of a financial nature (such as covering the costs of local activities with their own revenues). For the purposes of the study, fiscal discipline is understood as "The ability of the municipality to meet its planned budgets, both in terms of the structure and magnitude of its revenues, and in terms of cost, and its commitment to bear costs", using for this purpose data on financial indicators for the annual implementation of municipal budgets in Bulgaria. The difference in concept is due to the effort to draw a demarcation line between financial stability and fiscal discipline and seek a relational relationship between them within the present study.

1. Definitions and Literature Review

Before presenting the evaluation model and the findings of the study, we shall briefly review the existing definitions, which reveal the different characteristics of financial stability, fiscal stability and financial management of municipalities, as well as various studies which have been published and are used in the field.

Terms used in the literature which characterize financial stability of municipalities to a various degree are fiscal stability, fiscal position, financial conditions and fiscal stress. Essentially, all of the definitions encompass to some extent the ability of local governments to maintain stable financial conditions and budget balance, and to satisfy the financial obligations for public service delivery and prosperity of people. Financial stability is a broad term that includes a variety of indicators that illustrate the diverse aspects of municipalities' financial management, such as: financial management capacity, macroeconomic factor impacts, legislative and business environment impacts. The Organization for Economic Cooperation and Development (OECD) defines financial stability as the "ability of local government to maintain public finances at a credible and serviceable position over the long term" (OECD, 2013).

In the Bulgarian economic literature, the issues of financial stability, the problems of the fiscal decentralization of the municipalities are examined. Analyzes, articles on financial stability, municipal finance management stand out (Ivanov,2017) The relationship between the decentralization policy and the financial condition of the municipalities has been deeply explored, as well as a system of indicators for assessing the financial condition of municipalities in the annual report "The Road to the European Union and the Balance of the First 10 Years, Annual Report of the Institute of Economic Research". In relation to a system of indicators for assessing the financial condition of the municipalities, Ivanov (2017) points out that "the selected indicators address the influence of the management factors on the financial situation, they set limits, thus becoming evaluation criteria and are regulated in the Public Finance Act ". The financial indicators for assessing the financial condition of the municipalities are analyzed in the article by Ivanova and Kusheva (2017), the authors believe that "the financial indicators of the Bulgarian municipalities can be used not only for the purposes of implementing the financial recovery rules but also for the purposes of better financial management and control." (Ganev and Aleksiev, 2018) in a study on fiscal decentralization "point out that the procedure for financial recovery of municipalities has a disciplinary character – both for those who receive interest-free loans and for all the others". Fiscal decentralization and fiscal management of the Bulgarian municipalities is an extensively explored topic in the monograph "Fiscal Decentralization and Financial Management of the Municipalities in Bulgaria" by Zahariev (2017).

In reference to fiscal stability

Fiscal stability refers to well-functioning financial management systems enabling local governments to manage financial resources effectively and responsibly, to maintain sustainable, balanced budgets and to apply imposed fiscal rules by the governments so that they meet their short and long term financial and operational obligations. (Hendrick, 2011)

defines fiscal stability as "the ability of the municipality to meet its administrative and capital (investment) needs by maintaining and developing its own assets in accordance with the current and future demand for the provided public services, while also adapting to possible external influences". Roberto Cabaleiro Casala et al. (2009) consider as key the determination of the adaptability of the budgeted costs and revenues to changes in the external environment or generally known as the fiscal stability analysis economy. Groves et al. (2003) state that "the financial condition of a local authority can be assessed by measures of cash solvency, budgetary solvency, long-run solvency and service-level solvency".

In reference to Fiscal discipline

There is no strict definition of fiscal discipline in the literature. The term 'fiscal discipline' in public finance literature has been used broadly. Fiscal discipline in the area of public finances is usually linked to the ability of public institutions to limit the costs associated with the performance of their assigned functions within the available budget. Musgrave's (1989) concept of financing the deficit is related to "cutting back on spending to the limits of available finance and fiscal discipline as part of the budgetary control process". The set of administrative, business and investment functions assigned by legislation to the local government is extremely broad, which affects both the budgeting process and municipal budgets. Own revenues in these budgets represent a relatively small part of the required financial resources, as a result of which the municipalities are additionally financed by the central budget. In this sense, the fiscal stability of the municipalities is directly related to the country's fiscal indicators. The lack of financial discipline in the spending of municipal funds makes it necessary for the centralized state budget to cover unplanned deficits. In this respect, Petrov (2017) highlights that "Practices for continuous additional targeted funding and covering municipal budgets by the state budget raise the questions the effectiveness of the local administration to encourage the economic and social development".

Fiscal discipline is applied to limit the expenditures and to guarantee a reasonable budget. The fiscal discipline of municipalities in this study refers to fulfilment financial indicators, which are connected with achieving financial robustness and stability of municipal finance.[2]

In the present study, a model for evaluation of municipalities in terms of fiscal discipline has been developed. In developing the evaluation model, the author assumes that local authorities possess the ability to fulfil administrative commitments related to their financial obligations to provide quality public services and to maintain stable fiscal conditions.

[2] Budget discipline" within the framework of this paper refers to the specified fiscal parameters with the implementation of an article. 130a of the Public Finance Act. The Ministry of Finance periodically publishes the data on the financial situation of the municipalities and municipalities undergoing a financial recovery procedure for 2017. In order to achieve financial sustainability, municipalities with deteriorated financial status develop a plan for financial recovery.

2. Capacity of municipalities to manage municipal finances

The topic of the study on fiscal discipline is up to date as the financial situation of the municipalities is monitored by the Ministry of Finance through a set of criteria established by the Public Finance Act. A methodology for the financial situation has been developed which covers the indicators that refer to the formulated criteria for the stability and sustainability of the financial condition of the municipalities. The indicators the Ministry of Finance sets refer to fiscal discipline and financial stability of the municipalities. The fulfilment of the criteria and indicators shows the current financial situation; however, the capacity of municipalities to manage municipal finances, to observe fiscal discipline is key to maintaining the sustainability of the municipal budget. Municipalities, which do not meet the financial criteria under the Public Finance Act, fall under the procedure of financial rehabilitation, and this is the reason for the granting of temporary non-interest-paying, this is, in reality, assistance to the municipalities. Under the Public Finance Act, municipalities with financial difficulties are those that meet only three of the six criteria for financial stability/sustainability. In particular, the conditions and the extent to which municipalities comply with them by the end of 2018 are:

- The annual amount of the municipal debt payments for each municipality may not exceed 15 per cent of the average annual amount of own revenues and the total equalization subsidy for the last three years; According to this criterion at the end of 2018 only 8 municipalities, or 3% of all, violate the rule under Art. 32, para 1 of the Public Finance Act.[3]

- Regarding another condition, "The municipal budget expenditures at the end of the year may not exceed 15 per cent of the average annual expenditure for the last 4 years", only 5 municipalities do not meet this condition.

- The condition "Commitments made available at the end of the year for expenditures on the budget of the municipality may not exceed 50 per cent of the average annual amount of the reported expenditures for the last 4 years – the number of municipalities is 34 (12.8% of all).

- The condition "Municipal overdue budget liabilities available at the end of the year may not exceed 5 per cent of the municipal expenditures reported for the last year" makes it difficult for the municipalities and 49 or (18.5%) of them do not meet it.

- The condition "The budget balance of the municipality budget in the last three years may not be negative for each of the three years", only 4 municipalities have reported a negative budget balance of the municipality budget for the last three years.

- Municipalities, whose average collection rate for real estate tax and vehicle tax is below the average collection rate of the two taxes for all municipalities reported for the last

[3] According to Art. 32, para. 1 of the Public Finance Act stipulating that the annual amount of the municipal debt payments for each municipality may not exceed 15 per cent of the average annual amount of own revenues and the total equalization subsidy for the last three years.

year. At an average collection rate of 71.41% for the country at the end of 2018, a total of 116 municipalities (43.8% of all) reported lower parameters.

The Ministry of Finance indicates for 2018 17 municipalities, most of them are small and medium-sized municipalities, which are in the rural category, with the exception of one larger municipality with potential.

It is noteworthy that the number of municipalities with financial difficulties is decreasing, they are 32 for 2018, which is fewer compared to 2017 and 2016. The limitation of the overdue liabilities is also positive, but in total, they amount to 122.2 million BGN, 7% less compared to 2017 (the total amount of overdue liabilities is approximately 157 million BGN). The number of municipalities where municipal debt payments exceed 15% of their own revenues and subsidies decreases. The decrease in the number of municipalities with financial difficulties is due to the received targeted non-interest-bearing loans and not to the improvement of the fiscal discipline.

3. Research design and methodology

A variety of quantitative and qualitative models which are used to describe and characterize the fiscal stability can be found in the economic literature. Quantitative models investigate the dependence between financial stability and financial, economic, social and demographic indicators. The applied methodologies measure the statistical dependence between the amount of cost and revenue, the budget balance, the amount of debt and fiscal stability. The impact of changes in the external environment and the dynamics of the economy on the implementation of the budget of the municipality is assessed through statistical tools (Carroll, Goodman, 2011). Variability or tendency to modify individual budgetary components is considered to be a function of the fiscal structure of the budget (Afonso, 2013) and the local fiscal policy (Afonso, 2013). Moreover, Bland (2013) use a regression assessment of the municipalities' fiscal stability; the main variables are own revenues, local activity costs and delegated costs.

However, some models characterizing the financial stability of the municipalities assess the impact of socio-economic, demographic and political factors. For examples, Wang, Dennis and Sen (2007) summarize the different approaches and consider that the socio-economic environment is another factor when analyzing the financial situation. Kloha (2005) considers that socio-economic factors affect local finances and should not be included as an additional factor in the analysis of the financial situation, no indicator can outline the whole picture of the fiscal position of local government". Groves, Godsey and Shulman (2003) assume that social, economic, and demographic factors influence the financial position of a municipality Zafra-Gomez et al. (2009) assess the effects of socioeconomic indicators and they evaluated of all the elements that make up the financial condition. Wang et al. (2007) analyze the relationship between the financial condition and population (population size and growth rate) and economic factors (personal income per capita, gross state product per capita, and percentage change in personal income), and infer that these variables can be used to predict the financial condition with a certain level of accuracy.

Moreover, stress-test models are used in practice. The goal of the stress tests is to show the vulnerability of the municipal finances, fiscal stability, financial management flexibility, and sustainability of economic, financial and management factors. Generally speaking, the common feature between the stress-test models is that they are developed on the basis of financial indicators that characterize fiscal and financial stability. The standard practice in the Netherlands, Denmark, France, United Kingdom, USA and others show stress tests are a useful tool for financial planning and financial risk management. In other countries, the practice to monitor compliance with financial discipline through specific laws and administrative procedures, which determines the financial stability of the municipalities, has also been adopted.

From the brief review of the methods and practices used for assessing financial and fiscal stability, one could see that there is a similarity between the used indicators, namely, that they measure the quality of financial planning and management, and include impacts of external socio-economic factors, financial discipline, planning and budget management in municipalities. The economic and demographic factors that influence the financial status of the municipality are selected in the evaluation model based on proven significance through correlation analysis.

The criteria for financial stability set by the Ministry of Finance are a form of a centralized approach to municipal finance management. One such centralized approach to assessing and monitoring financial stability is by conducting stress tests that are used in countries with a high degree of fiscal stabilization and local self-government.

3.1. Methodology Description

The elaborated evaluation model aims at analyzing a dependency between socio-economic and demographic factors and financial stability, on the one hand, and at assessing fiscal discipline from a point of view fulfilment financial indicators determined by the Bulgarian Public Finance Act (2017), on the other hand. The model uses a statistical tool, including correlation analysis and multiple regressions. The correlation analysis verifies the relationships between socio-economic, demographic and financial factors. The correlation between the fiscal situation of the municipalities and the economic and demographic indicators has been evaluated on a step by step basis. The regression analysis is used to define the interdependence of the financial variables and fiscal discipline. The main derived indices concern the financial stability and the capacity of local government to follow discal discipline.

The following hypotheses are formulated within the framework of the development and the test of the evaluation model:

Hypothesis 1. The fiscal discipline of the municipalities is not predetermined by the size of the municipality and its social economic and demographic characteristics, but is the result of the actions of the operational management on a municipal level.

Hypothesis 2. There is a statistically significant dependency between the different components of the fiscal discipline assessment and the demographic, social, economic and administrative characteristics of the municipalities.

The following limitations are set in the assessment model:

- It is assumed that municipalities perform their legal functions within their available budgets.
- Data from official public sources are used for individual municipal indicators; and therefore the scope of the rating model with regard to the data used for its construction is limited to the available public information on individual indicators by municipality.
- No sufficient information for individual municipalities, therefore the information is limited to the total debt exposure of all municipalities. For that reason, the model includes those commitments, which are components of the municipal budget for the current financial year, but the effects of long-term financing on the fiscal stability of municipalities over one year are not assessed. Information on investment funding from the European Structural and Investment Funds (ESIF) is only available on a program level, and there is a lack of systematic information available for each municipality.

Data on the financial situation of the municipalities are taken from the Ministry of Finance's assessment of the indicators in the Public Financial Act. The data on the socio-economic indicators are taken from the National Statistical Institute. All 265 municipalities are included in the evaluation model.

Each of the formulated indices, which are the basis for the evaluation of the municipalities, cover variables that affect the financial situation of the municipalities. In the research are selected indicators for which information is reliable and available for all municipalities in the country.

The model is structured in stages in the following logical sequence:

- Identification of factors that can determine or at least affect the financial condition;
- Verification of interdependencies – statistical dependencies between economic, social, demographic and financial variables, which characterize the financial situation of municipalities and measured by correlation;
- Determination of the main variables in the model related to the rating of the municipalities.
- Verification of the continuity of the calculation function of the individual components included in the assessment indices (i.e. a quantity is calculated for each of the municipalities in the country);
- Calculation of rating indices for all municipalities in the country used for rating;
- Formulation of conclusions from the model and test results of the formulated hypotheses.

In the model presented below, three indices are elaborated. Index K1 is used for assessing the economic, social and administrative potential of the municipality, which is considered as a condition in predicting financial stability of municipality. The other two indices (K2 and K3) – to assess the propensity of municipalities to follow financial discipline.

3.2. Model Specification

Assessment of interdependencies between economic, demographic and financial parameters

A correlation analysis has been made[4] to show the degree of dependence between the financial, demographic and economic factors and the financial situation of the municipality. The statistical significance between economic and social factors and the financial stability indicators is presented below (Table 1).

Table 1

A summary of the results of the correlation analysis

Correlation (without § 19)	1. Share of revenue from total income*	2. Coverage of the cost of local activities with revenues*	3. Budget balance compared to total revenues	4. Debt size as a percentage of planned revenues and equalization subsidy	5. Overdue liabilities as a percentage of planned revenue and equalization subsidy	6. Population per one municipal employee	7. Share of wage and social security costs as a percentage of total costs	8. Share of capital expenditure in total costs (investment activity)	Municipal revenue under Art. 45, para. 1, item 1 of the PFA (without §46, §47 and §48)	Municipal expenditure under Art. 45, para. 1, item 2 of the PFA	Budget balance
Total number of unemployed (number)	0.086096	0.198747	0.04345	0.060183	0.035973	0.437288	0.078524	-0.17846	0.25274	0.306223	0.382865
Unemployed up to 29 years of age	0.0935	0.208442	0.037007	0.062456	0.032424	0.451646	0.089738	-0.19296	0.24853	0.304244	0.385446
Unemployed registered more than a year ago	-0.18626	-0.07061	-0.00562	0.008114	0.128915	0.233907	0.148714	-0.10527	0.016894	0.065002	0.037847
Unemployment rate (%)	-0.44617	-0.45382	-0.12666	-0.19276	0.155194	-0.40551	0.142489	0.133436	-0.15975	-0.18387	-0.13718
Average annual income per person (BGN)	0.405964	0.435581	0.084515	0.048173	-0.1397	0.146056	-0.15838	-0.09676	0.077888	0.077404	0.102848
Total area (decares)	0.121055	0.159868	-0.10633	0.086091	-0.06806	0.328415	0.02752	-0.17648	0.187759	0.225434	0.009214
Population density (per 1 km^2)	0.149566	0.218267	0.076782	0.039374	-0.02467	0.3524	-0.00229	-0.0888	0.272335	0.313944	0.508549

[4] The scale used to determine the relevance of the link is: 0-0.2 – poor correlation; 0.2-0.4 – moderate correlation; 0.4-0.6 – significant correlation; 0.6-0.8 – high correlation; 0.8-1 – very high correlation.

Correlation	Size of municipal debt	Overdue liabilities according to budget	Debts for budget expenditure	Budget expenditure commitments	Share of overdue liabilities according to budget from the expenditure for 2016	Share of budget expenditure debt from the average annual expenditure for 2013-2016	Share of budgetary commitments from the average annual expenditure for 2013-2016	Collection rate of the real estate tax (%)	Collection rate of vehicle tax (%)	Average collection rate of both taxes
Total number of unemployed (number)	0.15458	0.23499	0.231534	0.294364	0.03808	0.052272	0.090423	-0.05006	0.141102	0.082852
Unemployed up to 29 years of age	0.142961	0.237771	0.225014	0.291364	0.042425	0.051397	0.088806	-0.04617	0.143137	0.085212
Unemployed registered more than a year ago	0.00834	0.32071	0.100681	0.040571	0.112755	0.078802	0.028073	-0.21512	-0.04776	-0.12056
Unemployment rate (%)	-0.10873	-0.05642	-0.13192	-0.17809	0.105203	-0.00812	-0.17044	-0.3395	-0.42113	-0.47134
Average annual income per person (BGN)	0.042787	-0.04594	0.032726	0.069837	-0.11443	-0.1225	0.036174	0.134707	0.296296	0.268235
Total area (decares)	0.181955	0.160332	0.225257	0.204	-0.05385	-0.03248	0.067829	0.026093	0.175074	0.16605
Population density (per 1 km^2)	0.102017	0.038296	0.142811	0.300549	-0.01845	-0.00038	0.094694	0.016458	0.111387	0.083516

Source: Ministry of Finace, NSI author's calculations.

The main results of the correlation relationship between economic and demographic and financial indicators are summarized below:

- A significant correlation between the financial indicators (Revenue share from total proceeds and Coverage of costs for local activities with revenues) and the economic indicators (Unemployment rate (%) and average annual income per person (BGN) has been identified. Municipalities that are characterized by high unemployment and low incomes of the population are highly sensitive to the availability and extent of their own revenues. Improving macroeconomic characteristics is directly linked to generating more own revenues in the future. Additionally, the dependence on municipal expenditures and obligations is moderate in relation to the indicators Unemployed up to 29 years of age and Unemployed registered more than a year ago.
- A similar dependence is also observed in terms of the parameters – municipal territory and the density of the population (Total area and Population density (per sq. km)). If the territory is a constant magnitude, then the unemployment rate and the presumed social cost, expressed in a larger amount of social and other commitments of the municipality, respectively, leads to an increase in costs. The correlation analysis shows that municipal financial situation is dependant on the unemployment rate; for example, the increase the unemployment rate contributes to decrease of the municipal revenues and so that it slows down the economic activity. A moderate correlation has been identified between the demographic indicators (Population per one municipal employee) and (Total

number of unemployed), but a more significant dependence is recorded for unemployed up to 29 years of age and unemployed registered more than a year ago. Higher unemployment rate and a larger territory lead to increase of the need of expenditures connected with carrying out social and pubic duties.

- A change in the population could have important consequences on the financial situation of the municipality. For example, increases of retirement age population can put increased pressures on social service demand. Conversely, an increase of the share of working-age population could increase revenues and require more supply of public services.
- The correlation is moderate between the indicator measuring the capacity of the administration to serve the population (Population per one municipal employee) and economic indicators (unemployed up to 29 years of age, unemployed registered more than a year ago and unemployment rate (%). It shows that less" busy" municipalities which deliver service to population are more inclined to form a deficit. This higher sensitivity should be taken into account in the forming of buffers in the financial management and could become a cause of low fiscal discipline due to the greater sensitivity to possible external shocks.

There is a strong relationship between the tax collection rate in the municipality (real estate tax (%), vehicle tax (%) and average collection rate of both taxes) and economic indicators (Unemployed registered more than a year ago, Unemployment rate (%) and Average annual income per person (BGN). The dependence shows that fiscal stability is sensitive to the tax rate and tax collection. Fiscal discipline indirectly impacts on fiscal stability through how to municipal employees carry out a control on tax collection. In practice for small municipalities, there is a danger for fiscal stability because of the higher unemployment and low incomes of the population in comparison to urban and big municipalities. Ivanov (2017) expresses doubt regarding the performance indicator – population per one municipal employee – it is meaningless as far as it reflects the size of the municipality. A small municipality, however efficient, cannot catch up with a large inefficient municipality on this indicator. This indicator is included as it is used as a standard in many methodologies for assessing the efficiency of the activity of the administrative unit.

The correlation analysis shows that economic, demographic indicators and financial situation of the municipality have statistical relationships with separate indicators for fiscal discipline at the municipal level. At the same time, the concepts of financial stability and fiscal discipline are complex, using a set of indicators to quantify each of them. In this sense, although there is a correlation between individual indicators in one group, it remains questionable whether it is sufficiently serious in order for us to assume that there is, indeed, a significant link between financial stability and fiscal discipline (perceived as complex variables). The construction of complex indexes evaluating the two indicators would make it possible to empirically prove such a hypothesis.

Assesment of financial stability

In the assessment, financial stability is a complex of economic, social, demographic and other characteristics of the municipalities, such as unemployment, population income and productivity of the local economy.

Index **K1 Assessment of the economic, social and administrative potential of the municipality is formulated in the following equation**:

$$K1 = \ln(1+A) + \ln(1+B) + \ln(1+C) + \ln(1+D) - \ln(1+k) + \ln\left(1+\frac{n}{\max(nn)}\right) + \ln(1+\frac{m}{\max(mm)})$$

or

$$K1 = \ln\left(\frac{(1+A)*(1+B)*(1+C)*(1+D)}{(1+k)} * (1+\frac{n}{\max(nn)}) * (1+\frac{m}{\max(mm)})\right)$$

Where:

K1 is aggregated index

A – Share of revenue from the total proceeds

B – Coverage of the cost of local revenue activities

C – Population per one municipal employee

D – Share of wage and social security costs from the total costs

k – Unemployment rate (%).

n – Average annual income per person (BGN)

max(nn) – maximum value of the variable Average annual income per person (BGN) for the municipalities in the sample

m – Production of enterprises (thousand BGN)

max(mm) – maximum value of the variable Production of enterprises (thousand BGN) for the municipalities in the sample

For the calculation of the index **K1** variables that have a strong correlation with the financial condition of the municipality and with the socio-economic parameters have been included. The share of the revenues from the total proceeds of the municipality depends on the economic and social profile of the municipality. The higher value of the variable, the more the municipality has the ability to resist external financial and economic impacts. Another variable is the coverage of the cost of local revenue activities (B), which is a direct measure of how well the municipality observes financial discipline. The higher its value, the more positive the influence of the capacity of the municipality to resist external impacts. The variable Population per one municipal employee (C) is a measure of the effectiveness of the municipal administration's activity to serve the population. The regression results indicate moderate dependency between expenditures and unemployment rate.

An additional variable Share of wage and social security costs from the total costs (D) is included in order to take into account the optimization of the workload of the municipal administration. The deterioration of the financial state of the municipality could occur as a result of the reverse effect of the unemployment rate (k). The average income per person and the production of enterprises affect positively the financial condition of the municipality.

Assessment of the fiscal discipline

Index **K2 The tendency for violation of fiscal discipline is expressed by the following logarithmic equation.**

$$K2 = \ln(1+G) - \ln(1+E) - \ln(1+F) + \ln(1+S*H) + \ln\left(\frac{I}{aver(II)}\right) + \ln\left(\frac{J}{aver(JJ)}\right)$$

or

$$K2 = \ln\left(\frac{(1+G)*(1+S*H)*I*J}{(1+E)*(1+F)*aver(II)*aver(JJ)}\right)$$

Where:

G – The budget balance compared to total revenues

E – Debt size as a percentage of planned revenue and equalization subsidy

F – Overdue liabilities as a percentage of planned revenue and an equalization subsidy

H – Share of capital expenditure in total costs (investment activity)

I – Tax collection rate on real estate (%)

aver(II) – average value of the index Tax collection rate on real estate (%) for all municipalities in the sample

J – Tax collection rate on vehicles (%)

aver(JJ) – average value of the index Tax collection rate on vehicles (%) for all municipalities in the sample

S – is indicative of whether the municipality has overdue liabilities, or:

$$S = \begin{cases} F > 0 & \rightarrow S = -1 \\ F \leq 0 & \rightarrow S = 1 \end{cases}$$

Financial variables are included that characterize the financial management of the local government. Budget balance compared to total revenues (G) is a key variable to assess the fiscal discipline and not to allow a municipal budget deficit. An additional condition, in this case, is that the greater the balance at the end of the year (as a percentage or relative share of the magnitude of the expenditure of the municipality), the greater the ability to precisely plan revenue and expenditure in the respective municipality is weak. The high value testifies to the existence of good fiscal discipline, while the opposite testifies to a low one.

Debt size as a percentage of planned revenue and equalization subsidy (E) is a variable for the assessment of the financial situation is the structure of the debt for the current year. The high value has a negative impact on the company's finances.

The variable „Overdue liabilities as a percentage of planned revenue and equalization subsidy (F) shows the quality of the financial management of the municipality and the extent to which financial commitments are fulfilled. The existence of a large delay in payment is a overburdens the municipality financially with a commitment that is transferred into subsequent periods and breaks the financial planning process entirely. The variation of the financial balance could be the result of insufficient synchronization of revenue and expense by periods, and overdue liabilities are always evidence of poor fiscal discipline. Therefore, the dependence between the index and the variable is negative and the value of the index is negative. In its optimal version, the indicator has a zero value, which indicates a lack of overdue liabilities.

The Share of capital expenditure in total costs (investment activity) (H) is an important factor displaying the dynamics of the investment activity of the municipality and it directly affects the process of optimizing revenues and expenditures in the coming years. Where there are a sound financial management and lack of budget deficit, the investment activity has favourable effect on the fiscal stability. On the other hand, investments in the condition of existing overdue liabilities will result in worsening the fiscal stability and can be a signal for the absence of any fiscal discipline. In other words, the high value of the index is an evidence of good financial management and fiscal discipline, and the absence of overdue liabilities.

Average collections of both taxes – real estate tax (I) and a vehicle tax (J) show the attitude of the municipality towards its own main sources of income. Regardless of any external environment conditions and other factors, the high value of the indicators is a testimony of the ability of the local government to secure the revenue set in its budget, and the low figure is evidence of a lack of discipline with regard to fiscal stability.

It is accepted (in the approach proposed by the PFA) that the collection rate limit would be the average collection rate for the relevant tax, although thus, the lack of discipline could have a demotivating and antidisciplinary effects on all other municipalities. Regardless of that, the average tax collection rate of all municipalities in the country has been taken as a basis for the construction of this rating indicator.

A verification of the calculation of the value of the indicators in the formed indices is made by taking the maximum and minimum values of each indicator, i.e. it has been checked whether the values of the indicators fall within the range of continuity of the function. The purpose of the calculations based on the continuity of the function is to ensure, under equal conditions, the correctness of the evaluation, for municipalities with inferior values of the indicator to get a lower value in the rating index. The verification results are presented in the table below:

Code	Name of the index	range of variation		There is a better condition for values that are:		range of variation within the indicator	
	Name of the indicator	min	max			min	max
	Characteristics of the municipality						
A	Share of revenue from total incomes	0.058205556	0.85830128	high	LN(1+A)	0.056574602	0.61966278
B	Coverage of the cost of local activities with revenue	0.125351807	1.90374382	high	LN(1+B)	0.118095704	1.066000877
C	Population per one municipal employee	26.93548387	583.7864078	high	LN(1+C)	3.329897704	6.371246666
D	Share of wage and social security costs from the total costs	0.236695324	0.691136659	high	LN(1+D)	0.212442761	0.525400882
k	Unemployment rate (%)	2.01894317	65.54621849	low	ln(1+k)		
n	Average annual income per person (BGN)	4859	25043	high	LN(1+(n/MAX(nn)	0.17733102	0.693147181
m	Production of enterprises (thousand BGN)	383	55541798	high	LN(1+(m/MAX(mm)	0	0.693147181
	Tendency for violation of fiscal discipline						
G	Budget balance compared to total revenues	-0.83996297	0.367884184	high	LN(1+G)	-1.832350028	0.313265155
E	Debt size as a percentage of planned revenues and equalization subsidy	0	2.7034626	low	LN(1+E)	0	1.30926822
F	Overdue liabilities as a percentage of planned revenue and equalization subsidy	0	2.785018717	low	LN(1+F)	0	1.331050832
H	Share of capital expenditure in total costs (investment activity)	0.015718574	0.531893187	conditional	LN(1+H)	0.015596317	0.426504348
				conditional	LN(1-H)	-0.015843421	-0.759058777
I	Collection rate of real estate tax (%)	0.4168	1	high	LN(I/average(II))	-0.530402415	0.344746373
J	Collection rate of vehicle tax (%)	0.3179	1	high	LN(J/average(JJ))	-0.728910791	0.41710762
	Average collection rate of both taxes	0.3958	0.9436	high			

Source: Ministry of Finace, NSI author's calculations.

A range of minimum and maximum values of the individual variables in the above calculation confirms that it is possible to rate municipalities in terms of both indices.[5]

The values of K1 and K2 have been calculated for every municipality in the country.[6] The evaluation shows that the fiscal discipline of the municipalities is not predetermined by the size of the municipality and its economic, social and demographic characteristics, but it is the result of the actions of the operational and financial management on a municipal level. To verify whether the more vulnerable financial municipalities are exposed to adverse external changes to the macro- or micro-environment and to show the impact of the external environment on their ability to comply with fiscal discipline, the dependence of the K2 indicator on K1 has been tested in case K2 is a function of K1.

The results of the linear regression test for K1 and K2 are:

Regression Statistics	
Multiple R	0.09165
R Square	0.0084
Adjusted R Square	0.004629
Standard Error	0.450106
Observations	265

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.451349	0.451349	2.227835	0.136742
Residual	263	53.28258	0.202595		
Total	264	53.73393			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0,69432	0.269605	-2.5753	0.010562
X Variable 1	0,063301	0.04241	1.492593	0.136742

The statistical result confirms that the vulnerability of municipalities to financial turmoil is not a factor for compliance or non-compliance with fiscal discipline. Therefore, non-compliance with fiscal rules and criteria should not be explained by shocks from the external environment but rather by the quality of financial management.

The condition under which the assessment is made is that when action is taken for financial recovery, it is possible to change the behaviour of the municipality in the direction of increasing the fiscal discipline in the following period. The assessment takes into consideration the number of unmet fiscal criteria under the PFA.

The connection between the number of unmet criteria and the financial situation has been verified through the functional dependence of the individual components (variables) included in index K1.

[5] A reverse-dependent variable that is noted are reversely correlated with the financial stability index K1 (for example, the unemployment rate at which the high values are reversely correlated with the financial stability index K1), the component is included in furthers calculations with a negative sign.
[6] The results are calculated and applied in a common table in annex.

The data from the regression analysis are as follows:

Regression Statistics	
Multiple R	0.324246
R Square	0.105136
Adjusted R Square	0.080762
Standard Error	1.08188
Observations	265

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	35.34148	5.048783	4.313486	0.000156
Residual	257	300.8095	1.170465		
Total	264	336.1509			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3.735257	1.296574	2.880868	0.0043	1.181996	6.288519	1.181996	6.288519
X Variable 1	0.073805	1.835307	0.040214	0.967954	-3.54035	3.68796	-3.54035	3.68796
X Variable 2	-1.02265	1.196452	-0.85474	0.393493	-3.37875	1.333447	-3.37875	1.333447
X Variable 3	-0.00633	0.148034	-0.04274	0.965944	-0.29784	0.285187	-0.29784	0.285187
X Variable 4	-4.51237	2.013638	-2.2409	0.025887	-8.4777	-0.54703	-8.4777	-0.54703
X Variable 5	0.169224	0.139616	1.212068	0.2266	-0.10571	0.444162	-0.10571	0.444162
X Variable 6	-2.37394	1.275567	-1.86109	0.063873	-4.88584	0.13795	-4.88584	0.13795
X Variable 7	1.38062	1.573157	0.877611	0.380974	-1.7173	4.478539	-1.7173	4.478539

The regression analysis shows that there is no statistical dependence, or the current external environment (micro and macro) of the municipality does not lead to a deterioration (or improvement) of the fiscal discipline.

As a result of the regression, the K1 does not characterize fiscal discipline, it is a summary of the influence of factors from the external environment, and through it the municipalities can be ranked according to their vulnerability to external impacts.

K2 measures the propensity for violating fiscal discipline, and values below 0 (zero) shall be viewed as risky or violating the fiscal stability of the municipality as a result of poor management, and vice versa. If K2 has positive values, it can be assumed that municipalities comply with fiscal discipline.

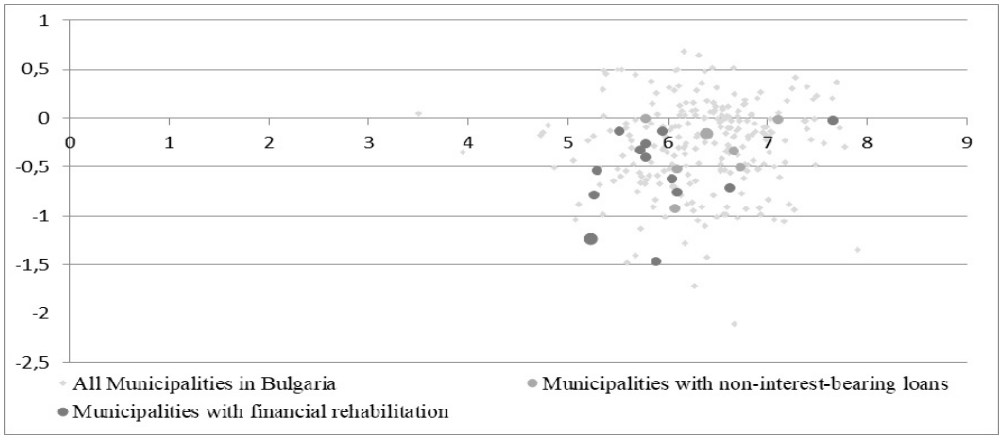
Compliance with fiscal discipline is a characteristic of the financial management of the municipality and not of the surrounding environment, as much as the control applied by the Ministry of Finance, based on the rules of the PFA, actually encompasses the "most undisciplined" municipalities in the country. According to data from the Ministry of Finance, two groups of municipalities are under special supervision: (i) Municipalities with non-interest-bearing loans, and (ii) Municipalities with financial recovery. Some of the municipalities fall within both groups.

The following figure presents the conditional location of the municipalities according to the assessment of the economic, social and administrative potential of the municipality and the propensity for violation of fiscal discipline. Separately (in a different colour) the

municipalities of the two groups under special supervision are marked (Municipalities with non-interest-bearing loans and Municipalities with financial recovery[7]).

Figure 1

Location of the municipalities according to fiscal stability assessment



Source: Ministry of Finace, NSI author's calculations.

The measures for financial recovery include the intervention of the Ministry of Finance by providing interest-free loans aimed at improving the financial performance of local authorities. In some cases, the Ministry of Finance remits the loans. However, there is a lack of transparency in relation to the loan remission practice, which may lead to the undesirable results of favouring one municipality over others.

As it can be seen, all supervised municipalities fall below the set limit of value 0 of the evaluatimg index K2. In practice, most of the supervised municipalities fit into that part of the total set in which K2 <0.

Supervised municipalities do not have the lowest value of K2. There are municipalities with significantly lower values of the K2 than the lowest ones of the supervised municipalities. This detailed review of the dependence between the components of the index makes it possible to formulate the assumption that this is due to a certain simplicity of the fiscal discipline assessment approach used in the PFA. This can be explained by the fact that the Ministry of Finance does not take into account the extent to which the criteria are not met (minimum or maximum).[8]

Municipalities that do not meet one or two indicators defining financial discipline, and their values are negative, have a low value compared to other municipalities that have not

[7] For convenience of work and brevity of expression, the two groups of municipalities with fiscal discipline violations and subject to special supervision by the MoF, according to the ministry's data, will be referred to as "supervised".

[8] Supervised municipalities are municipalities that do not meet a number of parameters related to redefined fiscal criteria.

fulfilled three or more criteria. Therefore, in order to refine the overall evaluation weight ratios of each individual indicator in the K2 index are determined. Thus the degree of statistical dependence is assessed by establishing the functional relationship between the index and the future results for the next fiscal year).

There is a static dependence between the rating index K2 and the financial discipline indicators, with the number of unmet criteria being considered as a function of the individual variables composing the rating coefficient K2. The results of the linear, multiple regression analysis are as follows:

Regression Statistics	
Multiple R	0.721831
R Square	0.52104
Adjusted R Square	0.509901
Standard Error	0.789963
Observations	265

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	175.1481	29.19134	46.77783	1.34E-38
Residual	258	161.0029	0.624042		
Total	264	336.1509			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.568777	0.06773	8.397721	3.06E-15	0.435403	0.702151	0.435403	0.702151
X Variable 1	1.066741	0.229583	4.646418	5.39E-06	0.614645	1.518837	0.614645	1.518837
X Variable 2	2.836997	0.309621	9.162822	1.63E-17	2.227292	3.446703	2.227292	3.446703
X Variable 3	0.090751	0.335561	0.270446	0.787033	-0.57004	0.751538	-0.57004	0.751538
X Variable 4	-0.99592	0.344241	-2.89308	0.004141	-1.6738	-0.31804	-1.6738	-0.31804
X Variable 5	-1.74883	0.399358	-4.3791	1.73E-05	-2.53524	-0.96241	-2.53524	-0.96241
X Variable 6	-1.51314	0.321123	-4.71202	4.01E-06	-2.14549	-0.88078	-2.14549	-0.88078

It should be noted that there is statistical significance (Pearson's correlation coefficient R is 0,721831, a R Square 0,52104). The dispersion of unmet fiscal discipline criteria can be explained by the dispersion of the evaluating index variables in the previous period. In addition, the resulting values of the linear equality coefficients (Coefficients) can in practice be used and included in the **K3** index, which shows the degree of compliance with the fiscal discipline criteria and it is more accurate than index K2.

Index **K3 Propensity for violation of fiscal discipline**

Index K3 calculations are presented in the following equation:

$$K3 = 1{,}066741 * \ln(1+G) - 2{,}836997 * \ln(1+E) - 0{,}090751 * -$$

$$-0{,}99592 * \ln(1+S*H) - 1{,}74883 * \ln\left(\frac{I}{aver(II)}\right) - 1{,}51314 * \ln\left(\frac{J}{aver(JJ)}\right)$$

Where:

G – The budget balance compared to total revenues

E – Debt size as a percentage of planned revenue and equalization subsidy

F – Overdue liabilities as a percentage of planned revenue and an equalization subsidy

H – Share of capital expenditure in total costs (investment activity)

I – Tax collection rate on real estate (%)

aver(II) – average value of the index Tax collection rate on real estate (%) for all municipalities in the sample

J – Tax collection rate on vehicles (%)

aver(JJ) – average value of the index Tax collection rate on vehicles (%) for all municipalities in the sample

S – is indicative of whether the municipality has overdue liabilities, or:

$$S = \begin{cases} F > 0 & \rightarrow \quad S = -1 \\ F \leq 0 & \rightarrow \quad S = 1 \end{cases}$$

The improved index **K3** is calculated on the basis of K2. Weights are added to the variables according to their significance to the index, and it is calculated for each municipality individually (the data is presented in Annex 1). The results of a multifactorial regression test are as follows:

Regression Statistics	
Multiple R	0.721831
R Square	0.52104
Adjusted R Square	0.509901
Standard Error	0.789963
Observations	265

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	175.1481	29.19134	46.77783	1.34E-38
Residual	258	161.0029	0.624042		
Total	264	336.1509			

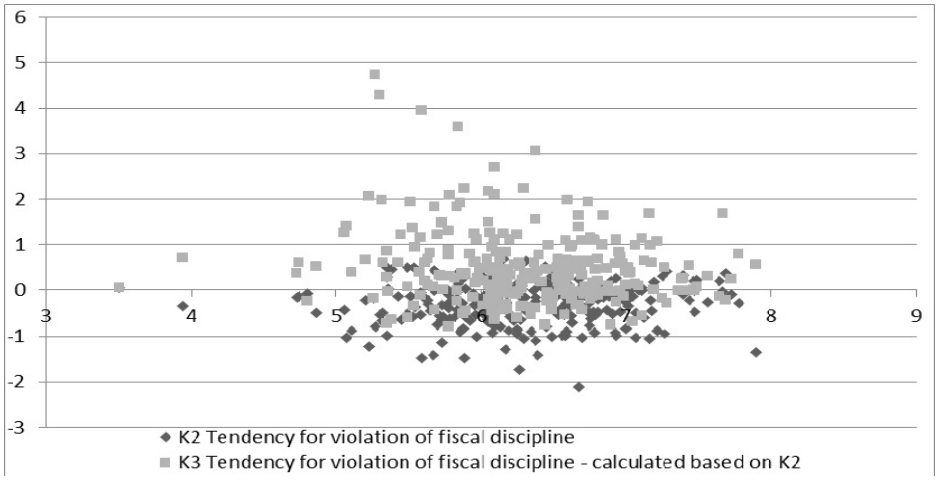
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.568777	0.06773	8.397721	3.06E-15	0.435403	0.702151	0.435403	0.702151
X Variable 1	1.066741	0.229583	4.646418	5.39E-06	0.614645	1.518837	0.614645	1.518837
X Variable 2	2.836997	0.309621	9.162822	1.63E-17	2.227292	3.446703	2.227292	3.446703
X Variable 3	0.090751	0.335561	0.270446	0.787033	-0.57004	0.751538	-0.57004	0.751538
X Variable 4	-0.99592	0.344241	-2.89308	0.004141	-1.6738	-0.31804	-1.6738	-0.31804
X Variable 5	-1.74883	0.399358	-4.3791	1.73E-05	-2.53524	-0.96241	-2.53524	-0.96241
X Variable 6	-1.51314	0.321123	-4.71202	4.01E-06	-2.14549	-0.88078	-2.14549	-0.88078

The regression shows statistical reliability and significance. Pearson's correlation coefficient R is 0,721831, and R Square 0.52104, is similar to the test of K2. Compared to

the individual values of K2, those of the index K3 are higher and more accurate from a valuation and risk value margin perspective (K3 <0). Graphically this is evident from the simultaneous representation of the multitude of points {K1;K2} and {K1;K3} for each municipality (see the figure below).

Figure 2

Propensity to violate the fiscal discipline



Source: Ministry of Finace, NSI author's calculations.

The total of three indices obtained is an improved version of the rating index K2 for Propensity for violation of fiscal discipline. They are functionally related to the future fulfillment or non-fulfillment of a number of fiscal discipline criteria under the PFA. The results from a regression, multifactoral dependency test are as follows:

Regression Statistics	
Multiple R	0.72406
R Square	0.524263
Adjusted R Square	0.518795
Standard Error	0.782763
Observations	265

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	176.2315	58.74384	95.87419	7.4E-42
Residual	261	159.9194	0.612718		
Total	264	336.1509			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.066842	0.482989	2.208834	0.028055	0.115791	2.017893	0.115791	2.017893
X Variable 1	-0.08041	0.074928	-1.07312	0.284208	-0.22795	0.067134	-0.22795	0.067134
X Variable 2	-0.09177	0.119329	-0.76908	0.44254	-0.32674	0.143196	-0.32674	0.143196
X Variable 3	0.965992	0.066857	14.44867	3.62E-35	0.834345	1.09764	0.834345	1.09764

The test shows the following statistical reliability and significance. Pearson's correlation coefficient R is 0.72406, and R Square 0.524263. Significance F is below the limit of 5%, and the refined index K3 has the highest coefficient, which confirms its higher credibility against the index K2, since different weights have been reported according to the degree of impact. There are a large number of municipalities that have a value below 0 (K2<0), but they are not under supervision and the Ministry of Finance does not require that they present a recovery plan.

The municipalities with very low values of the indicators (K2 and K3) pose the following issues: is compliance with fiscal discipline a function of the general financial situation of these municipalities and whether this is due to an investment activity, which does not correspond to the financial capacity of municipalities. The municipalities that have "too high" values of the indicators (K2 and K3), on the other hand, raise the issue of the effectiveness of the budget management, in particular, in relation to existing of large budget surpluses.

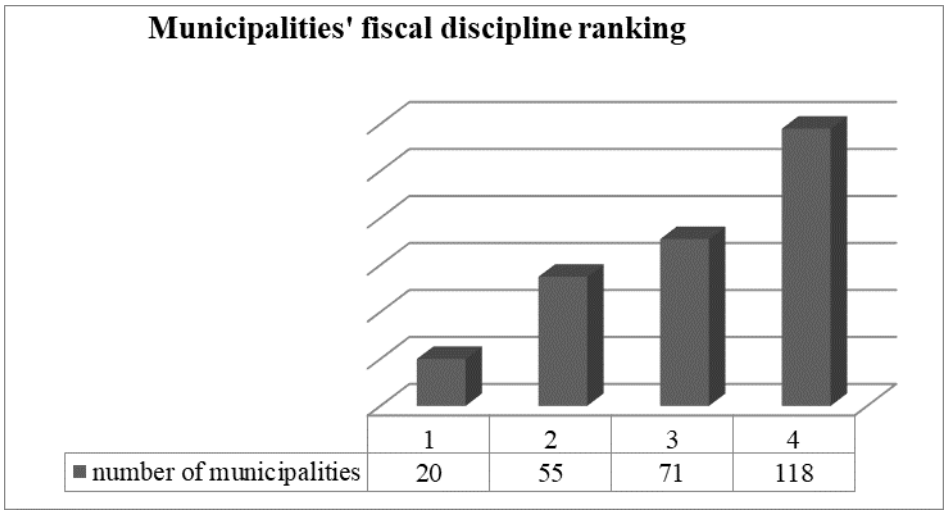
Values of the index K3 allow for ranking the municipalities according to their compliance with fiscal discipline. The municipalities are divided in the following four groups:

- Group 1 “systematically low fiscal discipline”: municipalities with the lowest rating for propensity to follow fiscal discipline. Their lack of fiscal discipline and compliance with the fiscal criteria and indicators is systematic, and they are considered to be the most at risk.
- Group 2 “low fiscal discipline”: municipalities which face difficulties in complying with the indicators for fiscal discipline. It is considered that despite that they can start complying with fiscal criteria and indicators;
- Group 3 “good fiscal discipline”: municipalities which comply with the criteria and indicators for fiscal discipline;
- Group 4 "High Fiscal Discipline ": municipalities with the highest rating value (above 0), they comply with the fiscal criteria and there are few instances of non-compliance.

Most of the municipalities (118) comply with indicators for fiscal discipline, the other municipalities (the number is 71) comply with regulatory requirements for fiscal discipline but are not very resilient to exogenous shocks (the number is 118), only 20 municipalities are rated as low fiscal discipline (they do not comply with the fiscal indicators, which reflects their poor financial management capacity. The rating estimates show that the majority of municipalities hold strong to high fiscal discipline, which contributes to sound financial management.

Figure 3

Ranking of municipalities according to fiscal discipline



Source: Ministry of Finance and author's calculations.

3.3. Findings of the evaluation model

The main results of the assessment of municipalities in terms of their propensity to observe financial discipline are summarized below:

- The interaction between the indicators characterizing the local development and the financial situation of the municipalities shows a sensitivity of the financial stability towards the income of the population and the unemployment. In other words, this means that in order to improve the financial management of the municipalities it is necessary to take into account the impact of external factors as well as the efficiency of the work of the municipal administration.
- The collection level of the municipal revenues is in a reverse functional commitment with certain social characteristics of the municipalities. Insufficient control of the collection of local taxes appeared as a form of support for the population (this statement is a consequence of the statistical analysis).
- Large discrepancies in the implementation of the financial efficiency indicators (formulated under the PFA Methodology) have been found, which require their specification in terms of reducing dissimilarities between different municipalities. This confirms that the presence of "too big" and "too small" municipalities poses some methodological problems from analytical, as well as from a practical system management point of view.
- The analysis shows that the existing methodology for identifying municipalities with problems in their fiscal performance, according to the criteria of the PFA, can be

substantially improved. In the model, indices K1, K2 and K3 are suggested, which are calculated according to available data. These indicators measure financial stability (K1) and fiscal discipline (K2 and K3) of municipalities in Bulgaria. They are better than the PFA indicators, as they are quantifiable and have a determined value. The PFA indicators are binomial, i.e. compliance or non-compliance. According to the PFA indicators and methodology, if two municipalities fail to meet a PFA criterion, for example, due to a negative budget balance, and only one of them has a smaller deficit in value, while the other a larger one, no difference is made, i.e. according to this criterion non-compliance is reported for both municipalities. According to the K3 index, the extent of non-compliance with financial indicators affects its rating and ranking. That is why it can be assumed that the index approach is better and gives a better idea of the real financial situation of the municipalities.

- The index K2 Propensity for violation of fiscal discipline in its improved version K3 shows good results, as the selected limit of K3<0 correctly differentiates municipalities that observe fiscal discipline from those which fail to do so, while at the same time giving enough opportunity for direct comparisons between two municipalities, which is not provided by the PFA's methodology. The evaluation of this indicator shows that many municipalities with respect to the risk of non-fulfilment of the criteria are close to 0, but there are those that are not able to meet the criteria and in the future, there is a real risk of violation of the fiscal discipline.

- The indicator K1 (Assessment of the economic, social and administrative potential of the municipality) is suitable for designing stress tests as well as for evaluating and modelling the system of decentralization of local self-government, which is not the purpose of this analysis. The index evaluates sources of systemic risk that are entirely the result of the impact of the external environment, which depends on factors typical for a specific municipality.

The pre-formulated hypotheses have been confirmed as a result of the applied statistical tools (multiple regression).

- The hypothesis that *„The fiscal discipline of the municipalities is not predetermined by the size of the municipality and its economic, social and demographic characteristics, but is the result of the actions under operational management on a municipal level“* is confirmed. Factors of the surrounding macro-environment do not predetermine the level of fiscal discipline, which means that fiscal discipline is a function of the quality of management in the municipality or at least that part of the management's functions that are related to the management of the municipality's finances.

- The hypothesis that *„There are statistically significant dependency between the different components of the fiscal discipline assessment and individual characteristics of the municipalities – demographic, social, economic and administrative. In other words, it is possible to construct a profile of municipalities where the risk of negative impact of the external environment is higher than in the other municipalities“* is confirmed by the statistical analysis.

The above findings are evidence of the fact that compliance with fiscal discipline can be a compensatory mechanism of local government management in cases of external shocks and stressful situations on a local level. In that respect, it would be a good idea to consider whether the financial system of heterogeneous municipalities could be improved in terms of their resistance to external shocks in the future.

4. Conclusions

The evaluation model developed in this study attempts to evaluate municipalities according to their propensity to comply with financial discipline. It is a comprehensive assessment model examining the impacts of economic, demographic and financial factors on the fiscal stability and evaluating the fiscal discipline through the fulfilment of relevant criteria for the financial situation of the municipalities.

The indices show that the criteria thus indicated and the pool of indicators set by them by the Ministry of Finance, the main municipalities that violate the budget discipline are not exactly those for which there is a risk for the fiscal stability and are not only municipalities that do not have enough own revenues.

Overall, the fulfilment of the requirements for fiscal discipline can be perceived as functionally related to the financial performance of the municipalities and their budgetary implementation. This means that there is a broad set of financial management tools that can help improving the fiscal performance of municipalities. However, this raises an important question of whether there is a need to amend the rules for operational and monitoring control of municipal finances, or whether the problems are related to the lack of real consequences of non-compliance with them. The deteriorated financial and fiscal indicators of the municipalities are not an exception, but a normal state of the system.

The developed evaluation model provides a conceptual and empirical framework that can be used to improve the monitoring and control of the financial situation of municipalities, as well as their fiscal stability and financial risk management. The findings summarized above can serve as guidelines for future research as well as to implement an actual policy for improving the fiscal performance of municipalities.

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Annex1

Calculated value of the rating indicators K1, K2 and K3 for the municipalities in Bulgaria (data 2018)

Municipalities	K1	K2	K3	Municipalities	K1	K2	K3
Avren	3.503141	0.042255	0.058652	Lukovit	6.810088	-0.18436	0.19868
Aytos	6.960017	-0.0898	-0.00369	Laki	5.493481	0.493677	-0.59997
Aksakovo	6.590074	0.020843	0.253463	Lyubimets	6.371686	-0.00156	0.611245
Alfatar	5.583721	-0.05888	-0.11749	Lyaskovets	6.531813	-0.54361	0.680971
Anton	5.351378	0.291942	0.286436	Madan	5.986966	-0.19565	0.219794
Antonovo	5.109344	-0.8842	0.395413	Madzharovo	4.730195	-0.17035	0.365608
Apriltsi	6.014925	0.314489	-0.35462	Makresh	5.071974	-1.03586	1.400082
Ardino	5.578714	-0.10313	0.384003	Malko Tarnovo	5.882334	0.255676	0.319543
Asenovgrad	7.440552	-0.21949	0.54319	Maritsa	6.904422	-0.52521	-0.02455
Balchik	6.695497	-1.01983	0.651987	Medkovets	5.773982	-0.66646	0.762154
Banite	5.312806	-0.67594	1.9879	Mezdra	6.548277	0.094774	0.581858
Bansko	6.188341	-0.8858	0.424037	Miziya	6.076549	-0.92906	0.936039
Batak	5.528696	-0.59328	1.364594	Mineralni Bani	6.373313	-1.09912	1.548423
Belene	6.783209	-0.92746	1.096692	Mirkovo	6.307828	-0.45981	0.368099
Belitsa	6.047209	-0.4647	-0.19706	Momchilgrad	6.11437	0.027037	0.179264
Belovo	6.097688	-0.52623	2.112522	Montana	7.069352	-0.49836	0.981203
Belogradchik	5.886837	-1.46684	2.241528	Maglizh	6.226718	-0.6723	0.553789
Beloslav	6.453247	-0.7888	0.451916	Nevestino	4.801327	-0.07591	-0.25244
Berkovitsa	6.750662	-0.29779	0.610394	Nedelino	5.299719	-0.54483	4.290762
Blagoevgrad	7.563824	-0.26059	0.311005	Nesebar	6.262409	-1.72266	0.601356
Bobov dol	6.296115	-1.04553	2.241496	Nikola Kozlevo	6.010917	-0.52772	0.465138
Boboshevo	5.492048	-0.52765	0.067687	Nikolaevo	5.973074	-0.18432	0.255021
Bozhurishte	6.619128	-0.3062	0.650834	Nikopol	5.952245	-0.32244	0.609347
Boynitsa	4.743045	-0.14782	0.60206	Nova Zagora	6.807715	-0.21005	-0.12248
Boychinovsti	6.199805	-0.57592	1.111374	Novi Pazar	7.126048	-0.60384	0.640165
Bolyarovo	5.35456	0.487505	-0.74383	Novo Selo	5.254597	-0.18169	-0.18482
Borino	5.056748	-0.43258	1.264431	Omurtag	6.080557	-0.07859	0.401707
Borovan	5.589012	-1.48142	3.953154	Opaka	6.04137	-0.09556	0.5625
Borovo	6.171942	-1.277	-0.07482	Opan	5.611601	-0.17206	0.18954
Botevgrad	6.76266	0.138791	0.074647	Oryahovo	6.84268	-0.16704	1.633644
Bratya Daskalovi	5.897352	-0.58378	0.363948	Pavel Banya	6.579031	-0.33553	-0.53966
Bratsigovo	6.603773	-0.27997	0.508442	Pavlikeni	6.607589	0.123749	0.295109
Bregovo	5.837394	-0.4461	1.835532	Pazardzhik	7.178569	-0.45135	0.597561
Breznik	5.817076	-0.58987	0.271679	Panagyurishte	7.114022	0.054034	-0.5695
Brezovo	6.107591	0.333653	-0.24654	Pernik	7.665243	-0.03129	1.692097
Brusartsi	5.730475	-0.65848	1.486004	Perushtitsa	6.345917	-0.91271	0.248661
Burgas	7.68929	0.370395	-0.22816	Petrich	7.013516	-0.34801	0.501487
Byala	5.631084	-0.23351	0.109884	Peshtera	6.837134	0.028029	0.974824
Byala	6.373685	-0.24358	0.385748	Pirdop	6.777283	-0.47029	1.109026
Byala Slatina	6.744302	-0.76738	0.634633	Pleven	7.067872	-1.0337	0.135608
Varna	7.392668	0.326336	-0.01326	Plovdiv	7.72707	-0.09821	0.236855
Veliki Preslav	6.630567	-0.10325	-0.20994	Polski Trambesh	6.669524	-0.18597	-0.02777
Veliko Tarnovo	7.191096	0.176014	0.003942	Pomorie	6.723524	-0.02792	1.081906
Velingrad	6.379363	-0.15199	3.064675	Popovo	6.587407	-0.98564	-0.10677
Venets	5.881417	-0.83167	-0.52658	Pordim	6.631212	-0.02712	-0.13656
Vetovo	6.660488	-0.19392	0.454829	Pravets	5.831485	0.377384	-0.25417
Vetrino	6.113064	-0.08154	0.320575	Primorsko	6.241401	0.072852	-0.08916
Vidin	6.736319	-0.50912	1.934038	Provadiya	6.542853	0.024538	-0.02102
Vratsa	7.265511	-0.93648	0.490432	Parvomay	6.979709	-0.09067	0.580797

Municipalities	K1	K2	K3	Municipalities	K1	K2	K3
Valchidram	6.070983	-0.53729	0.467567	Radnevo	6.454449	0.15526	-0.23753
Valchidol	6.021944	-0.1233	0.206652	Radomir	6.533384	-0.4708	0.417991
Varbitsa	5.987393	-0.34622	0.465978	Razgrad	7.026394	-0.13481	0.37896
Varshets	6.180697	0.158887	0.111318	Razlog	6.862764	-0.43233	0.476762
Gabrovo	7.251856	0.298982	-0.18272	Rakitovo	6.696407	-0.37883	1.084788
General Toshevo	6.545529	-0.41196	-0.00397	Rakovski	6.896916	0.204187	-0.75171
Georgi Damyanovo	5.452442	-0.64246	1.209153	Rila	5.515043	-0.13576	1.938599
Glavinitsa	5.835466	-0.05495	-0.01286	Rodopi	6.923275	-0.92187	0.583296
Godech	5.680931	0.438165	-0.42909	Roman	5.784569	-0.63505	0.300486
Gorna Malina	6.177281	-0.26058	0.832481	Rudozem	5.678762	-0.01463	1.822019
Gorna Oryahovitsa	6.996041	-0.18562	0.117118	Ruen	6.485327	-1.01207	-0.37151
Gotse Delchev	7.018487	-0.18944	0.360659	Ruzhintsi	5.701579	-0.75208	1.221658
Gramada	5.778056	-0.40037	0.869111	Ruse	7.645504	0.202574	-0.13733
Gulyantsi	6.527957	-0.52552	0.489429	Sadovo	6.714426	0.074826	0.079974
Gurkovo	6.259612	0.159042	-0.03374	Samokov	7.284874	0.417449	-0.2985
Galabovo	6.532494	-0.09276	0.179164	Samuil	5.652474	-0.46591	0.809294
Garmen	6.466263	-0.2534	-0.09577	Sandanski	6.810051	-0.47509	0.676647
Dve Mogili	6.119083	0.128016	0.494213	Sapareva Banya	6.62696	-0.71197	0.972826
Devin	6.156434	-0.3055	1.228481	Satovcha	6.52171	-0.04634	0.261015
Devnya	7.04385	-0.14521	-0.68798	Svilengrad	6.556365	0.10666	0.037396
Dzhebel	5.359678	0.019686	-0.02795	Svishtov	6.962064	-0.47234	-0.00377
Dimitrovgrad	7.091338	-0.01794	0.091837	Svoge	6.86553	-0.05871	-0.03658
Dimovo	5.267692	-0.79276	4.740573	Sevlievo	6.655316	0.518393	-0.32917
Dobrich	7.897765	-1.35115	0.55623	Septemvri	6.048969	-0.62832	1.486329
Dobrichka	6.046138	-0.65418	0.681507	Silistra	6.930219	-0.98542	1.10766
Dolna Banya	6.175575	-0.36443	0.454088	Simeonovgrad	6.253187	-0.94276	1.206299
Dolna Mitropoliya	6.671824	-2.10802	1.647642	Simitli	6.093962	-0.76583	2.69943
Dolni Dabnik	6.393049	-1.41973	0.40234	Sitovo	5.730844	-1.12834	0.298914
Dolni Chiflik	6.623131	-0.5629	0.932712	Sliven	7.108635	-0.01861	1.123861
Dospat	5.844144	0.14571	3.586851	Slivnitsa	7.003019	-0.83353	0.401068
Dragoman	5.671951	-1.40248	0.079167	Slivo Pole	6.343926	0.358502	-0.54382
Dryanovo	6.289146	-0.19222	0.218375	Smolyan	7.170336	-0.2278	0.983642
Dulovo	6.585196	-0.15745	1.078738	Smyadovo	6.278097	-0.31146	-0.37861
Dupnitsa	6.964414	-0.15825	0.730694	Sozopol	6.110797	-0.19289	0.82485
Dalgopol	6.273972	-0.64029	0.522415	Sopot	6.758143	-0.61946	1.159518
Elena	5.718831	-0.55595	0.318632	Sredets	6.564766	-0.9847	0.214046
Elin Pelin	7.383157	-0.02588	0.236482	Stamboliyski	6.955289	-0.14729	0.835569
Elhovo	6.477963	0.115619	-0.14256	Stambolovo	5.223176	-1.231	2.068295
Etropole	6.613706	0.00691	-0.03869	Stara Zagora	7.477518	-0.47566	-0.00426
Zavet	6.17697	-0.28315	0.265871	Sofia Capital Municipality	7.775814	-0.29819	0.786188
Zemen	5.319287	-0.50191	0.597669	Strazhitsa	6.056414	-0.63271	0.120274
Zlataritsa	5.539959	0.492707	-0.35688	Straldzha	6.144265	0.077362	-0.0456
Zlatitsa	6.446025	0.512429	-0.7463	Strelcha	6.360101	-0.00292	0.237469
Zlatograd	6.396329	0.174716	0.780441	Strumyani	5.785832	-0.26377	2.081688
Ivaylovgrad	6.06659	-0.70206	0.124395	Suvorovo	6.185808	-0.48498	-0.40644
Ivanovo	6.067494	0.287295	-0.29561	Sungurlare	5.777623	-0.01033	1.292401
Iskar	6.302522	-0.16303	0.307117	Suhindol	5.352619	-0.98692	0.858195
Izperih	6.547443	-0.01571	0.496908	Saedinenie	6.484867	0.308749	-0.42691
Ihtiman	6.713321	-0.11415	-0.08765	Sarnitsa	6.076841	0.487047	-0.4495
Kavarna	6.423542	0.065345	0.177671	Tvarditsa	6.793549	-0.02623	0.075539
Kazanlak	7.392759	-0.10787	0.268777	Tervel	6.208036	-0.05647	0.32861
Kaynardzha	5.971394	-1.00629	1.106048	Teteven	6.67047	-0.33675	1.392227
Kaloyanovo	6.454622	0.058331	-0.05794	Topolovgrad	6.757148	-0.51032	-0.19837

Municipalities	K1	K2	K3	Municipalities	K1	K2	K3
Kameno	6.669971	0.247929	-0.32211	Treklyano	3.944205	-0.34861	0.717437
Kaolinovo	6.28108	0.082546	0.056389	Troyan	6.934418	0.269388	-0.26109
Karlovo	6.833429	0.038855	1.010008	Tran	5.961026	-0.54247	0.619728
Karnobat	6.985028	-0.2243	-0.14701	Tryavna	6.373793	0.475092	-0.39228
Kaspichan	6.288536	0.283976	-0.35302	Tundzha	6.496737	-0.00514	-0.15495
Kirkovo	5.614499	-0.17787	0.609442	Tutrakan	6.278081	0.024731	0.101371
Knezha	6.880776	-0.14016	0.100897	Targovishte	7.362907	-0.02288	-0.00999
Kovachevtsi	4.859659	-0.5084	0.51024	Ugarchin	5.741737	-0.59423	0.005386
Kozloduy	6.769865	0.185464	-0.13894	Hadzhidimovo	6.580562	-0.00301	0.040676
Koprivshtitsa	5.946254	-0.08155	-0.15793	Hayredin	5.631599	-0.30755	0.683816
Kostenets	6.462419	0.079553	0.9913	Harmanli	7.021553	-0.00795	0.373195
Kostinbrod	6.909038	-0.52725	-0.03615	Haskovo	7.475389	-0.00978	0.010454
Kotel	6.133654	-0.79143	0.702655	Hisarya	6.685675	-0.12817	0.45072
Kocherinovo	5.728517	-0.32772	1.465289	Hitrino	6.25013	-0.8673	-0.6058
Kresna	6.06779	-0.51128	1.267922	Tsar Kaloyan	6.047167	-0.69899	2.17894
Krivodol	5.854693	-0.91111	1.90518	Tsarevo	6.616861	-0.36198	0.0338
Krichim	6.792283	-0.5408	0.442802	Tsenovo	5.892824	0.039777	-0.45851
Krumovgrad	5.776261	-0.08827	-0.79929	Chavdar	6.157356	0.678152	-0.44696
Krushari	5.544103	-0.38296	0.937558	Chelopech	6.309541	0.642763	-0.37196
Kubrat	6.778777	0.148312	0.152168	Chepelare	5.953742	-0.14108	1.231821
Kuklen	6.172605	0.024397	-0.3008	Cherven Bryag	6.591781	-0.90924	0.672557
Kula	5.870269	-0.28666	0.367381	Chernoochene	5.383279	0.449494	-0.65661
Kardzhali	6.601079	-0.10038	1.981727	Chiprovtsi	5.426126	-0.13268	0.609309
Kyustendil	7.214501	-0.88628	1.058641	Chirpan	6.697478	0.018001	-0.42718
Levski	6.575619	-0.53575	0.254734	Chuprene	5.202942	-0.22616	0.667769
Lesichovo	5.582277	-0.54543	1.148255	Shabla	5.964186	-0.3035	0.159972
Letnitsa	6.06849	-0.38977	-0.03161	Shumen	7.464816	0.189869	0.017942
Lovech	6.698282	0.066612	0.321852	Yablanitsa	6.108416	-0.30386	0.079227
Loznica	6.09076	-0.49192	1.108091	Yakimovo	5.92349	-0.67004	0.785816
Lom	7.161165	-1.05605	1.679906	Yakoruda	6.094853	0.499336	-0.65753
				Yambol	7.488391	0.230026	0.063688