SUSTAINABLE DEVELOPMENT GOALS AND FINANCIAL STABILITY IN CEE COUNTRIES

Antoaneta AMZA [23]

Petre-Cornel GRIGORESCU [24]

Leonard-Dan UZUM [25]

Abstract:

The Sustainable Development Goals (SDGs), established by the United Nations as part of the 2030 Agenda, represent an ambitious set of targets aimed at addressing global challenges related to poverty, inequality, climate change, environmental degradation, and economic prosperity. In the context of an increasingly interconnected global economy, subject to pressures from climate change and socio-economic crises, financial stability plays a critical role in achieving these objectives. This article aims to explore the relationship between the SDGs and financial stability, arguing that sustainable development is not only a social and environmental challenge but also a fundamental condition for economic growth and the long-term stability of the financial system.

Keywords: *financial stability, sustainable development goals*

JEL classification: Q01, G00

Introduction

The Sustainable Development Goals (SDGs), established by the United Nations as part of the 2030 Agenda, represent an ambitious set of targets aimed at addressing a wide range of global challenges, including poverty, inequality, climate change, environmental degradation, and economic prosperity. These goals are interconnected and require a multifaceted approach, emphasizing the importance of sustainable development across all sectors. In the context of an increasingly globalized economy, financial stability has emerged as a crucial factor in realizing these objectives. The global economy faces mounting pressures from climate change, socio-economic disparities, and systemic risks, all of which have the potential to undermine efforts toward sustainable development.

Expanding access to financial services helps reduce vulnerability to financial shocks and promotes inclusive economic growth, both of which contribute to broader financial stability. Moreover, some macroprudential policies are designed with objectives that align closely with SDG targets, particularly those aimed at fostering financial inclusion and ensuring economic growth. (National Bank of Romania, 2024)

[23] *Bucharest University of Economic Studies, The Faculty of Economic Cybernetics, Statistics, and Informatics (CSIE) MSc Applied Statistics & Data Science Candidate, amzaantoaneta10@stud.ase.ro*

[24] *Bucharest University of Economic Studies, The Faculty of Economic Cybernetics, Statistics, and Informatics (CSIE) MSc Applied Statistics & Data Science Candidate, grigorescupetre19@stud.ase.ro*

[25] *Bucharest University of Economic Studies, Doctoral School of Finance PhD Candidate, uzumleonard16@stud.ase.ro*

In Romania, two intermediate objectives of the macroprudential policy are related to credit growth and financial inclusion. Both the SDGs and financial stability frameworks prioritize sustainable and inclusive growth as a means of ensuring resilience against systemic risks. (National Committee for Macroprudential Oversight, 2023)

Nevertheless, challenges such as increased economic inequality, market instabilities, and climate-related disruptions pose significant risks to financial stability, making it crucial for these frameworks to integrate adaptive, forward-looking risk mitigation measures. Governments, financial institutions, regulatory bodies, and international organizations must collaborate to create frameworks that promote financial stability, inclusion, and sustainability. (United Nations)

This article explores the complex relationship between financial stability and the achievement of the SDGs, considering, on the one hand, that sustainable development is not only a pressing social and environmental challenge but also a key factor in ensuring long-term economic growth and the stability of the global financial system, and, on the other hand, that a sound financial system is essential for fostering sustainable development. A central aspect of this relationship is financial inclusion, which is vital for achieving several SDGs, including those related to poverty reduction, inequality, and economic growth. (United Nations)

The remainder of the paper is structured as follows: Section 2 provides a review of the relevant literature. Section 3 describes the methodology and the data sources employed in the analysis. Section 4 presents and discusses empirical results, while Section 5 concludes by summarizing the main findings, policy implications and suggesting directions for further research.

Description of the Problem

In the literature, the subject of interactions between financial stability and development can be assumed to have been first addressed by Schumpeter (1912), who attributed an important role in the development of market economies to innovation, the banking system and the concept of credit. He considered that the presence of uncertainty in the economic environment can represent an opportunity for the banking system, which can finance innovative projects, leading to economic development. Furthermore, Stiglietz (1994) and Westley (2001) believe that access to financing for a larger mass of citizens will increase their productivity and increase their chances of achieving a sustainable lifestyle that ensures the development of society.

From the perspective of sustainable development goals, the focus has been on how they can influence economic growth. Tampakoudis et al. (2017) studied the relationship between economic growth and SDGs in the euro area and concluded that there are significant differences between countries regarding the way the two targets interact, further suggesting that human needs require a concept capable of combining economic development and environmental protection. Coscieme et al. (2020) studied this relationship for EU countries and demonstrated that the risk of not meeting the SDGs was increased by the unconditional GDP growth goal. The study shows that the GDP growth rate is uncorrelated with sustainability indicators and is inversely correlated with economic performance indicators, so one of the study's suggestions was to carefully select policies so as to ensure synergies for achieving sustainable development.

More recently, approaches to this topic have mainly focused on how financial stability interacts with climate change issues (Dafermos et. al (2018) or Caloia and Jansen (2021)).

However, studies such as Ozili and Iorember (2023) or Kirkpatrick and Green (2002) show that financial stability is a necessary condition for ensuring sustainable development goals, because in a stable financial system, financial institutions will tend to finance projects oriented towards sustainable development, which can bring a higher return in the future than the current one, by financing projects that are less close to the SDG goals. The study by Ozili and Iorember (2023) shows that the link between financial stability and the SDG goals can be positive in countries where the banking system has important capital buffers, while the relationship can be negative if fluctuations in the economic and financial cycles, as well as regional characteristics of the SDG indicators, are taken into account.

Methodology and Data

For our study we considered data for five countries in the CEE region, namely Romania, Bulgaria, Czech Republic, Hungary and Poland, with annual frequency over a twenty-year horizon, between 2002 and 2022 (due to data availability). Variable selection is based on existing studies on the interactions between sustainable development goals and financial stability, Ozili and Iorember (2023). In Table 1 are presented the variables used, their definition and the source for each indicator.

Table 1

Variables used in the analysis, definitions, and sources(authors' elaboration)

Variable	Symbol	Definition	Source
SDG:Good health and well-being	SDG 3	The proxy measure of SDG3 is health expenditure as a percentage of GDP.	EUROSTAT
SDG: Quality education	SDG 4	The proxy measure of SDG4 is education expenditure as a percentage of total public sector expenditures.	EUROSTAT
SDG: Affordable and clean energy	SDG 7	The proxy measure of SDG7 is renewable energy consumption as a percentage of total final energy consumption.	EUROSTAT
SDG: Reduced inequalities	SDG 10	The proxy measure of SDG10 is the vulnerable employment ratio. It is measured as vulnerable employment as a percentage of total employment.	WGI [1]
Z-score	Z-SCORE	It captures the probability of default of a country's banking sector. Z-score compares the buffer of a country's commercial banking sector (capitalization and returns) with the volatility of those returns.	GFDI [2]
Bank cost performance	COST	Operating expenses as a percentage of the value of total assets of the banking sector.	GFDI
Domestic credit to the private sector	DCP	Loans provided to the private sector by banks and other financial institutions. It is measured as credit to the private sector as a share of GDP.	GFDI
Real GDP growth	GDPR	Annual change in real GDP	EUROSTAT
Institutional quality index	ISI	The ISI index is the average of the score of the six world governance indicators (WGI) which are the voice and accountability index, the political stability and absence of violence/terrorism index, the government effectiveness index, the regulatory quality index, the rule of law index and the control of corruption index.	WGI

Table 2 presents the mean values of the data used in the analysis. We can observe that the out of four sustainable development indicators, Romania has the best mean scores for two of them, namely SDG 7 and SDG 10. Possible explanations for these results could be in the first case, affordable and clean energy, the large share of energy produced from green sources, namely wind and hydro sources, but continuous investment in modern and efficient production capacities are needed. In the second case, reduced inequalities, although

according to data extracted from WGI database, Romania ranks first among the analyzed states, the issue of inequalities in society remains one of the most pressing problems that decision-makers must address in the medium and long term. On the other hand, for the quality education, expressed as current education expenditure as a percentage of total expenditure in public institutions, Romania has the lowest mean value over the period.

For the financial stability variable, in contrast to Ozili and Iorember (2023), we have used only the Z-score. This indicator was often applied in the literature to capture the level of financial stability in a country, see Lee and Hsieh (2013), or Fiordelisi and Mare (2014).It is obtained as the sum of return on assets ratio (ROA) and equity to asset ratio (CAR), divided by the standard deviation of return on assets. Higher values of the indicator mean a higher level of financial stability. From Table 2, we can observe that Romania and the Czech Republic register scores above 10,5, meaning that in those countries financial stability policies and macroprudential policies could be considered more effective compared to peers.

Regarding the financial sector indicators used in the model, domestic credit to the private sector is the one at which Romania ranks the last among peer countries. Being one of the structural weaknesses of the country, this issue was also addressed by the National Committee of Macroprudential Oversight in one of its reports in 2022.Possible solutions to fix this issue suggested by the report were among others: a higher absorption capacity of EU funds, a faster digitalization process for financial services, an industrial policy that supports access to finance for competitive firms, as well as an increased role of the domestic banking system in financingcompanies. Regarding the banking business efficiency, expressed as operating costs to total assets, Romania has the second highest score in the region after Hungary.

The other variables used in the model, namely ISI and GDPR, should have a positive relation with SDGs according to literature. In the first case, for the indicator representing institutional quality, Romania ranks the second, having an equal score with Hungary, while on the first position is the Czech Republic. Looking at the GDP growth, Poland leads the ranking with a mean value of 3,9%, while Romania is the second country with 3,77%. This could be attributed to the integration of CEE countries in the EU, which meant new opportunities for development and commerce.

Table 2

Mean values of variables used (authors' elaboration)

Country	SDG 3	SDG 4	SDG 7	SDG 10	COST	DCP	GDPR	ISI	Z-SCORE
BG	4,86	10,06	15,13	8,85	2,73	51,41	3,32	0,17	8,61
CZ	7,66	10,79	12,11	13,46	1,9	43,72	2,5	0,91	10,65
HU	5,15	10,76	11,5	8,07	4,28	43,3	2,5	0,67	7,88
PL	4,79	12,37	10,73	18,61	2,92	42,79	3,9	0,15	8,71
RO	4,12	9,5	21,58	29,69	3,58	27,73	3,77	0,67	10,75

Figure 1 - Countries selected for research (authors' own elaboration)

The aim of this paper is to determine whether the financial stability of a particular country, as quantified through the variables detailed previously, is a statistically significant predictor of its sustainable development scores. Starting from some of the four most important SDGs as scoped in the literature review, we standardize them through the standard scaling method by removing the meaning of each SDG variable and scaling it to the unit variance. We apply Principal Component Analysis (PCA) on the scaled SDG variables to then extract the first component, with 48.43% variance captured, and use it as a proxy dependent variable in the model we designed. The independent variables thus remain Z-SCORE, COST, DCP, GDPR and ISI. We use a 2-step Generalized Method of Moments (GMM) from the *linearmodels* library in Python. As an instrumental variable we applied the first principal component's 1-step lag. The choice of model is supported by the fact that these macroeconomic relationships between our variables may be linear in nature but constrained non-linearly (Hansen and Bruce, 2002), as well as having proven greater performance in smaller panel datasets and interpretability by providing more precise estimates than other traditionally-used panel models. (Woolridge, 2001)

Results

The aforementioned methodology was tested across multiple subsets of these variables. We ultimately arrived at the conclusion of Z-SCORE, DCP, GDPR and ISI being statistically significant variables for the prediction of sustainable development indicators, while COST is not at the 5% significance level. Therefore, we decided to remove it, and we arrived at the following end-results:

Table 3

2-Step GMM Results, *linearmodels* System GMM output(authors' elaboration)

Variable	Coefficient	Std. Err.	T-stat	P-value	Lower CI	Upper CI
ZSCORE	0.2087	0.0683	3.0544	0.0023	0.0748	0.3426
DCP	-0.0283	0.0090	-3.1605	0.0016	-0.0458	-0.0107
GDPR	-0.1027	0.0472	-2.1749	0.0296	-0.1952	-0.0101
ISI	-1.1057	0.4354	-2.5397	0.0111	-1.9591	-0.2524

Two of the variables are strongly significant even at the 1% significance level: Z-SCORE as the probability of banking system default, and DCP as domestic credit to the private sector. Still significant but at the lower 5% level we have the real GDP growth (GDPR) and ISI as the average of sixpublic governance indicators.

The final regression equation is thus the following:

$$SDI_{i,t} = 0.2087 \cdot ZSCORE_{i,t} - 0.0283 \cdot DCP_{i,t} - 0.1027 \cdot GDPR_{i,t} - 1.1057 \cdot ISI_{i,t} + \varepsilon_{i,t}$$

Equation 1 - Final 2-Step GMM Equation (authors' own elaboration)

The signs of the predictor coefficients are as expected with regards to Z-SCORE, which validates that financial stability positively contributes to the sustainable development scores of the countries scoped. Our result confirms the crucial role played by a sound banking sector in achieving sustainable development goals. The remaining coefficients are all negative, meaning that for higher values of domestic credit in the private sector, real GDP growth and ISI stability indicators, SDG scores tend to decrease. This suggests a possible inverse relationship between a country's productivity or economic performance and SDG scores' improvement. However, these findings are not in line with intuition, indicating potential limitations of the model, data constraints, or the presence of underlying structural factors influencing the relationship.

The model is validated by the instrument F-statisticwhich, at 43.93> 10,confirms that the lagged instrument is relevant for the model. The statistical test typically used for this model is Hansen's J-test, however due to having a single instrument, equaling the number of endogenous variables, the test becomes meaningless due to just-identification. (Pierce et al, 2011) We additionally test the robustness of the model by re-fitting the final equation using four different GMM weight types reflecting different assumptions about the variance-covariance structure of the underlying data, such as homo/heteroskedasticity, autocorrelation. Different weights have a different weighting matrix used to correct standard errors during the fitting of the model. For our particular case, we test the homoskedasticity-assuming (no heteroskedasticity or autocorrelation), robust (adjusts for heteroskedasticity) and kernel or "HAC" (Heteroskedasticity and Autocorrelation Consistent) matrix estimators.

Table 4

Statistical significance of SDI predictors in GMM, comparison of three covariance estimators (authors' elaboration)

Cov. Estimator Type	ZSCORE (p)	DCP (p)	GDPR (p)	ISI (p)
Homoskedastic	0.0030 (***)	0.0001 (***)	0.0499 (**)	0.8928 (n.s.)
Robust	0.0023 (***)	0.0016 (***)	0.0296 (**)	0.0111 (**)
Kernel	0.0086 (***)	0.0053 (***)	0.0784 (*)	0.0170 (**)

We note that ZSCORE and DCP remain robustly significant at the 1% level across the three covariance estimators, validating the two variables as highly significant predictors for SDG scores in the five countries examined. Real GDP growth becomes marginally significant when estimated with the Kernel weighting matrix suggesting some autocorrelation may be present and skewing this variable for the other estimators if left uncorrected. ISI remains significant at the 5% level when correcting heteroskedasticity and is otherwise markedly insignificant at any level with the homoskedastic estimator.

Our results thus indicate some level of sensitivity to the estimation method used when fitting the model, particularly for the GDPR and ISI variables, however in line with our initial assumptions we validate that financial stability, particularly noted through ZSCORE and DCP in this case, remain significantly robust predictors of SDG-related performance for our set of chosen countries and timeframe observed. The significance of GDPR is lowered when accounting for autocorrelation but remains moderately robust, while ISI remains statistically significant when correcting for heterosekdasticity and potentially autocorrelation.

In order to check the inverse of this relationship between financial stability and SDG scores, we will fit an additional model to support our findings with regards to the potential impact SDG scores would have on the financial stability of the countries analyzed. The model is replicated with the ZSCORE and SDI variables thus switched, resulting in:

Table 5

ZSCORE ~ coefficients, linearmodels System GMM output (authors' elaboration)

Variable	Coefficient	Std. Err.	T-stat	P-value	Lower CI	Upper CI
DCP	0.0087	0.0087	0.9965	0.319	-0.0084	0.0257
GDPR	0.0189	0.0338	0.5579	0.5769	-0.0474	0.0851
SDI	-0.0347	0.1234	-0.2816	0.7783	-0.2765	0.207
ISI	0.2055	0.5529	0.3718	0.7101	-0.878	1.2891

We note that all variables are markedly statistically insignificant , matching our understanding of the way development has been achieved in European countries, with a focus in the time period examined on rapid economic growth and development which is thus typically inversely correlated with SDG-related goal achievement as underlined in the literature review of our study.

2Conclusions

The main conclusion of the paper is that there is a close connection between the Sustainable Development Goals and financial stability. This finding confirms the importance of a sound financial system in fostering long-term economic growth and improving living conditions. In this context, macroprudential policies - a relatively new field in the areas of public policies, aimed at maintaining financial stability as its primary objective - can be effective also in achieving SDGs. Some steps have already been made in terms of selecting intermediate objectives for the macroprudential policies that fall also within the umbrella of SDGs. For instance, in Romania, beyond the five intermediate objectives recommended by the European Systemic Risk Board, the Macroprudential Strategy of the NCMO has two national specific objectives: (i) increasing financial intermediation in a sustainable manner and (ii) increasing financial inclusion. Additionally, in the context of greening the economy, there are ongoing discussions at the European level regarding the potential use of macroprudential tools,such as systemic risk buffers, to address banking sector exposures to climate-related risks.

Achieving the proposed targets requires collaboration at both national and international levels between various authorities and the implementation of a policy mix. Also, from a practical perspective, in order to assess the degree of achievement of the SDGs goals it is useful that Member States select a set of indicators that ensure comparability at the European level.

Future Directions

This analysis can be extended horizontally to other areas of impact in the UN SDG 2030 programme as well as vertically to a more in-depth impact assessment of the financial stability-related SDGs in grassroots-level areas of the economy.

As recommendations for future research' direction starting from this paper, we consider extending the analysis to determine other relevant indicators, as well as testing the second principal component to obtain an even "stronger" subset of statistically significant predictors to SDG scores improvement. A more contextual economic research direction starting from the signs of the predictor coefficients and leading into the relationship between SDG and economic performance would additionally be a powerful addition to the research space surrounding this topic.

Text notes

[1] WGI– Worldwide Governance Indicators.

[2] GFDI – Global Financial Development Database

Bibliography

1. Analysis of NCMO Working Group on Sustainable Increase in Financial Intermediation, 2022, https://www.cnsmro.ro/res/ups/Raport-CNSM-privind-intermedierea-financiara-1.pdf.
2. Caloia, F., and Jansen, D.J., 2021, Flood risk and financial stability: Evidence from a stress test for the Netherlands, De Nederlandsche Bank, Working Paper.
3. Coscieme, L., Mortensen, L.F., Anderson, S., Ward, J., Donohue, I., and Sutton, P.C., 2020, Going beyond gross domestic product as an indicator to bring coherence to the sustainable development goals, Journal of Cleaner Production, 248, 119232.
4. Dafermos, Y., Nikolaidi, M., and Galantis, G., 2018, Climate change, financial stability and monetary policy, Ecological Economics, 152, 219-234.
5. Eurostat Database, https://ec.europa.eu/eurostat
6. Fiordelisi, F., and Mare, D.S., 2014, Competition and financial stability in European cooperative banks, Journal of International Money and Finance, 45, 1-16.
7. Global Financial Development Database, https://datacatalog.worldbank.org/search/dataset/0038648
8. Hansen, B.E., and West, K.D., 2002, Generalized method of moments and macroeconomics, Journal of Business & Economic Statistics, 20(4), 460-469.
9. Kirkpatrick, C., and Green, C., 2002, Finance and development: an overview of the issues, Journal of International Development, 14(2), 207.

10. Lee, C.C., and Hsieh, M.F., 2013, The impact of bank capital on profitability and risk in Asian banking, Journal of International Money and Finance, 32, 251-281.

11. National Bank of Romania, 2024, Financial Stability Report, December 2024.

12. National Committee for Macroprudential Oversight, 2023, Annual Report, Bucharest, https://www.cnsmro.ro/res/ups/NCMO-Report_2023_website.pdf

13. Ozili, P.K., and Iorembert, P.T., 2023, Financial Stability and Sustainable Development Goals, International Journal of Finance and Economics.

14. Pierce, Brandon L., Habibul Ahsan, and Tyler J. VanderWeele, 2011, Power and instrument strength requirements for Mendelian randomization studies using multiple genetic variants. International journal of epidemiology 40.3: 740-752.

15. Schumpeter, J., 1912, The theory of economic development, Harvard University Press, Cambridge.

16. Stiglitz, J.E., 1994, Economic growth revised, Industrial and Corporate Change, 3(1), 65-110.

17. Tampakoudis, I.A., et al., 2017, Determinants of foreign direct investment in middle-income countries: New middle-income trap evidence, Mediterranean Journal of Social Sciences, 8(1), 58-70.

18. United Nations, UN 2030 Sustainable Development Goal Agenda.

19. Westley, G.D., 2001, Can financial markets reduce income inequality (No. 41498), Washington, DC: Inter-American Development Bank.

20. Wooldridge, J.M., 2001, Applications of generalized method of moments estimation, Journal of Economic Perspectives, 15(4), 87-100.

21. Worldwide Governance Indicators, https://databank.worldbank.org/source/worldwide-governance-indicators