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Banks' ESG disclosure: A new scoring model

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ABSTRACT

The study aims to apply an original methodology for aggregating indicators in a new ESG scoring model, to assess the level of banks' ESG disclosure. The methodology allows to calculate the BESGI score – Banks' Environmental, Social, Governance and Indirect impacts score - and to compare it with mathematical and geometric means. This method applies a flexible aggregation function, that is able to treat the indicators as not fully substitutable, by avoiding compensations among divergent performances. A pilot empirical application of the BESGI model is presented in the paper, to discover banks' green-washing practices.

1. Introduction

Regulation on sustainable finance requires financial institutions to make an increasing effort in the disclosure of information regarding the integration of environmental, social, and governance (ESG) factors in their operating processes, as well as the principal adverse impacts of their investment decisions and advisory activities[1]. In addition to regulatory pressures, the reputational impacts of financial institutions' sustainability practices provide a further incentive for increasing ESG disclosure (Brogi and Lagasio, 2019; Dell'Atti and Trotta, 2016; Agnese et al., 2023).

In this context, the phenomenon of green-washing can represent an emerging critical issue (Bellucci et al., 2021; Zainuldin and Lui, 2022). Green-washing is a marketing policy that emphasizes positive ESG performances or initiatives, able to compensate for bad results concerning other activities/practices. Green-washing is then associated with divergent or inconsistent performances regarding different ESG issues (Chen and Xie, 2022; Citterio and King, 2023). To detect it, a distinction needs to be made between "window dressing" sustainability and an approach to sustainability actually capable of pervading business processes and strategies, by taking into account both internal ESG practices and external impacts produced through lending and investing activities (Capelli et al., 2023; Yoo and Managi, 2022).

Against this background, the aim of the study is to discuss the applications of a new tool (called BESGI – Banks' environmental, social, governance, and indirect impacts) for assessing the banks' actual ESG disclosure, by emphasizing the level of consistency in the results achieved and communicated by financial institutions.

The tool is based on the contents of the environmental, social and governance-related disclosures required by the GRI Universal Standards, the most adopted guidelines for sustainability reporting, issued by the Global Reporting Initiative (GRI). Being focused on the financial industry, the tool was fine-tuned through semi-structured interviews with experts in the field to identify the central

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[1] [1] Regulation EU 2019/2088; Regulation EU 2020/852; Delegated Regulation (EU) 2021/1253; and Directive (EU) 2022/2464.

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elements of sustainability for financial institutions.

The contribution of the study is mainly theoretical. A relevant difference between the BESGI model compared to the more traditional ESG scoring tools is the methodology used for aggregating the different indicators included in the final measure. The final score is calculated by applying the "Multidimensional Synthesis of Indicators" (MSI) method (Mauro et al., 2018; Biggeri et al., 2019). The MSI is usually used by researchers and international institutions to aggregate multidimensional phenomena and rank the performance of countries and regions (Biggeri et al., 2021; Biggeri and Ferrone, 2021). In this paper, it is applied to measure banks' ESG performances. In this model, the final score depends on a function that takes into consideration the indicators by treating them as not fully substitutable, as opposed to the case of the arithmetic mean. The methodology penalizes heterogeneity and inconsistency in the bank outcomes and, at the same time, avoids the problems of the geometric mean which can easily collapse to zero (Biggeri and Mauro, 2018; Biggeri et al. 2019). The methodology does not require the assignment of a predefined weight to indicators, thus avoiding the need to previously define the relevance of each indicator included in the model.

The study also presents the highlights of a first exploratory application of the model on a sample of European banks, including all financial institutions supervised by the European Central Bank. This allows to check the differences between the results of the BESGI tool and the results of alternative ESG scoring models that, starting from the same initial indicators, apply more traditional aggregation methods, such as arithmetic or geometric mean.

The study is structured as follows. The second section of the paper presents the methodology, both in terms of indicators included in the tool and in terms of the aggregation method used for measuring the final BESGI score. The third section describes the sample and the main results of the pilot test. The final paragraph concludes and comments on the main findings, providing useful insights for financial institutions and supervisors to improve the level of ESG disclosure consistency.

2. The scoring model: methodology

2.1. Variables included in the BESGI score

The BESGI scoring model includes areas related to the disclosure of banks' corporate governance choices and internal behaviours concerning environmental and social issues, as well as areas concerning the sustainability of loan-related activities and investment-related activities. Each area includes dimensions which are defined by a variable number of indicators designed to measure the level of banks' disclosure on the topic.

The BESGI scoring model aims to provide a systematic assessment of the consistency of banks' ESG disclosure by leveraging key ESG indicators from the GRI Standards. These Standards provide a comprehensive framework for reporting on an organization's ESG performance and impact. The first step entailed selecting relevant indicators from the GRI Standards that are applicable to banks. The GRI Standards are comprised of three main categories: Economic, Environmental, and Social, with each category containing various subcategories and indicators. While the GRI Standards are designed to be applicable across industries, not all indicators are relevant for the banking sector. Therefore, we undertook a thorough examination of the GRI Standards and identified a list of ESG indicators that are pertinent to banks and their operations. These indicators were chosen through the use of semi-structured interviews with key informants from the banking sector, the ethical and sustainable finance industry, as well as academia, based on their relevance to the sector, materiality, and potential impact on stakeholders. The choice of universally adopted indicators such as those of the GRI Standards strengthens the applicability of our model. The use of data-driven reduction to form an index (such as Principal Component Analysis) is not optimal when constructing indexes that have a normative value, and for which we want to apply a formative model (Maggino, 2014; Mazziotta and Pareto, 2019), combining different areas of performance and different aspects of the same construct.

Tables 1-4 represent the final indicators included in the model for each area: environmental, social, governance, ESG financing, and ESG investing.

2.2. The aggregation method

The BESGI score aims to verify the level of banks' disclosure in the full spectrum of ESG dimensions, evaluating both the direct and indirect impacts communicated by financial institutions. To consider the synergies among dimensions and to penalize heterogeneity in the multidimensional results, we employ the Multidimensional Synthesis of Indicators (MSI) aggregation method (Mauro et al., 2018; Biggeri et al., 2019). The final score depends on a function that takes into consideration the results for each indicator, by treating them as not fully substitutable. This implies that a bank cannot simply compensate for a low score on a topic with a higher score in another

Table 1
Dimensions and indicators for the environmental area.

DIMENSIONS	*INDICATORS*
Inputs	*Energy consumption per employee (GigaJoule / per capita)*
	Paper consumption per employee (kg / per capita)
	Percentage of electricity from renewable sources
Outputs	*Direct emissions per employee (tCO_2eq)*
	Indirect emissions per employee (tCO_2eq)
	Amount of waste produced (kg) per employee

Table 2
Dimensions and indicators for the social area.

DIMENSIONS	*INDICATORS*
Internal	*Employee turnover*
	Gender wage gap
	Max / min salary ratio value
	Employee satisfaction surveys and their frequency (0/4)
External	*Economic value distributed to the community / total economic value*
	Contributions to the local community (y/n)
	Composite indicator 0/5 which aggregates binary variables regarding the supply chain: local suppliers; suppliers chosen according to environmental/social criteria; action taken about negative environmental/social outcomes in the supply chain.

Table 3
Dimensions and indicators for the governance area.

DIMENSIONS	*INDICATORS*
Governance transparency	*Composite indicator 0/7 which aggregates the binary variables regarding transparency: disclosure of conflicts of interest (1/0), corruption and actions taken (1/0); anti-competition actions (1/0); non-compliance with environmental laws (1/0); marketing complaints (1/0); privacy complaints (1/0); non-compliance with socioeconomic laws (1/0).*
	Composite indicator 0/2 which aggregates binary variables regarding stakeholders: information on the identification, selection and involvement of stakeholders (1/0); ESG stakeholder engagement information (1/0).
	Presence of information on ESG risks within the Basel Third Pillar communications (1/0).
Corporate bodies	*Percentage of non-men on the Board of Directors.*
	Composite indicator 0/4 which aggregates binary variables concerning corporate bodies: responsibility/delegation/committee on the Board of Directors about ESG (1/0); ESG responsibilities/delegations among managers (1/0); sustainability compensation incentives (1/0); policy on executive compensation regarding ESG performance (1/0)
	Percentage of independent directors on the Board of Directors
	Attendance rate at Board of Directors meetings.

Table 4
Dimensions and indicators for the ESG lending and investing areas.

DIMENSIONS	*INDICATORS*
ESG lending	*Amount of financing with environmental and social impact on the average of total financing*
	Composite indicator (0/4) on the presence of formal policies for exclusion of controversial sectors
	Sustainable investments: equity ESG funds and ethical funds / total assets under management.
ESG investing	*Composite indicator (0/3) which aggregates binary variables on ESG securities: issue of green bonds/social bonds/sustainability bonds.*
	Composite indicator (0/4) on the presence of formal policies for exclusion of controversial sectors

one, in order to improve the final result. In turn, this results in a penalization of heterogeneity in the bank outcomes. Let X be the nxk data matrix with generic entry xij the jth achievement for a bank i. Then, BESGI score for the bank named I_i is given by:

$$I_i = 1 - \left[\frac{1}{k}\sum_j \left(1 - x_{ij}\right)^{g(x_i)}\right]^{\frac{1}{g(x_i)}}$$

where k is the total number of indicators of the bank's performances and $g(x_i)$ is a generic real-valued function of the ith row of matrix X, with $g(.) \geq 1$. Following Mauro et al. (2018) the non-constant function g(.) allows a high degree of flexibility capturing the theoretical considerations regarding the structure of substitutability rates across the outcomes of each bank. All in all, the degree of substitutability can be directly linked to the general level of performance of the bank through a function g(.). Moreover, given the instrumental value of most indicators, very low rates in a specific dimension might not only cause an overall low performance (intrinsic value) but also negatively affect other outcomes of the bank.

As the level of multidimensional outcomes increases, a bank can choose among dimensions with very limited penalization. Further information (or assumptions) on the structure of substitutability rates relating to the banks can lead to more detailed and complex reiterations of the functional form of g(.). Following Bourguignon and Chakravarty (2003) we use the arithmetic mean μ as the function g(.) standardizing it with values between 0 and 1.

Therefore, a generic choice for the function g(.) is:

$$g(x_i) = \begin{cases} \frac{b}{a} & if \quad \mu < a \\ \frac{b}{\mu} & if \quad a \leq \mu < b \\ 1 & if \quad \mu \geq b \end{cases}$$

where μ is the arithmetic mean of x_i and a and $0 \leq a < b \leq 1$ are two thresholds selected so that all units above b (or below a) have their outcomes aggregated under the assumption of a perfect (or almost complementary) substitutability rate (see Fig. 1 for an example). In our case a=0 and b=1.

This is a simple and intuitive way to allow a flexible penalization of heterogeneity in bank results: banks with higher levels of performance are less penalized, as the heterogeneity associated with their outcomes is more likely to be the result of strategic choices, while banks that perform with a lesser degree of multidimensionality are more heavily penalized. As a result, the degree of substitutability moves from almost perfect complements (for the lowest performing banks) to perfect substitutes when it becomes linear where the best bank performers are situated, as illustrated in Fig. 1 (Mauro et al., 2018). In the figure, each iso-performance curve represents the infinite combinations of outcomes 1 and 2 that result in the same level of BESGI score. The lower the curve, the lower the associated score of the index.

The MSI provides a sort of 'middle ground' between the arithmetic and the geometric mean. The main issue with the arithmetic mean is that it tends to hide even strong heterogeneity of outcomes, which can instead be indicative of other phenomena (see above). The complete substitutability of indicators is also not optimal in a formative approach, which is necessary when synthesizing multiple aspects of the same construct (i.e. banks' ESG disclosure). This is the case of, for example, the SDGs, or Human Rights, where the normative nature of the indicators requires equal status between indicators. On the other hand, the geometric mean provides an excess of penalization which discounts efforts made by low performers especially for values of dimensions close to zero or zero (in this last case the geometric mean collapse to zero).

Finally, the MSI does not use an explicit weighting of indicators, but rather indicators are weighted through the aggregation function g. This allows each observation to be weighted according to the overall distribution of the sample and to the specific outcomes in each of the indicators. The alternative would be to enforce weights a priori, determining ex-ante the relative importance of each indicator and dimension. However, this approach imposes a hierarchy of importance that may not be consistent with the normative and formative approach discussed above.

3. Empirical test

3.1. Sample description and empirical model

To empirically test the model, we selected the overall sample of financial institutions directly supervised by the European Central Bank (as of 1 July 2021). Data was collected from Datastream and Bloomberg databases, which provide comparable and reliable data, both on financial and ESG issues. In case of missing values, data was retrieved from the documents published directly by the banks on their websites, such as non-financial statements or sustainability reports; pillar III public disclosure documents; corporate governance reports; and the codes of ethics.

Systematic data collection led to the construction of a complete dataset for 120 financial institutions, related to years 2017, 2018, and 2019. Each indicator was aggregated in dimensions, and dimensions into areas. First, eight scores were built to reflect each dimension. By using the MSI aggregation methodology, each area's score was built aggregating its dimensions. Subsequently, by using the MSI method, the areas were aggregated in the BESGI score. Fig. 2 shows an example of the scores calculated for the eight dimensions included in the score.

Each indicator has been standardized using the 'max-min' method: subtracting the minimum from each value and dividing by the difference between maximum and minimum. This results in a value between 0 and 1. For some indicators, the maximum and the minimum were taken from the theoretical reference values (for example, when dealing with a percentage), while for the other values it

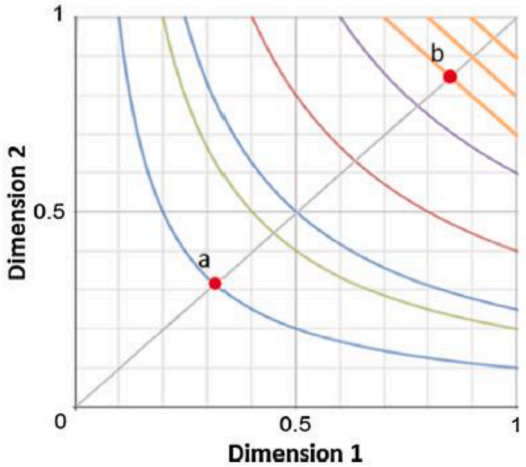

Fig. 1. Geometric representation of the MSI with generic a and b.

was decided to use the 1st and 99th percentiles as reference points to neutralize the weight of outliers.

3.2. Main results

The ability of the MSI to penalize heterogeneity in outcomes is a relevant feature that can raise flags to potential green-washing practices: if a bank has a high score in an area or a group of indicators - say, the easiest to achieve - and very low in another, this could be a clue of green-washing. Aggregation through the arithmetic mean would have hidden this disparity. To show the potential divergence in the measurement of the final score due to different methods applied for aggregating indicators, Fig. 3 compares the geometric (vertical axis) and arithmetic mean (horizontal axis) calculated for the sample of banks, highlighting the differences between the two approaches. The geometric mean is always lower than the arithmetic mean (all the observations are below the 45° line), and for a cluster of banks, the geometric mean is particularly punitive, while the value of the arithmetic mean is similar to that of other banks.

The BESGI score methodology corrects both the arithmetic and the geometric mean, producing potentially very divergent results, in particular compared to the arithmetic mean. Fig. 4 shows the difference between the BESGI and the arithmetic mean. As expected the BESGI produces lower scores than the arithmetic mean, however, the values tend to converge the higher the score.

Another indication of potential green-washing practices comes from comparing the different areas that compose the BESGI scoring model. Fig. 5 shows how the environmental and social components of the BESGI tool compare to each other. The score on the environmental component is considerably higher than the social component, which suggests that banks have put most of their efforts on environmental sustainability, neglecting the social component.

Finally, the BESGI score provides a useful tool to investigate banks' performance over time. Fig. 6 illustrates the relationship between the performance, measured as the difference between the 2019 score and the 2017 score, relative to 2017, and the final level reached in 2019. Banks are split into four quadrants: in the top-right quadrant are banks with a BESGI level in 2019 over 0.5, and that have improved their performance over the three years period. Here we find many southern and continental/northern European banks. In the bottom right quadrant are banks with a positive performance but still a low final score. In the two left quadrants we find banks with negative performances. Here we find mostly banks of the continental/northern European region, although many show a BESGI score higher than 0.5.

4. Conclusions

The study proposes a new indicator – the BESGI score – for assessing the consistency of banks' disclosure in terms of sustainability, by adopting a holistic, multidimensional approach for evaluating corporate action and practices. The paper makes mainly a theoretical contribution, by developing a new scoring model, specialized on the banking sector, with multidimensional indicators, weighted through a flexible and original aggregation methodology. Based on GRI Standards, the model measures both the disclosure concerning the bank's internal behaviors in terms of ESG issues and the disclosure of sustainability choices related to lending and investment activities. The materiality of the indicators included in the model was tested through in-depth interviews with bank experts.

A pilot application of the model is also proposed in the paper. First empirical results show a high potential divergence in the results achieved by the BEGSI model compared to the methodology based on the arithmetical mean, the standard aggregation method applied

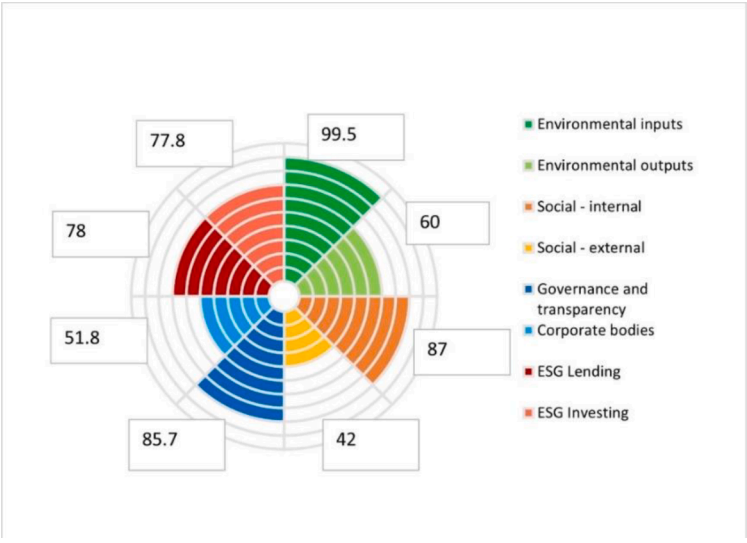

Fig. 2. An example of the BESGI dimensions' scores.
Source: *Authors' elaboration*

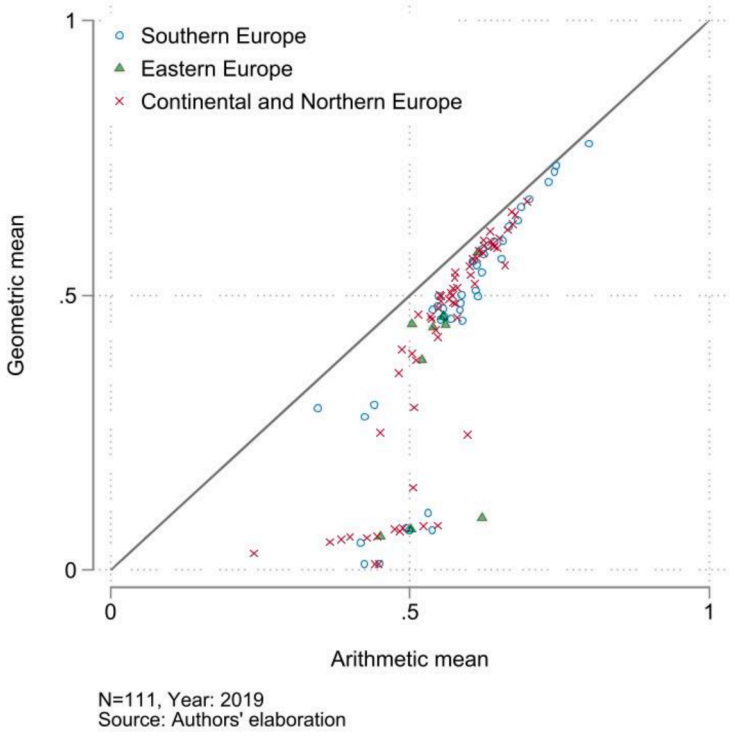

Fig. 3. Comparison between arithmetic and geometric mean.

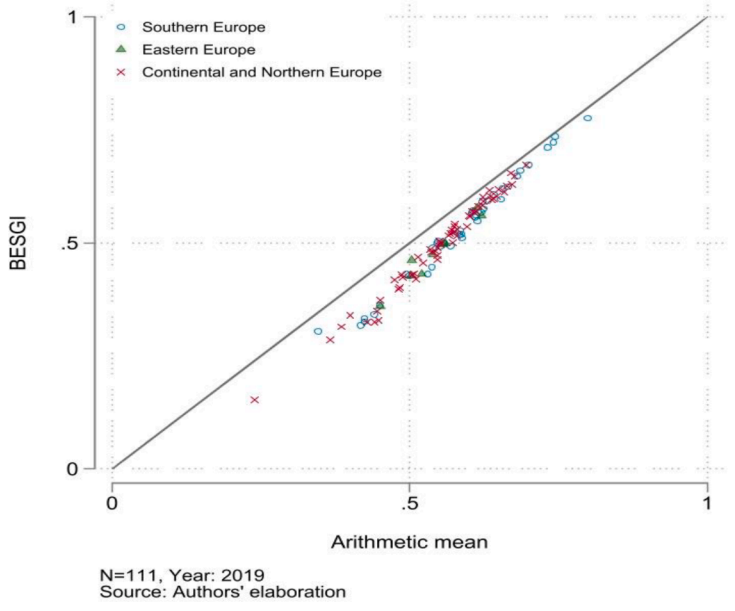

Fig. 4. Comparison between the BESGI and the arithmetic mean.

in traditional ESG scoring tools. The aggregation methodology, other than the choice of the indicators, is then an issue in the inconsistency of results shown by different ESG scoring methods. The measure of the difference between the BESGI score and the score calculated by applying the arithmetic mean can identify the level of heterogeneity in banks' performances for different ESG areas.

Moreover, the application of the model highlights serious difficulties in finding data in bank reports concerning specific ESG dimensions. In particular, the worst results point out the lack of information regarding practices concerning sustainable lending and investing. As an example, most banks seem unprepared to introduce and disclose internal policies for excluding controversial sectors in

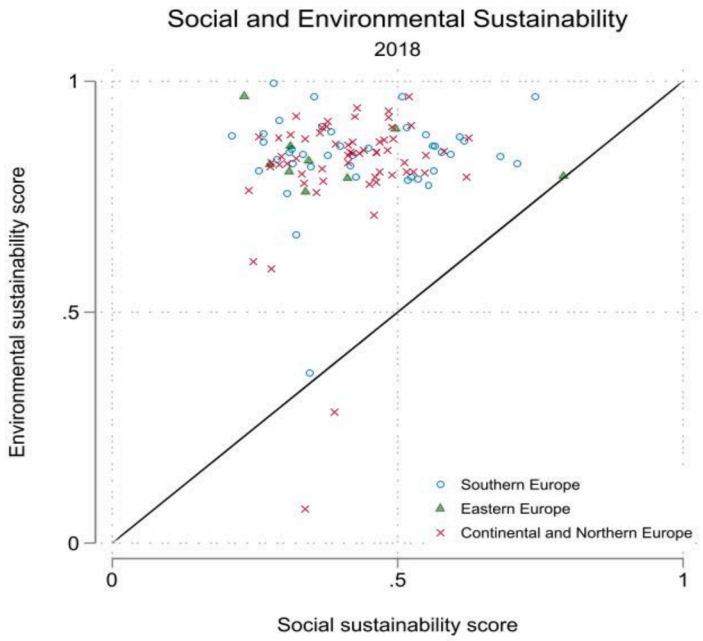

Fig. 5. Comparison between social and environmental components of the BESGI score.

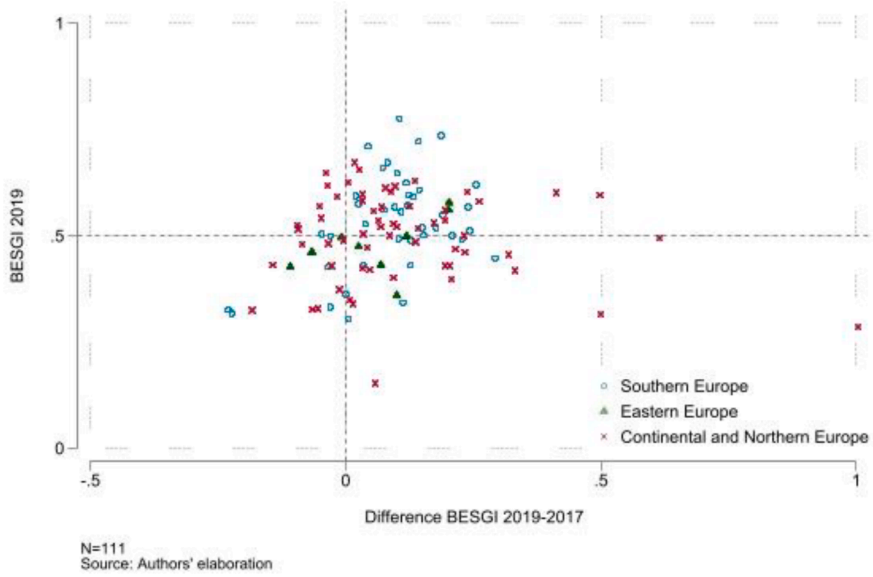

Fig. 6. Performance (2017-2019) and level (2019) of the BESGI score.

their lending and investment activities, or to be engaged in environmental and social loans and investments. Moreover, the main results highlight the need for banks to increase attention to social issues, especially concerning local communities.

The greater sensitivity of consumers and investors towards environmental objectives, like climate change mitigation and adaption, ecosystem protection, and circular economy transition, has probably contributed to the growth of attention by banks to environmental issues (Birindelli et al., 2022; Griffin et al., 2017; Yu et al., 2022). The regulation on sustainable finance is another boost for increasing transparency on environmental topics (Regulation EU 2019/2088; Regulation EU 2020/852; and Delegated Regulation EU 2021/1253). Moreover, literature shows that environmental pillar outperforms all other dimensions in terms of risk reduction (Meles et al., 2023). Our results show the need for a greater regulatory pressure on disclosure, in particular on social issues, by putting in evidence also the level of its consistency.

A limitation of the work concerns the pilot application of the tool to a limited sample of European banks. Future studies could deepen the empirical test concerning the actual application of the model, also to test determinants and correlations with bank-specific

or country-specific variables. In addition, the work does not present comparisons with the results of other scoring models, but tests the differences between the BESGI score and other scores that, starting from the same indicators, aggregate results using arithmetic and geometric mean methodologies. Other authors pointed out the low correlation between the results of different scoring models correlation (Berg et al., 2022; Dimson et al., 2020). Future research may investigate the level of correlation between the results of the BESGI scoring model and the results of existing models that use both different indicators and different aggregation methodologies (often based on the arithmetic mean).

Due to the heterogeneity penalization and the consequent focus on the multidimensional consistency of ESG disclosures, the BESGI score can help mitigate green-washing practices and boost more coherent and holistic responsible behaviours by financial institutions. The tool developed in this study can represent a valid support for scholars, researchers, supervisory authorities, and banks to conduct an assessment / self-assessment of the level and consistency of sustainability disclosure. In particular, the BESGI tool could guide stakeholders in interpreting reports and documentation specifically produced by financial intermediaries. Furthermore, the tool could support banks in verifying the effectiveness and comprehensiveness of their communication on sustainability issues, by rewarding financial institutions able to produce not only a high, but also a consistent ESG performance in the various areas investigated.

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Authors' CRediT contributions statements

This study is the result of a team effort and the authors have equally contributed to the paper.

Compliance with ethical standards

All authors declare that they have no conflicts of interest.

CRediT authorship contribution statement

Lorenzo Gai: Conceptualization, Validation. **Marco Bellucci:** Data curation, Formal analysis, Validation, Writing – original draft, Writing – review & editing. **Mario Biggeri:** Methodology, Formal analysis, Validation, Writing – original draft, Writing – review & editing. **Lucia Ferrone:** Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. **Federica Ielasi:** Conceptualization, Formal analysis, Validation, Data curation, Writing – original draft, Writing – review & editing.

Declarations of Competing Interest

The authors have no relevant financial or non-financial interests to disclose.

Data availability

Data will be made available on request.

References

Agnese, P., Battaglia, F., Busato, F., Taddeo, S., 2023. ESG controversies and governance: evidence from the banking industry. Financ. Res. Lett. 53 (May) https://doi.org/10.1016/j.frl.2022.103397.
Bellucci, M., Acuti, D., Simoni, L., Manetti, G., 2021. Restoring an eroded legitimacy: the adaptation of non financial disclosure after a scandal and the risk of hypocrisy. Account. Audit. Account. J. 34 (9), 164–186.
Berg, F., Koelbel, J., Rigobon, R., 2022. Aggregate confusion: the divergence of ESG ratings. Rev. Financ. 26 (6), 1315–1344. https://doi.org/10.2139/ssrn.3438533.
Birindelli, G., Bonanno, G., Dell'Atti, S., Iannuzzi, A.P., 2022. Climate change commitment, credit risk and the country's environmental performance: empirical evidence from a sample of international banks. Bus. Strat. Environ. 31, 1641–1655. https://doi.org/10.1002/bse.2974.
Biggeri, M., Bortolotti, L., Mauro, V., 2021. The analysis of well-being using the income-adjusted multidimensional synthesis of indicators: the case of China. Rev. Income Wealth 67 (3), 684–704.
Biggeri, M., Clark, D.A., Ferrannini, A., Mauro, V., 2019. Tracking the SDGs in an 'integrated' manner: a proposal for a new index to capture synergies and trade-offs between and within goals. World Dev. 122, 628–647.
Biggeri, M., Ferrone, L., 2021. Measuring child multidimensional deprivation: a sustainability perspective. Sustainability, 13 (7), 3922. https://doi.org/10.3390/su13073922.
Biggeri, M., Mauro, V., 2018. Towards a more 'sustainable' human development index: integrating the environment and freedom. Ecol. Indic. 91, 220–231.
Bourguignon, F., Chakravarty, S.R, 2003. The measurement of multidimensional poverty. J. Econ. Inequal. 1, 25–49. https://doi.org/10.1023/A:1023913831342.
Brogi, M., Lagasio, V., 2019. Environmental, social, and governance and company profitability: Are financial intermediaries different? Corp. Soc. Responsib. Environ. Manag. 26 (3), 576–587.
Capelli, P., Ielasi, F., Russo, A., 2023. Integrating ESG risks into value-at-risk. Financ. Res. Lett. https://doi.org/10.1016/j.frl.2023.103875.
Chen, Z., Xie, G., 2022. ESG disclosure and financial performance: moderating role of ESG investors. Int. Rev. Financ. Anal. 83, 102291.
Citterio, A., King, T., 2023. The role of environmental, social, and governance (ESG) in predicting bank financial distress. Financ. Res. Lett. 51 (January) https://doi.org/10.1016/j.frl.2022.103411.
Dell'Atti, S., Trotta, A., 2016. Managing Reputation in the Banking Industry. Theory and Practices, Springer, Switzerland.

Dimson, E., Marsh, P., Staunton, M., 2020. Divergent ESG rating. J. Portfolio Manag. 47 (1), 75–86. https://doi.org/10.3905/JPM.2020.1.175.
Griffin, P.A., Lont, D.H., Sun, E.Y., 2017. The relevance to investors of greenhouse gas emission disclosure. Contemp. Account. Res. 34 (2), 1265–1297. https://doi.org/10.1111/1911-3846.12298.
Maggino, F., Michalos, A.C., 2014. Indicator Development and Construction. Encyclopedia of Quality of Life and Well-Being Research. Springer, Dordrecht, pp. 3190–3197.
Mauro, V., Biggeri, M., Maggino, F., 2018. Measuring and monitoring poverty and well-being: a new approach for the synthesis of multidimensionality. Soc. Indic. Res. 135 (1), 75–89.
Mazziotta, M., Pareto, A., 2019. Use and misuse of PCA for measuring well-being. Soc. Indic. Res. 142, 451–476.
Meles, A., Salerno, D., Sampagnaro, G., Verdoliva, V., Zhang, J., 2023. The influence of green innovation on default risk: evidence from Europe. Int. Rev. Econ. Financ. 84, 692–710.
Yoo, S., Managi, S., 2022. Disclosure or action: evaluating ESG behavior towards financial performance. Financ. Res. Lett. 44 (January) https://doi.org/10.1016/j.frl.2021.102108.
Yu, E.P., Tanda, A., Luu, B.V., Chai, D.H., 2022. Environmental transparency and investors' risk perception: cross-country evidence on multinational corporations' sustainability practices and cost of equity. Bus. Strat. Environ. 30 (8), 3975–4000. https://doi.org/10.1002/bse.2852.
Zainuldin, M.H., Lui, T.K., 2022. A bibliometric analysis of CSR in the banking industry: a decade study based on Scopus scientific mapping. Int. J. Bank Mark. 40 (1), 1–26.