ISSN 0323-9004

Economic Archive

Svishtov, Year LXXIX, Issue 3 - 2026

Green Banking as a catalyst for Sustainable Development – Evidence from the Banking Sector

A Coefficient-Based Method for the Allocation of Indirect Costs

Fiscal and Distributional Effects of the Change in the Social Security Model for Civil servAnts in Bulgaria

Forecasting the Volatility of Leading Banking Institutions Using the EGARCH (1.1) Model

Measuring Regional Economic Opportunities: A New Approach Through the Regional Economic Opportunities Index and the Regional Deficit Coefficient

D. A. TSENOV ACADEMY OF ECONOMICS
SVISHTOV

Народностопански архив
Година LXXIX книга 3 - 2026
Year LXXIX, Issue 3 - 2026
Economic Archive

EDITORIAL BOARD:
Prof. Teodora Dimitrova, PhD – Editor-in-chief
Prof. Svetoslav Iliychovski, PhD – Deputy Editor
Assoc. Prof. Mihail Chipriyanov, PhD
Assoc. Prof. Zhelao Vytev, PhD
Assoc. Prof. Iskra Panteleeva, PhD
Assoc. Prof. Plamen Yordanov, PhD
Assoc. Prof. Plamen Petkov, PhD
Assoc. Prof. Anatoliy Asenov, PhD
Assoc. Prof. Sergey Radukanov, PhD

INTERNATIONAL BOARD:
Prof. Mihail A. Eskindarov, DSc (Econ) –Financial University under the Government of the Russian Federation, Moscow (Russia).
Prof. Grigore Belostechnik, DSc (Econ) – Moldovan Academy of Economic Studies, Chisinau (Moldova).
Prof. Mihail Zveryakov, DSc (Econ) – Odessa State Economic University, Odessa (Ukraine).
Prof. Andrey Krisovatiy, DSc (Econ) – Ternopil National Economic University, Ternopil (Ukraine).
Prof. Ken O'Neil, PhD – University of Ulster (Ireland)
Prof. Richard Thorpe, PhD – Leeds University (Great Britain)
Prof. Olena Nepochatenko, DSc (Econ) – Uman National University of Horticulture, Uman (Ukraine)
Prof. Dmytro Lukianenko, DSc (Econ) – Kyiv National Economic University named after Vadym Hetman, Kyiv (Ukraine)
Assoc. Prof. Maria Cristina Stefan, PhD – Valahia University of Targoviste (Romania)
Assoc. Prof. Anisoara Duica, PhD – Valahia University of Targoviste (Romania)
Assoc. Prof. Vladinir Klimuk, PhD – Baranovichi State University, Branovic (Belarus)

Support Team
Elena Petkova – Technical Secretary
Anka Taneva – Bulgarian Copy Editor
Ventsislav Dikov – Senior Lecturer in English – Translation from/into English
Margarita Mihaylova, PhD – Senior Lecturer in English – Translation from/into English

Editorial address:
2, Emanuil Chakarov street, Svishtov 5250
Prof. Teodora Dimitrova, PhD – Editor-in-Chief
☎ (++359) 631 66 201
Elena Petkova – technical secretary
☎ (++359) 631 66 201, e-mail: nsarhiv@uni-svishtov.bg
Blagovesta Borisova – computer graphic design
☎ (++359) 882 552 516, e-mail: b.borisova@uni-svishtov.bg
Milena Aleksandrova – computer graphic design
☎ (++359) 888 303 402, e-mail: m.aleksandrova@uni-svishtov.bg

In 2026, the journal will be printed using a financial grant from the Scientific Research Fund – Agreement № KP-06-NP7-66 from Bulgarska Nauchna Periodika – 2026 competition.

© Academic Publishing House "Tsenov" – Svishtov
© D. A. Tsenov Academy of Economics – Svishtov

ECONOMIC ARCHIVE

YEAR LXXIX, BOOK 3 – 2026

CONTENTS

Mihail Chipriyanov, Mario Stephan Hopfner
Green Banking as a catalyst for Sustainable Development – Evidence from the Banking Sector / 3

Rosen Iliyanov Kolev
A Coefficient-Based Method for the Allocation of Indirect Costs / 23

Teodor Nenov, Ivaylo Kanev
Fiscal and Distributional Effects of the Change in the Social Security Model for Civil servAnts in Bulgaria / 34

Petar Georgiev Dzhelepov
Forecasting the Volatility of Leading Banking Institutions Using the EGARCH (1.1) Model / 47

Stefka Chilova
Measuring Regional Economic Opportunities: A New Approach Through the Regional Economic Opportunities Index and the Regional Deficit Coefficient / 72

MEASURING REGIONAL ECONOMIC OPPORTUNITIES: A NEW APPROACH THROUGH THE REGIONAL ECONOMIC OPPORTUNITIES INDEX AND THE REGIONAL DEFICIT COEFFICIENT

Stefka Chilova
E-mail: *Stefka_0707@abv.bg*

Abstract: This study proposes a new approach for measuring regional economic disparities using the Regional Deficit Coefficient (RDC), a measure based on the Regional Economic Opportunity Index (REOI) developed by the author and the National Economic Opportunity Index (NEOI). Unlike other existing indicators, the model measures the extent to which the regional environment creates or constrains the economic opportunities for realization of human capital. The REOI is calculated using the geometric mean of four components – income, employment, education, and healthcare – while the RDC measures the deviation of each region from the national level.

The results show that the regional environment is closely linked to the economic opportunities available to the population. This suggests that even when people have similar levels of education, qualifications, and labor potential, they may have different opportunities for professional development and human capital accumulation depending on the region in which they live and work.

Key words: Regional Deficit Coefficient (RDC); Regional Economic Opportunity Index (REOI); National Economic Opportunity Index (NEOI); human capital; regional development.

URL: nsarhiv.uni-svishtov.bg
DOI: https://doi.org/10.58861/tae.ea-nsa.2026.3.05.en
JEL: R11; R58; O15; I25; C43.

* * *

Introduction

Regional disparities do not boil down to differences in income and economic activity only. Existing indicators measure individual dimensions of regional development but cannot determine directly the extent to which a particular region creates conditions for the realization of human potential. To this end an integrated approach that would enable these differences to be measured and compared on a common methodological basis is required.

The object of the study are the 28 administrative provinces of the Republic of Bulgaria.

The object of the study are the main components of REOI.

The aim of the study is to measure the economic opportunities of the 28 provinces by means of REOI and RDC, to identify the differences between them and the factors underlying these differences, and to determine the potential for sustainably reducing the development lag of the less-developed regions. The study is based on the understanding that changing only one of the factors is not sufficient to bring about a lasting change in the REOI and, consequently, in the RDC, since the individual factors are interrelated and operate as a system.

Regional Deficit Coefficient (RDC)

The Regional Deficit Coefficient (RDC) is an analytical indicator of the relative deviation of a given region from the national level of economic opportunities. The term "deficit" does not denote a shortage of resources, but rather a structural constraint on the conditions under which the population can realize its human capital. In the long term, these constraints may lead to the reproduction of regional inequalities across generations.

There are substantial differences in wage levels even for the same occupation, similar qualifications, and comparable job responsibilities. The lower wages in economically less-developed regions in the long run result in accumulation of socioeconomic disparities throughout an individual's working life. This affects not only current income but also the level of future pensions and social security benefits, as these are directly linked to contributory income.

Infrastructure, investment, industrial base, administrative concentration, and transport connectivity are not included as direct components of the Regional Economic Opportunities Index (REOI). They are considered factors that shape the economic environment rather than its direct manifestation. Including them simultaneously as both determinants and components of the index would result in double-counting the same processes.

Regional economic opportunities constitute a system formed through the interaction of income, employment, education, and healthcare. The use of a geometric mean is based on the concept that income, employment, education,

and healthcare represent mutually complementary dimensions of regional economic opportunities. Unlike the arithmetic mean, the geometric mean permits only limited substitutability, thereby restricting the extent to which high values of one component can fully compensate for low values of another. In this way, the index reflects the premise that persistent underperformance in one aspect constitutes a structural constraint on economic opportunities, regardless of strong performance of the other indicators. A similar approach was adopted in the calculation of the Human Development Index (HDI) following the methodological revision of UNDP (2010) and is also recommended in the OECD Handbook on Constructing Composite Indicators. Individual components are not weighted with different weights because the model assumes that they constitute mutually necessary elements of a single system. Assigning a higher weight for any one of them would imply a normative assumption that is supported neither by the theoretical framework nor by the empirical data.

Theoretical interpretation of RDC

The Regional Deficit Coefficient (RDC) was developed as an analytical tool for assessing differences in economic opportunities across regions. Its purpose is to indicate the extent to which a region's conditions for employment, income, education, and healthcare deviate from the national average.

RDC is not intended to substitute GDP, HDI, or RCI, but rather to measure a different concept - regional economic opportunities. This enables a more comprehensive assessment of regional disparities and may support the formulation of regional development policies (UNDP, 2010; European Commission, 2022). Human capital creates potential, while regional economic opportunities determine the extent to which that potential can be realized.

Regional Economic Opportunity Index (REOI)

In this study, economic opportunities are understood as the set of conditions that enable individuals to accumulate and realize their human capital and improve their economic well-being.

The Regional Economic Opportunities Index (REOI) is a composite indicator designed to measure the extent to which a given region provides the conditions necessary for the accumulation and realization of the human capital of its population, thereby creating the prerequisites for improved economic well-being. The index incorporates four internationally comparable components - income, employment, education, and healthcare - which capture the principal dimensions of regional economic opportunities.

The income component measures the economic returns for the population in the respective region. Employment reflects the extent to which labor potential can be realized in the labor market. The share of the population with higher education shows the accumulated human capital and the potential to perform activities with higher added value. The ratio of medical specialists per

capita is included as an indicator of access to healthcare services, which are a prerequisite for maintaining and developing human capital.

The REOI is based on the understanding that these components are inter-related. A change in one component affects the others; therefore, economic opportunities cannot be assessed by considering each indicator separately.

National Economic Opportunity Index (NEOI)

The National Economic Opportunities Index (NEOI) represents the average value of REOI across all regions of the country. It serves as a national reference benchmark for calculating the Regional Deficit Coefficient.

Calculation methodology

The Regional Deficit Coefficient (RDC) is a relative indicator that measures the extent to which a given region lags behind or exceeds the national average level of economic opportunities.

The underlying concept of the indicator is to determine the extent to which the opportunities for the accumulation and realization of human capital in each region deviate from the national level.

The proposed indicator serves as a tool for mapping regional economic opportunities. The greater the gap between the national and regional indices, the higher the Regional Deficit Coefficient (RDC), where:

- RDC = Regional Deficit Coefficient;
- NEOI = National Economic Opportunity Index;
- REOI = Regional Economic Opportunity Index.

REOI comprises:

I – Income

The average gross annual income (or average gross annual salary).

L – employment (labor)

Rate of employment among people aged between 15 and 64.

E – Education

The share of people with higher education.

H – Healthcare

Number of medical doctors per 10 000 people.

X av = standardized index value with the national average set equal to 100.

$$Xav = \frac{index\ av}{} = \frac{\sum \text{of all provinces}}{28}$$

$$Xav = \frac{X}{Xav}$$

Normalization of the indicators comprising the REOI. Each indicator is transformed into a relative index with respect to the national average according to the following relationship:

$$\mathrm{REOI} = (\mathrm{I}' \times \mathrm{L}' \times \mathrm{E}' \times \mathrm{H}')\text{^}(1/4)$$

The resulting Regional Economic Opportunities Index (REOI) is derived as the geometric mean of the four normalized components and provides an aggregate measure of the overall level of regional economic opportunities:

$$NEOI = \frac{\sum REOI}{28}$$

The National Economic Opportunities Index (NEOI) is the arithmetic mean of the Regional Economic Opportunities Index (REOI) values across all 28 provinces of the country and serves as a national reference benchmark for the calculation of the Regional Deficit Coefficient (RDC).

$$RDC = \frac{NEOI - REOI}{NEOI}$$

Positive values of the Regional Deficit Coefficient (RDC) indicate that the region's level of economic opportunities falls below the national average, whereas negative values indicate that the region's level of economic opportunities exceeds the national average.
NEOI = National Economic Opportunity Index;
RDCav = Average Regional Deficit Coefficient

RDC interpretation. A value **below 0** indicates that the province exceeds the national average level of economic opportunities. An RDC value **of 0** indicates that the region is at the national average level. **Values between 0 and 10** indicate a low degree of relative disadvantage; values **between 10 and 20** indicate a moderate degree of relative disadvantage; values **between 20 and 30** indicate a substantial degree of relative disadvantage; and values **above 30** indicate a severe structural deficit in economic opportunities.

NEOI and REOI are dynamic indices whose values vary in response to changes in the structure and development of regional economies. Accordingly, they should not be regarded as fixed measures but rather as indicators reflecting the prevailing level of economic opportunities at a given point in time.

For a direct comparison between two regions, a symmetric percentage difference may be calculated using the following formula:

$$\Delta = \frac{\text{REOIb (lagging province)} - \text{REOIa (exceeding province)}}{\frac{\text{REOIa} + \text{REOIb}}{2}}$$

Comparison between RDC and other indicators

The Regional Deficit Coefficient (RDC) is not intended to replace established international indicators but rather to complement them.

Unlike the **Human Development Index (HDI)**, which compares countries based on selected dimensions of human development, RDC measures disparities in economic opportunities across regions within a single country.

In comparison with the **Regional Competitiveness Index (RCI)**, RDC does not assess individual determinants such as infrastructure, institutions, or innovation. Instead, it captures their combined effect through income, employment, education, and healthcare.

Compared with the **OECD's Regional Well-being**, which focuses primarily on the quality of life across regions, RDC focuses specifically on the economic opportunities that a region provides for its population.

Theoretical Foundation of the Model

The proposed model draws on established economic theories while integrating their principal insights into a unified framework for measuring regional economic disparities.

The **Cumulative Causation Theory** proposed by Gunnar Myrdal in 1957 provides an explanation for the persistence and self-reinforcing nature of regional disparities. The RDC provides a means of quantifying the extent of such disparities.

The **Human Capital Theory**, associated with Gary Becker (1964), and the **Endogenous Growth Theory**, developed by Robert Lucas (1988), emphasize the role of education, health, and skills as fundamental drivers of economic development. The proposed model extends this perspective by recognizing that the development and realization of human capital are also conditioned by the regional economic conditions.

Amartya Sen's **capability approach** (1999) underpins the conceptual premise that well-being depends on the substantive opportunities available to individuals rather than solely on their income. It is these opportunities that the Regional Economic Opportunities Index (REOI) seeks to capture, while RDC measures their deviation from the national level.

New Economic Geography, popularized by Paul Krugman (1991), provides a theoretical explanation for the spatial concentration of economic activity in a limited number of centers. **Institutional Economics**, associated with

Douglass North (1990) and Ronald Coase's (1960) **Transaction Cost** Theory, underline the importance of institutions and the quality of the economic environment. Within the proposed model, these factors are not incorporated as direct components of the index; rather, their effects are assumed to be reflected indirectly through income, employment, education, and healthcare.

RDC is also consistent with the objectives of the **European Union's cohesion policy**, providing an additional analytical instrument for assessing regional disparities and examining the effects of policies aimed at promoting regional convergence.

Empirical Relationship between RDC and Gross Domestic Product

				Correlation	Rank	Rank	Correlation
	Year	RDC	GDP	Pearson	RDC	GDP	Spearson
Blagoevgrad	2020	0.05	5716.72	-0.664	75.5	13	-0.451
	2021	0.07	6652.61		76.5	33	
	2022	0.09	7486.33		86	53	
	2023	0.1	8412.73		92.5	79	
	2024	0.05	9209.44		68.5	99	
Burgas	2020	0.01	6315.94		55	27	
	2021	0.01	8751.98		55	86	
	2022	0.02	9977.34		59	108	
	2023	0	11338.03		51	117	
	2024	-0.06	11934.75		32	121	
Varna	2020	-0.17	8887.12		19.5	88	
	2021	-0.26	10051.91		10.5	109	
	2022	-0.31	12314.36		8.5	122	
	2023	-0.31	13780.93		8.5	129	
	2024	-0.36	15180.45		6.5	132	
V. Tarnovo	2020	-0.09	6365.42		28	28	
	2021	-0.06	7660.58		32	54	
	2022	-0.04	9158.43		40	96	
	2023	-0.07	10324		29	110	
	2024	-0.05	11253.1		36.5	116	
Vidin	2020	0.08	4819.1		81	3	
	2021	0.05	6167.85		68.5	25	
	2022	0.02	6737.52		59	39	
	2023	0.05	7707.71		68.5	57	
	2024	0.07	8277.95		76.5	74	
Vratsa	2020	0.01	8190.09		55	71	
	2021	0.06	9168.94		73	97	
	2022	0.12	13567.82		104	128	
	2023	0.05	13866.55		68.5	130	
	2024	-0.03	14765.91		44	131	

Gabrovo	2020	0.04	8107.57		65	69	
	2021	-0.05	8976.05		36.5	89	
	2022	-0.03	10870.63		44	113	
	2023	-0.03	12426.41		44	124	
	2024	-0.1	12660.42		26.5	125	
Dobrich	2020	0.1	6035.55		92.5	18	
	2021	0.13	7036.62		112	46	
	2022	0.16	7754.18		130	60	
	2023	0.15	8732.73		125.5	83	
	2024	0.14	9139.08		119.5	95	
Kardzhali	2020	0.22	6536.52		139.5	31	
	2021	0.1	6869.64		92.5	42	
	2022	0.12	7739.99		104	59	
	2023	0.16	7974.7		130	67	
	2024	0.18	8225.92		134.5	73	
Kyustendil	2020	-0.01	5259.14		48.5	6	
	2021	-0.04	6070.72		40	21	
	2022	0	6911.05		51	44	
	2023	-0.04	7686.81		40	56	
	2024	0	8351.85		51	75	
Lovech	2020	0.03	5953.71		62.5	17	
	2021	0.07	7249.08		76.5	48	
	2022	0.15	7683.18		125.5	55	
	2023	0.14	9217.99		119.5	100	
	2024	0.1	9176.46		92.5	98	
Montana	2020	0.22	5422.24		139.5	9	
	2021	0.18	6282.21		134.5	26	
	2022	0.14	6554.43		119.5	32	
	2023	0.19	7736.53		137	58	
	2024	0.15	7817.56		125.5	62	
Pazardzhik	2020	0.12	6139.02		104	24	
	2021	0.12	6453.63		104	30	
	2022	0.12	7826.28		104	63	
	2023	0.13	8212.18		112	72	
	2024	0.07	9059.14		76.5	91	
Pernik	2020	-0.01	5061.7		48.5	5	
	2021	0.08	5916.91		81	16	
	2022	0.13	7471.71		112	52	
	2023	0.13	7982.48		112	68	
	2024	0.05	9087.45		68.5	93	

Pleven	2020	-0.25	5315.75		12.5	8	
	2021	-0.25	6680.51		12.5	35	
	2022	-0.19	8131.54		16.5	70	
	2023	-0.26	9053.9		10.5	90	
	2024	-0.36	9815.56		6.5	105	
Plovdiv	2020	-0.19	7951.96		16.5	66	
	2021	-0.17	8380.8		19.5	77	
	2022	-0.17	11046.34		19.5	114	
	2023	-0.24	11358.43		14.5	118	
	2024	-0.24	13140.79		14.5	127	
Razgrad	2020	0.11	5782.86		98	15	
	2021	0.14	6998.55		119.5	45	
	2022	0.06	7780.78		73	61	
	2023	0.1	8735.94		92.5	84	
	2024	0.09	9082.18		86	92	
Ruse	2020	-0.15	7228.66		22.5	47	
	2021	-0.15	8385.2		22.5	78	
	2022	-0.14	9517.84		24.5	102	
	2023	-0.14	11086.62		24.5	115	
	2024	-0.17	11603.96		19.5	120	
Silistra	2020	0.14	4550.94		119.5	2	
	2021	0.11	5525.58		98	10	
	2022	0.13	6128.29		112	23	
	2023	0.12	6706.82		104	37	
	2024	0.1	7301.28		92.5	49	
Sliven	2020	0.09	4527.49		86	1	
	2021	0.12	5609.25		104	11	
	2022	0.12	6079.2		104	22	
	2023	0.09	6900.58		86	43	
	2024	0.08	6699.48		81	36	
Smolyan	2020	0.03	6424.87		62.5	29	
	2021	0.03	6737.41		62.5	38	
	2022	0.03	7876.77		62.5	64	
	2023	0.01	8702.29		55	81	
	2024	-0.03	9530.71		44	103	
Sofia prov.	2020	0.16	8613.09		130	80	
	2021	0.15	9960.34		125.5	107	
	2022	0.13	11600.15		112	119	
	2023	0.11	12402.68		98	123	
	2024	0.16	12849.14		130	126	

Sofia cap.	2020	-0.62	20837.77		1	135	
	2021	-0.59	24021.38		2	137	
	2022	-0.58	27748.87		3	138	
	2023	-0.53	31460.72		4	139	
	2024	-0.45	35411.64		5	140	
S. Zagora	2020	-0.06	8720.86		32	82	
	2021	-0.06	10730.43		32	112	
	2022	-0.05	20583.85		36.5	134	
	2023	-0.05	18652.01		36.5	133	
	2024	-0.1	22354.41		26.5	136	
Targovishte	2020	0.2	5725.05		138	14	
	2021	0.18	7346.08		134.5	50	
	2022	0.09	8738		86	85	
	2023	0.1	9615.85		92.5	104	
	2024	0.06	10405.73		73	111	
Haskovo	2020	0.14	4955.45		119.5	4	
	2021	0.14	5264.17		119.5	7	
	2022	0.14	6056.17		119.5	19	
	2023	0.16	6654.55		130	34	
	2024	0.18	7350.39		134.5	51	
Shumen	2020	0.01	6069.38		55	20	
	2021	0.02	6841.06		59	41	
	2022	-0.02	7941.51		47	65	
	2023	-0.06	8760.36		32	87	
	2024	-0.03	9256.03		44	101	
Yambol	2020	0.08	5693.9		81	12	
	2021	0.08	6789.39		81	40	
	2022	0.12	8358.45		104	76	
	2023	0.13	9136.75		112	94	
	2024	0.1	9897.53		92.5	106	

Note: For assessing the robustness of the model, the income component was excluded from the calculation of REOI.

To assess the robustness of the model, an alternative specification of the Regional Deficit Coefficient (RDC) was calculated, in which income was excluded from Regional Economic Opportunities Index (REOI). The analysis covers the period 2020–2024 and comprises 140 observations across the 28 administrative provinces of Bulgaria. The results indicate a moderately strong negative correlation between RDC and GDP ($r = -0.664$). As GDP increases, RDC tends to decrease, suggesting that regions characterized by higher levels of economic activity generally exhibit more favorable economic opportunities. The Spearman rank correlation coefficient ($\rho = -0.456$) indicates the same

general pattern, whereby districts with higher GDP tend to occupy higher relative positions in terms of economic opportunities. These findings indicate that RDC is not determined solely by income levels but reflects the combined contribution of employment, education, and healthcare. The results therefore provide support for the robustness of the model when applied as a composite indicator for assessing regional economic opportunities.

Indicator	**Value**
No. of observations (N)	140
R^2	0.440
Adjusted R^2	0.436
F	108.619
p-value	< 0.001
Constant (β_0)	9349.92
RDC coefficient (β_1)	−18608.10
Standard error of β_1	1785.46
p-value for β_1	< 0.001

The regression analysis indicates a statistically significant negative relationship between the Regional Deficit Coefficient (RDC) and GDP per capita ($p < 0.001$). The estimated model explains approximately **44%** of the variation in GDP per capita across all provinces ($R^2 = 0.440$), indicating a moderate degree of explanatory power.

The estimated regression coefficient is negative (−18,608.10), indicating that higher RDC values are associated with lower GDP per capita. Specifically, an increase in the RDC of **0.01** is associated, on average, with a decrease in GDP per capita of approximately **EUR 186**.

These findings indicate that RDC has substantial analytical utility and may serve as a useful composite indicator for assessing regional economic disparities.

	REOI excl. gross income						
				Correlation	Rank	Rank	Correlation
	Year	RDC	Income	Pearson	RDC	Income	Spearson
Blagoevgrad	2020	0.05	0.81	-0.700	68.5	1.5	-0.429
	2021	0.07	0.81		76.5	1.5	
	2022	0.09	0.82		86	3	
	2023	0.1	0.83		92.5	4.5	
	2024	0.05	0.91		68.5	30.5	

Burgas	2020	0.01	1		55	95.5	
	2021	0.01	0.98		55	79.5	
	2022	0.02	0.97		59	71.5	
	2023	0	0.99		51	87.5	
	2024	-0.06	0.98		32	79.5	
Varna	2020	-0.17	1.14		19.5	123.5	
	2021	-0.26	1.14		10.5	123.5	
	2022	-0.31	1.15		8.5	128.5	
	2023	-0.31	1.17		8.5	133.5	
	2024	-0.36	1.15		6.5	128.5	
V. Tarnovo	2020	-0.09	0.97		28	71.5	
	2021	-0.06	0.96		32	64.5	
	2022	-0.04	0.95		40	60	
	2023	-0.07	0.96		29	64.5	
	2024	-0.05	0.97		36.5	71.5	
Vidin	2020	0.08	0.84		81	6.5	
	2021	0.05	0.85		68.5	10.5	
	2022	0.02	0.86		59	16	
	2023	0.05	0.85		68.5	10.5	
	2024	0.07	0.88		76.5	24	
Vratsa	2020	0.01	1.16		55	132	
	2021	0.06	1.15		73	128.5	
	2022	0.12	1.15		104	128.5	
	2023	0.05	1.13		68.5	120	
	2024	-0.03	1.13		44	120	
Gabrovo	2020	0.04	1.03		65	107.5	
	2021	-0.05	1.04		36.5	110	
	2022	-0.03	1.01		44	101	
	2023	-0.03	1		44	95.5	
	2024	-0.1	0.99		26.5	87.5	
Dobrich	2020	0.1	0.93		92.5	43.5	
	2021	0.13	0.93		112	43.5	
	2022	0.16	0.94		130	54	
	2023	0.15	0.94		125.5	54	
	2024	0.14	0.92		119.5	35	
Kardzhali	2020	0.22	0.95		139.5	60	
	2021	0.1	0.96		92.5	64.5	
	2022	0.12	0.93		104	43.5	
	2023	0.16	0.94		130	54	
	2024	0.18	0.9		134.5	27.5	
Kyustendil	2020	-0.01	0.86		48.5	16	
	2021	-0.04	0.84		40	6.5	
	2022	0	0.83		51	4.5	
	2023	-0.04	0.94		40	54	
	2024	0	0.91		51	30.5	

Lovech	2020	0.03	0.94		62.5	54	
	2021	0.07	0.94		76.5	54	
	2022	0.15	0.93		125.5	43.5	
	2023	0.14	0.93		119.5	43.5	
	2024	0.1	0.93		92.5	43.5	
Montana	2020	0.22	0.93		139.5	43.5	
	2021	0.18	0.93		134.5	43.5	
	2022	0.14	0.92		119.5	35	
	2023	0.19	0.92		137	35	
	2024	0.15	0.94		125.5	54	
Pazardzhik	2020	0.12	0.97		104	71.5	
	2021	0.12	0.98		104	79.5	
	2022	0.12	0.97		104	71.5	
	2023	0.13	0.99		112	87.5	
	2024	0.07	0.97		76.5	71.5	
Pernik	2020	-0.01	0.92		48.5	35	
	2021	0.08	0.93		81	43.5	
	2022	0.13	0.96		112	64.5	
	2023	0.13	0.98		112	79.5	
	2024	0.05	0.96		68.5	64.5	
Pleven	2020	-0.25	0.94		12.5	54	
	2021	-0.25	0.97		12.5	71.5	
	2022	-0.19	1.01		16.5	101	
	2023	-0.26	0.99		10.5	87.5	
	2024	-0.36	0.99		6.5	87.5	
Plovdiv	2020	-0.19	1.06		16.5	113.5	
	2021	-0.17	1.05		19.5	111	
	2022	-0.17	1.06		19.5	113.5	
	2023	-0.24	1.06		14.5	113.5	
	2024	-0.24	1.06		14.5	113.5	
Razgrad	2020	0.11	1.03		98	107.5	
	2021	0.14	1.03		119.5	107.5	
	2022	0.06	1		73	95.5	
	2023	0.1	1		92.5	95.5	
	2024	0.09	1		86	95.5	
Ruse	2020	-0.15	1.01		22.5	101	
	2021	-0.15	1.02		22.5	104	
	2022	-0.14	1.02		24.5	104	
	2023	-0.14	1.02		24.5	104	
	2024	-0.17	0.98		19.5	79.5	
Silistra	2020	0.14	0.87		119.5	20	
	2021	0.11	0.88		98	24	
	2022	0.13	0.88		112	24	
	2023	0.12	0.87		104	20	
	2024	0.1	0.86		92.5	16	

Sliven	2020	0.09	0.92		86	35	
	2021	0.12	0.93		104	43.5	
	2022	0.12	0.91		104	30.5	
	2023	0.09	0.93		86	43.5	
	2024	0.08	0.91		81	30.5	
Smolyan	2020	0.03	0.9		62.5	27.5	
	2021	0.03	0.88		62.5	24	
	2022	0.03	0.88		62.5	24	
	2023	0.01	0.86		55	16	
	2024	-0.03	0.85		44	10.5	
Sofia prov.	2020	0.16	1.18		130	135	
	2021	0.15	1.17		125.5	133.5	
	2022	0.13	1.14		112	123.5	
	2023	0.11	1.15		98	128.5	
	2024	0.16	1.13		130	120	
Sofia cap.	2020	-0.62	1.71		1	137	
	2021	-0.59	1.7		2	136	
	2022	-0.58	1.76		3	139	
	2023	-0.53	1.78		4	140	
	2024	-0.45	1.75		5	138	
S. Zagora	2020	-0.06	1.12		32	117.5	
	2021	-0.06	1.1		32	116	
	2022	-0.05	1.12		36.5	117.5	
	2023	-0.05	1.15		36.5	128.5	
	2024	-0.1	1.14		26.5	123.5	
Targovishte	2020	0.2	1		138	95.5	
	2021	0.18	1		134.5	95.5	
	2022	0.09	1.03		86	107.5	
	2023	0.1	0.96		92.5	64.5	
	2024	0.06	0.94		73	54	
Haskovo	2020	0.14	0.87		119.5	20	
	2021	0.14	0.85		119.5	10.5	
	2022	0.14	0.85		119.5	10.5	
	2023	0.16	0.85		130	10.5	
	2024	0.18	0.86		134.5	16	
Shumen	2020	0.01	0.99		55	87.5	
	2021	0.02	1		59	95.5	
	2022	-0.02	0.99		47	87.5	
	2023	-0.06	0.99		32	87.5	
	2024	-0.03	0.98		44	79.5	
Yambol	2020	0.08	0.97		81	71.5	
	2021	0.08	0.98		81	79.5	
	2022	0.12	0.98		104	79.5	
	2023	0.13	0.95		112	60	
	2024	0.1	0.93		92.5	43.5	

The **correlation analysis** indicates a strong negative correlation between the Regional Deficit Coefficient (RDC) and gross income ($r = -0.700$). As RDC increases, gross income tends to decrease, while regions characterized by lower levels of regional deficit tend to exhibit higher income levels. The Spearman rank correlation coefficient ($\rho = -0.429$) likewise confirms this relationship, although with a lower magnitude.

These findings suggest that RDC may be used as an analytical tool for examining regional economic disparities.

Regression Analysis

The regression model is statistically significant ($p < 0.001$) and explains approximately 49% of the variation in gross income ($R^2 = 0.490$). The estimated regression coefficient is negative (-0.707), indicating that higher RDC values are associated with lower gross income.

Indicator	**Value**
No. of observations (N)	140
R^2	0.490
Adjusted R^2	0.486
F	132.583
p-value	< 0.001
Constant (β_0)	1.004
RDC coefficient (β_1)	−0.707
Standard error of β_1	0.061
p-value for β_1	< 0.001

Overall, the results of the correlation and regression analyses confirm a statistically significant negative relationship between the Regional Deficit Coefficient (RDC) and gross income. Further assessment of the structure and construct validity of the Regional Economic Opportunities Index (REOI) is provided through a factor analysis.

Factor Analysis of the Components of the Regional Economic Opportunities Index

To assess the construct validity of the Regional Economic Opportunities Index (REOI), an exploratory factor analysis (EFA) was conducted on the four constituent components of the index: income, employment, higher education, and availability of physicians. The analysis is based on 152 observations, corresponding to the 28 administrative provinces of Bulgaria over the period 2020 – 2025.

The suitability of the data for factor analysis was confirmed by the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (KMO = 0.695) and the statistically significant Bartlett's test of sphericity ($\chi^2(6) = 161.90$, $p < 0.001$).

The results indicate the presence of a single common factor, which accounts for 40.8% of the total variance of the indicators. The factor has an eigenvalue of 1.65, while the sum of squared loadings (SS loading) is 1.63.

The estimated factor loadings are positive for all four components:

Component	**Factor loading**
Income	0.686
Employment	0.409
Higher education	0.537
Physicians per 10 000 people	0.839

The highest factor loading is observed for physician availability (0.839), followed by income (0.686), higher education (0.537), and employment (0.409). The positive factor loadings indicate that all four components are associated with a common latent construct, interpreted as regional economic opportunities.

Despite the differences in factor loadings, the components have equal weights in the calculation of the REOI. This decision is grounded in the theoretical conception of the index, according to which income, labor-market participation, education, and healthcare represent equally important dimensions of economic opportunities. Given the small number of indicators included in the analysis (four components) the factor analysis should be regarded as an additional assessment of the overall structure of the index, rather than as a basis for modifying the weights assigned to its components. The relatively lower factor loading for employment may be attributable to differences between labor-market conditions and the other socioeconomic measures.

Discriminant validity

The relationship between the Regional Deficit Coefficient (RDC) and net migration, used as an indicator of migration dynamics, was examined. No statistically significant relationship was identified. This finding suggests that migration processes are influenced by factors beyond the scope of RDC. Accordingly, the indicator does not measure migration behavior but rather regional economic opportunities.

Construct validity

RDC's construct validity is supported by both its theoretical foundation and the results of the empirical assessments. The indicator is based on established economic theories and demonstrates statistically significant associations

with GDP and gross income. The findings support the construct, convergent, and discriminant validity of the RDC, as well as its robustness under an alternative specification of the REOI.

Differences in the number of observations are attributable to variations in the availability of statistical data for the individual components.

The proposed model measures **regional economic opportunities** rather than the overall level of social or economic development of regions. Accordingly, the findings should be interpreted exclusively within the conceptual framework of this concept.

The Regional Deficit Coefficient is intended to determine the position of each region relative to the national average rather than to measure its absolute level of development.

Since the model employs internationally comparable statistical indicators, it can be adapted for comparative analysis of regional economic opportunities across different countries, provided that the requisite regional-level data are available.

The relationships identified are **statistical** rather than causal. They indicate the existence of systematic associations between the variables but, in themselves, do not establish that one factor causes another.

The proposed model does not prescribe what policies should be implemented to reduce regional disparities. Rather, it provides an analytical instrument for measuring such disparities, which may support the decision-making process.

Conclusion

Regional inequality is not merely a reflection of accumulated historical developments nor is it solely a characteristic of the present. It provides information about the conditions that shape the future development trends of Bulgaria's regions.

RDC is a tool that captures precisely this duality. Its value reflects disparities that have already accumulated across income, employment, education, and healthcare while at the same time these disparities shape the environment in which human capital and economic activity will develop in the future. In this sense, RDC may be regarded as an "indicator of the accumulated and the potential" - an indicator that simultaneously reflects a region's inherited conditions and delineates the environment within which its future development will unfold.

This perspective places regional inequality within a dynamic framework: a disparity observed today may not only be an outcome of previous development but also a starting point for a subsequent cycle of development or

further divergence. Consequently, the significance of RDC extends beyond measuring a region's current position; it also raises the question of how the conditions accumulated within a region may become determinants of its future development.

References

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* Chicago: University of Chicago Press.

Coase, R. H. (1937). The Nature of the Firm. Economica. *Economica*.

Coase, R. H. (1960). The Problem of Social Cost. Journal of Law and Economics. *The Journal of Law and Economics*.

European Commission. (2021). *EU Cohesion Policy 2021–2027.* European Commission.

European Commission. (2022). *Regional Competitiveness Index (RCI) – Methodological Reports.* European Commission.

Eurostat. (2025). *Regional Statistics Database*. Извлечено от eurostat: https://ec.europa.eu/eurostat

Krugman, P. (1991). *Geography and Trade.* Cambridge, MA: MIT Press.

Lucas, R. E. (1988). *On the Mechanics of Economic Development.* Journal of Monetary Economics.

Myrdal, G. (1957). *Economic Theory and Under-developed Regions.* London: Duckworth.

North, D. C. (1990). *Institutions, Institutional Change and Economic Performance.* Cambridge: Cambridge University Press.

OECD & European Commission. (2008). *Handbook on Constructing Composite Indicators: Methodology and User Guide.* Paris: OECD Publishing.

OECD. (2020). *Regional Well-being Framework.* OECD Publishing.

Porter, M. E. (1990). *The Competitive Advantage of Nations.* New York: Free Press.

Sen, A. (1999). *Development as Freedom.* Oxford: Oxford University Press.

Stiglitz, J. E., Sen, A., & Fitoussi, J.-P. (2009). *Report by the Commission on the Measurement of Economic Performance and Social Progress.* Paris: Commission on the Measurement of Economic Performance and Social Progress.

United Nations Development Programme (UNDP). (2024). *Human Development Reports – Human Development Index (HDI) Methodology.* United Nations Development Programme.

Министерство на регионалното развитие и благоустройство. (2025). *Документи по регионалната политика*. Извлечено от mrrb: https://www.mrrb.bg

Министерство на финансите. (2025). *Бюджетни и макроикономически данни*. Извлечено от minfin: https://www.minfin.bg

Национален статистически институт. (2025). *Национален статистически институт*. Retrieved from: https://www.nsi.bg

Stefka Chilova holds a Bachelor's degree in Accounting and Control and a Master's degree in Accounting and Auditing of Non-Financial Enterprises from D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. She has more than 15 years of professional experience in the tourism sector, including managerial positions, as well as experience as a chief accountant. Her **research interests** include accounting, tourism, and regional development.

ORCID ID: 0009-0004-9002-0204