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FINANCIAL INNOVATION MANAGEMENT: IMPACT OF FISCAL DECENTRALIZATION ON ECONOMIC GROWTH OF THE BALTIC COUNTRIES

Abstract. *The management process of fiscal policy incorporates a wide analysis of various factors. The dynamic financial approach should be applied in deciding the level of centralization. The article offers the usage of the multicriteria method in selecting fiscal variables as a new instrument for financial evolution. In this article, the hypothesis of decentralization's impact on economic growth is tested to show the growth opportunities. The implications of the fiscal decentralization index on economic growth across the Baltic States for 2005-2017 were examined using a panel data approach with dynamic effects. The Baltic countries (Estonia, Latvia, and Lithuania) are often considered as a single region with similar economic profiles and common political and social values. They are closely related geographically and historically, particularly during the Soviet era. Although their post-Soviet development has been similar, there are significant differences in local administrative systems and government finances. After restoring independence, the three Baltic countries have been reorganizing their public institutions according to western standards. Each country has some differences in organizing the management of local governments. The study's novelty is emphasized by supplementing the analysis with a fiscal decentralization index, including 24 fiscal decentralization indicators. The fiscal decentralization index ranges from 0.29 to 0.51. Lithuania (0,29) has the lowest fiscal decentralization index, the highest – Latvia (0.52) in the Baltic countries. The investigated model has revealed that the facts considered produce a statistically significant effect. Results showed a negative relationship between fiscal decentralization and economic growth in the Baltic States from 2005 to 2017. It should not be forgotten that, in some cases, regions are not capable of implementing green and inclusive growth without the influence of the central government.*

Keywords: fiscal decentralization, economic growth, Estonia, Latvia, Lithuania, Baltic States, multiple-criteria decision-making.

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Introduction. Many countries are tackling the issues of changing the course of growth into a greener and more inclusive. Some of the political-economic factors that influence growth productivity are intergovernmental fiscal relations. In this case, fiscal decentralization, which gives the lower levels of government more responsibilities in dealing with expenditures and income assignments, is used to reorganize the quality of growth. The level of decentralization of a country is influenced by the country's size and development level. According to OECD (2019), larger countries are more decentralized than smaller ones, with a few exceptions confirming the rule: Denmark and Switzerland are small and highly decentralized, while France is large and quite centralized. At the EU level, local and regional authorities play an important role in implementing and developing various projects to contribute to the sustainable and inclusive growth of the entire EU. Situated in a very dynamic environment, the European Union is trying not to lose its competing position in the global market. Fiscal decentralization might encourage local government authorities to search for new economic opportunities and make a more effective impact on implementing various programs. The sub-national governments are responsible for public spending, public investment, implementation, and financing of various projects, and the instrument of fiscal decentralization might increase their responsibility. In addition to that, a more decentralized policy could boost cooperation between European local authorities and their counterparts from partner countries, thus finding greener solutions for growth. Being closer to the citizens, local authorities, in theory, are more capable of acting faster. Schakel et al. (2018) calculated the regional authority index from 1950 to 2016 for forty-five OECD and European countries. The previous index, presented by Hooghe et al. (2010), included 42 democracies and semi-democracies. Both studies reveal that countries have been engaged in a sufficiently active decentralization process since 1950. According to the latest rankings, Estonia took the 36th place, Latvia – the 60th, and Lithuania – the 61st. Finzgar and Brezovnik (2019) presented a new index of fiscal decentralization according to the European Charter of local self-government, and levels belong to Belgium (0.75) and Italy (0.72) and the lowest – to Cyprus (0.41) and Latvia (0.41). Decentralization could have both a positive and negative long-term impact on growth. Analyzing how fiscal decentralization has been linked with economic growth helps track the situation. The analysis also includes the years of crisis as it is very interesting to check the impact of decentralization on growth during the crisis and steady growth. A commonly used indicator of fiscal decentralization is the sub-central revenue or spending share. This article uses the index combining 24 fiscal decentralization indicators. This paper analyses the relationship between fiscal decentralization on the national level and the fiscal outcomes of the general government. There are lots of studies analyzing the relationship between decentralization and economic growth (Davoodi and Zou, 1998; Martinez-Vazquez and McNab, 2003; Rodriguez et al., 2009, Bova et al., 2014, Slavinskaitė, 2017, Slavinskaite et al., 2020, Ahmad, 2020, Farida et al., 2021). However, there is no single right way to define this relationship. Some researchers found a positive relationship (Akai and Sakata, 2002; Iimi, 2005; Buser, 2011; Szarowska, 2014, Slavinskaitė, 2017), whereas others showed that fiscal decentralization and economic growth are negatively correlated (Davoodi and Zou, 1998; Rodríguez-Pose and Ezcurra, 2011; Baskaran and Feld, 2013). A group of researchers found a relationship between Fiscal decentralization and economic growth, but it has no statistical significance (Davoodi and Zou, 1998; Thornton, 2007; Asatryan and Feld, 2015).

The novelty of this research is the use of the multiple-criteria decision-making (MCDM) method to evaluate the impact of decentralization on economic growth. The contradictory results of other research (the relationship between fiscal decentralization and economic growth might demonstrate a positive, neutral, or negative link) motivate to expand and improve the methodology. The Baltic countries (Estonia, Latvia, and Lithuania) are often considered as a single region with similar economic profiles and common political and social values. They are closely related geographically and historically, particularly during the Soviet era. Moreover, their post-Soviet development has been rather similar as well. Nevertheless, there are significant differences in local administrative systems and government finances. After restoring

independence, the three Baltic countries have been reorganizing their public institutions according to Western standards. Every country has some differences in organizing the management of local governments. In Lithuania, local authorities are divided into three layers: ten counties, sixty municipalities, and five hundred elderships. In Latvia and Estonia, local units are represented by municipalities. This paper analyses the three Baltic countries that became officially independent from the Soviet Union in September 1991 (Estonia, Latvia, and Lithuania). Local governmental reforms in the three Baltic States have been the subject of earlier publications (Wrobel, 2003; Vilka, 2004; King et al., 2004; Vanags and Vilka, 2006; Trasberg, 2009; Linnas, 2011; Mäeltsemees, 2012; Groenendijk and Jaansoo, 2016). However, these publications do not always specifically deal with fiscal decentralization. This paper analyzes the relationship between fiscal decentralization and economic growth in the Baltic States from 2005 to 2017. The panel data analysis uses the regression method to track similarities and differences in the fiscal decentralization impact on each country's economic growth. EViews software has been used as a quantitative technical instrument to perform quantitative research.

The research has been done in the following steps. The first section introduces the theoretical background on how fiscal decentralization impacts the fluctuation of economic growth. The second – explains the methodology of the empirical research. The third section tests the model using a comparative econometric analysis for Baltic countries. The fourth section presents conclusions.

Literature Review. The scientific works analyzing fiscal federalism's theoretical and practical aspects are classified into two periods: first-generation theories from 1950 to 1990 and second-generation theories from 1991 till now. Tiebout (1956) opened the first stream of works. The scholar highlighted the important role of local governance in the entire economic system. Oates (1972) underlined that the decision-making done closer to the citizens could have a more effective impact on the local growth. Tiebout (1956), Musgrave (1959), Olson (1969), and Oates (1972) represented an important part of the literature on fiscal decentralization. These studies represent a starting point for each study in this field. The main supporting arguments are related to the quality of disposing of information. It is said that the central authorities might have imperfect information about the real situation of the citizens' life in a particular area. Competition and labor mobility might impact the local government's ability to catch new opportunities and find better solutions to decrease public expenditures by stimulating growth. Martinez-Vazquez et al. (2015) pointed out that this first-generation literature (Tiebout, 1956; Musgrave, 1959; Olson, 1969; and Oates, 1972) has been characterized as normative. Besides, this generation may also be described as making the economic case for fiscal federalism because it has inspired numerous decentralization reform projects worldwide. Second-generation theories of fiscal federalism proved positive arguments for decentralization from a political and institutional perspective. The leading centralized fiscal systems are treated like monopolists. Such a situation might decrease the competition among decentralized local units and slow down the citizens' hunger for searching and implementing new ideas (Brennan and Buchanan, 1980; Besley and Coate, 2003). On the other hand, (such mistakes as soft budget constraints), mismatches in responsibility and resources can easily destroy a decentralized system, giving rise to opportunities for increased local rents and corruption (Weingast, 2014). Brueckner (2006) noted that closeness to citizens is easier to foster incentives for different groups to save, protect and be responsible for wealth. To sum up, every phenomenon has advantages and a lot of disadvantages. Fiscal decentralization might go together with higher government deficits, the inefficiency of government decisions, corruption, which is affected by very close relations, a fragmented national market, which might not be an effective area for huge companies, lack of managerial skills, which is related to well-paid workers residing in big towns, all of which can harm the overall economic growth.

Empirical findings testing the relationship between the particular level of fiscal decentralization and economic growth have not demonstrated unique results. In many cases, scientists used regression models, where the variable GDP is chosen as a dependent variable. The ratios such as the level of

decentralization, private investment, physical capital accumulation, tax level, etc., are chosen as independent variables in one model.

Thiessen (2003) analyzed high-income OECD countries. The scholar confirmed that fiscal decentralization positively impacts economic growth until a particular point beyond which the higher level of decentralization can negatively affect economic wealth. Iimi (2005) tested the relationship between the per capita growth rate and the local share of the expenditure to total government expenditure on the panel data of 51 countries for the period 1997-2001. The results confirmed a positive relationship between growth and decentralization. Thornton (2007) investigated the link between economic growth and fiscal decentralization. The analyses covered sixteen European countries, Japan, Mexico, and New Zealand. The author limited the fiscal decentralization measurement to the level of revenues, which guarantees full autonomy to local authorities. The research results showed that this variable's impact on economic growth is not statistically significant. Baskaran and Feld (2013) performed panel research of twenty-three OECD countries between fiscal decentralization and economic growth for 33 years (1975 to 2008). He indicated that fiscal decentralization has a negative but statistically insignificant effect on growth. Blochliger and Egert (2013) used productivity instead of economic growth. Their empirical study of OECD data demonstrated a weak positive effect. Asatryan and Feld (2014) highlighted that the ratio of revenue decentralization demonstrated a more positive impact on economic growth than the ratio of spending decentralization. Yushkov (2015) brought Russian experience in the relationship between fiscal decentralization and economic growth. The scientist used data from 78 Russian regions from 2005 to 2012. The results showed that regional dependence on central authorities is positively linked with economic growth. Szarowska (2014) conducted a study aiming to test and quantify the impact of fiscal decentralization on economic growth in the 21 EU countries from 1995 to 2012. The author found a positive impact of expenditure decentralization in her chosen sample of countries, a negative effect of revenue decentralization, and a negative but statistically insignificant impact of tax decentralization on economic development. Yang (2016) came up with a study on the effect of fiscal decentralization associated with tax reform on economic growth in 29 provinces of China. Yang (2016) analyzed the period from 1990 to 2012 by a fixed-effect method. Besides, Yang (2016) found that decentralization revenue and expenditure measures positively affect economic growth. The different level of impact was fixed in three main sectors. Noteworthy here, the results of a secondary sector demonstrated the largest impact. Baskaran and Feld (2013) found a neutral relationship between intergovernmental fiscal frameworks and growth.

The latest analyses of the relationship between decentralization and economic growth supplemented the research by including financial ratios like budgetary revenue to GDP, central budgetary revenue to total budgetary revenue, etc. Articles also could be grouped based on the criteria of choosing the data: some test the impact using countries' panel data, others – regions, provinces (Sun et al., 2017). Chinese researchers have actively studied the latest cases (Sun et al., 2017). Sun et al. (2017) conducted an empirical study of three regression panel models for China's 29 provinces over the 1995–2014 period. The first equation covers the GDP as a dependent variable and measures the fiscal decentralization level and the growth rate of per-capita physical capital in real terms as independent factors. The second model represents the growth rate of per-capita physical capital in real terms as a dependent variable and the level of fiscal decentralization, growth, and the real interest rate as explanatory variables. The third regression model evaluated fiscal decentralization by supplementing the model with the growth rate per capita of physical capital in real terms, the ratio of per capita provincial GDP to per capita national GDP, the composite tax rate, and the ratio of the land granting income to GDP. The results suggest that fiscal decentralization positively supports economic growth, but only until a particular point, following which a further increase in decentralization might negatively impact the growth. Liu et al. (2017) used the regression method to analyse the effects of fiscal decentralization and economic growth on environmental pollution. The variable – haze pollution decoupling index, which refers to environmental pollution, the fiscal

decentralization, expressed as budgetary, financial expenditure, and real GDP per capita growth as economic growth indicator, was used as the endogenous growth theory framework. The data used to test the model was the cross-province panel data from China, and the results confirmed the negative impact of economic growth on the environment. It is only logical since China's growth is related to the very active growth of industrial companies. Empirical findings revealed that the improvement of fiscal decentralization does not lead to a cleaner environment.

Song et al. (2019) narrowed down the analyses, replacing the GDP with the green total factor productivity ratio (GDP divided by aggregate inputs), and constructed a model where significant factors include the environmental regulation intensity and the degree of fiscal decentralization. A panel quantile regression model was tested on the panel data from 11 provinces in the Yangtze River economic belt from 2000 to 2015. The results were contradictory as a moderate level of fiscal decentralization can positively impact growth. In contrast, a high level of fiscal decentralization could have a negative effect on the green total factor productivity ratio. The mixed results can be affected by the different levels of economic development of chosen provinces. Ding et al. (2019) raised questions on how fiscal decentralization and fiscal reform impacted the fluctuation of economic growth in 31 provinces of Mainland China between 1980 and 1999. The first part of that empirical research followed the classical method, defined in the literature by evaluating the decentralization effect, expressed as a share of total public revenue and expenditure on economic growth. The empirical results showed that increasing local revenues have a negative impact on economic growth. The second part of the research included the ratio of the local tax revenue to central tax revenue and revealed the negative impact on economic growth. Summarizing the results achieved by analysing Chinese panel data from different provinces, it is seen that fiscal decentralization does not necessarily lead to higher growth. In many cases, the relation reminds an inverted U, where positive impact is noticed with lower levels of decentralization. Such results conclude that provinces cannot guarantee continuous high investments to stimulate green growth. On the other hand, separate provinces demonstrate different economic development levels, manage their financial abilities, and are not treated equally. As there were many empirical studies of different countries and regions, the theoretical analysis raises a question for empirical investigation of how the level of fiscal decentralization impacts the growth in the Baltic region. It is supposed that the higher level of decentralization should go with higher growth as the Baltic counties are small and educated enough to manage the freedom.

Methodology and research methods. Scientists investigate and evaluate the impact of fiscal decentralization on economic growth using various methods (Baskaran and Feld, 2013; Szarowska, 2014; Ashworth et al., 2013; Grisorio and Prota, 2015). Barro's (1990) endogenous growth model is one of the most popular methods in which Cobb-Douglas's production functions. It has multiple inputs, including private and public spending (Davoodi and Zou, 1998; Akai and Sakata, 2002, Akai et al., 2007; Perez and Cantarero, 2006; Carrion-i-Silvestre et al., 2008; Filippetti and Sacchi, 2016). Based on the endogenous growth model, scientists divided costs into three different levels of government expenses (first done by Davood and Zou, 1998) and analyze the impact of each of these groups of expenses on economic growth. Table 1 presents the scientists who used Barro's endogenous growth model in their research.

The most popular among researchers is the method of least squares (OLS) (Davoodi and Zou, 1998; Akai and Sakata, 2002; Desai et al., 2003; Feld et al., 2004). Zhang and Zou (1998) and Thiessen (2003) used the generalized linear model (GLS). In turn, Akai et al. (2007) used the maximum likelihood estimation (MLE), Zhang, Zou (1998) – least-squares dummy variables (LSDV), Desai et al. (2003) – three-stage least squares (3SLS), Baskaran and Lars (2012) – Two-Stage Least Squares (2SLS), Dobrata et al. (2021) – autoregressive distributed lag model (ARDL).

The methodological tools for assessing fiscal decentralization vary from country to country. There is no perfect approach to assess the country's fiscal decentralization fully. In this article, the phenomena of fiscal

decentralization were analysed and divided into four interrelated aspects: income, expense, borrowing, and inter-budget transfers.

Table 1. Scientists used Barro endogenous model in the fiscal decentralization studies

Author (year)	Period (country)	Method
Davoodi and Zou (1998)	1970–1989, 46 countries	Fixed effect panel model OLS
Akai and Sakata (2002)	1992–1996, 50 JAV state	Fixed effect panel model OLS
Iimi (2005)	1997–2001, 51 countries	Fixed effect panel model OLS
Carrion-i-Silvestre *et al.* (2008)	1980–1992, 17 independent communities	Fixed effect panel model OLS
Nguyen and Anwar (2011)	1990–2007, 61 Provinces of Vietnam	Fixed effect panel model OLS
Baskaran and Feld (2013)	1975–2008 23 OECD countries	Fixed effect panel model TSLS
Lozano and Julio (2015)	1990–2012 Colombia regions	Fixed effect panel model OLS
Filippetti and Sacchi (2016)	1970–2010 21 OECD countries	Fixed effect panel model

Sources: developed by the authors.

A particular set of indicators clarifies every aspect. Figure 1 presents the hierarchical structure of fiscal decentralization phenomena. Scientific literature features multicriteria methods to combine all the aspects and their referring indicators into one aggregate index. Multicriteria methods are universally applied in both the fundamental and applied sciences. These methods are widely used in the fields of economics and management (Ginevičius et al., 2008; Ginevičius and Zubrecov, 2009; Ginevičius et al., 2010; Stankevičienė and Mančaitė, 2012; Brauers et al., 2014; Dobrovolskiene, 2016; Epifanić et al., 2020). In this article, Simple Additive Weighting (SAW) method was chosen as the most popular among social researchers to evaluate the country's fiscal decentralization level. Fiscal decentralization by the SAW method could be calculated in the following way:

$$S_j = \sum_{i=1}^{m} \omega_i \tilde{r}_{ij} \tag{1}$$

where S_j – the value of the quantitative assessment of fiscal decentralization; ω_i – the weight of indicator of fiscal decentralization; $\tilde{r}_{ij}$ – the normalized value of the indicator i of fiscal decentralization. The multicriteria assessment SAW method requires the same nature of change in all indicators, i.e., all of them need to be maximized or minimized.

The normalization should be performed by employing the ESP method to determine fiscal decentralization. In this case, the normalization of the initial data could be performed with an equation (Ginevičius, 2011):

$$\bar{r}_{ij} = \frac{r_{ij}}{\max\limits_{j} r_{ij}} \tag{2}$$

where r_{ij} – the normalized value of indicator i; max r_{ij} – the highest value of indicator i (obtained from statistical data or established through expert assessment).
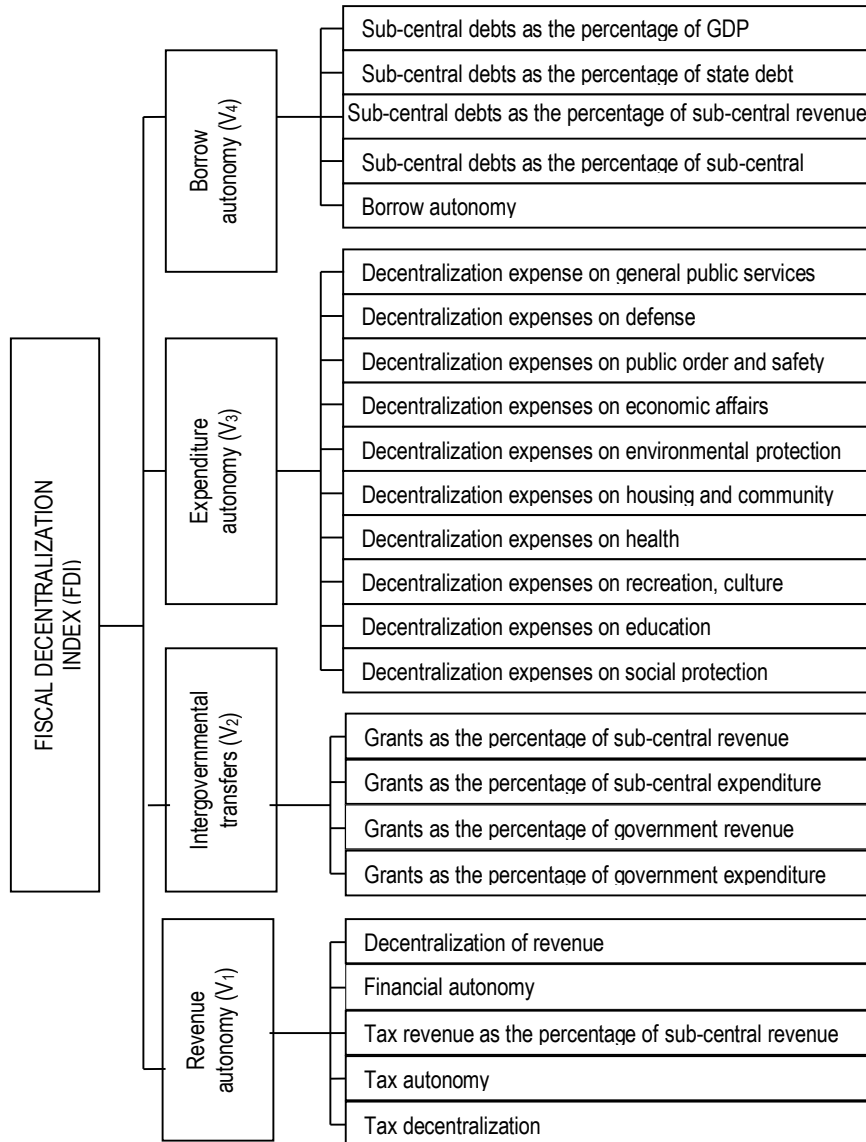
Figure 1. Hierarchical indicators system of the Fiscal decentralization index

Sources: developed by the authors.

The weight values could be used in the further multicriteria evaluation, provided that experts' judgments are consistent (in concordance). The concordance level could be determined by Kendall's concordance coefficient W (Kendall and Gibbons 1970):

$$W = \frac{12S}{r^2 m(m^2-1) - r\sum_{j=1}^{r} T_j} \tag{3}$$

where *r* is the number of experts, *m* – the number of the criteria considered.

In fact, the concordance degree of experts' estimates is determined by the value χ^2 rather than the concordance coefficient W (Kendall and Gibbons 1970):

$$\chi^2 = Wr(m-1) = \frac{12S}{rm(m+1)} \tag{4}$$

It has been shown (Kendall 1970) that if the value of χ^2 calculated with an equation (4) is larger than its critical value 2 χ^2_{kr} taken from the distribution table of χ^2 with v = m − 1 degree of freedom and the significance level α chosen to be close to zero, then the statistical hypothesis about expert estimates' consistency is adopted. The effect of fiscal decentralization on economic growth model adopts the following form:

$$y_{it} = \alpha + \beta_y Z_{it} + \beta_z X_{it} + \varepsilon, \tag{5}$$

where y_{it} is the GDP per capita for each country and year, Z_{it} - fiscal decentralization measure index (FDI) for each country and year, X_{it} - quantitative indicators – is a set of six control variables that are found to be significant in almost all economic growth studies (Nguyen and Anwar, 2011; Baskaran and Feld, 2013; Cantarero and Gonzalez, 2009; Gemmell *et al.,* 2013; Yushkov, 2015; Lozano and Julio, 2015).

The fixed effect panel data model was adopted to estimate the parameters of the regression model. The study employs the equation form used by Lapinskienė *et al.* (2014; 2015). The estimation procedure for the regression model parameters employed the ordinary least squares (OLS) method:

$$GDP_{it} = \alpha + \mu_i + \beta_1 FDI_{it} + \beta_2 EML_{it} + \beta_3 HUM_{it} + \beta_4 INF_{it} + \beta_5 INV_{it} + \varepsilon_{it} \tag{6}$$

Control variable includes: 1) employment (EML); 2) human capital - expenditure for education (HUM); 3) inflation (INF) 4) ratio of investment to GDP (INV).

Fiscal decentralization index (FDI) consists of four different variables (sub-indices):
1) revenue decentralization;
2) expenditure decentralization;
3) transfers to subnational government from other government levels;
4) borrowing decentralization.

The results have been statistically processed using MS Excel and Eview software. The evaluation model of the impact of fiscal decentralization on economic growth was generated by integrating the fiscal decentralization index into Barro's endogenous growth model. The second part would include testing the model with a comparative econometric analysis carried out for the Baltic countries.

Results. This section of the article aims to investigate the impact of fiscal decentralization and other chosen factors on economic growth in the Baltic countries from 2005-to 2017 (the latest available data comes from 2017). The variables, such as the fiscal decentralization index, the employment rate, %, the human capital (education expenditure), the inflation growth rate, %, investment of GDP, %) were included in the model. The variables have been chosen based on the economic model (Equation 5) and the available statistical data. The analysis uses Eurostat and OECD databases (Table 2).

Table 2 presents the basic descriptive statistics of variables used in the model to evaluate the fiscal decentralization effect on economic growth. Table 3 presents the definition of the variables and data source. Fiscal decentralization has many dimensions. Thus, the first step is to calculate the index of fiscal decentralization using the multicriteria decision-making method – SAW (Formula 1). The structure of fiscal

decentralization performance comprises four aspects (borrowing, expenditure, intergovernmental transfers, and revenue) and twenty-four sub-indicators at the lowest level.

Table 2. Descriptive statistics of variable

Variable	GDP	FDI	EML	HUM	INF	INV
Mean	10851.28	0.37	65.74	66.48	3.56	24.68
Standard Error	274.31	0.02	0.64	25.62	0.57	0.91
Median	10800.00	0.34	65.70	667.00	3.20	23.20
Mode	10800.00	0.34	70.10	-	0.20	28.60
Standard Deviation	1713.09	0.11	4.02	159.99	3.58	5.71
Sample Variance	2934669.37	0.01	16.19	25596.20	12.81	32.58
Kurtosis	-0.75	-1.39	-0.69	0.21	2.17	-0.43
Skewness	0.25	0.49	-0.09	-0.02	1.35	0.73
Range	6600.00	0.31	16.50	718.78	16.50	19.80
Minimum	8000.00	0.24	57.60	323.68	-1.20	16.90
Maximum	14600.00	0.55	74.10	1042.46	15.30	36.70
Sum	423200.00	14.58	2563.80	26031.71	138.90	962.40
Count	39.00	39.00	39.00	39.00	39.00	39.00

Sources: developed by the authors based on (Eurostat, OECD).

Table 3. Variable and data Source

Variable	Definition	Data Source
GDP	GDP per capita	Eurostat database
FDI	Fiscal decentralization index	Authors calculation, OECD
EML	Employment rate, %	Eurostat database
HUM	Human capital (Expenditure for education)	Eurostat database
INF	Inflation growth rate, %	Eurostat database
INV	Investment of GDP, %	Eurostat database

Sources: developed by the authors.

The evaluation process is performed in the following steps: 1) the definition of the values of every sub-indicator from Table 2; 2) the evaluation of the relative significance of every aspect of fiscal decentralization and its sub-indicators; 3) calculation of the index of every aspect separately and the final index of fiscal decentralization. To determine the sub-indices' values, the statistical analysis for the determination of the quantitative values of the sub-indicators is performed. After the normalization process of every sub-indicator of the fiscal decentralization (Formula 2), the next stage is the definition of the weights of indicators using expert judgment. 10 experts from 7 different countries participated in the study. Table 4 presents the breakdown of experts by country.

It has been proved that the accuracy of small expert group assessments in aggregate expert assessment models with equal weights does not lag behind the accuracy of large expert group assessments (Libby and Blashfield, 1978). If there are more than 7 experts, the accuracy is over 90 percent. If the number of experts is increased, the accuracy increases very little. Hence, the 10 is a sufficient number of experts for this study. Three experts hold senior positions in public service and are closely involved in top-level strategic decision-making in public finance and public finance research. Five experts conduct research in areas of scientific interest, such as the effectiveness of public finances, the impact of fiscal decentralization on growth, and the measurement and assessment of fiscal

decentralization. Results show that the Kendall coefficient of concordance (Formula 3) is statistically significant (0.76), and the opinion of experts is harmonized under the probability of 0.99 (Table 5).

Table 4. Experts by Countries

Expert Country	1	2	3	4	5	6	7	8	9	10
Austria									+	
Italy	+									
Lithuania				+				+		+
Portugal							+			
Romania		+	+							
Slovenia					+					
Turkey						+				

Sources: developed by the authors.

Table 5. Compatibility results of Expert assessment

Criteria	S	W	X^2	X_{kr}
I	309.5	0.76	20.63	7.82
V_1	671.5	0.83	37.35	9.49
V_2	303.5	0.75	20.25	7.82
V_3	4905	0.73	59.45	16.92
V_4	586.5	0.72	26.07	9.49

Sources: developed by the authors.

It was found that all the conditions foreseen in the expert assessment were met, and the opinions of the experts were coordinated. Thus, the results of this study could be used at the further stage of the study. Table 6 presents the weights of the fiscal decentralization index and the indicators that constitute them. The local government revenue autonomy (0.378) has the highest weight in the fiscal decentralization index, and experts marked the lowest weight the inter-budget transfers (0.161).

Table 6. Weights of fiscal decentralization indicators of the country

Name of indicators	Autonomy of revenue (V_1)	Intergovernmental fiscal transfer (V_2)	Autonomy of expenditure (V_3)	Autonomy of borrowing (V_4)	Total
Weight of the indicator	0.378	0.161	0.289	0.172	1.0

Sources: developed by the authors.

After determining the weights of the sub-indices and their indicators, the second step is to calculate the fiscal decentralization index based on the chosen formula (Formula 1). Figure 2 presents the fiscal decentralization index of The Baltic States index. Figure 2 shows that the fiscal decentralization index ranges from 0.29 to 0.51. Lithuania (0,29) has the lowest fiscal decentralization index, the highest – Latvia (0.52) in the Baltic countries. The last step is to evaluate the fiscal decentralization effect on economic growth in the Baltic countries. Table 7 presents the regression parameter estimates for the chosen fixed effect panel model.

The characteristics of the fitted model validated the model. The p-value of the student's test provided in the column «Prob.» was used to determine the significance of the fiscal decentralization index, employment rate, %, human capital (education expenditure), inflation growth rate, %, and investment of GDP, %.
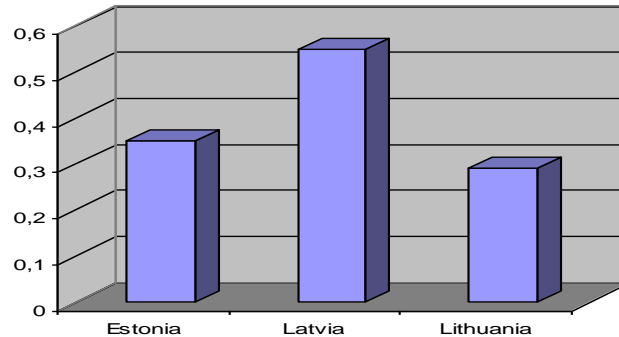
Figure 2. Fiscal decentralization index of Baltic Countries in 2017
Sources: developed by the authors.

Table 7. Regression parameter estimates for the chosen fixed effect panel model

Variable	Coefficient	Std. error	T -Statistic	Prob.
C	-3500.90	1419.35	-2.47	0.0190***
FDI	-4007.63	687.25	-5.83	0.0000***
EML	145.04	28.63	5.07	0.0000***
HUM	6.76	0.68	9.96	0.0000***
INF	-103.30	26.48	-3.90	0.0004***
INV	87.92	19.55	4.50	0.0001***
Effect specification				
R squared			0.9432	
Adjusted R squared			0.9347	
F-statistic			109.73	
DW			1.2427	
Prob. (F –statistic)			0.0000	

Sources: developed by the authors.

Since the p-value is lower than 0.05, these coefficients have a statistically significant explanatory power with a probability of 95%. R^2 is 0.93, and the adjusted R squared is 0.9347. R squared is very high due to its estimation specific for the pooled data series. The adjusted R^2 is lower than R2 by 0.0085, which confirms no redundant variables there. F-statistics of the final model is 109.73, and the probability of F-statistics being zero is non-existent. In this case, Durbin – Watson stat 1.2427 indicates the substantial serial correlation of residuals. The chosen fixed effect panel model for the three Baltic countries confirms the statistical significance of choosing a factor set. The obtained model coefficient estimates were used to explain the impact of factors on economic growth. The regression coefficients referring to employment rate, %, human capital (education expenditure), investment of GDP, and % have a positive sign. In contrast, the fiscal decentralization rate and inflation growth rate % have a negative sign as it was expected. The increase in these indicators makes for higher economic growth. The inflation growth rate (%) was expected to be negative, as a higher inflation rate reduces economic growth, and it has been obtained. The impact of the fiscal decentralization index is not likely to show negative results, which have been expected. Hence, results support other empirical studies, which confirmed that fiscal decentralization might reduce economic growth at a particular stage of economic development.

Conclusions. Two contradicted approaches have framed the discussion of theories about the level of decentralization. One highlights the positive aspects of high decentralization as freedom, higher

responsibility, and flexibility, and another one stresses the effectiveness of management, lower corruption level, and lower quality of disposing of information. Empirical findings testing the relationship between the particular level of fiscal decentralization and economic growth have not demonstrated unique results. In many cases, fiscal decentralization positively impacts economic growth until a particular point beyond which the higher level of decentralization can negatively affect economic wealth.

The performed thorough analysis of the scientific empirical studies in the considered area aimed to choose two methods to evaluate the impact of fiscal decentralization on economic growth in the Baltic region. First, the SAW method was chosen to perform the fiscal decentralization index. Second, the performed index with other significant factors (employment rate, %, human capital (education expenditure), inflation growth rate, %, investment of GDP, %) was combined in one fixed effect panel mode. The expert observation showed that revenue autonomy (0.378) and expense autonomy (0.289) are the most important aspects of fiscal decentralization in the Baltic region. The level of compatibility of expert opinions was determined by calculating the coefficient of concordance (W = 0.76).

The investigated model has revealed that the facts considered produce a statistically significant effect. The regression coefficients referring to employment rate, %, human capital (education expenditure), investment of GDP, %, are positive, while fiscal decentralization rate, inflation growth rate, %, are negative. The inflation growth rate, %, was expected to be negative, as a higher inflation rate reduces economic growth, and the expectation has proven right. It has been mentioned that the fiscal decentralization index impact results are not likely to meet the expectations of showing a negative index. There are lots of studies (Thiessen (2003), Baskaran and Feld (2013) Dinga et al. (2019) confirmed that fiscal decentralization at a particular level or stage of the economy does not support growth. Besides, this study's results support the above conclusion. It should not be forgotten that, in some cases, regions are not capable of implementing green and inclusive growth without the influence of the central government.

This investigation could be continued in two directions – fiscal decentralization and regional environmental indicators, and trying to find the other factors which, together with fiscal decentralization, could positively impact the wealth of the region.

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Управління фінансовими інноваціями: вплив фіскальної децентралізації на економічний розвиток країн Прибалтики

Процес управління фіскальною політикою включає в себе широкий аналіз різноманітних факторів. Авторами наголошено, що при прийнятті рішень щодо рівня централізації необхідно застосовувати динамічний фінансовий підхід. Новизна даного дослідження полягає у застосуванні індексу фіскальної децентралізації, до якого включено 24 показники. У статті запропоновано багатокритеріальний метод вибору фіскальних змінних, як новий інструмент. Авторами проведено перевірку гіпотези щодо впливу децентралізації на економічне зростання країни. Емпіричне дослідження впливу індексу фіскальної децентралізації на економічне зростання проведено на основі панельних даних з динамічними ефектами для країн Прибалтики за 2005-2017 роки. У статті зазначено, що країни Прибалтики (Латвія, Литва та Естонія) часто розглядаються як єдиний регіон за економічними характеристиками, а також політичними та соціальними цінностями. При цьому досліджувані країни мають близьке географічне розташування та спільне історичне минуле (особливо за часів існування Радянського союзу). Однак, між країнами існують значні відмінності в адміністративних системах та управлінні державними фінансами. Авторами зазначено, що після набуття незалежності, у кожній з країн було реорганізовано державні установи у відповідності до західних стандартів. До того, організація управління місцевими органами влади кожної з країн має свої особливості, які відрізняють її від інших. За результатами дослідження встановлено, що серед країн Прибалтики, найнижчий рівень фіскальної децентралізації має Литва (0,29), найвищий – Латвія (0,52). Отримані результати свідчать про існування негативного зв'язку між фіскальною децентралізацією та економічним зростанням у країнах Прибалтики з 2005 по 2017 роки. Таким чином, автори приходять до висновку, що у деяких випадках, регіони не спроможні реалізувати «зелений» та інклюзивний ріст без впливу центрального уряду.

Ключові слова: фіскальна децентралізація, економічний розвиток, Естонія, Латвія, Литва, країни Прибалтики, багатокритеріальні методи прийняття рішень.