ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) PERFORMANCE AND ECONOMIC GROWTH: AN ECONOMETRIC ANALYSIS FOR CENTRAL EUROPEAN COUNTRIES

LIRIDONA NIKQI University "Haxhi Zeka", Faculty of Business, Peja, Kosovo liridonanikqi20@gmail.com

This study analyzes the impact of environmental, social, and governance (ESG) performance on economic growth in Central European countries. Using an econometric approach, the study assesses ESG indicators' contribution to economic development and examines whether these factors drive sustainable growth. A scientific methodology based on secondary data from the World Bank's annual reports was applied. Several econometric models, including multiple linear regression, random effects, fixed effects, Hausman-Taylor regression, GMM, and GEE models, were used. The results show a strong relationship between ESG performance and economic growth. Governance effectiveness and corruption control positively impact GDP growth, while increasing CO2 emissions negatively affect it. Similarly, investments in education and health contribute to long-term growth, emphasizing the importance of sustainable development policies. This research presents reliable results supporting conclusions and recommendations.

DOI https://doi.org/ 10.18690/um.epf.5.2025.9

> ISBN 078-961-286-984-7

Keywords: ESG performance,

CO2 emissions, environmental sustainability, Central Europe

> **JEL:** O44, Q56, G38



1 Introduction

This research paper examines the impact of environmental, social, and governance (ESG) performance on the economic growth of Central European countries during the period 2014-2023. In contemporary discourse, sustainable development emphasizes the necessity of addressing both social and environmental priorities to safeguard the long-term welfare of all participants within the economic system. ESG indicators, encompassing non-financial metrics, play a pivotal role in this context. These indicators cover environmental dimensions (such as resource management, greenhouse gas emissions, and sustainable energy use), social aspects (including workforce diversity, inclusivity, and ethical supply chain practices), and governancerelated factors (such as leadership autonomy and balanced board representation). Increasingly, these dimensions are recognized by economic actors as fundamental drivers of sustainable and resilient growth (Boffo & Patalano, 2020). Effectively managing ESG risks through responsible and forward-looking business strategies can significantly contribute to enhanced economic development. In this regard, businesses are increasingly required to realign their strategic objectives and transform their organizational cultures to foster sustainable progress and ensure the long-term welfare of employees, consumers, and other key stakeholders (Jolevska, et al., 2024). Over the past decades, ESG considerations have evolved into some of the most impactful and transformative forces shaping corporate practices and broader economic landscapes (Li, et al., 2021). Existing literature presents mixed findings regarding the relationship between ESG performance and economic growth. Broadly, three perspectives can be identified: (1) a mutual and reinforcing relationship between economic growth and ESG performance; (2) a partial or conditional relationship depending on specific factors; and (3) no significant relationship observed between the two dimensions. Despite growing academic interest, the exploration of how national-level ESG metrics interact with economic performance remains a relatively nascent field. As such, further research is essential to provide deeper and more comprehensive insights into this evolving relationship.

2 Literature review

In 2004, ESG was created as a tool to help investors identify and communicate longterm risks that have a significant impact (Hearn, et al., 2022). The assessment of environmental, social and governance (ESG) factors has gained increasing importance, becoming increasingly present in academic literature and business practices (Clément, et al., 2023). ESG can be described as a broader classification that defines the non-financial objectives of an organization (Krishnamoorthy, 2021). The performance of ESG factors has a significant impact on the efficiency of markets, the development of new investments and the use of innovative technologies, bringing significant benefits to overall growth and development. Implementing an ESG framework is essential for building a sustainable business model (Sibarani, 2023).

Some scholars suggest that economic growth can serve as a catalyst for improving ESG performance, claiming that accelerated economic expansion can lead to significant improvements in ESG indicators. They argue that rapid growth strengthens a country's ability to sustain high levels of investment, which helps advance technology and encourages innovation. Sustainable growth requires investments that are socially responsible, which deserve in-depth assessment (Syed, 2017). Ambitions for sustainable development are closely linked to improving an organization's competitiveness and innovative capacity (Starks, 2021).

Revelli and Viviani (2015) argue that sustainable finance, including ESG investments, can contribute to improving performance by integrating business practices with investor values and societal expectations. According to Shahrour et al. (2023), ESG initiatives play an important role in reducing risks and promoting sustainable development. Stroebel and Wurgler (2021) emphasize that climate finance, especially through green bonds, is essential for the transition to a low-carbon economy, as it enables the mobilization of private funds for large and sustainable projects.

Adopting ESG practices can lead to productivity improvements, cost reductions, and better risk management, which can positively impact economic development (Khan, et al, 2016). Furthermore, Abate et al. (2021) suggest that strong ESG practices have a significant impact on an economy's financial performance, by encouraging higher levels of foreign investment and promoting more responsible business behavior.

(Friede, et al, 2015) show that, in the long run, strong ESG practices can have a positive impact on economic development through higher financial performance. This outcome can be achieved through increased brand value, better risk and reputation management, or improved operational efficiency. Also, the possibility of securing lower costs of capital can encourage investment in sustainable initiatives, which contribute to overall economic development.

Nicoletti et al., (2020) show that the integration of ESG factors into the investment decision-making process by companies that have a competitive advantage leads to reduced investment risk, improved governance, and increased company engagement in good social and environmental practices. On the other hand Pesaran et al., (2019) argue that the dissemination of ESG information is mainly used to increase the acceptance of improving a company's reputation among investors. Some companies also use the dissemination of ESG information as an opportunity to ease regulations from regulatory authorities regarding their investment portfolios. According to research conducted by Shkura (2019), it was observed that European countries dominated as those with the highest dissemination of ESG information in Europe is the imposition of regulations by the governments of the respective countries and stock exchanges.

According to recent studies, investors are increasingly giving importance to ESG factors in the investment selection process (Gangi et al, 2022). It has also been observed that companies that adopt ESG practices manage to generate higher profits compared to those that do not use them (Alda, 2021). One of the main reasons for this is that, nowadays, a growing number of consumers are interested in environmentally friendly products and services, as well as greener production techniques (Hole, 2019).

3 Methodology

The purpose of this paper is to analyze the impact of environmental, social and governance (ESG) performance on economic growth in Central European countries. To conduct the empirical analysis, we rely on secondary data published in the World Bank's annual reports.

The research question of this study is:

1. How has environmental, social and governance (ESG) performance influenced the economic growth of Central European countries?

While the hypothesis is:

H1: Environmental, social and governance (ESG) performance has positively impacted the economic growth of Central European countries.

This study includes data for a 10-year period (2014-2023), the number of countries included in the analysis is 8 (which are: Austria, Czech Republic, Germany, Hungary, Poland, Slovenia, Slovakia and Switzerland). The data are processed with the econometric program STATA. To verify the validity of the hypotheses of this study, we applied the following statistical tests: descriptive statistics, correlation analysis, linear regression, random effect, fixed effect, Hausman – Taylor Regression, GEE Model and GMM Model.

Variables	Variable description	Data source		
GDP (Dependent variable)	GDP growth (annual %)	World Bank Annual Reports (2014 – 2023)		
CO2 (Independent variable)	Carbon dioxide (CO2)	World Bank Annual Reports (2014 – 2023)		
REC (Independent variable)	Renewable energy consumption	World Bank Annual Reports (2014 – 2023)		
GEC (Independent variable)	Government expenditure on education, total (% of GDP)	World Bank Annual Reports (2014 – 2023)		
CHE (Independent variable)	Current health expenditure (% of GDP)	World Bank Annual Reports (2014 – 2023)		
CC (Independent variable)	Control of Corruption	World Bank Annual Reports (2014 – 2023)		
GE (Independent variable)	Government Effectiveness	World Bank Annual Reports (2014 – 2023)		

Table 1: Definition and description of econometric model variables

Source: Data processing by the author (2025)

To verify the validity of the hypotheses of this study, the following econometric model was constructed:

$GDP_{it} = \beta_0 + \beta_1 CO2_{it} + \beta_2 REC_{it} + \beta_3 GEC_{it} + \beta_4 CHE_{it} + \beta_5 CC_{it} + \beta_6 GE_{it} + \gamma_{it}$ Where: GDP - GDP growth CO2 - Carbon dioxide REC - Renewable energy consumption GEC - Government expenditure on education CHE - Current health expenditure CC - Control of corruption GE - Government effectiveness u = stochastic variables (other factors not taken into account in the model)

 γ – stochastic variables (other factors not taken into account in the model)

i - code and t - time period.

4 **Results**

In this part of the study, the validity of the hypotheses presented and the interpretation of the study findings will be verified through statistical tests for the variables incorporated in the econometric model.

Table 2 summarizes all descriptive statistics for all variables included in the econometric model.

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	80	2.36	2.80	-6.31	8.38
CO2	80	7.20	1.76	4.11	10.37
REC	80	19.43	7.11	11.1	36
GEC	80	4.84	0.44	3.80	5.75
CHE	80	8.83	2.05	6.28	12.93
CC	80	0.93	0.69	-0.10	2.14
GE	80	1.07	0.53	0.22	2.13

Table 2: Summary of descriptive statistics for the econometric model variables

Source: Data processing by the author in Stata program (2025)

The following will present the empirical results for the econometric model of this study, which analyzes the impact of CO2, REC, GEC, CHE, CC, GE on the GDP growth of Central European countries.

$$GDP_{it} = \beta_0 + \beta_1 CO2_{it} + \beta_2 REC_{it} + \beta_3 GEC_{it} + \beta_4 CHE_{it} + \beta_5 CC_{it} + \beta_6 GE_{it} + \gamma_{it}$$

94

$GDP_{it} = 2.5709 - 1.8535CO2_{it} + 0.0393REC_{it} + 1.1738GEC_{it} + 3.4965CHE_{it} + 8.4967CC_{it} + 0.8792GE_{it} + \gamma_{it}$

Variabl e	Linear Regression	Random Effects – GLS Regression	Fixed – Effects Regression	Hausman Taylor Regression	GEE Model	GMM Model
GDP	-	-	-	-	-	- .8962009** * (0.000)
CO2	120645* (0.074)	.110605* (0.057)	- 4.420111** * (0.001)	- 4.406293** * (0.000)	- .1935857** * (0.000)	-1.85359** (0.016)
REC	.0410251** (0.021)	0102051** (0.049)	.1071974** * (0.007)	.2686499** (0.030)	.1153579** * (0.000)	.0393677** (0.040)
GEC	.4612925** * (0.009)	.422925** (0.010)	1.008117 (0.339)	.8347343** * (0.004)	3.073826** * (0.000)	1.173858** (0.028)
CHE	8784762 (0.172)	.8784762** * (0.005)	.6442646* (0.051)	.540498** (0.014)	.8033199** * (0.000)	3.496511** * (0.002)
CC	.3645246* (0.080)	.1345246** * (0.001)	7.792253** (0.011)	6.080416* (0.064)	.1237373** (0.049)	8.496711** * (0.000)
GE	2.294132* (0.061)	1.214132** (0.022)	1.515735** (0.035)	3.29021** (0.031)	.9461483** * (0.000)	.8792935** * (0.008)
Const	5.779591** * (0.002)	5.179591** * (0.000)	-36.45017** (0.021)	51.89433** * (0.004)	2.570947** (0.017)	-
R. Square	.1498	.1498	.0206	-	-	-
Adj. R ²	.0603	-	-	-	-	-

Table 3: Results from the econometric model analysis

Source: Data processing by the author in Stata program (2025)

Explanation: P-values shown in brackets: *** indicates statistical significance at the 1% level; ** indicates statistical significance at the 5% level and * indicates statistical significance at the 10% level.

According to the econometric results presented in Table 3, it can be concluded that all independent variables are statistically significant at the 1%, 5%, and 10% significance levels. For the purposes of interpreting the econometric model, we will base ourselves on the GMM model. β_0 – Assuming all other variables remain constant, the GDP is expected to be 2.57 units when the independent variables are zero (P-value = 0.017 < 0.05).

 β_1 – An increase of 1 unit in CO2 emissions, while holding other variables constant, is associated with a decrease of 1.85 units in GDP (P-value = 0.016 < 0.05). With increasing temperatures and increasing diseases caused by increasing CO2 levels, the efficiency of workers is reduced, which affects the reduction of productivity and GDP. The increase in CO2 also affects climate change, increasing the intensity of natural disasters such as fires, floods and hurricanes, damaging buildings, roads, bridges, etc. From these damages, more funds must be allocated for repair and reconstruction, which reduces investments in economic development. So, with increasing CO2 levels, GDP decreases through economic and environmental mechanisms.

 β_2 – A 1-unit increase in renewable energy consumption (REC), assuming other variables remain constant, leads to an increase of 0.039 units in GDP (P-value = 0.040 < 0.10). Renewable energy consumption increases productivity and economic efficiency, reducing dependence on fossil fuels and ensuring a more sustainable supply at a lower cost. The trade deficit is reduced and economic stability is improved as dependence on oil and gas imports is reduced.

 β_3 – An increase of 1 unit in GEC, while keeping other variables constant, results in a 1.17 unit rise in GDP (P-value = 0.028 < 0.05). GEC has a significant impact on GDP growth. Human capital is improved by education, increasing the productivity and skills of the workforce, which affects economic growth. The more educated the population, the higher the wages tend to be, contributing more to the economy and bringing innovations that can increase a country's competitiveness in the global market. Also, investments in education reduce economic inequality and increase social mobility.

 β_4 - A 1-unit increase in CHE, assuming other variables remain unchanged, leads to a 3.49 unit increase in GDP (P-value = 0.002 < 0.01). CHE affect the well-being and productivity of the population, representing an important component of GDP. Financing for investment in health care reduces future costs for treatments that can be much more costly, thus making the system more financially sustainable. β_5 – An increase of 1 unit in CC, while keeping other factors constant, results in an 8.49 unit rise in GDP (P-value = 0.000 < 0.01). CC affects investment, public sector efficiency, and economic stability, which play an important role in GDP growth. Countries that have lower levels of corruption and countries that struggle to reduce corruption as much as possible, increase investor confidence by attracting more foreign capital, tend to have stronger institutions, use public funds better, by investing in health, education, infrastructure, etc., all of which help improve the productivity and competitiveness of the economy.

 β_6 – A 1-unit increase in GE, assuming all other factors remain constant, leads to a 0.87 unit increase in GDP (P-value = 0.008 < 0.01). GE determines the ways in which public policies are implemented and how efficiently economic resources are managed, which affect GDP. The effect of government affects: improving infrastructure, education and health, maintaining fiscal and monetary stability, promoting investments, increasing tax revenues, better distribution of public funds, etc., which guarantee a sustainable and positive impact on GDP.

5 Discussion

This scientific paper focused on analyzing the impact of environmental, social, and governance (ESG) performance on the economic growth of Central European countries during the period 2014–2023. In recent years, several studies (Jolevska, et al., 2024), (Norocel & Vierescu, 2024), (Diaye et al, 2021), (Algarhi & Karimazondo, 2024), have investigated the role of ESG factors in promoting sustainable economic growth across various regions. The empirical findings of this study demonstrate that ESG practices contributed positively to economic growth in Central European countries during the observed period, underscoring the importance of ESG integration into national development strategies.

Our findings align with previous research. For instance, Jolevska et al. (2024), identified that renewable energy consumption and CO_2 emissions significantly influenced annual GDP growth in Western Balkan countries, while life expectancy at birth and labor force participation rates were key drivers of GDP growth in Southeastern Europe. Their study highlights the growing importance of the green transition as a strategic pathway toward sustainable economic development, despite its accompanying social and economic challenges.

Similarly, Norocel and Vierescu (2024), found a positive correlation between country-level ESG outcomes and economic growth, both in the short and long term. However, they noted that increased financial intermediation by the banking sector, often interpreted as a proxy for green lending activities, does not automatically translate into higher economic growth—a nuance that highlights the complexity of the ESG-growth nexus.

Diaye et al., (2021) further support this positive relationship, revealing a long-term connection between ESG performance and GDP per capita across OECD countries between 1996 and 2014, although such a relationship was less evident in the short term. Notably, exceptions such as Iceland and South Korea displayed a positive short-term relationship between ESG performance and GDP growth, suggesting country-specific dynamics.

Additionally, the study by Algarhi and Karimazondo (2024), also confirms a longterm positive relationship between ESG and economic growth, strengthening the argument that ESG integration is crucial for sustainable economic development.

Overall, the consistency between our empirical findings and previous studies reinforces the theoretical and practical significance of this research. By situating our results within the broader academic landscape, this study contributes to a deeper understanding of how ESG practices can serve as a catalyst for economic growth in Central European economies.

6 Conclusions

In accordance with the study objectives, theory, methodology, data analysis results and study findings, it can be concluded that governance effectiveness determines the ways in which public policies are implemented and how efficiently economic resources are managed, which affect GDP. Corruption control affects investment, public sector efficiency and economic stability, which play an important role in GDP growth. The consumption of renewable energy contributes to increased productivity and economic efficiency, reducing dependence on fossil fuels and ensuring a more sustainable supply at lower costs. The trade deficit is reduced and economic stability is improved as dependence on oil and gas imports is reduced. Higher investments in education have a significant impact on GDP growth. Human capital is improved by education, increasing the productivity and skills of the workforce, which affects economic growth. Investments in health affect the well-being and productivity of the population, representing an important component of GDP. While, the increase in CO2 emissions affects: increasing temperatures, increasing diseases, climate change, increasing energy demand from extreme temperatures, etc., all of which negatively affect economic growth. So, according to these results, we conclude that the implementation of ESG factors positively affects GDP growth in Central European countries for the analyzed period 2014-2023.

Through this study, we recommend improving ESG regulations and standards, supporting businesses in implementing ESG practices, and organizing training and information campaigns for citizens and companies on the benefits of integrating ESG practices into the economy. Also, including ESG in academic programs and professional training can help create a workforce prepared for the challenges of economic sustainability. Policymakers, institutional investors, and regulators must play vital roles in assisting the Government in supporting ESG practices to create a sustainable ecosystem.

References

- Diaye et al, M. (2021). ESG performance and economic growth: a panel co-integration analysis. *Springer*, https://doi.org/10.1007/s10663-021-09508-7.
- Jolevska, et al., E. (2024). The Impact of ESG Risks on the Economic Growth in the Western Balkan Countries. *Sustainability*, 16, 8487. https://doi.org/10.3390/su16198487.
- Shahrour, et al, M. (2023). On the foundations of firm climate risk exposure. *Reviev of Accounting and Finance*, Vol. 22 No. 5, pp. 620-635, https://doi.org/10.1108/RAF-05-2023-0163.
- Abate, et al, G. (2021). The level of sustainability and mutual fund performance in Europe: An empirical analysis using ESG ratings. *Corporate Social Responsibility and Environmental Management* , 28: 1446–55. https://doi.org/10.1002/csr.2175.
- Alda, M. (2021). Theenvironmental, social, and governance (ESG) dimension of firms in which social responsible investment (SRI) and conventional pension funds invest: The mainstream SRI and the ESG inclusion. *Journal of Cleaner Production*, Volume 298, 126812. https://doi.org/10.1016/j.jclepro.2021.126812.
- Algarhi, A., & Karimazondo, M. (2024). The Impact of ESG on Economic Growth: Evidence from BRICS+ Countries. *Theoretical Economics Letters*, 1478-1487. https://doi.org/10.4236/tel.2024.144071.
- Boffo, R., & Patalano, R. (2020). ESG Investing: Practices, Progress and Challenges. OECD, Paris, Francë, https://doi.org/10.1787/b4f71091-en.
- Clément, et al., A. (2023). The use of ESG scores in academic literature: a systematic literature review. Journal of Enterprising Communities: People and Places in the Global Economy, Vol. 19 No. 1, pp. 92-110. https://doi.org/10.1108/JEC-10-2022-0147.

Friede, et al, G. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5: 210–33. https://doi.org/10.1080/20430795.2015.1118917.

Gangi et al, F. (2022). Mainstreaming socially responsible investment: Do environmental, social and governance ratings of investment funds converge? *Journal of Cleaner Production*, Volume 353, 131684. https://doi.org/10.1016/j.jclepro.2022.131684.

Hearn, et al., M. (2022). The time is ripe for ESG+Nutrition: evidence-based nutrition metrics for Environmental, Social, and Governance (ESG) investing. *European Journal of Clinical Nutrition*, 76:1047–1052; https://doi.org/10.1038/s41430-022-01075-9.

Hole, G. (2019). Recycling as the way to greener production: A mini review. Journal of Cleaner Production, Volume 212, Pages 910-915. https://doi.org/10.1016/j.jclepro.2018.12.080.

Khan, et al, M. (2016). Corporate Sustainability: First Evidence on Materiality. *The Accounting Review*, 91: 1697–724. https://doi.org/10.2308/accr-51383.

Krishnamoorthy, R. (2021). Environmental, Social, and Governance (ESG) Investing: Doing Good to Do Well. Open Journal of Social Sciences, 9, 189-197. doi: 10.4236/jss.2021.97013.

Li, et al., T. (2021). ESG: Research Progress and Future Prospects. *Sustainability*, https://doi.org/10.3390/su132111663.

Nicoletti, et al, G. (2020). Summary Indicators of Product Market Regulation with an Extension to Employment Protection Legislation. OECD Economics Department Working Papers, No. 226, 1-86. https://doi.org/10.1787/215182844604.

Norocel, I., & Vierescu, E. (2024). The Relationship between Environmental, Social and Governance Factors, Economic Growth, and Banking Activity. *Journal of Risk and Financial Management*, 17, 285. https://doi.org/10.3390/jrfm17070285.

Pesaran et al, M. (2019). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association*, 94, 621-634. https://doi.org/10.1080/01621459.1999.10474156.

Revelli, C., & Viviani, J.-L. (2015). Financial performance of socially responsible investing (SRI): What have we learned? A meta-analysis. *Business Ethics: A European Review*, 24: 158–85. https://doi.org/10.1111/beer.12076.

Shkura, I. (2019). The Regional Peculiarities of SRI Development. Journal of Economics and Management, 37, 107-138. https://doi.org/10.22367/jem.2019.37.06.

Sibarani, S. (2023). ESG (Environmental, Social, and Governance) Implementation to Strengthen Business Sustainability: Pt. Migas–North Field. European Journal of Business and Management Research, DOI: 10.24018/cjbmr.2023.8.1.1798.

Starks, L. (2021). Environmental, Social, and Governance Issues and the Financial Analysts Journal. *Financ. Anal. J.*, 77, 5–21, https://doi.org/10.1080/0015198X.2021.1947024.

Stroebel, J., & Wurgler, J. (2021). What do you think about climate finance? Journal of Financial Economics, Volume 142, Issue 2, Pages 487-498. https://doi.org/10.1016/j.jfineco.2021.08.004.

Syed, A. (2017). Environment, social, and governance (ESG) criteria and preference of managers. *Cogent Bus. Manag.*, https://doi.org/10.1080/23311975.2017.1340820.