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RESEARCH ARTICLE

Corporate climate reporting of European banks: Are these institutions compliant with climate issues?

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Abstract

This article focuses on climate disclosures from STOXX Europe 600 banks during the 2017–2020 period, comprising 152 company years. Specifically, we analyze compliance based on general and bank-specific recommendations of the Task Force on Climate-related Financial Disclosures. Although our results indicate an overall increase in climate reporting quality over time, we identify major reporting gaps, such as consideration of forward-looking information (particularly related to scenario analyses). We also stress that the bank-specific recommendations are taken into account rather insufficiently. This study stands to benefit mostly researchers, business practices, and regulatory bodies owing to the future standardization of European and global sustainability reporting frameworks.

KEYWORDS

climate change, climate report, climate-related risks, environmental policy, risk management, sustainability report

1 | INTRODUCTION

Climate change is linked to major physical and transition risks. To realize a substantial reduction in greenhouse gas (GHG) emissions, a fundamental shift in business strategies and in products and services is needed. While most sustainability reporting frameworks address a broad range of corporate social responsibility (CSR)/environmental, social, and governance (ESG) topics, corporate climate disclosure has been examined insufficiently for a long time. As a result, the Financial Stability Board (FSB) of the G20 founded the Task Force on Climate-related Financial Disclosures (TCFD) to improve the reporting on climate-related financial information, and in 2017, the TCFD published its global recommendations on voluntary climate-related financial disclosures. Owing to the TCFD's emphasis on the impact of climate change on firms' financial performance, such as their recommended integrated reporting concept, the disclosures took on the perspective of investors on climate risks. TCFD recommendations have

become the subject of research in the past few years, and there have already been academic calls for research on TCFD (O'Dwyer & Unerman, 2020).

As a result of their high social, and increasingly **political**, importance (e.g., the European Green Deal project), climate-related regulations have increased significantly in recent years, demonstrating the importance of environmental issues from a regulatory perspective. This situation also applies to the regulation of climate-related reporting. Published TCFD guidelines are one of the most recent and important climate-related reporting standards and are of great international relevance. This relevance is clearly reflected by the fact that both the planned ISSB standards and the EU standards on sustainability reporting refer to the TCFD recommendations, but the ISSB leans most heavily on the recommendations, since here too the goal of climate-related financial reporting is paramount.

In this context, it should also be noted that the ISSB standards follow a single materiality perspective (outside-in approach), focusing

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in particular on the information needs of shareholders, whereas the EU standards for sustainability reporting take a double materiality approach (inside-out approach) and include the information needs of a broader stakeholder group. For investors especially, there is an urgent need for emissions to be presented in a simple and easy-to-understand manner and for the impacts of climate change to be quantifiable and understandable so that they can anticipate financial risks arising from climate change in advance and act on this information in a way that is useful for decision-making. The main objective of the TCFD is to achieve better disclosure of the financial impacts of climate-related risks and opportunities on a company in order to enable investors and lenders to make informed financial decisions based on this information. Therefore, it is necessary for these users to develop an understanding of how climate-related risks and opportunities are likely to affect the future financial position of an organization (TCFD, 2017).

In addition, the special role of the financial industry in the context of climate change impacts should be noted. Although financial institutions have a rather small direct impact on climate because of their low direct emissions and limited resource use, their indirect impact on climate change, manifested in the sustainable finance movement and multiplier effects, is significant (Loew et al., 2020). In this regard, the TCFD sets the disclosure of financial impacts of climate-related risks and opportunities as a core objective of its work (TCFD, 2017). It also provides additional industry-specific recommendations for financial institutions, which will also be explored in our analysis.

As mentioned above, the investigation of the banking sector with regard to climate reporting is also of particular importance due to the sector-specific peculiarities, which are especially characterized by the indirect influence of banks on climate issues. In addition to these industry-specific features, banks are also in the spotlight with regard to additional regulatory pressure. The most prominent example of this is the European Green Deal, which promotes green financing and investment. The European Commission has also formulated a strategy to finance a sustainable economy, focusing particularly on financing the transition to sustainability and the resilience and contribution of the financial sector (European Commission, 2021). Another issue is the Basel IV regulation, which sets as a key objective the assessment of viability and sustainability, that is, to verify the bank's ability to generate "acceptable returns" in the time horizons considered (12 and 36 months) (Porretta & Fabrizio, 2021).

Climate and sustainability aspects also play increasingly important roles in lending. Wellalage and Kumar (2021) found that banks consider the environmental performance of borrowers and that companies with better environmental performance receive about 6.4% higher loans (relative to total sales), an effect that is more pronounced for small and medium-sized enterprises. In addition to reviewing the environmental or climate performance of creditors, the bank itself must also consider climate-related risks and opportunities in its reporting. Therefore, this issue doubly affects banks. Another peculiarity regarding environmental reporting, especially in the financial

sector, is the risk that banks simply want to present a more environmentally friendly image to the public (i.e., greenwashing) (Zharfpeykan, 2021). This approach does not provide potential investors with information useful for decision-making and defeats the purpose of climate reporting.

Increased bank engagement on climate issues can generate several positive impacts. For example, engagement on climate issues is shown to lower the risk level of bank loans when banks pay a medium to high level of attention to these issues (Birindelli et al., 2022). Moreover, a positive relationship has been observed between environmental performance and financial performance of banks in emerging markets (Shakil et al., 2019). A significant and positive impact of the Carbon Disclosure Project (CDP) score on bank profitability has also been found (Caby et al., 2022).

Given the abovementioned relevance and specificities of the TCFD recommendations, as well as the special position of banks, especially in terms of regulatory requirements and the positive impact of environmental performance, this article aims to examine the quality of banks' climate reporting based on the TCFD recommendations. In the following, we investigate whether and to what extent STOXX Europe 600 banks voluntarily comply with climate reporting based on general and bank-specific TCFD recommendations and which categories of TCFD recommendations were associated with major information gaps in the 2017–2020 period.

Interestingly, only Cosma et al. (2022) examined climate reporting by European banks against the background of the TCFD recommendations. Aside from them, Moreno and Caminero (2020) published a study that examined the TCFD disclosure quality of a few Spanish banks. In addition, Demaria and Rigot (2020) investigated the compliance with TCFD recommendations of companies from the CAC 40 and developed the climate compliance index (CCI) on this basis.

This article contributes to prior literature on climate-related disclosures in several ways, as we rely on a content analysis of corporate climate disclosure in line with TCFD recommendations on European banks listed on the STOXX Europe 600. We also include bank-specific TCFD recommendations for the first time. This is where we see our main contribution, as these bank-specific recommendations have not, to our knowledge, been addressed in any paper to date. Our analysis is based on management commentaries, mandatory nonfinancial declarations, and voluntary sustainability reports from the 2017 to 2020 period. The results indicate the potential for improvements that can help banks, standard setters (e.g., European Commission and ISSB), and researchers.

The paper is organized as follows. Section 2 provides a theoretical and regulatory description of banks' climate reporting. Section 3 presents a literature review of empirical research on bank-related climate reporting and our key research question (RQ). Section 4 lays out the empirical study with a description of the sample selection, a presentation of the TCFD disclosure score, and the results from the content analysis. Subsequently, Section 5 critically examines and discusses the insights gained. Section 6 concludes with a summary and discussion of the study's limitations.

2 | THEORETICAL AND REGULATORY FRAMEWORK OF BANKS' CLIMATE REPORTING

2.1 | Legitimacy theory

First, we will describe the theoretical framework of this article. Legitimacy theory (Dowling & Pfeffer, 1975; Suchman, 1995) serves as the basis of our study. It represents the prevailing lens (e.g., Qian & Schaltegger, 2017; Velte et al., 2020) because it assumes that firms will gain, preserve, or restore their legitimacy status in society when they embrace societal values, norms, and beliefs (Dowling & Pfeffer, 1975) and implicitly enter into a social contract with society. If firms fail to uphold this social contract, they will become subject to greater stakeholder scrutiny, which could jeopardize their license to operate or, in extreme cases, their very existence (Deegan, 2002). Regarding climate issues, companies use climate reports as an instrument to counter social and political pressure (Cho et al., 2012). This approach applies particularly to large firms and others that attract media scrutiny over their carbon-reporting transparency because their public visibility increases public pressure to attain societal legitimacy (Hahn et al., 2015). Listed banks are exposed to a high level of stakeholder awareness, that is, climate reporting is of great importance in attaining societal legitimacy.

Legitimacy theory also explains possible opportunistic uses of climate disclosure for self-impression management (Mahoney et al., 2013). Disconnected and vague information disclosures may lead to greenwashing and information overload that, in turn, can result in reduced readability and usefulness of disclosed information for shareholders and other stakeholder groups (Gerwanski et al., 2019). Greenwashing behavior leads to one-sided positive information on climate aspects, neglecting material environmental risks and negative circumstances. However, high-quality and precise climate disclosures will decrease the risk of symbolic reporting behavior (Hummel & Schlick, 2016).

2.2 | Regulatory aspects

Owing to the increasing importance of climate issues and the lack of climate-related reporting among European companies, in 2019, the European Union (EU) published non-binding guidelines on reporting climate-related information, which dovetailed closely with TCFD recommendations. These voluntary guidelines extended the Non-Financial Reporting Directive 2014/95/EU. Along with the TCFD, these EU guidelines also bear the frameworks of the Global Reporting Initiative (GRI), CDP, Climate Disclosure Standards Board, Sustainability Accounting Standards Board (SASB), and International Integrated Reporting Council.

These various standards focus primarily on the climate or sustainability aspects of reporting. As mentioned above, CDP specializes in the publication of emission data. However, the understanding of such carbon data remains questionable (Kolk et al., 2008).

A key difference between GRI standards and TCFD recommendations is the materiality consideration. While TCFD recommendations provide for single materiality (outside-in perspective) and primarily focus on shareholders (Chiu, 2022), GRI standards and the CDP questionnaire likewise take into account the interests of other stakeholders and thus pursue a dual-materiality perspective (de Villiers et al., 2022). Unlike GRI standards, TCFD recommendations are characterized by a principles-based approach. Through this principles-based design, the TCFD recommendations allow banks the necessary flexibility to adapt their assessments and reporting over time (Meyer, 2018). In addition to the rule-based design of the CDP questionnaire and the GRI standards, both frameworks also tend to focus on information about environmental concerns and their impact on society (Hayashi, 2020).

SASB offers a variety of sector-specific standards (including commercial banking, insurance, and mortgage finance). Nevertheless, the SASB standard for commercial banks, for example, only marginally addresses climate issues and includes other sustainability topics, such as data security (SASB, 2018). Since we want to investigate the reporting of climate aspects in this article, this standard does not seem suitable for our analysis. SASB also follows a rules-based approach, allowing less flexibility in reporting than the TCFD (Hayashi, 2020).

TCFD recommendations are some of the most recent and important climate-related standards. The G20's FSB founded the TCFD to develop recommendations for more effective climate-related disclosures that could promote more informed investments, leading to credit and insurance underwriting decisions that enable stakeholders to improve their understanding of the concentrations of carbon-related assets in the financial sector and the exposures of the financial system to climate-related risks. In 2017, the TCFD published specific guidelines on the integration of climate-related risks and chances in financial reporting (TCFD, 2017). TCFD recommendations are structured around the following four categories that comprise core elements of how organizations operate: governance, strategy, risk management, and metrics and targets. The TCFD states that the materiality principle for climate-related issues is consistent with the materiality of other information included in annual financial filings. Thus, TCFD recommendations focus on financial materiality (outside-in perspective) in line with traditional financial reporting, but these recommendations are of importance to the financial sector because supplement guidance exists in this sector. For banks, specific information on strategy, risk management, and metrics and targets must be considered. Recently, the TCFD published guidance on the implementation of its recommendations, metrics and targets, and transition plans.

On April 21, 2021, the EU Commission published a draft of the Corporate Sustainability Reporting Directive (CSRD). Subsequently, a political agreement on the CSRD was reached in a trilogue, and the directive was published on June 30, 2022. This replaces the Non-Financial Reporting Directive (NFRD) and leads to more detailed reporting requirements for a significantly expanded group of users. The European Financial Reporting Advisory Group (EFRAG) will serve as a technical advisor responsible for preparing draft European

sustainability reporting standards until October 2022. In September 2021, a subgroup of the EFRAG Project Task Force on European Sustainability Reporting Standards (PTF-ESRS) prepared a working paper, “Climate standard prototype,” followed by a Basis of Conclusions to support the climate standard prototype (EFRAG, 2021). Efforts to regulate the use of TCFD recommendations are already emerging, such as in the United Kingdom, Denmark, France, Ireland, Italy, and Norway (TCFD, 2021).

The TCFD recommendations also serve as the basis for the establishment of global sustainability standards by the ISSB. The draft IFRS S2 Climate-related Disclosure published by the ISSB in March 2022 refers to the four basic pillars of the TCFD recommendations but also makes slight clarifications to the individual disclosures (ISSB, 2022).

This regulatory incorporation of TCFD recommendations into international and supranational law can also exert real and direct impacts on climate change. An examination of the responses to EU Directive 2014/95 found that CSR reporting requirements have real impacts on the CSR activities of companies. This finding also raises objections to the assumption that companies would react to the introduction of the directive by greenwashing (Fiechter et al., 2022). Therefore, a reporting obligation that would use the TCFD recommendations as basis could have a positive impact on climate change. Against this background, our study on climate reporting by European banks is based on the TCFD recommendations, including bank-specific requirements.

3 | LITERATURE REVIEW AND RESEARCH QUESTION

Two separate topics in empirical research are relevant to our analysis. First, during the past few years, an increasing number of studies have been addressing sustainability reporting in the banking industry. Second, with only a short history of carbon disclosure based on TCFD recommendations to work with, few studies have relied on this topic, while only two have focused on the banking industry. Compared with other industries, empirical research on sustainability reporting on banks is quite limited owing to its indirect effect on environmental and social development. With several empirical studies available on the sustainability performance of banks (e.g., Belasri et al., 2020), we only focused on sustainability reporting studies due to the different concept and the European capital market. Loew et al. (2020) analyzed several determinants of 76 European banks' sustainability reports from 2017 and 2018. The authors stressed that firm size, listing status, sustainability assurance, and stand-alone sustainability reports drive quality but not profitability, common equity tier ratio, and reporting quantity. Recently, Schröder (2021) analyzed sustainability reports from 78 German bank websites and found that the least-disclosed information concerned the environment and energy. Firm size, capital market orientation, government ownership, and media visibility have also been associated with the increasing sustainability reporting of German banks. Interestingly, all studies explicitly stressed

major information gaps and key improvements needed for future sustainability reporting in European banks.

We already mentioned how few studies have focused on TCFD recommendations. The financial sector is often excluded from studies dealing with climate reporting, especially in light of the TCFD recommendations. Nevertheless, in their study, Cosma et al. (2022) investigated banks' disclosure of climate aspects based on the TCFD recommendations. They used content analysis to examine 101 banks in terms of the completeness, tone, and forward-looking orientation of their climate change disclosure and the relationship between CSR committees and these disclosure aspects. The researchers identified the greatest potential for improvement in the future orientation of information. In addition, a positive relationship between the existence of a CSR committee and completeness in climate change aspect disclosure was observed, and it could be proven that a CSR committee positively influences the future orientation of information. Accordingly, the expertise of these committees could be useful for scenario analysis disclosure. Nevertheless, the present study is, to our knowledge, the first to address climate reporting by banks in light of the TCFD recommendations.

Gelmini and Vola (2022) also focused on governance issues related to the TCFD recommendations. In essence, the researchers examined materiality, board involvement, and management roles of Italian listed companies against the backdrop of the TCFD recommendations and found a rather unsatisfactory result.

Amar et al. (2020) and Demaria and Rigot (2020) introduced the Climate Risks and Opportunities Reporting Index (CRORI) as a standardized measure of the extent to which companies comply with TCFD recommendations. Using various statistical techniques (Cronbach's alpha, principal component analysis, etc.), Amar et al. (2020) concluded that the CRORI methodology is satisfactory for future empirical research. Demaria and Rigot (2020) examined French CAC 40 companies during the 2015–2018 period and found a trend toward improved voluntary disclosure of climate-related information, especially in the case of large companies and CO₂-intensive companies.

Moreover, Loew et al. (2021) included 100 German firms (the 80 biggest German firms [not financial industry], 10 biggest German banks, and 10 biggest German insurance firms) for business year 2020, German DAX30 firms, and 20 SMEs with the highest sustainability rankings. The authors stressed that the examined banks focused on transition risks in climate reporting. While most DAX30 firms refer to TCFD, Loew et al. (2021) documented reporting deficits due to strategic risks.

Recently, Bingler et al. (2021) conducted an empirical study of 301 international firms and detected a “cheap talk” and “cherry-picking” strategy in the climate risk disclosures of firms. The authors used a deep neural language model (“ClimateBert”) and found that firms primarily mention non-material climate information. In light of these information gaps, mandatory reporting and future regulations are proposed.

Wulf et al. (2020) also examined German DAX30 firms for business year 2019 and analyzed their voluntary compliance with EU guidelines on climate reporting. The authors did not find any hints of

industry effects but mentioned low reporting quality. However, reporting quality improved if TCFD recommendations were included in the nonfinancial declaration. Extending the sample to firms listed on the German DAX30, MDAX, and SDAX for business year 2019, Wulf and Friedrich (2020) stated that only 23.9% of the firms followed TCFD recommendations. Moreover, as firm size represents a main driver of voluntary adoption of TCFD recommendations, DAX30 firms are more likely to follow TCFD recommendations compared with the other indices (MDAX and SDAX).

In addition to the article by Cosma et al. (2022), Moreno and Caminero (2020) also focused on the banking industry in light of the TCFD recommendations. The researchers applied text-mining techniques to analyze TCFD recommendations on the climate-related disclosures of 12 significant Spanish banks between 2014 and 2019. The authors created a compliance index and reported a growing quantity of disclosures per year and a variety of different disclosure options, leading to low comparability in reporting.

We contributed to this research because we were not merely interested in one European regime; instead, we relied on the STOXX Europe 600 as a prominent index and started with the first year of published TCFD recommendations (business year 2017). We relied on the disclosure index of Demaria and Rigot (2020) but also included bank-specific TCFD recommendations, leading us to our key RQ for the following empirical analysis:

RQ: Do STOXX Europe 600 banks voluntarily comply with climate reporting based on general and bank-specific TCFD recommendations, and which categories of TCFD recommendations were linked to major information gaps during the 2017–2020 period?

4 | EMPIRICAL STUDY

4.1 | Sample selection

To examine climate reporting quality by the largest European banks in the context of TCFD recommendations, we analyzed 40 banks listed on the STOXX Europe 600 as of April 1, 2021. Two Swiss banks were excluded due to regulatory peculiarities. Accordingly, the study covers 152 corporate years of European banks from 13 countries. To identify the development of reporting practices after the announcement of TCFD recommendations, the study covers management commentaries, voluntary sustainability reports, and mandatory non-financial declarations from the 2017 to 2020 period.

The analysis also considered whether the banks studied were members of the Science Based Targets initiative (SBTi). Banks were identified as members of SBTi if a reference to this initiative could be found in their reporting.

4.2 | TCFD disclosure score

The methodological basis of this study is quantitative content analysis, which is the methodology applied when analyzing archival data to

measure key features (in this case, climate reporting). The results from the analysis were then transformed into theme-based variables to ensure that the qualitative content of the studied reports is available in quantitative variables for subsequent statistical analysis (Smith, 2017, p. 184). To increase intersubjective verifiability and reproducibility, a standard catalog was used to analyze the text components (Milne & Adler, 1999, p. 240). Therefore, in the first step of the analysis, a codebook is created to capture the different text components as precisely and unambiguously as possible. In the next steps, this codebook is revised several times until the most precise delimitation possible is achieved in the allocation of points (Neuendorf, 2017, p. 156). The final codebook is largely guided by the CCI created by Demaria and Rigot (2020), which follows the recommendations of the TCFD. Similar to Demaria and Rigot (2020), our focus is placed on the four core elements of the TCFD recommendations (Governance, Strategy, Risk Management, Metrics and Targets). However, unlike them, our analysis also considered three bank-specific TCFD recommendations relating to the strategy, risk management, and metrics and targets categories. Thus, our set of criteria is more precisely suited to capture the climate reporting quality of the European banking sector as it also includes bank-specific recommendations.

The coding of the climate reporting quality took place after the creation of the codebook. Following the scoring model of Quick and Klocinski (2006) and Wulf and Inwinkl (2018), a 3-point scale that depends on the intensity of the information is used. To enable precise delineation between the points of the scale, the most precise minimum requirements possible for achieving a specific point value were formulated for each subcategory. The final codebook and the scoring model used can be found in Table 1.

To attain a 100% achievement level, the bank had to score a total of 28. After the presentation of the objects of investigation and the methodological procedure, the next chapter goes into more detail on the individual results of the evaluation.

5 | RESULTS

5.1 | Overall results

The first part of the analysis addresses the four core elements of the TCFD recommendations (Governance, Strategy, Risk Management, and Metrics and Targets) and the three bank-specific proposals recommended by the TCFD.

Figure 1 stresses that climate reporting quality increased by almost 42 percentage points from 2017 to 2020. Interestingly, the highest average increase can be seen between 2019 and 2020. While reporting quality only increased by just under 12 percentage points between 2017 and 2018, an increase of almost 17 percentage points can be observed between 2019 and 2020.

Figure 1 also shows significant differences in reporting quality between the four core elements and the bank-specific recommendations of the TCFD. For example, the highest quality can be observed in the area of Risk Management in each year studied compared to the



TABLE 1 Criteria catalog and scoring

No.	Rationale for evaluating the general TCFD recommendations and the bank-specific recommendations	Point range
1	Governance	0–4
1.1	<p>General: “Describe the board’s oversight of climate-related risks and opportunities”</p> <p>Risks</p> <p>0 = no reporting, if the bank does not publish information on the board’s oversight of climate aspects related to risks</p> <p>0.5 = incomplete reporting, if the bank explains the board’s oversight related to climate risks</p> <p>1 = intensive reporting, if the bank reports comprehensively on the board’s oversight on climate-related risks and may designate various individuals or bodies responsible for climate risks</p> <p>General: “Describe the management’s role in assessing and managing climate-related risks and opportunities”</p> <p>Risks</p> <p>0 = no reporting, if the bank does not provide any information on how the management is dealing with climate-related risks</p> <p>0.5 = incomplete reporting, if the bank provides information on how management manages climate-related risks but not how management assesses them</p> <p>1 = intensive reporting, if the bank provides disclosures on how management manages and assesses climate-related risks.</p>	0–2
1.2	<p>General: “Describe the management’s role in assessing and managing climate-related risks and opportunities”</p> <p>Opportunities</p> <p>0 = no reporting, if the bank does not provide any information on how the management is dealing with climate-related opportunities</p> <p>0.5 = incomplete reporting, if the bank provides information on how management manages climate-related opportunities but not how management assesses them</p> <p>1 = intensive reporting, if the bank provides disclosures on how management manages and assesses climate-related opportunities</p>	0–2
2	Strategy	0–8
2.1	<p>General: “Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term”</p> <p>Risks</p> <p>0 = no reporting, if the bank does not report any time horizon in identifying climate-related risks.</p> <p>0.5 = incomplete reporting, if the bank identifies climate-related risks and only considers two of the three time horizons (e.g., short- and medium-term risks)</p> <p>1 = intensive reporting, if the bank comprehensively identifies and reports short-, medium-, and long-term climate risks</p> <p>Opportunities</p> <p>0 = no reporting, if the bank does not report any time horizon in identifying climate-related opportunities</p> <p>0.5 = incomplete reporting, if the bank identifies climate-related opportunities and only considers two of the three time horizons (e.g., short- and medium-term opportunities)</p> <p>1 = intensive reporting, if the bank comprehensively identifies and reports short-, medium-, and long-term climate opportunities</p>	0–2
2.2	<p>Bank-specific: Significant concentrations of credit exposure to carbon-related assets and information about climate-related risk (transition and physical) in their lending and other financial intermediary business activities</p> <p>0 = no reporting, if the bank reports on transition and physical risks, but in doing so does not relate them to lending and other financial intermediary activities and does not address significant concentrations of credit exposures to carbon-related assets</p> <p>1 = incomplete reporting, if the bank reports on transition and physical risks, relating them to lending and other financial intermediary activities, but does not address significant concentrations of credit exposures to carbon-related assets</p> <p>2 = intensive reporting, if the bank reports on transition and physical risks, relating them to lending and other financial intermediary activities, and addresses significant concentrations of credit exposures to carbon-related assets</p>	0–2

TABLE 1 (Continued)

No.	Rationale for evaluating the general TCFD recommendations and the bank-specific recommendations	Point range
2.3	<p>General: “Describe the impact of climate-related risks and opportunities on the organization’s business, strategy, and financial planning”</p> <p>Risks</p> <p>0 = no reporting, if the bank does not report the impact of climate-related risks or only reports the impact of these risks on one issue (e.g., financial planning)</p> <p>0.5 = incomplete reporting, if the bank considers two of the three issues when considering the impact of climate-related risks (e.g., strategy and organization’s business, but not financial planning)</p> <p>1 = intensive reporting, if the bank reports the impact of climate-related risks, taking into account the organization’s business, strategy, and financial planning</p> <p>Opportunities</p> <p>0 = no reporting, if the bank does not report the impact of climate-related opportunities or only reports the impact of these opportunities on one issue (e.g., financial planning)</p> <p>0.5 = incomplete reporting, if the bank considers two of the three issues when considering the impact of climate-related risks (e.g., strategy and organization’s business, but not financial planning)</p> <p>1 = intensive reporting, if the bank reports the impact of climate-related opportunities, taking into account the organization’s business, strategy, and financial planning</p>	0–2
3	<p>Risk Management</p> <p>General: “Describe the organization’s processes for identifying and assessing climate-related risks”</p> <p>0 = no reporting, if the bank neither describes how it identifies climate risks nor how it assesses them</p> <p>1 = incomplete reporting, if the bank describes the process for identification but not the process for assessment</p> <p>2 = intensive reporting, if the bank describes the process for identifying and assessing climate-related risks</p> <p>Bank-specific: Characterizing climate-related risk in the context of traditional banking risk categories such as credit risk, market risk, liquidity risk, and operational risk and describing any risk classification framework used</p> <p>0 = no reporting, if the bank’s report does not identify a link between climate-related risks and traditional risk categories and does not explain the risk categories used</p> <p>1 = incomplete reporting, if the bank relates climate-related risks to traditional risk categories but does not explain the risk categories used</p> <p>2 = intensive reporting, if the bank relates climate-related risks to traditional risk categories and explains the risk categories used</p> <p>General: “Describe the organization’s processes for managing climate-related risks”</p> <p>0 = no reporting, if the bank does not report how climate risks will be managed or only mentions potential climate risks</p> <p>1 = incomplete reporting, if the bank discloses climate risks and describes how climate risks are managed in general but does not report how specific climate risks are managed</p> <p>2 = intensive reporting, if the bank reports how it manages climate risks in general and how it manages specific climate risks (e.g., with reference to quantitative key figures)</p>	0–8 0–2
3.2	<p>Bank-specific: Characterizing climate-related risk in the context of traditional banking risk categories such as credit risk, market risk, liquidity risk, and operational risk and describing any risk classification framework used</p> <p>0 = no reporting, if the bank’s report does not identify a link between climate-related risks and traditional risk categories and does not explain the risk categories used</p> <p>1 = incomplete reporting, if the bank relates climate-related risks to traditional risk categories but does not explain the risk categories used</p> <p>2 = intensive reporting, if the bank relates climate-related risks to traditional risk categories and explains the risk categories used</p> <p>General: “Describe the organization’s processes for managing climate-related risks”</p> <p>0 = no reporting, if the bank does not report how climate risks will be managed or only mentions potential climate risks</p> <p>1 = incomplete reporting, if the bank discloses climate risks and describes how climate risks are managed in general but does not report how specific climate risks are managed</p> <p>2 = intensive reporting, if the bank reports how it manages climate risks in general and how it manages specific climate risks (e.g., with reference to quantitative key figures)</p>	0–2
3.3	<p>General: “Describe the organization’s processes for identifying, assessing, and managing climate-related risks are integrated into the organization’s overall risk management”</p> <p>0 = no reporting, if the bank does not integrate any process or only integrates the identification process for climate-related risks into the organization’s overall risk management</p> <p>1 = incomplete reporting, if the bank integrates the identification and management process for climate-related risks into the organization’s overall risk management but not the assessment process</p> <p>2 = intensive reporting, if the identification, assessment, and management processes have been integrated by the bank into the organization’s overall risk management</p>	0–2

(Continues)



TABLE 1 (Continued)

No.	Rationale for evaluating the general TCFD recommendations and the bank-specific recommendations	Point range
4	Metrics and Targets	0–8
4.1	<p>General: “Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management processes”</p> <p>Risks</p> <p>0 = no reporting, if the metrics used by the bank are not used to assess climate risks and are not in line with their strategy and risk management processes</p> <p>0.5 = incomplete reporting, if the metrics used by the bank to assess climate risks are not in line with its strategy or risk management processes</p> <p>1 = intensive reporting, if the bank uses metrics to assess climate-related risks and these are in line with its strategy and risk management processes</p> <p>Opportunities</p> <p>0 = no reporting, if the metrics used by the bank are not used to assess climate opportunities and are not in line with their strategy and risk management processes.</p> <p>0.5 = incomplete reporting, if the metrics used by the bank to assess climate opportunities are not in line with its strategy or risk management processes.</p> <p>1 = intensive reporting, if the bank uses metrics to assess climate-related opportunities and these are in line with its strategy and risk management processes</p>	0–2
4.2	<p>Bank-specific: Providing the metrics used to assess the impact of (transition and physical) climate-related risk on their lending and other financial intermediary business activities in the short, medium, and long term and the amount and percentage of carbon-related assets relative to total assets as well as the amount of lending and other financing connected with climate-related opportunities</p> <p>0 = no reporting, if the bank uses metrics to assess (transitional and physical) risks but does not apply them to its short-, medium-, and long-term lending activities</p> <p>1 = incomplete reporting, if the bank uses metrics to assess (transitional and physical) risks and applies them to its short-, medium-, and long-term lending, but does not set the amount and percentage of carbon-related assets relative to total assets</p> <p>2 = intensive reporting, if the bank makes ratios to assess (transitional and physical) risks and applies them to its short-, medium-, and long-term lending and sets the amount and percentage of carbon-related assets relative to total assets</p>	0–2
4.3	<p>General: “Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and related risks”</p> <p>0 = no reporting, if the bank has published scopes 1, 2, and 3 but has not related them to its risks</p> <p>1 = incomplete reporting, if the bank has published scopes 1 and 2 and related them to its risks</p> <p>2 = intensive reporting, if Scopes 1, 2, and 3 have been published and related to risks</p>	0–2
4.4	<p>General: “Describe the targets used by the organization to manage climate-related risks and opportunities and their performance against targets”</p> <p>Risks</p> <p>0 = no reporting, if the bank does not describe targets that do not address how they will manage climate-related risks and does not provide information on performance against those targets</p> <p>0.5 = incomplete reporting, if the bank describes specific climate targets to manage climate-related risks but does not report performance to meet those targets</p> <p>1 = intensive reporting, if the bank describes specific climate targets to manage climate-related risks and reports performance to meet those targets</p> <p>Opportunities</p> <p>0 = no reporting, if the bank does not describe targets that do not address how they will manage climate-related opportunities and does not provide information on performance against those targets</p> <p>0.5 = incomplete reporting, if the bank describes specific climate targets to manage climate-related opportunities, but does not report performance to meet those targets</p> <p>1 = intensive reporting, if the bank describes specific climate targets to manage climate-related opportunities and reports performance to meet those targets</p>	0–2
Total		28

FIGURE 1 Average reporting quality over time, overall

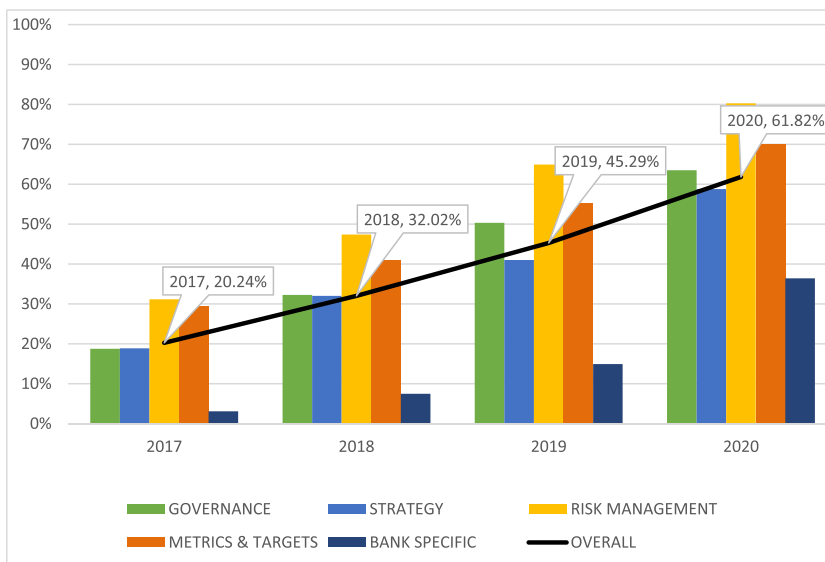
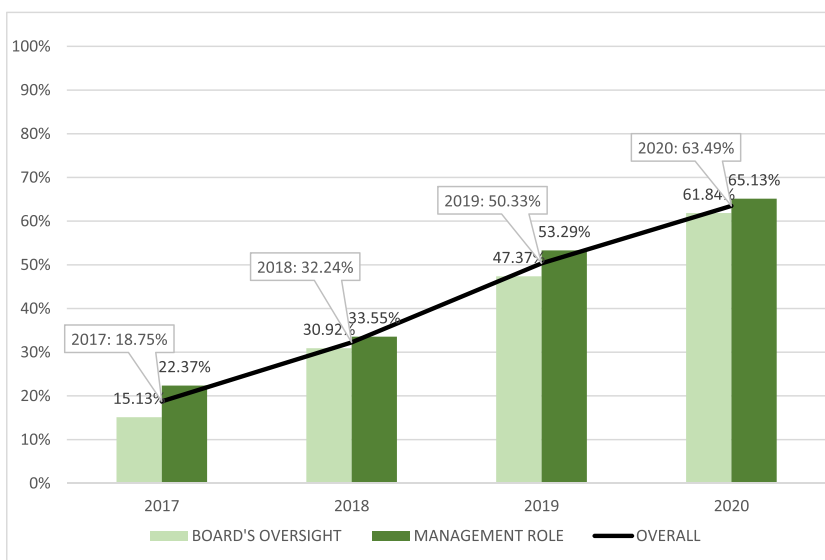


FIGURE 2 Average quality of reporting: Governance



other categories. This category likewise shows the greatest improvement with an increase of 49 percentage points. Surprisingly, the second highest increase can be observed in the Governance category with an increase of almost 45 percentage points, even though this category shows a lower reporting quality on average in each year than the Metrics and Targets category. By contrast, the lowest reporting quality can be identified in the area of bank-specific recommendations. This category shows the lowest increase in 2017 with a quality of only 3.07% and in 2020 with 36.40%. A similarly low increase and low reporting quality can be observed in the Strategy category.

In the following subsections, we take a closer look at individual categories of TCFD recommendations and focus on specifics. In the differentiated analysis of the four categories (Governance, Strategy, Risk Management, Metrics and Targets) with their subcategories, the bank-specific recommendations are not considered as a separate category as in the overall analysis but are assigned to the four main categories.

5.1.1 | Governance

Figure 2 shows the average climate reporting quality in the governance category, indicating a significant increase of almost 45 percentage points.

Thus, the largest increase can be observed in this category. As mentioned above, the greatest improvement can be observed from 2018 to 2019. A difference of over 7 percentage points between the two subcategories is evident in the first year. However, these divergences decrease significantly over time, such that only a difference in quality of three percentage points can be observed in 2020. Therefore, banks initially appear to have significantly greater difficulties in presenting the board's oversight of climate-related opportunities and risks than in publishing information on the management role with regard to the assessment and management of such opportunities and risks. Nevertheless, note that the governance category, initially with a

rather low reporting quality of 18.75% on average, was able to increase to a significantly higher reporting level of 63.49%. This development shows the growing importance of climate issues in the board and management.

5.1.2 | Strategy

With an average of 33.39%, the Strategy category has the lowest reporting quality of the four categories. As in the overall analysis, the highest increase (20 percentage points) can be observed in this category between 2019 and 2020. However, a look at Figure 3 reveals massive differences between the subcategories.

The subcategory that focuses on the impact of climate change on the bank stands out from the other subcategories with a significantly

higher reporting quality. In the analysis, it was frequently found that banks also take into account the impact of climate change on financial planning, in addition to the impact of climate change on the strategy and business model. In this subcategory, however, incomplete reporting was observed more frequently, whereas we found no reporting for the other two general recommendations and the bank-specific recommendation in the Strategy section (cf. Appendix A). This outcome could indicate a higher risk of greenwashing in the presentation of the impact of climate-related risks and opportunities on the business, strategy, and financial planning of the organization.

Significantly lower reporting quality can be seen in the area of identifying climate risks and opportunities over different time periods. The evaluation shows that while the majority of banks put risks and opportunities related to climate change in context, only a minority put them in the context of different time horizons. The disclosure of the

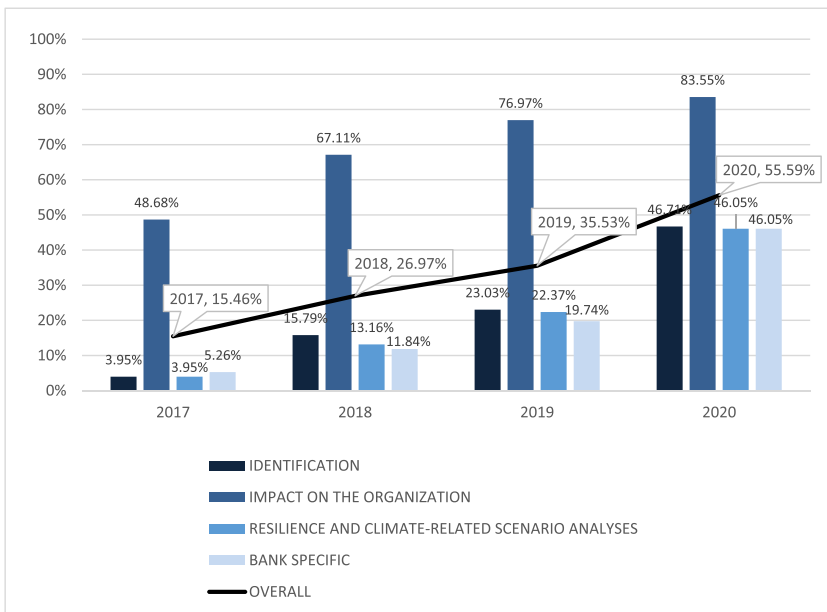


FIGURE 3 Average quality of reporting: Strategy

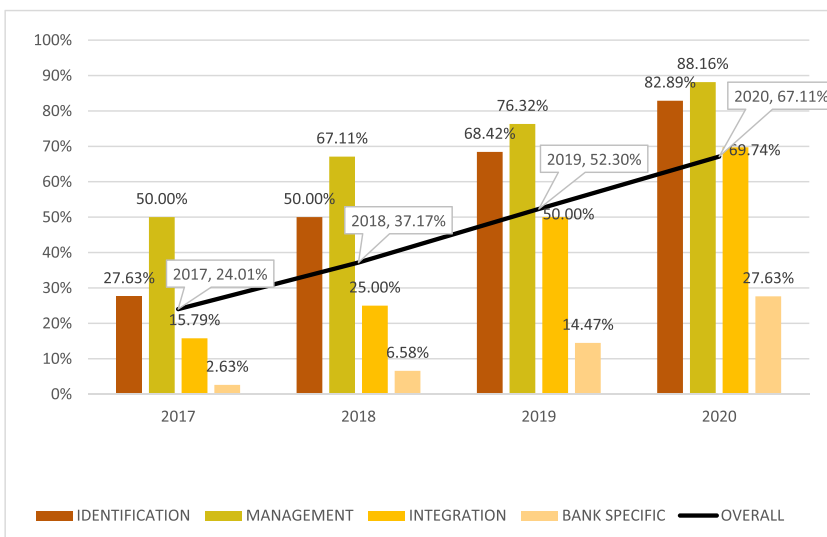


FIGURE 4 Average quality of reporting: Risk Management

bank's resilience to climate change and the disclosure of scenario analyses were also problematic. We can identify massive reporting gaps in these two subcategories. Clearly, the publication of forward-looking analyses is fraught with difficulties for banks.

It is also worth noting that, in addition to the identification of climate risks and opportunities and the resilience to climate change, bank-specific recommendations in the area of strategy also show similarly low scores. Despite the fact that the bank-specific data show a significantly lower level in the overall analysis, the general recommendations of the TCFD seem to show similarly large reporting gaps. This result also shows that there is still great potential for improvement in the bank-specific recommendations.

5.1.3 | Risk Management

The highest average reporting quality of 45.15% is observed in the Risk Management category. In conjunction with Figure 4, lower fluctuations between the three general recommendations become apparent in this category than in the Strategy category.

The subcategories with the largest reporting gaps are, first (as in Strategy), the bank-specific recommendations and the processes for integrating the identification, assessment, and management of climate-related risks into the overall risk management of the organization. Note that even in the case of the bank-specific recommendations, climate-related risks should be placed in the context of traditional bank risk categories (e.g., credit or market risks). Thus, both subcategories concern the integration processes of climate-related risks. Additionally, a lower reporting quality in these subcategories seems unsurprising, as climate-related risks have to be identified and managed in a first step in order to put them subsequently into the context of traditional bank risk categories or integrate them into the overall risk management of the organization. Interestingly, however, the integration process of climate risks into the overall risk

management of the organization shows the highest percentage of incomplete reporting (cf. Appendix A) in the Risk Management category with an average of 42.11%. This finding could indicate that this subcategory in Risk Management poses the greatest risk of greenwashing.

5.1.4 | Metrics and Targets

Including the bank-specific recommendations, the second lowest reporting quality can be observed in the area of Metrics and Targets compared to three other core categories, with an average of 39.93%. The exact breakdown of the four subcategories is shown in Figure 5.

Banks show the highest reporting quality when disclosing the metrics used to identify climate-related risks and opportunities in line with their strategy and risk management processes. However, it was also evident that this subcategory had the highest average percentage of incomplete reporting of all subcategories surveyed (46.71%) (see Appendix A). In this context, it was often observed during the evaluation that banks use metrics to assess climate-related risks and opportunities, but these were not related to their strategy or risk management process.

By contrast, there were larger reporting gaps in the disclosure of GHG emissions, the description of targets to manage climate-related risks and opportunities, and the performance against these targets. When disclosing GHG emissions, while banks often published their Scope 1, 2, or 3 emissions, they were rarely observed to relate emissions to their risks. In the case of disclosing targets and performance against these targets, similar difficulties emerge in the area of identifying climate-related opportunities and risks over different time horizons as well as of publishing scenario analyses. Apparently, banks have enormous problems publishing future-oriented analyses in connection with climate change. The second highest average value of incomplete reporting (41.12%) was observed in this subcategory (see

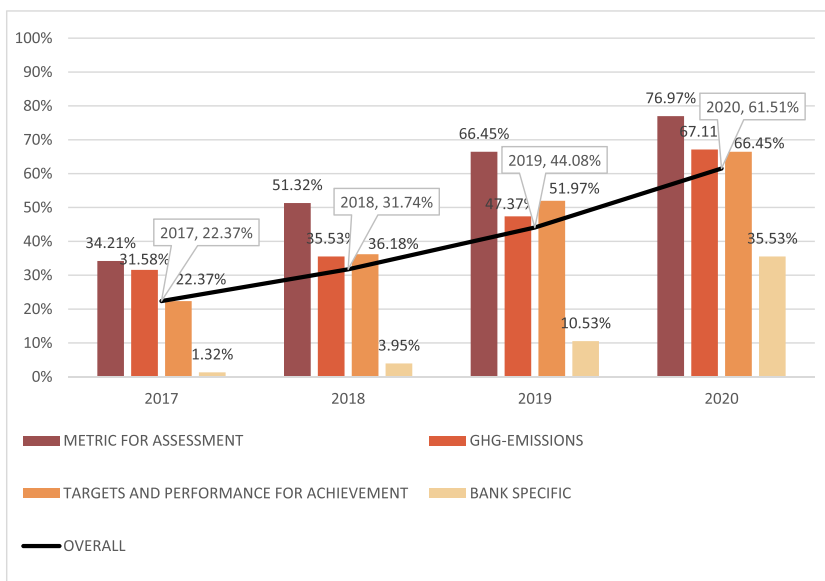


FIGURE 5 Average quality of reporting: Metrics and Targets

Appendix A). As with the publication of metrics, this behavior of the banks could indicate greenwashing, given that information regarding the relevant subcategories is partly disclosed by the banks but essential information is missing in the explanations.

As in the other two bank-specific recommendations, the largest reporting gaps in the area of Metrics and Targets are also evident in this area. Again, this result seems unsurprising, as part of these recommendations include that metrics should be disclosed that show the impact of climate-related risks on their short-, medium-, and long-term lending and other financial intermediation activities. Similarly, it can be surmised that banks have difficulty considering different time periods in conjunction with climate changes.

5.1.5 | Science-based targets

A further analysis was to investigate the influence of participation in the science-based targets on reporting quality. The descriptive analysis of this aspect shows that participants in this initiative had a higher reporting quality than the rest of the banks studied in each year. The difference in average reporting quality between the two groups was notably high in 2020 at almost 22 percentage points. The descriptive analysis of this study can be found in Table 2.

We also found massive differences when looking at the individual subcategories. For example, the average reporting quality for the disclosure of identified short-, medium-, and long-term climate-related risks and opportunities for 2020 was 68.18%. For the disclosure of climate change resilience and the publication of scenario analyses, the average reporting quality for 2020 was as high as 72.73%. Significant differences were also evident in the Metrics and Targets area. For example, an average reporting quality of 81.82% was found for 2020 in the description of targets used by banks to manage climate-related risks and opportunities and performance against these targets.

Since the prerequisites for a *t*-test were not met for these two samples, a Mann-Whitney *U* test was used to examine whether the central tendencies differed between the two independent samples. Participants in the science-based targets for 2017 (Mann-Whitney *U* test: $U = 70.500$, $p = .012$) and 2020 (Mann-Whitney *U* test:

$U = 73.000$, $p = .015$) were found to have significantly higher reporting quality. The Cohen (1992) effect size for 2017 is $r = .16$ and corresponds to a rather weak effect, but the effect size for 2020 is $r = .36$ and corresponds to a medium effect.

As can be seen from our analysis, the most massive reporting gaps are in the area of bank-specific recommendations. We also observed strong reporting gaps especially in the publication of forward-looking statements, whether by disclosing climate-related targets and their performance against them or by analyzing resilience through scenario analyses. Nevertheless, this analysis also reveals positive developments. Banks made the greatest progress in reporting quality in the area of Governance, and Risk Management was the category with the highest average reporting quality. Our analysis also shows that participation in the SBTi has a positive impact on reporting quality.

6 | DISCUSSION

A first key finding of our analysis is that the quality of climate reporting increased significantly from 2017 to 2020. Similar to Moreno and Caminero (2020), we therefore conclude that banks have gradually improved their climate-related reporting in recent years. Greater regulatory and social pressures have obviously encouraged banks to implement robust climate reporting. Legitimacy theory can explain this increase in climate reporting quality to the extent that banks use climate reporting as a tool to address both regulatory and social pressures from various stakeholders (Cho et al., 2012) and build a new and positive corporate image for society by making climate activities visible (Hopwood, 2009).

A key point for increased regulatory pressure is the European Green Deal, which was presented on December 11, 2019. The project includes a phase-out of fossil fuel infrastructure financing or the strengthening of a sustainable financial system (European Commission, 2019). This legislative initiative may have led to a rethinking of banks with regard to climate reporting and may also explain the higher increase in average reporting quality between 2019 and 2020.

SBTi (N = 11)				
	Min.	Max.	Mean	Standard deviation
2017	0.07142857	0.39285714	0.26461039	0.09577097
2018	0.07142857	0.57142857	0.35064935	0.13559034
2019	0.26785714	0.75	0.50649351	0.15304576
2020	0.41071429	1	0.7711039	0.19801602
NON-SBTi (N = 27)				
2017	0	0.57142857	0.17857143	0.12981314
2018	0.01785714	0.75	0.30753968	0.2103189
2019	0.08928571	0.91071429	0.42526455	0.22932766
2020	0.14285714	0.96428571	0.5542328	0.25197812

TABLE 2 Descriptive statistics science-based targets

6.1 | Governance

As a second key finding, our analysis showed that the greatest improvement in reporting quality was observed in the Governance category. In contrast to our analysis, Cosma et al. (2022) saw the greatest weaknesses in climate reporting in the area of Governance. They concluded that while banks have started to assess the business and risk impacts of climate change, they have not yet completed the upstream and downstream processes on associated roles and responsibilities. However, our further analysis shows that significant improvements in reporting quality were visible in the area of Governance, particularly from 2019 to 2020. This development may have high potential in terms of robust climate reporting. Cosma et al. (2022) stated that the existence of CSR committees at banks promotes greater transparency in climate reporting and supports stakeholders' need for information. The dangers of greenwashing can also be mitigated by the presence of ESG experts, as CSR committees have not only a symbolic but a substantive role in regulatory compliance and international standards. The value of such expertise can also be seen in the CSRD of June 30, 2022. Here, Art. 19 para. 2 (c) requires, in addition to a description of the role of the administrative, management, and supervisory bodies in relation to sustainability issues, forces information on expertise and skills to fulfill this task or gain access to such expertise and skills. Such clarifications could avoid the dangers of greenwashing.

6.2 | Strategy

Unfortunately, we could only observe such a development to a lesser extent in the Strategy category. Linking governance and strategy aspects could help improve reporting quality. The Corporate Sustainability Due Diligence amending Directive (CSDD) is a first regulatory step in this direction. The abovementioned aspects could be linked by integrating climate protection targets into sustainable compensation systems. Accordingly, variable compensation should be linked to the contribution of a member of the corporate directors to the strategy and sustainability of the company (European Commission, 2022). This incentive function has great significance with regard to strengthening the European Green Deal project and the goal of climate neutrality (Winschel, 2021). In this context, the CSRD requires a description of the company's policy regarding sustainability issues. This should include information on the existence of incentive systems for members of the administrative, management, and supervisory bodies that are linked to sustainability aspects. These incentive systems are therefore not necessarily limited to pure compensation systems.

Unlike Cosma et al. (2022), we see the largest reporting gaps in the core category of Strategy. In this context, we observed that although the majority of banks have already identified climate-related risks and opportunities, a majority of them do not differentiate between short-, medium-, or long-term climate-related impacts. Similar to Demaria and Rigot (2020) and Moreno and Caminero (2020), we found an information gap in the publication of climate scenario

analyses and resilience in corporate strategy. It appears that banks have difficulties providing forward-looking analyses and considering climate-related impacts based on different time horizons. One possible reason could be that the usual planning horizons, due to the mandate for political tasks or to management personnel being responsible for business plans, are generally shorter in business or politics than the effects from climate change (Bopp & Weber, 2020).

6.3 | Metrics and Targets

The problem of future-oriented analyses is also evident in the Metrics and Targets category. Our analysis also shows massive reporting gaps in the description of targets used by the bank to manage climate-related risks and opportunities and the performance against these targets. Demaria and Rigot (2020) and Moreno and Caminero (2020) yielded similar results. Demaria and Rigot (2020) suggested that reporting on quantified emission limitation targets over different time horizons needs improvement. Moreno and Caminero (2020) identified the publication of targets and performance to achieve them as the third worst subcategory of TCFD recommendations. The authors suggest that financial institutions prefer to report on climate-related metrics rather than on the targets being pursued. This inference can also be seen in our analysis.

One way to counteract this relatively low reporting quality could be through the SBTi. As our analysis shows, banks participating in this initiative not only have a statistically significant higher reporting quality overall for the years 2017 and 2020 but also show a higher reporting quality in the subcategories that focus on future-oriented analyses. In the light of the CSRD, which requires publication of the company's adoption of a plan to ensure that its business model and strategy are consistent with limiting global warming to 1.5°C under the Paris Climate Agreement, participation in the SBTi is inevitable. The SBTi also provides explicit metrics, such as portfolio-wide intensity or sector-based physical intensity, which are tailored precisely to the financial sector. Accordingly, it would make sense for banks to consider both frameworks in efficient climate reporting. The general and bank-specific recommendations could be used as a basic framework for reporting climate change issues in a qualitative manner.

6.4 | Risk Management

As a further finding, our analysis revealed that risk management has the highest reporting quality of the four core categories, and therefore, banks report most intensively on this aspect. This aspect was also observed by Cosma et al. (2022), who added that banks have many years of experience in risk management and have mandatory committees for this purpose. Perhaps this would account for the high reporting quality in this core category. However, our analysis also showed that there were differences in reporting quality between the subcategories of risk management. While the identification, assessment, and management of climate risks are reported at a

comparatively higher level, integration processes in the overall risk management of the organization are published less frequently and with a lower reporting quality. Loew et al. (2020) also identified similar reporting gaps. The researchers found that less than a quarter of banks surveyed had integrated climate-related risks into their risk management for lending operations. As noted above, this observation seems unsurprising because these subcategories are to some extent interdependent. To integrate identification, assessment, and management processes into the overall risk management of a bank, the first step is to create processes to identify, assess, and manage these climate risks in general. Perhaps in this case, the TCFD recommendations should be made more specific to avoid such overlap and possibly repetition of claims.

6.5 | Final discussion

As can be seen from our analysis, incomplete reporting was observed frequently in the description of the integration processes of climate-related risks into the overall risk management of the organization. This incomplete reporting was evident in subcategories with particularly extensive information, such as the description of the impact of climate-related risks and opportunities on the business, strategy, and financial planning of the organization. Furthermore, incomplete reporting was increasingly found in subcategories that link various disclosures with one another. For example, the analysis showed that banks often published key figures related to climate-related opportunities and risks, but these were less often linked to strategy or risk management. On the one hand, these subcategories make it difficult for the reader of the report to distinguish between the individual disclosures; on the other hand, these subcategories harbor great dangers of greenwashing since banks could comment on certain sub-assumptions to fulfill this reporting point but omit certain disclosures in the process. In this context, banks should pay attention to the linkages of information to avoid a disjointed presentation of climate issues.

For comprehensive and coherent climate reporting, it would therefore be important to further specify the TCFD's recommendations in order to limit this scope for interpretation and mitigate the risk of greenwashing. A more precise definition could make it easier for banks to identify essential information and thus better meet the information needs of their stakeholders.

A specification is necessary, especially since the TCFD recommendations form the basis for the IFRS S2 Climate-related Disclosure draft. For example, the disclosure of the objectives the bank is pursuing to manage climate-relevant risks and opportunities, and the performance against these objectives is expanded to include information on how the objectives are compared with the objectives of the most recent international agreement and whether these are verified by a third party. In addition to this information, banks should disclose whether targets have been derived using a sectoral decarbonization approach. It is possible that such specifications avoid incomplete reporting because they create a more accurate framework. In our

analysis, a high proportion of incomplete reporting was observed in the description of integration processes of climate risks into general risk management. Unfortunately, the ISSB does not provide any specifics regarding this subcategory. In this context, it would be desirable if the IFRS S2 draft also provided more details on these integration processes. As a result, the first weaknesses in the IFRS S2 Climate-related Disclosure draft are already becoming apparent.

EFRAG's draft European sustainability reporting standards also use the TCFD recommendations as a foundation and provide more specific details. According to the EFRAG draft, targets are to be differentiated into general climate-related targets, GHG emission reduction targets, and net zero targets and other neutrality claims. These concretizations also enable the bank to respond more precisely to the stakeholder's need for information.

The industry-specific reference in the ISSB draft is positive. Based on our analysis, it was possible to recognize that the largest reporting gaps were identified in the bank-specific disclosures. In particular, the disclosure of metrics used to assess the impact of (transitional and physical) climate risk on their short-, medium-, and long-term lending and other financial intermediary activities as well as the percentage of carbon-related assets was completely absent for a majority of banks and showed the lowest reporting quality of all subcategories in our analysis. Therefore, the clarification of the ISSB draft, a requirement to disclose industry-related metrics relevant to the industry and activities of an entity, is especially significant.

7 | CONCLUSION

Our study examined the climate reporting quality of European banks in line with TCFD recommendations. Specifically, we focused on STOXX Europe 600 banks during the 2017–2020 period, comprising 152 company years. Our key RQ was whether STOXX Europe 600 banks voluntarily prepare climate reporting in line with general and bank-related TCFD recommendations and which elements of TCFD recommendations lead to major information gaps. Given that the TCFD's goal is to develop recommendations for more effective climate-related disclosures that promote more-informed investment, credit, and insurance decisions, this framework was particularly suited to evaluate the climate reporting quality of banks.

Overall, our analysis showed a significant increase in average climate reporting quality over the period 2017–2020 among the European banks surveyed. We found the highest reporting quality in the Risk Management category, with the greatest improvements observed in the Governance category. Therefore, it can be assumed that the awareness of climate-related risks and opportunities continues to grow on the board and at management level, which could also lead to positive synergy effects with regard to the reporting quality of the other categories (Cosma et al., 2022).

We were also able to identify some reporting gaps in our analysis. The lowest reporting quality was observed in the bank-specific recommendations. Banks should focus much more on these recommendations. Against the background of the two drafts of the ISSB and

EFRAG, such sector-specific recommendations should also be given greater consideration here. IFRS S2 at least shows initial approaches in this context by requiring industry-based metrics, but such industry-specific disclosures should be further specified. A supplementary standard for different industries similar to the SASB approach would be conceivable.

Significant weaknesses in climate reporting quality were identified in the Strategy and Metrics and Targets categories. Visible reporting gaps were observed in the disclosure of forward-looking information. In the Strategy category, such gaps were found specifically in the consideration of short-, medium-, and long-term climate-related risks and opportunities and the provision of scenario analyses as well as the bank's resilience with regard to climate issues. In the Metrics and Targets category, banks seemed to find it difficult to formulate (science-based) targets and report performance against these targets (Moreno & Caminero, 2020). However, further investigation showed that participants in the SBTi had statistically higher reporting quality, especially for the issue mentioned above. Therefore, in our view, participation in this initiative can help achieve better and more comprehensive climate reporting.

Reporting gaps in the integration of identification, assessment, and management processes into general risk management could also be identified (Loew et al., 2020). However, this lower reporting quality can be partly explained by the fact that in this case, this subcategory is dependent on others. For example, the description of processes to identify climate-relevant risks and the description of the integration of these identification processes into general risk management can lead to redundant reporting. As a result, an exact delineation of different recommendations is problematic in some places. For example, a sentence dealing with the identification of climate risks and their integration into overall risk management fits into two subcategories. This can lead to considerable difficulties, and not only when evaluating these reports for this article. Overlapping categories can also be a problem for banks, as it may be difficult to provide accurate information on a particular recommendation when reporting.

In addition, our analysis encountered problems in defining which statement of the bank can be assigned to a certain subcategory. This can be seen as a limitation in our analysis. Another significant problem in the delimitation of certain statements of the bank is the imprecise description of some recommendations of the TCFD. While recommendations such as the disclosure of Scope 1, 2, and 3 emissions allow for a precise evaluation, the description of the management role in assessing and managing climate-related risks and opportunities, for example, leaves enormous room for interpretation. The initiators may have provided this leeway owing to the principles-based interpretation of the TCFD recommendations, as a checklist-like approach would not do justice to the climate issue (Hayashi, 2020). However, this latitude could also be exploited, leading to more vague and inaccurate reporting and more greenwashing (de Freitas Netto et al., 2020).

The danger of greenwashing has already been addressed in connection with incomplete climate reporting. In the context of

greenwashing and information overload, this may lead to bias problems. While evidence of greenwashing at some banks exists, such as gaps in governance reporting or a lack of integration of a climate strategy, our study cannot conclusively quantify information overload and greenwashing's impact on the readability or accountability of climate reporting. Future research could examine the phenomenon of information overload and greenwashing in more detail, which could include examining the report forms in light of information density using automatic text recognition technologies or readability indices (e.g., Moreno & Caminero, 2020).

Of course, there is some bias in a content analysis due to the subjectivity of the coder. An attempt was made to minimize this subjectivity through the frequent revision of the codebook (Neuendorf, 2017). The sample size could also have a limiting effect on the results of this paper. Only the banks of the Europe STOXX 600 were examined. Therefore, a specific industry was examined against the backdrop of the unique EU environment, which is not comparable to other systems and industries. Future studies should analyze possible country-specific effects of TCFD reporting, such as culture, strength of enforcement, or shareholder rights. In addition to this exceptional setting, the specific period of study should also be considered. Here, the initial phase of the TCFD recommendations was considered. The analysis of the reports also showed that at the beginning of the COVID-19 pandemic, reporting with regard to climate concerns intensified significantly. It is possible that biases in reporting quality arose with respect to the pandemic.

With the insights gained, this article can make a significant contribution to climate reporting by banks for researchers and academics as well as provide a contribution for practitioners and standard-setters. It is thus clear that the draft ISSB and EFRAG use the TCFD recommendations as a basis but further specify and concretize them. However, the main difference between the two drafts is the materiality perspective. While the ISSB draft only follows an outside-in approach (single materiality), the EFRAG draft also considers the inside-out perspective (double materiality). The main disadvantage of double materiality is that it could further increase the risk of greenwashing and information overload. However, single materiality could undermine the information needs of non-shareholder stakeholders. For shareholders, the financial incentives would probably outweigh the benefits. Since shareholders tend to take a short-term view while climate issues have to be considered in the long term, such materiality would not contribute to a climate-neutral economy in the sense of the European Green Deal. This discrepancy between the single materiality of the ISSB draft and the double materiality of the EFRAG draft will make it difficult to achieve comparability at international and supranational levels. Hence, the creation of a global framework would be useful in this regard (Stawinoga & Velte, 2022).

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APPENDIX A: INTENSITY OF REPORTING

