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Financial risk in the activity of voivodships in Poland: Synthetic measure as an element of risk assessment in the activities of local government units in the years 2010-2020

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ABSTRACT

Objective: The article aims to analyse the spatial diversity of financial risk in the activity of voivodships in Poland and to use a synthetic measure to present selected factors that have a direct impact on the risk assessment.

Research Design & Methods: The authors used literature and statistical analysis for the research. The technique for order preference by similarity to ideal solution (TOPSIS) was used to create synthetic measures. Empirical data were collected by voivodeships in Poland for the years 2010-2020.

Findings: The synthetic rate of financial risk in 2020 ranged from 0.40 (Lubelskie) to 0.77 (Mazowieckie), and in 2010 from 0.37 (Opolskie) to 0.61 (Śląskie). Comparing 2020 to 2010, the voivodships Śląskie, Podlaskie, Warmińsko-Mazurskie, and Lubelskie showed a decrease in the value of the synthetic measure. The measure of financial risk was correlated, among others, with own revenues, operating surplus, income from participation in taxes constituting state budget revenues, level of current transfers, liabilities, number of entities and natural persons conducting business activity, and number of employees.

Implications & Recommendations: The detected correlations in the area of financial risk of the voivodships show that the local authorities in their actions should take into account the risk assessment system. The voivodships should define probabilities and impacts in terms of risks, criteria for assessment, and risk analysis in the organization. Finance and economy are interlinked. The actions taken in this aspect must be based on analyses that facilitate comparisons and on current information necessary for effective ac.

Contribution & Value Added: The value of the article is the indicated set of variables allowing us to assess the financial risk of the voivodships, the years of the presented analysis 2010-2020, and the synthetic measure as a basis for the assessment of financial risk.

Article type: research article

Keywords: risk; financial risk; voivodship; synthetic measure; sustainable finance

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INTRODUCTION

The activity of a local government unit (LGU) is a continuous process of making short-, medium-, and long-term decisions regarding various aspects of functioning. Their decisions can be divided into operational and financial. The operational decisions are related to the functioning of the entity, which occur in the sphere of current activities and generate operational and investment risk that result in tangible assets combined with investment risk. The financial decisions refer to the source of financing and financial risk. Risk is a potential threat to which we are all constantly exposed (Akintoye, & MacLeod, 1997). It is an objective category that always occurs independently of human

consciousness. It becomes a key decision criterion in each area of operation and the measured risk is managed (Almeida, Teixeira, da Silva, & Faroleiro, 2019).

Risk, fulfilling itself, results in dysfunctionality of the individual. The areas of activity of LGUs are characterized by the risk of occurrence of events that may hinder the implementation of the set objectives and tasks. Effective risk management involves assessing and analysing risks in individual areas of activity (Jastrzębska, 2014). Economic risk is a risk occurring in the economy that is examined in the context of specific goals and opportunities to achieve them (Rampini, Sufi, & Viswanathan, 2014).

Financial risk is mainly identified with the possibility of obtaining income different (lower) than assumed. In addition, when the risk of obtaining lower budget revenues is burdened with the probability of implementing higher expenditures, the risk of liquidity loss may be generated (Poniatowicz, 2010).

The aim of the study is to analyse the spatial diversity of financial risk in the activities of voivodships and the use of a synthetic measure in its assessment. This allowed to rank and group the surveyed units from the point of view of the main criterion and to present selected factors directly affecting the risk assessment. When addressing the issue of risk, the following research questions were formulated: How do financial variables shape current and investment activities? What is the role of risk in current and investment activities? What is the regional variation in the level of risk in individual voivodships?

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LITERATURE REVIEW

The voivodeship – as the analysis subject of analysis – is a regional self-government community (total population) created to perform the tasks of public administration. It performs public tasks of a provincial nature, not reserved by law for government administration bodies. In order for the voivodship self-government to be able to perform its tasks independently and to exercise its rights, it was equipped with financial resources and legal personality. The basic tasks of the voivodship self-government include shaping and maintaining spatial order, stimulating economic activity, preserving cultural and natural heritage, and maintaining and developing technical and social infrastructure of voivodship importance.

The modern economy operates in conditions of risk, which is an ambiguous and complex concept, so it is difficult to determine its essence in an unambiguous and precise way (Wang, Liang, Li, & Yang, 2016). The risk is a hazard or an opportunity. The risk is understood as the probability of damage to the property or the image of the individual, which will hinder the achievement of the objectives set (Allegrini, D'Onza, Paape, Melville, & Sarens, 2006). Bernstein (1998) describes risk as a variation of the rate of return. Damodaran (2002), on the other hand, indicates standard deviation as a measure of risk. He defines risk as the distribution of rates of return around the expected value, which describes the uncertainty associated with the possibility of achieving a certain level of income.

Jajuga and Jajuga (1998) describe the risk as the possibility of the occurrence of an effect inconsistent with expectations, and the deviation from the assumed result may be both negative and positive. According to Marshall (2001), risk is the possibility of events or adverse trends causing future losses or fluctuations in the future level of income. The risk should be determined in relation to possible outcomes and volatility, as well as expected results in the course of operations (Merna, & Al-Thani, 2008).

The activity of voivodships is a continuous process of making decisions that concern various aspects of functioning with a different horizon (short-, medium- and long-term). Their decisions can be divided into investment (related to investment activities, the effect of which is tangible assets, combines investment risk with them), financial (the effect of which is the nature, structure and type of liabilities, the risk associated with them is financial risk) and operational risks occur in the sphere of current activities and generate operational risk (Ahmeti, & Vladi, 2017).

Risk assessment in the public sector allows for the identification, analysis, assessment of operation and communication of risk in a way that allows an individual to minimize losses and maximize opportunities. As a process, the assessment should take into account the specificity of the voivodship and be an integral part of general management and permeate all processes. It should also allow for the identification of the most critical processes and services carried out in the entity, the threats to those processes and services and the assessment of their impact on the business. The final stage of the analysis should be to build resistance to these risks.

Risk analysis in the activities of voivodships serves to improve the quality of the decision-making process in the field of service provision, change management, innovation, provide better use of resources and taking into account the priorities for action. It allows for an efficient flow of information, making the right decisions, and coordinated cooperation, which will contribute to the rational management of public funds in the area of revenue collection and expenditure. This should ensure greater effectiveness in the implementation of tasks at a higher quality level, defining an attitude in relation to risk, counteracting risk by creating and implementing specific action plans, withdrawing from activities with too-high a risk and transferring risk to other entities (Poniatowicz, 2010).

RESEARCH METHODOLOGY

The research aimed to analyse the spatial diversity of financial risk in the activities of voivodships and the use of a synthetic measure in its assessment. This allowed us to rank and group the surveyed units from the point of view of the main criterion and to present selected factors directly affecting the risk assessment.

The empirical data used in the study describing the financial situation in spatial terms of Poland's 16 provinces are described for the years 2010 and 2020. Their selection was determined by the availability of data collected from the Central Statistical Office (CSO). The voivodeship is a local government unit, a regional self-government community (total population) created to perform public administration (this is NUTS 2 – regions (voivodships or parts thereof) – 16 units).

At the first stage of the implemented research, diagnostic variables were selected to describe the phenomenon under study (financial risk of voivodeships). The quality of statistical data is determined by three characteristics, namely the usefulness of data, timeliness, and accuracy. The study distinguished financial situation variables describing the income and expenditure aspects (which may pose risks), which are presented in Table 1.

In the next stage of the research, the authors tried to eliminate quasi-constant variables from the set of diagnostic variables. To evaluate the variables, the following were used the coefficient of variation and correlation coefficient. The selection of variables was also made based on factor analysis performed in the Statistica programme (Malina, 2006).

Variables describing objects in linear ordering should be characterized by high variability, be poorly correlated with each other, and be strongly correlated with rejected variables. As a result of the analysis, the variables X1, X4, X7, X17, X19, X20, X21 were rejected and further studies included X2, X3, X6, X8, X9, X10, X11, X12, X13, X14, X15, X16, X18. The selection of simple variables and their verification allowed us to determine the observation matrix, consisting of objects and features. It was saved in the form of X_{ij}:

$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \dots & \dots & \dots & \dots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix} \quad (1)$$

where:

X_{ij} - the values of the j-th variable for the i-th object, the object data matrix;

i - the object number (i = 1, 2,..., n);

j - the variable number (j = 1, 2, ..., m).

Table 1. Financial situation variables describing the income and expenditure aspect

Variables		unit
X1	Share of current income in total income	%
X2	Share of own revenues in total revenues	%
X3	Share of operating surplus * in total income	%
X4	Share of property expenditure in total expenditure	%
X5	Charge of current expenses to wages and salaries	%
X6	Share of operating surplus and income from the sale of assets in total income	%
X7	Self-financing rate/ Share of operating surplus and property income in property expenses	%
X8	Current transfers (subsidies + grants) per capita	PLN
X9	Operating surplus per capita	PLN
X10	Total liabilities per capita	PLN
X11	Share of total liabilities in total income	%
X12	Charge of total income to debt servicing expenses	%
X13	Debt service charge on own income	%
X14	Share in taxes constituting state budget revenue * */total income (fiscal wealth per capita index)	%
X15	Debt service expenditure/own revenue (debt service ratio)	%
X16	Expenditures on education and upbringing / number of inhabitants	PLN
X17	Expenditures on housing / population	PLN
X18	Healthcare expenditure / population	PLN
X19	Public administration expenditure / number of inhabitants	PLN
X20	Expenditure on agriculture and hunting / population	PLN
X21	Expenditures on transport and communication / population	PLN

Note: S – stimulant, D – destimulant; * operating surplus = total income – property income – current expenditure;
** Municipalities have a share in the personal income tax (PIT) and corporate income tax (CIT).
Source: own elaboration of data from the Local Data Bank of Statistics Poland (LDB).

In the set of diagnostic variables, the final list of which is presented in Table 1, selected for the construction of the synthetic measure, the following are distinguished:

$$S\ (\text{stimulant}) = \{X2, X3, X6, X9, X14, X16, X18\} \quad (2)$$

$$D\ (\text{destimulant}) = \{X8, X10, X11, X12, X13, X15\} \quad (3)$$

Diagnostic variables typically have different titles and varying ranges of variation, which prevents them from being directly compared and added (Rogowski, & Krysiak, 1997). The selected variables were subjected to the procedure of zero unitarisation using the following Hellwig's formula:

$$Z_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, \text{when } x_i \in S \quad (4)$$

$$Z_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}}, \text{when } x_i \in D \quad (5)$$

where:

S - stimulant, i=1.2…n; j=1.2…m;

D - destimulant, i=1.2…n; j=1.2…m;

$\max x_{ij}$ - the maximum value of the j-th variable;

$\min x_{ij}$ - the minimum value of the j-th variable;

x_{ij} - means the value of the j-th variable for i of this object.

Z_{ij} normalized value j of this variable for i of this object (Wysocki, & Lira, 2005; Kukuła, 1999; Dziekanski, Pawlik, Wrońska, & Karpińska, 2020; Dziekański, & Prus, 2020).

The obtained values Z_{ij} belonged to the range [0;1]. All variables were unified due to the range of variability as well as their location in the observation space. As a result of unitarization, we obtained a matrix of values of the Z_{ij} following features:

$$Z_{ij} = \begin{bmatrix} z_{11} & z_{12} & \dots & z_{1m} \\ z_{21} & z_{22} & \dots & z_{2m} \\ \dots & \dots & \dots & \dots \\ z_{n1} & z_{n2} & \dots & z_{nm} \end{bmatrix} \quad (6)$$

where:

Z_{ij} - is the unified value of the j-th variable for the i-th object.

The synthetic measure was used to assess the variation of provincial financial risk in Poland. It was built based on the TOPSIS method (Behzadian, Khanmohammadi, Otaghsara, Yazdani, & Ignatius, 2012).

The synthetic measure for individual objects was determined based on the formula:

$$q_i = \frac{d_i^-}{d_i^- + d_i^+}, in\ which\ 0 \le q_i \le 1, i = 1, 2, \dots, n \quad (7)$$

where:

$q_i \in [0; 1]$ - the value of the synthetic measure;

d_i^- - the distance of the object from the anti-pattern (from 0);

d_i^+ - the distance of the object from the pattern (from 1).

A higher value of measure indicates a better situation of the individual in the studied area (Jahanshahloo, Lotfi, & Izadikhah, 2006; Velasquez, & Hester, 2013).

In the last stage of research, the division into typological groups was used to interpret the obtained measures. The size of the synthetic measure in the first group means a better unit, in subsequent groups – the weaker units. A linear regression and autocorrelation analysis were also presented (Zeliaś, & Malina, 1997).

The correlation coefficient (Pearson) was assessed, expressed by the formula:

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \overline{x})^2 \sum_{i=1}^{n}(y_i - \overline{y})^2}} \quad (8)$$

where:

r_{xy} - Pearson's linear correlation coefficient;

$x\ and\ y$ - are measurable statistical features x = (1,2, … n), y = (1,2, … n), and are arithmetic means of features x and y. The necessary calculations were carried out using the Statistica software.

Regression analysis (performed in Gretl) is an analytical technique used to calculate the estimated relationship between a dependent variable and one or more describing variables (Gigerenzer, 2004; Schmidt, 2020).

Spatial autocorrelation is the correlation between the values of the same variable at different points in space (Griffith, 2003; Getis, 2007). The global and local spatial correlation coefficient of Moran's I. The global Moran's I (Anselin, 1995; Upton, & Fingleton, 1985; De Siano, & D'Uva, 2012):

$$I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} wij(x_i - \overline{x})(x_j - \overline{x})}{S_o \sigma^2} \quad (9)$$

The local form of the I Moran coefficient for observation i, determine the similarity of a spatial unit to its neighbours and the statistical significance of this relationship and is determined by the formula:

$$I = \frac{(x_i - \overline{x}) \sum_{j=1}^{n} wij\ (x_j - \overline{x})}{\sigma^2} \quad (10)$$

where:

n - number of spatial objects (number of points or polygons),

x_i, x_j - the value of the variable for the compared objects;

$\overline{x}$ - the average value of the variable for all objects;

wij - elements of the spatial weight matrix (weight matrix standardized in rows to one);

x_{ij} - means the value of the j-th variable for i of this object.

$S_o = \sum_{i=1}^{n}\sum_{j=1}^{n} wij$, $\sigma^2 = \frac{\sum_{j=1}^{n}(x_i - \overline{x})^2}{n}$ - variance (Anselin, & Bera, 1998; Getis, & Ord, 1992).

To illustrate the spatial relationship of the financial risk distribution of voivodships in Poland, Moran's I statistics were calculated, using the Queen matrix standardized in rows to one. The calculations were made in the PQStat programme.

RESULTS AND DISCUSSION

Figure 1 presents the results of the classification of voivodships obtained on the basis of the synthetic measure TOPSIS. Four groups were distinguished, consisting of five, three, four, and four voivodships in 2020, and six, three, three, and four voivodships in 2010. The synthetic measure of qi financial risk in 2020 ranged from 0.40 (Lubelskie) to 0.77 (Mazowieckie), and in 2010 from 0.37 (Opolskie) to 0.61 (Śląskie). Comparing 2020 to 2010, the following voivodships Śląskie, Podlaskie, Warmińsko-Mazurskie, Lubelskie present a decrease in the value of the synthetic measure. The first group includes voivodships with the lowest financial risk: Mazowieckie, Wielkopolskie, Dolnośląskie, Kujawsko-Pomorskie and Pomorskie, and the fourth group – with the highest financial risk: Lubuskie, Podlaskie, Warmińsko-Mazurskie and Lubelskie.

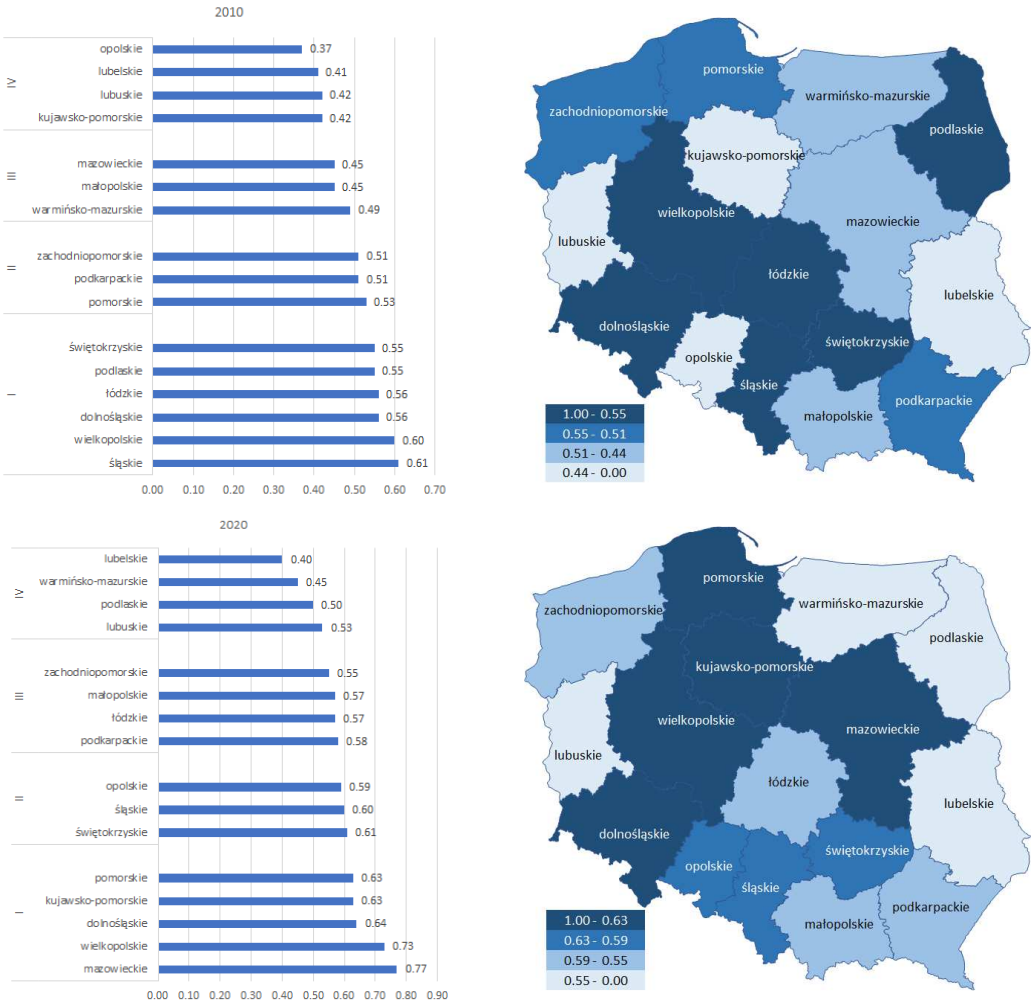

Figure 1. Spatial differentiation of the synthetic measure financial risk of voivodships in 2010 and 2020
Source: own elaboration of data from the Local Data Bank of Statistics Poland.

The financial risk measure was correlated with the share of own income in total income (0.5438), the operating surplus in total income (0.6808), surplus income from the sale of property in total income (0.6758), operating surplus per capita (0.6209), the share of taxes constituting state budget income in total income (0.5428), and health care expenditure per capita (0.4343). The value of the financial risk measure

was negatively correlated with the level of current transfers (sum of subsidies and subsidies) per capita (0.388), total liabilities per capita (-0.5434), the share of total liabilities in total income (-0.5554), encumbrance of own income with debt service expenditure (-0.6904), or the ratio of debt service expenditure to own income (-0.5902). The high value of the correlation of the synthetic measure of financial risk with the share in taxes constituting state budget revenues – personal income tax (0.5719), corporate income tax (0.5686) – indicates the dependence of voivodships on income from the state budget.

Negative values of global Moran's I statistics mean the occurrence of a different level of the studied phenomenon in units distant in relation to neighbouring ones. In the considered period, there was a slight negative autocorrelation and a decrease in value (comparing 2020 to 2010) for the synthetic measure of financial risk, see Table 3. The decreasing value of the considered statistics means a decreasing spatial dependence.

Table 3. Values of global Moran's I statistic for the synthetic measure of financial risk of voivodships in 2010 and 2020

Statistics	2010	2020
Moran's I	-0.379643	-0.150688
Expected I	-0.066667	-0.066667
Assuming normal		
Variance I	0.022125	0.022125
Z-Statistics	-2.104116	-0.56487
p-value	0.035368	0.572162
Assuming randomness		
Variance I	0.02354	0.021183
Z-Statistics	-2.039909	-0.577291
p-value	0.041359	0.563743

Source: own elaboration of data from the Local Data Bank of Statistics Poland in the Statistica programme.

The obtained values of local Moran's I statistics are presented in Figure 2. High positive values of local Moran's I statistics in 2010 were obtained in the case of the following voivodships: Zachodniopomorskie, Pomorskie, Mazowieckie, and negative for Małopolskie, Lubuskie, Opolskie. In 2020, positive statistics were obtained for Podlaskie, Kujawsko-Pomorskie, Dolnośląskie, and negative for Lubelskie, Warmińsko-Mazurskie, Mazowieckie. At the same time, the decreasing trend in the value of the considered statistics (Lubelskie, Łódzkie Mazowieckie, Pomorskie, Warmińsko-Mazurskie, and Zachodniopomorskie) in the period under consideration means a decreasing spatial dependence (Figure 2).

To assess the impact of socioeconomic variables of voivodships on the diversity of financial risk, the regression model was estimated, see Table 4. The fit of the model was measured by means of the following indicators: determination factor R-squared 0.734180 and adjusted R-squared 0.714610, which confirmed that the model allows explaining 73.41% of the variance of variables. Statistics F (12, 163) 37.51636 is statistically significant as well as (P value) was statistically significant, which means that the construction of the linear model was correct.

The voivodship authorities should be able to predict the risk of action. Determining the risk facilitates making rational decisions and actions enabling the implementation of tasks and objectives that are important from the point of view of meeting the needs of the voivodship community.

The implemented tasks of voivodships cannot be carried out effectively as a result of the impact of various factors on finances. The identification of these factors (internal or external) in terms of realised income and expenditure, changes in legal regulations, and the economic situation require constant analysis by the authorities. They should provide up-to-date, ongoing information necessary for the decision-making process. The multi-factor analysis method and the synthetic measures of financial (investment or operational) risk created on this basis prove to be supportive in this process (Kata, 2012). The financial risk associated with innovative processes financed, among others, by credit instruments

determines the financial situation. The risk occurs in the investment activity undertaken by the voivodship and is reflected in the levels of non-implementation of budgets in part of investment expenditure (included in the budget in the asset part) (Filipiak, 2017).

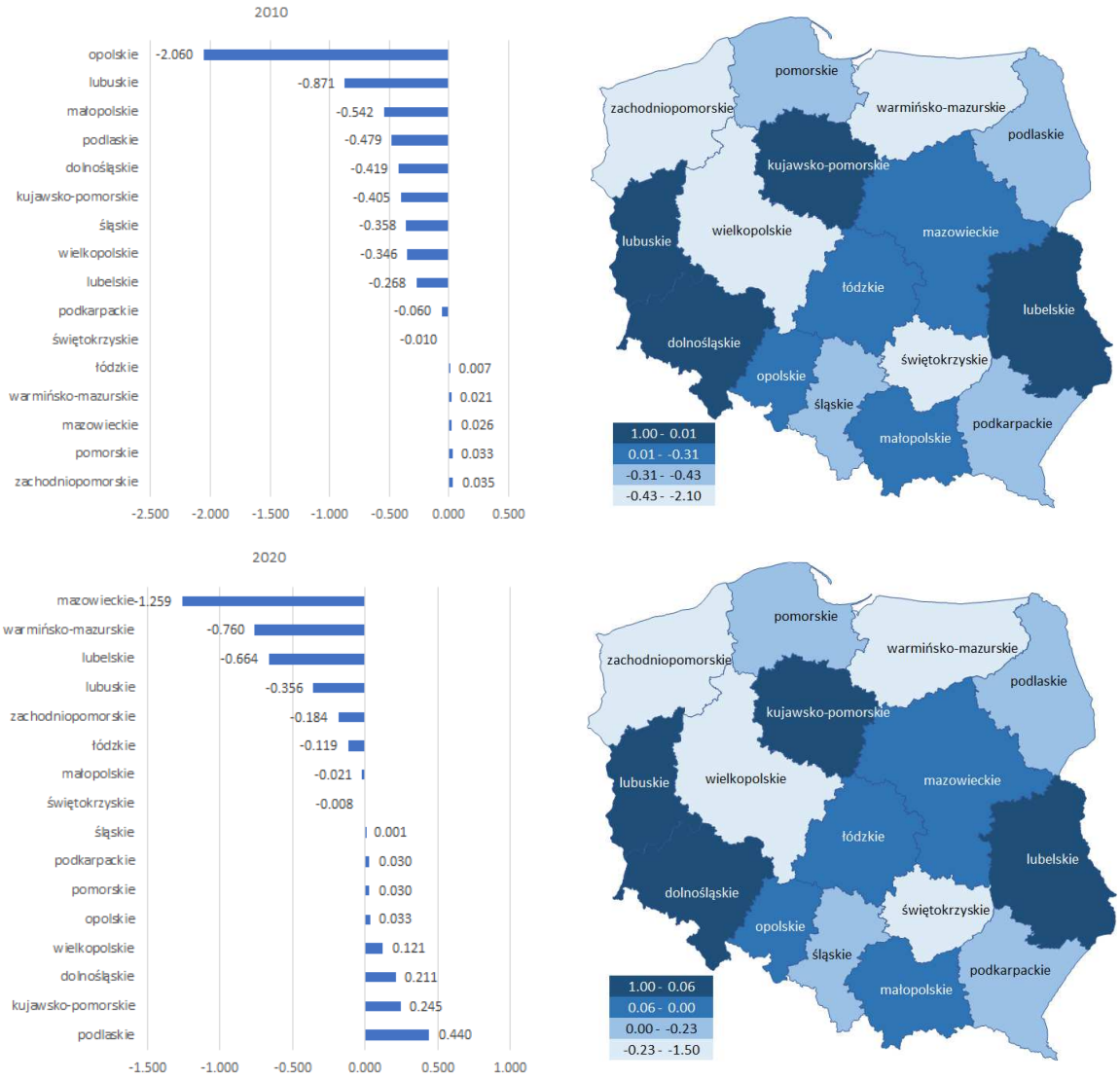

Figure 2. Spatial differentiation of the synthetic measure of financial risk in voivodships in 2010 and 2020
Source: own elaboration of data from the Local Data Bank of Statistics Poland.

The synthetic measure presented in the study allows to include in one number many features that have a significant impact on the analysed risk phenomena. Such measures may be particularly useful in comparative analyses, as well as in the assessment of changes in the studied phenomenon. This risk is determined by their activity (including investment), sources and structure of expenditure financing and income potential determining financial independence. The main threats affecting the financial situation undoubtedly include the issues of safe debt and its servicing, which examined Filipiak (2013). To the mentioned areas, we should also add the management of financial liquidity or income and current expenditure, the difference of which is an operating surplus/deficit. The risk of over-indebtedness is greater as local authorities benefit more from EU subsidies and receive less from the state budget. Poor financial situation causes threats to the safe functioning of units, and reckless decisions of managers, even with a favourable initial situation, may cause significant problems later, including debt (Trussel, & Patrick, 2009).

Table 4. The results of the regression analysis between the measure of financial risk and socioeconomic variables of voivodships in 2010-2020

Name of the socio-economic variable	Coefficient	Standard error	t-Student's	p-value
Constant	-0.525137	0.122615	-4.283	<0.0001
Total expenditure by budget classification headings Section 851 – Health care PLN	0.000380319	0.000203829	1.866	0.0639
Electricity in households by location of the consumer Electricity consumption per capita in the countryside kWh	0.000113518	4.20174e-05	2.702	0.0076
Share of legally protected areas in the total area %	0.00258366	0.000376034	6.871	<0.0001
% area of active landfills where municipal waste is disposed of – as of 31 December	-522.978	189.792	-2.756	0.0065
Waste collected selectively in relation to total waste %	-0.00155004	0.000513057	-3.021	0.0029
Registered entities per 1000 population	-0.0105334	0.00119941	-8.782	<0.0001
Natural persons conducting economic activity per 1000 population	0.0158281	0.00156914	10.09	<0.0001
Employed persons by section groups and gender in poviats (per person) 1000 inhabitants	0.00108448	0.000223066	4.862	<0.0001
Corporate income tax (PLN) pc	0.000950006	0.000166120	5.719	<0.0001
Industrial areas %	0.187455	0.0362337	5.173	<0.0001
Wastewater treated per year discharged in total dam3 per 100 km2	-0.000198709	5.06931e-05	-3.920	0.0001
Population using sewage treatment plant in % of total population in %	0.00549375	0.000770746	7.128	<0.0001

Arithmetic mean of the dependent variable	0.495511	Standard deviation of the dependent variable	0.087170
Sum of residual squares	0.353476	Residual standard error	0.046568
Determining coefficient R- square	0.734180	Corrected R-square	0.714610
F (12, 163)	37.51636	P-value for the F test	9.94e-41
Logarithm of credibility	296.7842	Information criteria Akaike	-567.5685
Bayesian information criterion	-526.3522	Crit. Hannana-Quinna	-550.8513

Note: least squares method estimation, observations used 1-176; Dependent variable (Y): the measure of financial risk.
Source: own elaboration of data from the Local Data Bank of Statistics Poland in the Statistica programme.

CONCLUSIONS

The decrease or increase in the financial risk of voivodships results from the fact of functioning in changing conditions, the impact of which may lead to increasing financial problems.

The synthetic rate of financial risk in 2020 ranged from 0.40 to 0.77 and in 2010 from 0.37 to 0.61. Comparing 2020 to 2010, voivodships Śląskie, Podlaskie, Warmińsko-Mazurskie, and Lubelskie presented a decrease in the value of the synthetic measure. The measure of financial risk was correlated, among others, with own revenues, operating surplus, income from participation in taxes constituting state budget revenues, level of current transfers, liabilities, number of entities and natural persons conducting business activity and number of employees.

An entity must agree on a risk assessment system that includes definitions for different levels of risk probability and impact, risk assessment, and analysis criteria in a uniform manner across the organisation. This allows for risk identification, unambiguous assessment of the impact on the entire organization, indication of the risk that has the greatest impact on the organization's ability to achieve its objectives, reduction of subjectivity, and increased transparency of risk assessment.

Effective risk analysis requires the use of a uniform method for individual areas of functioning and development. The investigated risk should be adequately described in the documentation and ranked according to the order and speed of response to it in individual areas of activity.

The results of the study allow for comparisons to be made between the units studied and new areas of analysis to be identified. In terms of new directions of research, future research should compare the results of ordering on the basis of a larger number of variables describing the main criterion, comparing the results of linear ordering with another method, or analysing outliers and determining their impact on the studied area.

Problems encountered in the process of analysis were the availability of data, comparability of data, and changes in legislation, especially in the area of local government tasks, finances, and financial reporting.

The value of the article is the indicated set of variables allowing to assess the financial risk of the voivodships, the years of the presented analysis 2010-2020, and the synthetic measure, as a basis for the assessment of financial risk.

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