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Article

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SUSTAINABILITY REPORTING AND CREDIT RISK MANAGEMENT IN THE ROMANIAN BANKING LANDSCAPE

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Abstract

The paper analyses the association between the reporting of the Sustainable Development Goals (SDGs) and the behaviour of Romanian banks, focusing on the relationship between SDG disclosure scores (both total and across the four sustainability dimensions) and credit risk management practices, measured by the level of credit loss allowances. The study combines content analysis with fixed-effects regressions to examine a sample of Romanian banks spanning the period 2017-2023. The results highlight a positive and significant relationship between the level of SDG reporting - including the environmental, social, and economic dimensions - and the expected credit loss allowances, suggesting that banks actively engaged in sustainability reporting tend to support the financing of emerging sectors, thus exposing themselves to higher credit risk. However, banks appear to mitigate this risk through strong governance practices. The conclusions, relevant for policymakers, emphasise the need for a balanced strategy between commitment to the Sustainable Development Goals (SDGs) and financial stability, highlighting the role of sustainability reporting in enhancing transparency, trust, and the identification of lower-risk sustainable financing opportunities. This research contributes to the existing body of literature by introducing SDG disclosure scores specifically tailored to the banking sector and by employing the Quadruple Bottom Line (QBL) framework, which encompasses the four pillars of sustainability. Moreover, it distinguishes itself by examining the relationship between SDG reporting and credit risk – a relatively underexplored but highly relevant area within the banking industry.

Keywords: Sustainable Development Goals (SDGs); sustainability reporting; credit risk; Quadruple Bottom Line (QBL); banks.

JEL Classification: M41, M14, G21, G32.

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Introduction

Under the influence of evolving regulatory frameworks for the transition to a sustainable economy, in line with the Paris Agreement and the 2030 Agenda, banks are adjusting their business strategies, making public commitments to integrate sustainability pillars into their investment, lending, risk management, and transparent reporting of their contribution to the implementation of the Sustainable Development Goals - SDGs (EBEF and KPMG, 2021). *Sustainable Finance Disclosure Regulation* (EU, 2021) is just one of the EU regulations that requires asset managers, including banks, to pay attention to the concepts of "sustainability risk" and "sustainable investments", to disclose the extent to which their investment decisions affect people and the environment, and how they integrate sustainability risks into their investment decisions.

Beyond regulatory compliance, the banking system, through its screening activities and prudential supervision, has the potential to direct financing toward investment projects grounded in sustainable practices. In doing so, it can stimulate economic activity and job creation in emerging sectors, foster trust among stakeholders in responsible financial practices, and promote innovative market opportunities based on the analysis of sustainable development needs reflected in the SDGs (Avrampou et al., 2019; Nicolò et al., 2023).

Banks' commitment to one or more SDGs could represent, according to some opinions (Ozili, 2023a), a diversification of them into low-profit and high-risk activities, to the detriment of the core activity (lending), which leads to an increase in the amounts allocated by banks to mitigate losses from non-performing bank loans (with an impact on credit loss allowances – CLA). On the other hand, if commitment to the SDGs becomes a very profitable business for banks, it is very likely that they will redirect their focus toward SDG-related activities, enabling them to generate significant profits by supporting the 2030 Agenda, potentially resulting in reduced CLA levels (Ozili, 2024a).

A relatively small number of studies in the field (Jan, Marimuthu & Mat Isa, 2019; Gambetta et al., 2021; Iqbal and Nosheen, 2023a; 2023b; Ozili, 2023b; 2024a; 2024b) have investigated the relationship between developments in the banking sector's support for the SDGs and the consequences for banks' performance or risk exposure. With a few minor exceptions, there is a notable gap in the literature on banking sustainability and credit risk management, particularly due to the absence of studies in well-established academic journals. This gap is one that our study aims to address – both theoretically and methodologically. Furthermore, the limited existing literature has yet to clarify the extent to which banking sector support for SDG implementation gives rise to credit risk, as indicated by the level of credit loss allowances (CLA), in accordance with IFRS 9. Therefore, our research seeks to answer questions such as: *How do sustainability reporting practices influence credit risk management behaviour in banks that support SDG achievement? Does reporting based on the Quadruple Bottom Line (QBL) approach to sustainability minimise or amplify credit risk management practices, as measured in accounting terms by the level of expected credit loss allowances?* These questions highlight a significant gap in the empirical banking literature in general and, more specifically, a lack of evidence on this topic within the context of emerging economies (Datta & Goyal, 2022; Mazumder, 2025).

Consequently, our study examines the relationship between SDG disclosure, based on the QBL approach, and credit risk management in Romanian banks over the period 2017–2023. Using content analysis of banks' non-financial reports as its methodology, the study

calculates disclosure scores for all SDGs, including groupings based on the four pillars of sustainability. These scores are then linked to credit risk through a fixed-effects regression analysis. The results demonstrate a connection between sustainability reporting and credit risk management practices.

The paper distinguishes itself from prior research in several ways: 1) by calculating disclosure scores that account for the varying relevance of individual SDGs based on the specific characteristics of banking activities, while also incorporating the four pillars of sustainability outlined in the QBL framework, which remains underutilised in this context. The QBL paradigm – built on the foundations of People, Planet, Profit, and Purpose – extends the traditional tripartite sustainability model (centred on the social, environmental, and economic pillars) by adding the “Purpose” dimension, which highlights the role of governance in sustainable business practices. Governance, reflected through principles of accountability and fiscal resilience, transparency, fairness, independence, and integrity in decision-making processes, supports the long-term balance among the three traditional components (People, Planet, Profit). This forms a quadruple sustainability approach, still underutilised in studies on corporate SDG reporting in general, and particularly within the banking sector; 2) by exploring the relationship between SDG disclosures (as a measurable expression of banks’ commitment to sustainability) and their behaviour in assuming credit risk, whose level may be influenced by the degree of transparency and accountability demonstrated in SDG reporting. Thus, the research enriches knowledge and fills in the existing gaps in literature through a combined qualitative and quantitative approach.

The remainder of the study is structured as follows: the literature review section is followed by the presentation of the research methodology (including the construction of the SDG disclosure score in line with the QBL approach, data and sample description, and econometric specifications). The empirical results are discussed in a separate section, and the final section summarises the conclusions, implications, and limitations of the present study.

1. Literature review and development of research hypotheses

Banks make an important contribution to achieving the SDGs, due to their role as financial intermediaries and risk managers, but also to their influence on other industries they finance (Zimmermann, 2019; Iqbal and Nosheen, 2023a). But banks are also transforming their operations to be more sustainable due to pressure from regulators, customers, and other stakeholders (Gambetta et al., 2021).

Studies on SDG information reporting in the banking sector rely on a multi-theoretical framework that explains the relationship between organisational behavior and sustainability reporting. This framework includes legitimacy theory, agency theory, stakeholder theory, and the resource-based view. Legitimacy theory posits that banks use SDG reporting to maintain their social acceptability and demonstrate social and environmental responsibility, thereby reducing banking risks (Khan, Serafeim, and Yoon, 2016). Agency theory, which links reporting transparency to the reduction of information asymmetry between managers and shareholders, enables banks to improve their reputation and manage risks effectively (Eccles, Ioannou and Serafeim, 2014). According to stakeholder theory, banks respond to diverse pressures and expectations from stakeholders by integrating non-financial information into their reporting, allowing them to manage social and reputational risks that are essential for financial stability (Bose, Khan, and Bakshi, 2024; Erin and

Olojede, 2024). The resource-based view demonstrates that banks can achieve competitive advantages by incorporating sustainability into their strategies (Mazumder, 2025). We consider that these theories also govern the relationship between the quality of SDG reporting and the behaviour of Romanian banks regarding credit risk management.

The literature addressing banks' SDG reporting practices can be classified into two categories, at the intersection of which our study is positioned. A first stream addresses the quality of banking reporting. These studies are mainly based on content analysis, which is widely used in the corporate field (Erin and Olojede, 2024; Galeazzo, Miandar and Carraro, 2024; Zampone et al., 2024) and on the calculation of disclosure scores, as proxies for reporting quality (Nikolaou, Tsalis, & Evangelinos, 2019; Tsalis et al., 2020; Jan et al., 2023). Thus, Sardanou et al. (2021), across a sample of 37 European banks, find a generally low quality of SDG-related sustainability disclosures, indicating room for improvement. The best reported SDGs are those related to economic growth, decent work (SDG 8), and justice and strong institutions (SDG 16), while those related to the environment (SDGs 14 and 15) are on the opposite side. Jan et al. (2023), examining a group of Islamic banks, reach comparable conclusions: the disclosure scores are low, with banks prioritising, within the Triple Bottom Line (TBL) approach – focused on the economic, social, and environmental dimensions – the SDGs related to the economic dimension over the environmental and social ones. Avramiou et al. (2019) investigate how leading European banks align their sustainability reporting with SDG achievement and find a generally limited contribution to the SDGs, with heterogeneous performance across banks and individual SDGs. None of these studies, however, utilise the QBL approach. In Romania, research on SDG reporting by banks is nearly nonexistent, with a greater focus on sustainability reporting in general. Bădulescu et al. (2018) note the relatively slow and sometimes reactive response of major Romanian banks to SDG reporting, which provides little evidence of the application of sustainability principles and pays marginal attention to environmental and social aspects. Similar conclusions are drawn by Tăchiciu et al. (2020) in a study of five banks that held over 60% of the banking system's market share in 2018. These banks provided information difficult to access and lacked comparability in terms of content, detail, and indicators used, extensively highlighting philanthropic activities and charitable projects, thus offering information more for marketing purposes than for strategic transformation (Bădîrcea et al., 2020).

The second stream includes the literature that explores the link between the quality of SDG reporting and the financial risks of credit institutions, which are significantly less developed (Gambetta et al., 2021; Iqbal and Nosheen, 2023a). Iqbal and Nosheen, (2023a) examine the relationship between SDG adoption and the risk profile of banks in the Asia-Pacific region, demonstrating a negative correlation between the two, suggesting that banks adopting SDGs are better positioned to mitigate future risks. Gambetta et al. (2021) investigate the impact of Spanish financial institutions' risk profiles on their contributions to the 2030 Agenda for Sustainable Development, highlighting the significant role of banks in promoting sustainability through risk management and transparent reporting. They demonstrate that institutions with lower capital risk, lower management efficiency, and higher market risk tend to have greater contributions to achieving the SDGs. Among financial risks, credit risk is particularly important for banks. In existing empirical studies, it is operationalised using various variables such as the level of impaired or non-performing loans (NPL), loan loss provisions (LLP), or credit loss allowances (CLA), which are

sometimes used interchangeably^{*}. Iqbal and Nosheen, (2023b) studied NPL as a moderating factor in the relationship between SDG adoption and banks' financial performance, concluding that even in the context of SDG adoption, high NPL ratios can reduce profitability. The relationship between credit risk and SDG reporting is complex: the achievement of certain SDGs may lead to either an increase or a decrease in non-performing loans, depending on the specific SDG and regional context (Ozili, 2024b). Ozili (2023a) shows that banks are increasingly aware of the importance of sustainability, yet they often fail to consider social and environmental impacts when estimating loan loss provisions (LLP). Ozili (2024a) identifies a negative relationship between LLPs and banks' involvement in SDGs, indicating a lower credit risk. Therefore, banks that adopt SDGs may be better equipped to mitigate future risks.

In summary, we consider that existing studies reveal that banks need to integrate the SDGs into their business models and risk management practices to promote sustainable development and effective credit risk management (Gambetta et al., 2021; Iqbal and Nosheen, 2023a). Therefore, we develop hypothesis H₁.

H₁ *There is a positive and significant relationship between the level of disclosure of information about the SDGs and the credit risk management of Romanian banks.*

The QBL paradigm expands the TBL sustainability framework – *People, Planet, and Profit*, stressing the importance of purpose (*Purpose*) in promoting sustainable business practices. Defining the purpose of economic entities entails an ongoing commitment to pursuing economic, social, and environmental objectives without compromising fundamental humanistic values. Del Gesso, Parravicini and Ruffini (2024) highlight the significance of the fourth pillar (*Purpose*), which introduces ethical principles into corporate activities, emphasises governance, and supports institutional capacity-building through policies that promote sustainability. Alibašić (2017) stresses that the QBL defines an organisation's ability to integrate a set of definitive/irrevocable policies and programmes to address the economic, social, environmental and governance aspects of sustainability. QBL therefore adds an additional dimension to corporate sustainability by focusing on governance defined by fiscal responsibility and resilience, transparency, fairness, and independence. The 2008 global financial crisis and the vulnerabilities of the financial system have led to an increase in banks' awareness of the role of corporate governance strategies (Budsaratragoon and Jitmaneeroj, 2019; Manta et al., 2020). Consequently, sustainability disclosure practices have gained increasing importance for banks seeking to restore their reputation and legitimise their role as entities capable of generating societal prosperity and contributing to sustainable development (Nicolo et al., 2023).

In their study, Budsaratragoon and Jitmaneeroj (2019) argue that each pillar of the QBL framework affects overall organisational performance differently and unevenly. Therefore, the sustainability score should not be calculated by assigning equal importance to all four

¹ Impaired loans are an accounting concept that reflects the occurrence of events negatively impacting future cash flows, while non-performing loans refer to a regulatory banking term designating loans overdue by more than 90 days (Cerulli et al., 2020). Loan Loss Provisions (LLP) represent expenses recorded in the income statement during a given period to cover estimated credit losses, whereas loan loss adjustments (CLA) appear on the balance sheet as a corrective item, representing the cumulative balance of estimated losses from different periods (Lejard, Paget-Blanc and Casta, 2021; Hansen, Charifzadeh and Herberger, 2024).

pillars, but rather by weighing each according to its specific relevance. The authors also advocate for the individual analysis of each pillar. These considerations lead us to formulate the hypothesis H₂.

H₂ *SDG disclosure scores, reflecting the QBL's approach to sustainability, differently influence the credit risk management of Romanian banks.*

2. Literature review and development of research hypotheses

2.1 Data and sample

The sample consisted of 13 commercial banks (out of a total of 21, according to the National Bank of Romania – BNR (2023)) that published non-financial reports. The full list published by the NBR in 2023 contained 24 banks, of which two were eliminated, as they were subsidiaries of groups already included in the sample (and were not even commercial banks) and another one, as it was a credit cooperative. Four more banks were excluded for lack of non-financial data, and another four due to the absence of financial data. Among the 13 banks remaining in the sample, the majority had foreign private capital as of 2023, and three were listed on the Bucharest Stock Exchange.

The analysis spans 2017–2023, starting with the first year of implementation of EU Directive 2014/95 on non-financial reporting. The non-financial data was collected from 83 annual observations, unevenly distributed across years. Approximately 78% (65 reports) of the non-financial reports were standalone documents (such as non-financial statements, sustainability reports, CSR reports, or social impact reports), while the remaining information was extracted from management reports or transparency reports submitted to the supervisory authority. The disclosure scores were obtained through manual content analysis conducted by the authors, a method widely used in studies assessing the quality of corporate non-financial reporting (Erin and Olojede, 2024; Galeazzo, Miandar and Carraro, 2024; Zampone et al., 2024). The financial data come from the BankFocus – Bureau van Dijk and Moody's Analytics databases, and the macroeconomic data from the NBR and WorldBank databases.

2.2 SDG Reporting Quality Scoring System

Disclosure scores (DS) were calculated for each SDG. The main steps consisted of:

1. selecting 95 of the 169 SDG targets, depending on the particularities of the banking activity, and using them in the subsequent content analysis;
2. calculating a score for each SDGs and for each QBL pillar using a 0/1/2 scoring system, as follows (Tsalis et al., 2020; Jan et al., 2023):
 - Not reported (0 points): if there were no mentions of the SDGs or sustainability efforts in the bank's reports;
 - Qualitative reporting (1 point): if the bank provided only qualitative descriptions, indicating partial disclosure of information;
 - Quantitative and qualitative reporting (2 points): if the bank also included numerical data, as full disclosure, since numerical data enhances the reliability of the narratives.

An example of scoring for disclosures that include numerical data (score 2) would be: “Financial education for high school students, conducted through the competition ‘Supporting Financial Education in My Community,’ aims to educate students to cultivate healthy financial behaviours. In the 2022–2023 school year, 29,910 students benefited from the program and 17 high schools received financial support for technical equipment” (Raiffeisen Bank Romania, 2023).

Each researcher reviewed one-third of the reports twice, with no significant differences observed between the two evaluations. Subsequently, the reports were exchanged among researchers, so that each report was reviewed by two different researchers. In cases of discrepancies, the third researcher was consulted to resolve them.

To ensure comparability the total normalised score was calculated for each bank, based on Equation 1 (Jan, Marimuthu and Mat Isa, 2019; Pizzi, Rosati and Venturelli, 2021).

$$DS_{SDG,i} = \sum_{j=1}^{17} \frac{SDG_{i,j}}{SDG_{max,j}} \quad (1)$$

where:

$DS_{SDG,i}$ – Bank i normalised total score for all 17 SDGs;

$SDG_{i,j}$ – Bank i 's score for SDG j ;

$SDG_{max,j}$ – the maximum score on a full reporting of SDG j (ranging from 4 for SDGs 14 to 18, for SDGs 4 and 8).

3. weighting the SDGs according to their relevance to banks, to capture the specificities and complexity of banking activities. The ranking was established by juxtaposing the findings from the literature with those generated by the analysis of Romanian banks and relevant international studies (EBEF and KPMG, 2021). Eight SDGs deemed relevant in comparative studies and reports, providing an international perspective, received the highest weight (3 points). Three SDGs with scores above the median of the sample, but not highly ranked in international studies, were assigned 2 points to capture the national and local dimension. The remaining SDGs were assigned 1 point. Of the total 95 targets, 18 were assigned to the economic pillar, 25 to the environmental one, 39 to the social pillar, and 13 to governance.

4. grouping the SDGs according to the economic, environmental, and social dimensions of sustainability (Avrampou et al., 2019; Nikolaou, Tsalis, and Evangelinos, 2019; Zimmermann, 2019; Tsalis et al., 2020; Jan et al., 2023). Following Del Gesso, Parravicini, and Ruffini (2024), a fourth sustainability pillar – governance – was introduced in accordance with the QBL approach. The few existing studies addressing corporate sustainability through the QBL paradigm employ variables such as board size, proportion of independent directors, gender balance on the board, frequency of board meetings, board duality, and audit/sustainability committees to investigate the influence of the governance pillar on transparency in sustainability reporting (Pizzi, Rosati, and Venturelli, 2021; Nicolò et al., 2023; Zampone et al., 2024). In our study, the governance variables were operationalised by correlating them with relevant SDG targets, such as SDGs 16.6, 16.7, 5.5, and 12.6.

5. weighting the four pillars of the QBL paradigm according to their differing specific weights, as proposed by Budsaratragoon and Jitmaneeroj (2019), as follows: the governance pillar, with the highest average score across the entire sample, received 4 points; the social pillar, 3 points; and the economic and environmental pillars received 2

and 1 point, respectively. For each bank, a score was calculated for each pillar as well as a total score, obtained by summing the four pillar scores. Figure 1 illustrates the criteria used for grouping the SDGs in the DS calculation.

International perspective 3 points		National/local perspective 2 points		General perspective 1 point	
SDGs included: 4, 5, 7, 8, 9, 11, 12, 13		SDGs included: 10, 16, 17		SDGs included: 1, 2, 3, 6, 14, 15	
Economic pillar 2 points		Social Pillar 3 points		Env. Pillar 1 point	
SDGs included: 8, 9, 12		SDGs included: 1, 2, 3, 4, 5, 10, 17		SDGs included: 6, 7, 11, 13, 14, 15	
				Governance pillar 4 points	
				SDGs included: 5, 8, 9, 12, 16, 17	

Figure no. 1. Grouping and weighting the SDGs in the calculation of disclosure scores

Ultimately, two total disclosure scores (DS) were generated: the first based on the specific weighting of the SDGs, and the second based on the specific weighting of the four sustainability pillars. Within these, scores were also calculated for each individual pillar.

2.3 Dependent and independent variables

Table no. 1 explains the main variables and how they are calculated.

Table no. 1. Dependent and independent variables

Variable	Calculation method	Source
Dependent variable		
Credit Loss Allowances (CLA) Credit Loss Allowances – Stage 3 (CLA₃)	Expression of credit risk management practices in the banking sector (Jin, Kanagaretnam & Lobo, 2018), CLA is calculated as the ratio between expected credit loss allowances (either total – CLA, or Stage 3 – CLA ₃) and the total loans granted	(Hasan & Wall, 2003; Mohd Isa et al., 2018; Naili and Lahrichi, 2022; Ozili, 2024a)
Independent variables		
Disclosure Score (DS)	The total <i>DS₁</i> disclosure score (calculated by weighting the 17 SDGs according to the relative importance of each), broken down into the four dimensions of the QBL approach: <i>DSEc₁</i> - Economic Pillar Disclosure Score <i>DSEnv₁</i> - Environmental Pillar Disclosure Score <i>DSSoc₁</i> - Social Pillar Disclosure Score <i>DSGov₁</i> - Governance Pillar Disclosure Score The total <i>DS₂</i> disclosure score (calculated by weighting the four sustainability pillars according to their relative importance), broken down according to the QBL approach: <i>DSEc₂</i> - Economic Pillar Disclosure Score <i>DSEnv₂</i> - Environmental Pillar Disclosure Score <i>DSSoc₂</i> - Social Pillar Disclosure Score <i>DSGov₂</i> - Governance Pillar Disclosure Score	(Avrampou et al., 2019; Budsaratagoon and Jitmaneeroj, 2019; Jan, Marimuthu and Mat Isa, 2019; Tsalis et al., 2020; Pizzi, Rosati and Venturelli, 2021; Sardanou et al., 2021; Jan et al., 2023; Del Gesso, Parravicini and Ruffini, 2024)

Variable	Calculation method	Source
Control variables		
Non-Performing Loans Ratio (NPLs)	The ratio between non-performing (or impaired) loans and the total gross loan portfolio. This indicator reflects the quality of a bank's most important assets and is one of the key measures of credit risk (Ozili, 2024b).	(Hasan and Wall, 2003; Mohd Isa et al., 2018; Nguyen and Vo, 2021; Ozili, 2024a; 2024b)
Capital Adequacy Ratio (CAR)	The ratio between Tier 1 and Tier 2 capital and risk-weighted assets. It reflects regulatory capital, in line with prudential standards (Naili and Lahrichi, 2022)	(Yitayaw, 2021; Naili and Lahrichi, 2022; Eltweri et al., 2024; Ozili, 2024a)
Loan Growth (LoanGw)	$(\text{Loans granted}_t - \text{Loans granted}_{t-1}) / \text{Loans granted}_{t-1}$ An increase in this indicator signals a rise in credit risk (Abbas and Ali, 2022)	(Nguyen and Vo, 2021; Yitayaw, 2021; Naili and Lahrichi, 2022)
Net interest margin (NIM)	Ratio between net interest income and annual average of interest-earning assets NIM indicates the profitability of banks' lending activity, with a direct impact on credit risk (Yitayaw, 2021)	(Huian, Mironiuc and Mihai, 2018; Yitayaw, 2021; Eltweri et al., 2024)
Size	Natural logarithm of total assets	(Nguyen and Vo, 2021; Farisyi et al., 2022; Bose, Khan, and Bakshi, 2024)
Banking Diversification (NTI)	Ratio between net gains/losses from trading derivatives and financial securities and net profit The literature provides mixed results on the impact of diversification on credit risk (Naili and Lahrichi, 2022)	(Huian, Mironiuc and Mihai, 2018; Mohd Isa et al., 2018; Naili and Lahrichi, 2022)
Banking Efficiency (Eff)	Ratio between operating expenses and operating income It reveals either weak managerial skills, unexpected external events, or resource savings as factors linking cost efficiency to credit risk (Naili and Lahrichi, 2022)	(Huian, Mironiuc and Mihai, 2018; Naili and Lahrichi, 2022)
Ownership structure (Own)	Categorical variable, having 3 categories: 1 – public ownership; 2 – private ownership; 3 – mixed ownership It is expected to have a mixed impact on credit risk (Mazumder, 2025)	(Farisyi et al., 2022; Naili and Lahrichi, 2022; Mazumder, 2025)
Economic growth (GDPg)	Annual GDP growth (%) During periods of economic growth, the level of NPL tends to decline, which positively affects the level of CLA (Ng, Saffar, and Zhang, 2020)	(Nguyen and Vo, 2021; Yitayaw, 2021; Naili and Lahrichi, 2022)
Reference interest rate (IntR)	Annual reference interest rate set by the NBR IntR volatility leads to the adoption of effective risk management practices (Eltweri et al., 2024)	(Naili and Lahrichi, 2022; Eltweri et al., 2024)

Source: Authors' own elaborations

The dependent variable, CLA, is a proxy for credit risk and reflects the level of expected credit loss allowances established by banks in accordance with the provisions of IFRS 9 "Financial instruments". Banks applying IFRS 9 use a general impairment approach, with

certain exceptions. This approach follows a three-stage model that monitors possible deterioration in credit risk, materialised as a significant increase in credit risk (Huian, 2023, p. 310). CLA is recognised from the first stage, when loans are still considered “financially healthy”, but reaches its highest level in the third stage, when loans are impaired due to the occurrence of default events (Bojar, 2023). In our paper, we use both the total allowances (as the sum across all three stages – CLA) and those specifically related to Stage 3 (CLA3). The primary purpose of establishing CLA is to build a financial buffer for potential future losses from loans affected by default events (Jin, Kanagaretnam and Lobo, 2018). By accounting for both present and future risks, banks with higher CLA are more prudent – that is, they take on less risk and maintain greater stability, especially during periods of financial crisis (Abbas and Ali, 2022).

The variable of interest is the disclosure score, DS, calculated both in aggregate and for each of the four sustainability pillars, using two weighting approaches, as described in Section 2.2.

2.4 Econometric specifications

In order to examine the relationship between SDG reporting and credit risk in the Romanian banking sector, an analysis of fixed-effect panel data was performed, by developing the model in equation (2).

$$Y_{it} = \alpha_0 + \sum_{j=1}^4 \alpha_j DS_{it} + \alpha_5 NPL_{it} + \alpha_6 CAR_{it} + \alpha_7 LoanGw_{it} + \alpha_8 NIM_{it} + \alpha_9 Size_{it} + \alpha_{10} NTI_{it} + \alpha_{11} Eff_{it} + \alpha_{12} Own_{it} + \alpha_{13} GDPg_{it} + \alpha_{14} IntR_{it} + \mu_{it} \quad (2)$$

where, t = the period of time (year); i = the bank at time t ; Y = the dependent variable (CLA or CLA3); DS = total disclosure score and scores for the four pillars (calculated using two approaches); NPL = non-performing loans ratio; CAR = capital adequacy ratio; $LoanGw$ = loan growth; NIM = net interest margin; $Size$ = bank size; NTI = banking diversification; Eff = banking efficiency; Own = ownership structure; $GDPg$ = economic growth; $IntR$ = reference interest rate; α_0 = constant; $\alpha_1 - \alpha_{14}$ = coefficients of independent and control variables; μ = error term.

Fixed-effect estimation was used in regression analysis, the selection of this model being supported by the results of the Hausman test, which indicated its superiority over the random-effects model. The fixed-effects model ensures a more efficient control of heterogeneity between banks, reducing the influence of unobserved factors specific to each entity. In addition, to improve the distribution of data and respect the assumption of normality, the *Size* control variable was log-transformed.

3. Results and discussions

3.1 Descriptive statistics and correlations

A brief overview of the Romanian banking sector shows that it is stable and well-capitalised, providing it with a strong capacity to absorb economic shocks (BNR, 2023). There is an observed increase in profitability, high asset quality, and a low non-performing loan ratio. The ownership structure is predominantly foreign, positively influencing governance standards and the adoption of sustainability practices. However, the level of financial intermediation in

Romania remains below the EU average, indicating untapped development potential (Huian, 2023, p.20). The descriptive statistics in Table 2 confirm these trends.

Table no. 2. Descriptive statistics and variance inflation factors (VIF)

Variable	Average	Std. Dev.	VIF	1/VIF	Variable	Average	Std. Dev.	VIF	1/VIF
CLA	0.05	0.01			NPL	5.02	2.05	1.93	0.51
CLA ₃	0.03	0.02			CAR	20.77	3.36	1.44	0.69
DSt ₁	25.67	8.11	1.57	0.63	CAR ₂	0.11	0.02		
DSEc ₁	4.45	1.75			LoanGw	0.06	0.09	1.69	0.59
DSEnv ₁	3.89	2.75			NIM	3.87	0.71	1.31	0.76
DSSoc ₁	5.90	1.98			Size	15.25	1.18	2.14	0.46
DSGov ₁	9.41	2.51			NTI	0.55	1.94	1.20	0.83
DSt ₂	29.97	8.11	1.45	0.68	Eff	0.50	0.12	2.00	0.50
DSEc ₂	1.48	0.58			Own	2.10	0.31	1.47	0.67
DSEnv ₂	1.61	1.17			GDPg	3.66	3.49	1.39	0.71
DSSoc ₂	2.84	1.04			IntR	3.59	2.23	1.64	0.60
DSGov ₂	4.21	0.89							

The quality of SDG reporting by Romanian banks is moderate to low, since the total scores are just above half of the maximum score achievable with full reporting (50 for DSt₁ and 57 for DSt₂). A standard deviation of 8.11 indicates noticeable differences between banks, with total disclosure scores varying considerably around the mean. The analysis conducted on each SDG shows that the best-reported are SDG 8, SDG 17, and SDG 5, with normalised scores above 0.5 (out of a maximum of 1), while at the opposite end are SDG 6, SDG 2, and SDG 14, with scores of 0.15 or lower. These results are similar to those found in the reviewed literature (Avrampou et al., 2019; Sardanou et al., 2021; Jan et al., 2023), highlighting the need to improve reporting for more transparent and relevant communication of banks' contributions to sustainable development. The results are also comparable to these studies in terms of sample size, which consists of 13 Romanian banks and 83 annual observations. Many similar studies investigate smaller samples due to the use of manual content analysis: Avrampou et al. (2019) study 5 leading European banks in sustainability management; Sardanou et al. (2021) analyse 37 annual observations from 37 European banks; and Jan, Marimuthu, and Mat Isa (2019) as well as Jan et al. (2023) use a sample of 16 Islamic banks tracked over a decade.

The average capital adequacy ratio (CAR) of 20.77%, well above the basic prudential requirements set by EU regulations at 8%, suggests that banks in Romania are well capitalised. The non-performing loans ratio (NPL), with an average of 5.02%, indicates a moderate level of credit risk. The net interest margin (NIM) of 3.88% reflects the profitability of core banking activities. Loan growth (LoanGw), with an average of 6.7%, points to a moderate expansion in lending, but with significant variability, ranging from -21.4% to 33.8%. Banks operate at an average efficiency level (Eff) of 50.9%, suggesting notable differences among entities in terms of cost control. Against the backdrop of an average GDP growth of 3.66% and an average interest rate of 3.60%, the descriptive statistics highlight the diversity among the sampled banks in terms of risk, performance, and operational efficiency.

Regarding multicollinearity, the analysis of the correlation matrix (not included in the paper due to space constraints but available upon request) and the variance inflation factors (VIF) (Table 2) suggests a sound regression model structure and a robust analysis. VIF values are below the threshold of 5, and the average VIF is 1.62, further supporting the presence of only moderate linear dependencies among the variables.

Tables no. 3a and 3b present the results of the fixed-effect regression analysis using the first calculation method of the total disclosure score (DSt₁) and its components, for both CLA (Table no. 3a) and CLA₃ (Table no. 3b).

Table no. 3a. Results of the regression analysis using the first calculation method of the total disclosure score

	(1) CLA	(2) CLA	(3) CLA	(4) CLA	(5) CLA
DSt ₁	0.0005**				
DSEc ₁		0.0016*			
DSEnv ₁			0.0011*		
DSSoc ₁				0.0027***	
DSGov ₁					0.0000
NPL	0.0055***	0.0053***	0.0055***	0.0055***	0.0052***
CAR	0.0009***	0.0009***	0.0009***	0.0008***	0.0009***
LoanGw	0.0078	0.0037	0.0046	0.0069	-0.0010
NIM	-0.0037*	-0.0040*	-0.0039*	-0.0037*	-0.0049**
Size	0.0012	0.0042	0.0035	-0.0006	0.0085
NTI	-0.0001	-0.0001	0.0000	-0.0001	0.0000
Eff	-0.0034	-0.0046	-0.0047	-0.0028	-0.0071
Own	0.0134***	0.0122**	0.0131**	0.0127***	0.0126**
GDPg	-0.0003	-0.0002	-0.0003	-0.0002	-0.0002
IntR	0.0001	0.0000	0.0001	0.0000	0.0001
Constant	-0.0392	-0.0745	-0.0627	-0.0115	-0.1264
R ²	0.7792	0.7713	0.7704	0.7921	0.7577

p<0.01, ** *p*<0.05, * *p*<0.1

Table no. 3b. Results of the regression analysis using the first calculation method of the total disclosure score

	(6) CLA ₃	(7) CLA ₃	(8) CLA ₃	(8) CLA ₃	(10) CLA ₃
DSt ₁	0.0007*				
DSEc ₁		0.0017			
DSEnv ₁			0.0017*		
DSSoc ₁				0.0035**	
DSGov ₁					0.0015
NPL	0.0093***	0.0091***	0.0093***	0.0093***	0.0092***
CAR	0.0007	0.0008*	0.0007	0.0007	0.0007
LoanGw	0.0137	0.0065	0.0103	0.0117	0.0085
NIM	-0.0123***	-0.0131***	-0.0125***	-0.0125***	-0.0135***
Size	-0.023**	-0.0175*	-0.0206**	-0.0246**	-0.0152
NTI	-0.0007	-0.0006	-0.0006	-0.0006	-0.0006
Eff	-0.0104	-0.0128	-0.0117	-0.0099	-0.0144

	(6) CLA ₃	(7) CLA ₃	(8) CLA ₃	(8) CLA ₃	(10) CLA ₃
Own	0.0134	0.0119	0.0131	0.0124	0.0135
GDPg	-0.0005	-0.0004	-0.0005	-0.0004	-0.0005
IntR	0.0032***	0.0031***	0.0032***	0.0031***	0.0031***
Constant	0.3202**	0.2557	0.2988*	0.3478**	0.2143
R ²	0.7994	0.7913	0.7962	0.8046	0.7910

$p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tables no. 4a and 4b show the results of the fixed-effects regression analysis using the second calculation method of the total disclosure score (DSt₂) and its components, for both CLA (Table no. 4a) and CLA₃ (Table no. 4b).

Table no. 4a. Results of the regression analysis for the second variant of calculating the disclosure score

	(1) CLA	(2) CLA	(3) CLA	(4) CLA	(5) CLA
DSt ₂	0.0005**				
DSEc ₂		0.0048*			
DSEnv ₂			0.0030*		
DSSoc ₂				0.0045***	
DSGov ₂					0.0019
NPL	0.0054***	0.0053***	0.0055***	0.0055***	0.0053***
CAR	0.0009***	0.0009***	0.0009***	0.0008***	0.0009***
LoanGw	0.0076	0.0037	0.0054	0.0066	0.0025
NIM	-0.0038*	-0.004*	-0.0038*	-0.0037*	-0.0047**
Size	0.0015	0.0042	0.0035	-0.0003	0.0064
NTI	-0.0001	-0.0001	0.0000	-0.0001	0.0000
Eff	-0.0046	-0.0046	-0.0041	-0.0052	-0.0064
Own	0.0139***	0.0122**	0.0133***	0.0138***	0.0134**
GDPg	-0.0003	-0.0002	-0.0003	-0.0002	-0.0002
IntR	0.0001	0.0000	0.0001	0.0000	0.0000
Constant	-0.0457	-0.0746	-0.0636	-0.0135	-0.1073
R ²	0.7775	0.7712	0.7725	0.7865	0.7621

$p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table no. 4b. Results of the regression analysis for the second variant of calculating the disclosure score

	(6) CLA ₃	(7) CLA ₃	(8) CLA ₃	(9) CLA ₃	(10) CLA ₃
DSt ₂	0.0007*				
DSEc ₂		0.0051			
DSEnv ₂			0.0047*		
DSSoc ₂				0.0060**	
DSGov ₂					0.0036
NPL	0.0093***	0.0091***	0.0094***	0.0093***	0.0091***
CAR	0.0007	0.0008*	0.0007	0.0006	0.0007
LoanGw	0.0140	0.0066	0.0116	0.0116	0.0083
NIM	-0.0124***	-0.0131***	-0.0123***	-0.0123***	-0.0135***

	(6) CLA ₃	(7) CLA ₃	(8) CLA ₃	(9) CLA ₃	(10) CLA ₃
Size	-0.023**	-0.0175*	-0.0208**	-0.0247**	-0.0168*
NTI	-0.0007	-0.0006	-0.0006	-0.0007	-0.0006
Eff	-0.0118	-0.0128	-0.0107	-0.0129	-0.0141
Own	0.0142*	0.0119	0.0134	0.0139*	0.0139
GDPg	-0.0005	-0.0004	-0.0005	-0.0004	-0.0005
IntR	0.0032***	0.0031***	0.0031***	0.0031***	0.0032***
Constant	0.3178**	0.2558	0.2986*	0.3512**	0.2369
R²	0.7999	0.7914	0.7980	0.8029	0.7914

$p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tables 3a, 3b, and 4a, 4b highlight the significant association between SDG reporting and the behavior of Romanian banks in terms of credit risk. The analysis indicates that total, economic, social, and environmental reporting scores are associated with an increase in CLA, suggesting a direct link between sustainability transparency and credit risk. Our results confirm H_1 and H_2 and are consistent with recent evidence (Ngamvilaikorn, Lhaopadchan, and Treepongkaruna, 2024; Islam, Abdul Hamid, & Shahid, 2025). Islam, Abdul Hamid, and Shahid (2025) demonstrate that, although sustainability reporting can help reduce reputational risks, fundamental banking risks, such as credit and interest rates, continue to affect the bank's stability. These findings suggest that despite the reputational benefits, the impact of sustainability reporting on financial risks remains complex and dependent on additional factors. Banks with a high level of transparency in reporting economic, social, and environmental aspects play a significant role in supporting emerging economic sectors and small and medium-sized enterprises, including green projects and energy transition initiatives, which inherently involve a higher degree of uncertainty. According to Finger, Gavius and Manos (2018), these banks tend to adopt lending strategies geared toward long-term economic impact, implicitly accepting a higher level of short-term risk. In a similar vein, Torre Olmo, Cantero Saiz and Sanfilippo Azofra (2021) reveal that sustainable practices lead to a reduction in reputational risk, but also entail significant additional costs and significant financial risks.

These results suggest that a high performance in reporting the SDGs is not necessarily correlated with a reduction in credit risks, as banks with high disclosure scores are more likely to finance projects in sectors characterised by higher credit risk and exposed to economic volatility. Financing projects with social and environmental impact or those in developing sectors is often perceived as risky, time-consuming, and expensive, as several studies highlight (Ozili, 2024b; Islam, Abdul Hamid, and Shahid, 2025). Such initiatives are characterised by profitability uncertainties and industry-specific challenges, which can lead to an increase in CLA. Banks granting green loans are exposed to increased risk due to less stringent guarantees, fluctuations in their value over time, and uncertainty about the long-term performance of the sustainable projects financed (Akomea-Frimpong et al., 2022). On the other hand, banks that provide detailed sustainability reporting increase transparency in their activities. They are also subject to rigorous prudential supervision, especially in the context of the European regulatory framework (Horobet et al., 2024). All this leads to a more rigorous assessment of risks by investors and rating agencies, resulting in increased CLA. In addition, previous studies suggest that entities with a high sustainability performance may be exposed to different capital costs (Ng and Rezaee, 2015), with implications for lending and risk management strategies. Detailed SDG

disclosures may attract more risk-conscious investors, who, in turn, may demand higher allowances for estimated credit losses.

In contrast, the governance disclosure score does not show a statistically significant relationship with the CLA, suggesting that a strong governance framework can offset the additional risks taken by the bank, as other authors opine (John, De Masi and Paci, 2016). Sound corporate governance practices can counterbalance the risks associated with the other dimensions of sustainability, leading to a net neutral effect on CLA.

Regarding the control variables, the results in Tables no. 3a, 3b, and 4a, 4b show the close link between CLA and NPL, reinforced by the adoption of the expected credit loss model under IFRS 9. The positive relationship between the two, also confirmed by other studies in the literature (Ng, Saffar, and Zhang, 2020; Ozili, 2024a), indicates that banks in the sample increase their CLA levels in response to the deterioration in asset quality (as reflected by rising NPLs), using allowances as a credit risk management mechanism to maintain financial stability (Abbas and Ali, 2022).

Tables no. 3a and 4a, columns 1–5, show that well-capitalised Romanian banks (CAR) can manage the risks associated with increased lending more effectively, as their solid capital levels enable them to absorb potential losses more efficiently (Abbas and Ali, 2022). The more pronounced negative link for CLA3 (col 6-10) ($p < 0.01$) between NIM and the level of allowances suggests that greater lending efficiency reduces the volume of non-performing loans and, consequently, the need for credit loss allowances (Yitayaw, 2021). This contributes to the stability and resilience of banks during periods of crisis (Ng, Saffar, & Zhang, 2020). A significant positive relationship is observed between ownership structure (Own) and CLA, confirming the idea that banks with majority private ownership prioritise their financial health and stability by increasing their CLA levels to mitigate credit risk (Ng and Roychowdhury, 2014). For the third stage of impairment (CLA3), a negative relationship is found with bank size (Naili and Lahrichi, 2022), indicating that larger banks maintain lower CLA levels due to more accurate risk assessment, advanced risk management systems, and greater available resources (Jin, Kanagaretnam & Lobo, 2018; Ng, Saffar & Zhang, 2020). An increase in CLA3 in response to higher reference interest rates (IntR) allows banks to better manage potential credit losses (Eltweri et al., 2024).

The results can be interpreted through the lens of legitimacy and agency theories, suggesting that sustainability reporting, as a practice of transparency and accountability, is associated with active risk management, even though a direct effect on CLA cannot be demonstrated. To test the robustness of the results, an alternative measure of capital adequacy was used by replacing CAR with CAR₂ (Equity / Total Assets). For brevity, these results are not reported but are available upon request and are consistent with those obtained in the main analysis, thus reinforcing the robustness of the conclusions.

Conclusions

The SDG reporting acts as a catalyst for organisational change in the Romanian banking sector, influencing credit risk-taking strategies and redefining approaches to sustainable finance. The study's findings reveal a direct and significant relationship between sustainability reporting and the level of CLA. Banks that provide extensive reporting on the economic, social, and environmental dimensions of sustainability tend to exhibit higher

CLA levels, suggesting greater exposure to financing emerging sectors and small and medium-sized enterprises. Although these sectors play a crucial role in the transition toward a sustainable economy, they are also characterised by higher financial uncertainty and credit risk. At the same time, the adoption of high standards of transparency and sustainability may attract more risk-averse investors, which contributes to the increase in CLA. However, banks appear to partially offset these risks through strong governance practices, which may explain the insignificant relationship between the governance score and the CLA. These findings are consistent with recent literature, suggesting that sustainability in the banking sector is not merely a compliance requirement, but a complex risk management strategy in which the different dimensions of sustainability interact to shape the bank's overall risk profile.

The study's conclusions may be of interest to bank managers and regulatory authorities, highlighting that sustainability reporting is not merely a compliance exercise, but a factor associated with banks' risk profiles. The results are intended to be particularly useful for managers of Romanian banks, as well as in other emerging economies with similar institutional and regulatory characteristics, who need to integrate the SDGs into their business models and strategies in order to enhance sustainable financial performance and meet stakeholder expectations about sustainability. In this regard, managers are required to implement effective risk management systems, prioritise sustainability reporting to increase transparency, legitimacy, and stakeholder trust, and promote low-risk activities that facilitate the transition toward a green and sustainable economy, thus maintaining financial stability and protecting stakeholder interests. Moreover, pillar scores allow for a differentiated understanding of each dimension's contribution to banking behaviour regarding credit risk, thus providing a useful basis for strategic adjustments in reporting policies and risk management. Theoretically, the research extends the applicability of the QBL approach in the banking sector, a direction rarely explored in the literature.

Although the study provides a detailed analysis of the association between SDG reporting and credit risk, the research is limited to banks in Romania, which may restrict the applicability of the results to financial markets with different regulatory regimes. It should also be emphasised that the relationships identified are associative in nature and do not allow for causal conclusions to be drawn. Future research could explore how changes in European and international regulations influence banks' SDG reporting strategies and the level of CLA, considering global trends in sustainability regulation. Additionally, future studies could include comparisons with banks from other economies and integrate quantitative methods focused on causality, as well as qualitative approaches to understand the motivations behind sustainable reporting.

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