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Are firms (getting) ready for the Corporate Sustainability Reporting Directive?

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Abstract

The study examines whether the announcement and passing of the Corporate Sustainability Reporting Directive (CSRD) affects sustainability reporting of German firms. On the one hand, the scope of the CSRD will be extended, so new firms under the scope may increase their voluntary sustainability reporting as part of the preparation process. On the other hand, the reporting requirements will be stricter, so firms currently under the mandate of the Non-Financial Reporting Directive (NFRD) may increase the quality of their sustainability reporting as preparation for the CSRD. First, we find no increase in voluntary sustainability reporting of firms which are not under the scope of the NFRD but will be under the CSRD. Second, for firms under the current reporting mandate, we find increased sustainability reporting quality after the CSRD's announcement and passing. The finding suggests that these firms start implementing new reporting requirements before the first reports according to the CSRD will be published in 2025. Our findings contribute to the understanding of the sustainability disclosure transformation and point to potential challenges of compliance with the CSRD. The new reporting requirements may present high burden for affected firms, particularly those without prior sustainability reporting experience.

Keywords: sustainability reporting, reporting quality, reporting requirements, compliance, Non-Financial Reporting Directive (NFRD), Corporate Sustainability Reporting Directive (CSRD)

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1 Introduction

Governing bodies and firms play particularly vital roles in shaping a sustainable economy and giving future generations the ability to meet their own needs. For example, the European Green Deal aims to transform the European Union (EU) into a modern, resource-efficient and competitive economy, ensuring net zero greenhouse gas emissions by 2050 and decoupling economic growth from resource use (EC 2019). Similarly, the United Nation's Sustainable Development Goals (SDGs) call for action under the *2030 Agenda for Sustainable Development* to shift the world onto a sustainable and resilient path (UN 2015).

Sustainability reporting (hereafter SR) is considered an important tool for holding firms accountable for their impact on the environment and society. It is defined as communication of information about firms' sustainability topics, activities, risks and policies to their stakeholders (Christensen et al. 2021). It should increase transparency and reduce information asymmetry between firms and their stakeholders. While firms used to disclose sustainability information on a voluntary basis (Cho et al. 2015), many countries are introducing reporting mandates. The European Commission (EC) mandates large public interest entities to disclose non-financial information[1] via the Non-Financial Reporting Directive (Directive 2014/95/EU, NFRD) passed in 2014 and applicable from 2017 (EC 2014). Moreover, more comprehensive reporting with stricter requirements is contained in the Corporate Sustainability Reporting Directive (Directive (EU) 2022/2464, CSRD) passed in 2022 and applicable for fiscal year 2024 and onwards (EC 2022).

The NFRD and the supplementing non-binding Guidelines on non-financial reporting (EC

[1] We consider the term "non-financial" information or reporting (used in the NFRD), equivalent to "sustainability" (used in the CSRD), "environment, social and governance" (ESG), and "corporate social responsibility" (CSR) information or reporting. While these terms can be used largely interchangeably to refer to a common underlying concept, we consistently use sustainability information or reporting in this paper.

2017) mandate and guide firms to disclose a minimum set of sustainability information but without use of specific reporting standards. They give firms substantial flexibility and discretion to disclose information that is relevant to their stakeholders. Consequently, the CSRD introduces more comprehensive reporting with stricter requirements, assurance requirement, and extended scope of firms subject to the directive. Approximately 49,000 firms are expected to be affected, which is significantly more than 11,700 firms currently subject to the NFRD. Overall, the CSRD's implications on firms' SR are expected to be material (KPMG 2023). Thus It may thus be beneficial for firms which are under the scope of the NFRD and those which are not but will be under the scope of the CSRD, to prepare for the new directive before its first application. Although early implementation of the new reporting requirements may be a competitive advantage over firms that have not yet considered the implications for their reporting processes (KPMG 2023), it also requires resources which firms may not have to spare. Therefore, it remains an open question whether the CSRD's announcement and passing affect firms' SR as part of the preparation for the new reporting requirements.

We address this question and analyse the extent to which the CSRD's announcement and passing affects voluntary SR and quality of mandatory SR. We focus on German firms because of the country's significant economic role in the EU, its relatively strict enforcement system, and the absence of other SR rules besides the EU ones. Findings from this study can be generalised to other similar economies.

We randomly select our sample from two groups. First, firms that are currently not reporting under the NFRD but will be reporting under the CSRD (non-NFRD firms) and second, firms that are currently subject to the NFRD (NFRD firms). The final sample has 297 firm-year observations from 99 unique firms in years 2020-2022. We construct a dataset containing hand-collected sustainability information, and firm-level financial and industry information from

Bureau van Dijk's Dafne database for the sample firms. We develop a four-point score for measuring firms' quality of SR. It captures SR quality with the extent to which firms are implementing aspects of CSRD's the new reporting requirements (i.e., publication of a sustainability report, application of dual materiality approach, voluntary assurance, disclosure of sustainability information in a management report).

First, we find that non-NFRD firms do not increase their voluntary SR and are thus not preparing for the implementation of the new reporting requirements after the CSRD's announcement and passing. Only very few firms (i.e., less than one tenth) are voluntarily disclosing sustainability information in the sample period. On average, these firms are larger and belong to industries with a more pronounced negative impact on the environment and society. Since the non-NFRD firms are significantly smaller and less profitable than NFRD firms, we interpret our first finding as lack of sufficient resources being among the reasons for poor preparation for the CSRD.

Second, we find that NFRD firms, which are already disclosing mandatory sustainability reports, increase the quality of their SR after the CSRD's announcement and passing. Employing the SR quality score, we find that more firms include aspects of the new reporting requirements in their sustainability reports in 2021 and 2022 compared to 2020. We also find that the SR quality is significantly associated with firm size, PPE to assets ratio and industry affiliation.

Taken together, we document that firms under the current reporting mandate make efforts to prepare for the implementation of the CSRD's reporting requirements in a timely manner. On the other hand, we find a potentially alarming result that non-NFRD firms (smaller firms) are not using voluntary SR as part of the preparation process for the new reporting requirements although the firms will have to apply the CSRD in 2025 or 2026. Inadequate preparation and transformation of the firms' reporting processes may adversely affect future compliance with the CRSD. While we do not directly study the reasons for this outcome, our descriptive findings imply that firms lack resources to adequately prepare for the CSRD in a timely manner.

This study makes several contributions. First, we analyse the effect of the announcement and passing of the CSRD on non-NFRD firms. Prior studies primarily highlight the significant extension of the scope of firms that fall under the reporting mandate (e.g., Baumüller and Grbenic 2021; O'Dochartaigh 2022) but do not study the implications for those newly affected firms. We document that non-NFRD firms are not increasing their voluntary SR as part of the preparation for the CSRD. Second, we document the positive effect of the CSRD's announcement and passing on the SR quality of firms already under the NFRD's scope. Existing studies often analyse the effects of sustainability regulation on sustainability performance (e.g., Aluchna et al. 2023; Cuomo et al. 2022;) or on single dimensions of quality (Alsahali and Malagueno 2022; Baumüller and Sopp 2022) rather than combining them in a comprehensive SR quality score. Third, studies about German firms investigate firms' preparation for the NFRD (Hoffmann et al. 2018) and its determinants (Bergmann and Posch 2018). We add to those by investigating the transition of the firms' reporting processes as preparation for the CSRD, which introduces more comprehensive reporting with stricter requirements than the NFRD. Moreover, we document that prior SR experience is important for timely preparation for the CSRD.

Finally, our findings indicate potential challenges of future compliance with the CSRD. Especially non-NFRD firms (smaller firms) may need additional support and resources to transform their reporting processes and implement the CSRD's reporting requirements on time. While prior work clearly underlines the need for adequate preparation (e.g., Baumüller and Grbenic 2021; KPMG 2022; O'Dochartaigh 2022), analysis of the preparation process itself received little attention. We leave it to policy makers, regulators and assurance providers to find ways to incentivise and support firms in transitioning their reporting processes towards the new reporting requirements in a timely manner.

2 Sustainability reporting regulation

In the last two decades, SR and its regulation in the EU evolved substantially. At the beginning, the Commission Recommendation 2001/453/EC (EC 2001) and the Directive 2013/34/EU (EC 2013) encouraged the inclusion of sustainability information in firms' annual reports. Subsequently, the passing of the NFRD in 2014 mandated large listed firms, banks and insurance firms (i.e., large public interest entities) with more than 500 employees to publish sustainability information from fiscal year 2017 onwards (first reports published in 2018). The NFRD aimed to improve comparability of reporting about the multidimensional nature of corporate sustainability and firms' application of sustainability policies, and pushed towards more standardisation. Next, as part of the European Green Deal (EC 2019), the NFRD was reviewed and a new directive to supersede it was announced in April 2021. The NFRD's effectiveness was questioned because many firms did not publish material information on sustainability matters, and the comparability and reliability of published information was very limited. Finally, the CSRD, which introduces more comprehensive and detailed reporting, assurance requirement, and application of the newly issued European Sustainability Reporting Standards (ESRS), was passed in December 2022 and came into force in January 2023. Firms will have to apply it in fiscal year 2024 and first sustainability reports will be published in 2025. The number of affected firms is expected to be significantly higher (approximately 49,000 firms) compared to firms subject to the NFRD (around 11,700 firms) (Deloitte 2022) but the scope will expand gradually as presented in Fig. 1.

[Insert Fig. 1 here]

The CSRD will affect a considerable number of firms and pose challenges of implementing the new reporting requirements, particularly for firms without prior SR experience. In addition, increase in assurance mandates for sustainability reports will pose challenges to assurance providers. Therefore, we find it relevant to study the effects of the CSRD's announcement and passing on the voluntary SR and the quality of mandatory SR. Our findings can indicate to policy makers, regulators and assurance providers whether additional support and resources may be needed by firms for timely transformation of their reporting processes to achieve adequate SR quality and compliance with the CSRD.

3 Literature review and hypothesis development

3.1 Related literature

German firms not subject to the NFRD may publish sustainability information on a voluntary basis. Existing literature investigates various determinants of voluntary SR. For example, firms in industries with a more pronounced negative impact on the environment and society are more likely to implement SR than firms in lower impact industries (e.g., Elalfy et al. 2021; Fallan 2016). Larger and more profitable firms, which usually have greater public visibility and more resources, are more likely to disclose sustainability information because they experience higher societal and political pressures (e.g., Brammer and Millington 2005; Gallo and Christensen 2011; Wickert et al. 2016). These determinants are aligned with the legitimacy theory, arguing that firms use voluntary reporting to convince the society that they operate responsibly and thereby maintain their legitimacy (Cho et al. 2015).

Prior literature also studies SR quality. Christensen et al. (2021) argue that voluntary and mandatory SR lacks quality as the disclosed information is often repetitive, boilerplate, and not necessarily tailored to the reporting firm. Transformation from a mere financial reporting to an integrated SR requires firms to invest in resources, overcome administrative challenges and costs associated with such new conceptualisation and operationalisation (Baumüller and Grbenic 2021; Baumüller and Sopp 2022; Nguyen 2020). For firms communicating sustainability matters to their stakeholders, the costs of transforming the reporting processes may be among main reasons for lower SR quality.

In addition, stakeholders' demand for accountability and transparency in sustainability matters is increasing (Fernandez-Feijoo et al. 2014). This is likely due to very easy access to information about firms' sustainability activities (e.g., via internet-based services and platforms) in combination with public discussions about environmental and societal issues created by large firms (e.g., Andreou and Besharov 2022; Waugh and Oldfield 2022). On the other hand, stakeholder groups are very diverse and follow different objectives (Ayuso et al. 2014). For example, financial stakeholders' main objective is a firm's value creation, while consumers more likely value the firm's impact on the environment and society (Flower 2015). According to Stubbs and Higgins (2015), especially financial stakeholders support mandatory reporting which likely enhances accountability and reporting quality.

With the revision of the NFRD and introduction of the CSRD, the EU regulators are expanding the scope of mandatory SR, enhancing the standardisation and unification of the reporting processes, and requiring assurance of the reposts. Indeed, prior literature highlights several weaknesses of the NFRD.

For example, Aureli et al. (2018) find that lack of assurance reduces the credibility of SR and question the appropriateness of the NFRD's reporting and assurance discretion. Vander Bauwhede and Van Cauwenberge (2022) also conclude that the mandatory SR should be accompanied by assurance to enhance the credibility of sustainability reports. Aluchna et al. (2023) document better performance regarding environmental, social and governance (ESG) commitments after the NFRD, but the improvements are mostly present in firms subject to the directive. In addition, the NFRD's materiality concept seems insufficient for reporting relevant information. Raith (2023) finds that the concept is ambiguous and leads to a contest for materiality where the focus is either on business risks or impacts, shareholders or stakeholders, business or social case, but never on more than one of these determinants. In line with these arguments, Fiandrino et al. (2022) call for a double materiality approach. Slacik and Greiling (2020) investigate implementation of the Global Reporting Initiative's materiality concept and find that firms' coverage and quality of the material aspects do not meet the requirements for relevant and transparent reporting. Comparability of sustainability information across firms is hampered due to the NFRD's flexible reporting guidelines and lack of specific reporting standards. Steinhöfel et al. (2019) document significant discrepancy across sustainability reports of German manufacturers and conclude that better comparability of sustainability information and performance would require more harmonisation.

Finally, studies also document several compliance challenges with SR regulation. These studies are mostly country-specific and for example investigate Spain (Criado-Jiménez et al. 2008; Larrinaga et al. 2002), Norway (Vormedal and Ruud 2009), Poland (Matuszak and Rozanska 2021) and the U.S. (Peters and Romi 2013). Generally, they find that firms are more likely to comply with SR requirements when their industry is deemed to be environmentally sensitive, non-compliance penalties are high, and enforcement and monitoring of regulation is adequate. On the other hand, Criado-Jimenez et al. (2008) show that enhanced regulation and enforcement may lead firms to adopt complex concealment strategies rather than report truthfully.

3.2 Hypothesis development

The application of the CSRD will start in fiscal year 2024 and first reports will be published in 2025. With the announcement and passing of the CSRD in 2021 and 2022, respectively, we posit that firms start preparing for the implementation of the new reporting requirements because there are significant organisational changes to be undertaken, sustainability performance to be prioritised, considerable investments in resources to be made (Baumüller and Grbenic 2021; Baumüller and Sopp 2022; O'Dochartaigh 2022).

First, we investigate if there is an increase in voluntary SR for firms not subject to the NFRD but subject to the CSRD. High relevance of sustainability matters to governments and stakeholders alike may motivate firms to increase SR and follow the latest trends in actively communicating sustainability information (Zrnić et al. 2020). Similarly, voluntary SR may represent firms' response to stakeholders' increased demand for accountability and transparency (Fernandez-Feijoo et al. 2014; Fiandrino and Tonelli 2021). Moreover, the CSRD itself contains advice for early preparation because processing sustainability information, adjusting the reporting process and governance structures requires additional effort and investments (Baumüller and Grbenic 2021). On the other hand, non-listed and smaller firms coming under the scope of the CSRD may lack resources and expertise to overcome these challenges (Afolabi et al. 2023). It thus remains an open question if voluntary SR changes before the CSRD' application. We phrase the first hypothesis in an alternative form as follows:

H1*: The announcement and passing of the CSRD increase voluntary sustainability reporting.*

Second, we investigate if firms start implementing the new reporting requirements before the CSRD's application. We study to what extent firms already consider the aspects of the CSRD's requirements in their sustainability reports and, in this way, capture SR quality changes after the announcement and passing of the CSRD. The latest trends in SR and increased interest in voluntary assurance (Vander Bauwhede and Van Cauwenberge 2022; Zrnić et al. 2020) may motivate firms with existing SR experience to start implementing new reporting requirements early. Moreover, compared to the NFRD, the new requirements demand more sustainability performance information to be processed and reported, which in turn requires implementation of advanced reporting processes and governance structures (Baumüller and Grbenic 2021). Hence, we expect the NFRD firms to make additional efforts and investments upfront to avoid non-compliance. Because the CSRD itself gives firms clear guidance on how to analyse their organisations from a sustainability perspective, industry experts believe that the preparation process should start early (KPMG 2022). Such developments would consequently imply that the quality of SR increases. We phrase our second hypothesis as follows:

H2: *The announcement and passing of the CSRD increase sustainability reporting quality.*

4 Research design

4.1 Sample

We select our sample from firms operating in Germany, which is the largest European economy in 2022 measured by gross domestic product (Eurostat and IMF 2023). Moreover, its strict reporting regulation enforcement by the Federal Financial Supervisory Authority suggests high future compliance with the CSRD as it is with the NFRD because non-compliance imposes high costs on firms (Loew and Braun 2019). We collect firm-level data from Dafne database for fiscal years 2020-2022.[2] For construction of dependent variables, we retrieve firms' sustainability reports and sustainability information from their websites.[3] Year 2020 is the base year prior to the CSRD's announcement. We posit that the announcement in April 2021 would have little to no impact on the SR for fiscal year 2020. Fiscal year 2021 is the first reporting

[2] In particular, we collect annual information about net income, total assets, property, plant and equipment (PPE), number of employees, and industry affiliation of a firm. Industry affiliation in Dafne is based on the Classification of Economic Activities, issue 2008 (WZ 2008) from the German Federal Statistical Office (2008). We exclude financial firms (i.e., WZ 2008 code K).

[3] The NFRD allows firms to publish a sustainability report separately or as part of the annual report. If firms publish sustainability information in the annual report, we extract this information from the integrated report.

period after the CSRD's announcement and year 2022 is the period after the CSRD is passed.

First, we start with firms not subject to the NFRD (i.e., non-NFRD firms). We randomly select 30 listed firms with less than 500 employees and 30 private firms which are large or medium-sized. Second, we sample firms which are subject to the NFRD (i.e., NFRD firms). We randomly select 60 listed firms with 500 or more employees[4] from Dafne database. We retrieve their firm-level data for 2020-2022. As shown in Table 1, we clean the initial sample of 120 firms, so that each firm-year observation has a published sustainability report and non-missing firm-level data. This leaves us with the final sample of 297 firm-years.

[Insert Table 1 here]

4.2 Research methodology

To empirically test H1 about the increase in voluntary SR after the CSRD is announced and passed, we estimate the following logit model on the sample of non-NFRD firms:

$$SustReport_{it} = \beta_0 + \beta_1 Directive_t + \beta_2 IndustryNeg_i + \beta_3 Size_{it} + \beta_4 ROA_{it} + \beta_5 PPE_{it} + \epsilon \qquad (1)$$

The dependent variable $SustReport_{it}$ identifies if firm *i* publishes a sustainability report[5] in year *t*. The main variable of interest is $Directive_t$ which indicates the announcement and passing of the CSRD (i.e., equals 1 for years 2021-2022 and 0 for the base year 2020).

Based on prior literature, our model controls for firm characteristics associated with voluntary SR. Firms in industries with more pronounced negative impact on the environment and society are more likely to proactively communicate their activities and contributions to sustainable economy than other firms (e.g., Elalfy et al. 2021; Fallan 2016). Based on their

[4] On average during each fiscal year in period 2020-2022.
[5] For brevity, and as allowed by the NFRD, throughout the paper "publication of a sustainability report" can mean that either a sustainability report is published separately or as part of an annual report.

share in pollution, waste production, water and energy consumption, we classify industries like energy, transport, manufacturing, construction, technology, food and fashion retail as such (e.g., Wieser et al. 2021; Rad et al. 2022) and create variable $IndustryNeg_i$. However, we cannot estimate model (1) with this control variable on our sample because it perfectly predicts the outcome (i.e., all firms with voluntary SR are from industries with more negative impact). Larger and more profitable firms are more visible and have more resources to communicate sustainability activities to their stakeholders (e.g., Brammer and Millington 2005; Gallo and Christensen 2011; Wickert et al. 2016). In line with Aluchna et al. (2023) and Cuomo et al. (2022), we measure $Size_{it}$ as the natural logarithm of total assets, ROA_{it} as net income over total assets and PPE_{it} as the ratio of tangible asset of firm *i* in year *t*. Definitions of all variables are in Appendix A.

We test H2 about the increase in SR quality after the CSRD's announcement and passing with the following ordinal logistic model estimated on NFRD firms:

$$SustReportQuality_{it} = \beta_0 + \beta_1 Directive_t + \beta_2 IndustryNeg_i + \beta_3 Size_{it} + \beta_4 ROA_{it} + \beta_5 PPE_{it} + \epsilon \quad (2)$$

$SustReportQuality_{it}$ captures SR quality of firm *i* in year *t*. We assess it via early implementation of the CSRD's reporting requirements using a self-constructed score. The score contains four components, each worth one point: 1) publication of a sustainability report; 2) application of a double materiality approach;[6] 3) voluntary assurance of the sustainability report

[6] Double materiality approach requires that reported sustainability matters are considered from two perspectives. First, inside-out perspective concerns a firm's impact on the environment and society. Second, outside-in perspective concerns the risks and opportunities created for the firm by sustainability-related developments and events. Hence, a sustainability matter can be material from the impact perspective and/or the risk and opportunity perspective (PwC, 2023). We search sustainability reports for the following keywords to identify application of double materiality approach: *materiality matrix, inside-out / outside-in, financial- / effect perspective, financial- / impact materiality, double materiality,* and *dual materiality*.

(usually in accordance with ISAE 3000 (revised)[7] or standards published by the German Institute of Public Auditors (i.e., IDW EPS 352 (08.2022), IDW EPS 990 (11.2022), IDW EPS 991 (11.2022))[8]); and 4) disclosure of sustainability information in a management report. Please note, that the first component is a prerequisite for scoring on any of the next three components. While the order in which these three components are scored does not matter, higher total score always means better SR quality. Our main variable of interest is $Directive_t$ as in model (1), which captures the effect of the CSRD's announcement and passing on SR quality. Control variables are as in model (1).

5 Results and discussion

5.1 Descriptive findings

We begin our analysis by discussing and comparing descriptive findings for the non-NFRD and NFRD firms (presented in Table 2). Table 3 displays components of the SR quality score over time. Comparison of SR across the two groups and across time provides initial insights into the SR developments around the CSRD's announcement and passing.

[Insert Table 2 here]

First, descriptive statistics for non-NFRD firms present the situation of voluntary SR before the application of the CSRD. The mean of *SustReport* is 9% and reveals that very few firms publish voluntary sustainability reports in our sample period. As demonstrated by the first component of the SR quality score shown in Table 3, our sample contains four firms (five in 2022) with a voluntary report. On the other hand, 62% of the observations are from industries

[7] The International Standard on Assurance Engagements (ISAE) 3000 (revised) concerns assurance engagements other than audits or reviews of historical financial information and was published by the International Auditing and Assurance Standards Board (IAASB) in 2011 (IAASB, 2011).

[8] IDW EPS 991 (11.2022) is based on ISAE 3000 (revised) in terms of its content, but also requires risk identification and assessment.

with more pronounced negative impact on the environment and society, so one would expect more voluntary SR. Note that all firms with voluntary sustainability reports come from these industries. Compared to the NFRD firms, an average non-NFRD firm is smaller, with negative profitability[9] and lower *PPE* ratio. In sum, we interpret the finding that only one tenth of firms which will be under the CSRD's mandate in two or three years publish voluntary sustainability reports as unsatisfactory and rather alarming.

[Insert Table 3 here]

Second, descriptives of the total sample reveal that the mean of *SustReport* is 0.540 because it is dominated by mandatory SR of NFRD firms. While 57% of total observations belong to industries with more negative impact on the environment and society, the percentage is higher for non-NFRD firms. On average, the NFRD firms are significantly larger (15.027 vs. 10.827), more profitable (0.044 vs. -0.043), and with higher *PPE* ratio (0.260 vs. 0.142). These differences are in line with the narrower scope of the NFRD compared to the CSRD. Additionally, they indicate that non-NFRD firms have less resources for voluntary SR as part of the preparation for reporting under the CSRD.

Third, Table 2 also allows us to compare SR quality for firms publishing sustainability reports (i.e., NFRD firms and non-NFRD firms with voluntary SR). The majority of observations (92%) belongs to NFRD firms because non-NFRD firms seldomly publish voluntary reports. The mean of *SustReportQuality* is 2.070 and may be interpreted as "average reporting quality". However, the mean quality for NFRD firms (2.130) is significantly higher than for non-NFRD firms (1.380). Specifically, as shown in Table 3, only one voluntary report

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[9] The median profitability of non-NFRD firms is positive but still lower than the median of NFRD firms. We acknowledge that the negative mean profitability is driven by one firm-year observation with an extremely negative value. But to preserve our sample size we abstain from truncating the sample at the extreme percentiles.

applies the double materiality approach (in years 2021-2022) and obtains assurance (in years 2020-2022). In both groups of firms more than half of the firms are from industries with more negative impact. Interestingly, all non-NFRD firms with voluntary SR belong to these industries. Finally, untabulated descriptive statistics document that the NFRD firms are on average larger (15.027 vs. 12.613), more profitable (0.044 vs. 0.025) and with higher *PPE* ratio (0.260 vs. 0.115) than non-NFRD firms with voluntary SR.

Finally, Table 3 permits a univariate analysis of the SR quality score's components. They are presented for each year and separately for non-NFRD firms with voluntary SR and NFRD firms. By default, all NFRD firms publish sustainability reports in years 2020-2022 but only four non-NFRD firms (five in 2022) publish a voluntary report (publication of voluntary sustainability report is also captured by *SustReport* variable). Because so few non-NFRD firms publish voluntarily, we test our H2 only on NFRD firms. More importantly, we find that increasing number of NFRD firms applies the double materiality approach and has their sustainability reports assured. While in 2021, we see a slight decrease in the fourth component (i.e., sustainability information disclosed in the management report), its trend is generally increasing.

[Insert Table 4 here]

Table 4 shows industry composition of all unique firms in the final sample as well as non-NFRD and NFRD firms separately. The major industries are similar for non-NFRD and NFRD firms, i.e., professional, scientific and technical activities (27% and 40%, respectively), manufacturing (18% and 30%, respectively), and wholesale and retail trade, repair of vehicles and motorcycles (22% and 6%, respectively). But the non-NFRD firms come from more diverse industries and the second largest industry is the wholesale and retail trade.

[Insert Table 5 here]

Panels A and B of Table 5 present correlation matrices for variables used in the regression models (1) and (2), respectively. As expected, Panel A shows that *IndustryNeg* and *Size* are significantly positively correlated with the dependent variable *SustReport*, which captures voluntary SR. Panel B shows that *Directive*, *Size* and *PPE* are significantly positively associated with the SR quality, and *IndustryNeg* is negatively correlated with it. These univariate correlations are as expected and also indicate higher SR quality after the CSRD's announcement and passing. As the independent variables in both panels are not highly correlated with each other, we conclude that multicollinearity is not an important concern.

5.2 Main findings

First, we estimate the logistic regression model (1) to test whether the CSRD's announcement and passing increase voluntary SR among non-NFRD firms. Findings are reported in column 1 in Table 6. In contrast to H1, variable *Directive* is not significantly associated with *SustReport*. Multivariate analysis supports our descriptive findings and suggests that non-NFRD firms do not increase voluntary SR after the announcement and passing of the CSRD. This is contrary to our expectation that firms which will be mandated to report in two to three years start publishing voluntary sustainability reports earlier and, in this way, prepare for the CSRD. While the regression results do not support H1, we caution that our small sample with only five firms voluntarily reporting might affect the finding. Among control variables, *Size* is significantly positively associated with *SustReport* as expected. This could imply that smaller firms lack resources for voluntary SR as part of the preparation for the new reporting requirements. It would also be in line with Afolabi et al.'s (2023) finding that smaller firms less likely implement SR because they lack resources, expertise and perceived benefits.

Taken together, our findings point to a hazardous situation in which many non-NFRD firms will have to apply the CSRD's reporting requirements in two to three years but are likely not well prepared. They are also aligned with industry experts questioning the timely preparation of these firms (KPMG 2023). Our findings remind policy makers, regulators and assurance providers that smaller firms may need additional support and resources to transform their reporting process and achieve compliance with the CSRD.

[Insert Table 6 here]

Second, we estimate the ordinal logistic regression model (2) to test whether the CSRD's announcement and passing increase the SR quality among NFRD firms. Findings are reported in column 2 in Table 6. In line with H2, variable *Directive* is significantly and positively associated with the quality of SR and suggests increased SR quality. Combining this result with our descriptive statistics (Table 3), we show that NFRD firms after CSRD's announcement and passing most considerably improve with respect to the application of the double materiality approach, followed by the voluntary assurance of their reports. Overall, the results suggest that firms under the scope of the NFRD start implementing new reporting requirements into their SR processes in a timely manner.

Considering the effects of control variables, we find that *Size* and *PPE* ratio are significantly positively associated with SR quality. Variable *IndustryNeg* is negatively associated with SR quality which indicates that firms from industries with less negative impact are more likely to implement new reporting requirements. Such findings are aligned with Vander Bauwhede and Van Cauwenberge (2022) who show that firm size and industry affiliation drive voluntary assurance of SR.

Baumüller and Grbenic (2021) conceptually argue that the CSRD's reporting requirements require excessive resources and question whether the burden put on the firms is acceptable. We empirically analyse firms' preparation for the new reporting requirements. Our findings suggest that additional effort and resources are particularly critical for non-NFRD firms without prior

SR experience. Furthermore, the CSRD requires application of the recently issued European Sustainability Reporting Standards (ESRS) which are likely to impact firms' implementation of the CSRD's requirements even if they already publish high-quality sustainability reports. Additional administrative and financial resources for complying with the ESRS may create challenges for firms, irrespective of their current reporting status and the first year of the CSRD's application.

6 Summary and conclusion

This study analyses the effects of the announcement and passing of the CSRD on German firms' SR. It examines the preparation process for implementation of the CSRD's reporting requirements. We examine non-NFRD firms, which will be under the mandate of the CSRD, and NFRD firms, which are under the current reporting mandate. While the examination of non-NFRD firms shows whether voluntary SR changes after the CSRD's announcement and passing, the examination of NFRD firms documents whether the quality of SR changes. The main motivation for our study is the substantial number of firms which will be under the scope of the CSRD as well as the comprehensive reporting requirements that the CSRD will introduce.

We select a random sample of firms and collect their sustainability reports to capture the extent of voluntary SR and the quality of mandatory SR. We analyse our dataset with descriptive statistics and multivariate regressions. First, we find that very few non-NFRD firms publish voluntary sustainability reports. We conclude that the CSRD's announcement and passing does not increase German firms' voluntary SR as part of the preparation for the CSRD. This finding is particularly important to policy makers and regulators as it implies the non-NFRD firms may need additional support and resources for appropriate preparation and compliance with the CSRD. On the other hand, we find that the CSRD's announcement and passing have a significantly positive effect on the quality of SR for NFRD firms. We find that firm size and industry affiliation are also driving the SR quality. This finding is informative for practitioners who are transforming the reporting processes to comply with the CSRD's reporting requirements. Taken together, we conclude that the announcement and passing of the CSRD more considerably affect the SR quality of German firms which are already subject to the NFRD than voluntary SR of non-NFRD firms.

This study has a few limitations. First, our sample is relatively small and limited to German firms. Therefore, the findings may not be generalisable to all firms which will be subject to the CSRD and are located in other EU member states. The small sample may particularly affect the findings for non-NFRD firms because their sustainability information is more likely to be consolidated in their parents' sustainability reports. Second, while our findings suggest that the majority of non-NFRD firms has not yet started to prepare for the CSRD, we do not explicitly investigate the reasons. We leave it to future research to potentially interview non-NFRD firms and gain insights on reasons for and against voluntary SR. Third, while the findings imply high relevance of firms' industry affiliation for the SR quality, the industries are split solely according to the negative impact on the environment and society. Other factors, such as the level of competition within the industry, were not considered.

Appendix A: Variable definitions

Variable	Definition	Data source
$SustReport_{i,t}$	Indicator variable equal to 1 if firm *i* publishes a sustainability report or sustainability information as part of its annual report in year *t*, and 0 otherwise	Information from sustainability reports or annual reports obtained from firms' websites
$SustReportQuality_{i,t}$	A four-point score capturing SR quality via early implementation of the CSRD's reporting requirements. For each component of the score, firm *i* in year *t* receives one point: 1) publication of a sustainability report or sustainability information as part of an annual report; 2) application of a double materiality approach; 3) voluntary assurance of the sustainability report (usually in accordance with ISAE 3000 (revised) or standards published by the German Institute of Public Auditors (IDW EPS 352 (08.2022), IDW EPS 990 (11.2022), IDW EPS 991 (11.2022); and 4) disclosure of sustainability information in a management report.	Information from sustainability reports or annual reports obtained from firms' websites
$Directive_{t}$	Indicator variable equal to 1 for years of the CSRD's announcement and passing (2021-2022), and 0 otherwise (2020)	Own calculation
$IndustryNeg_{i}$	Binary indicator equal to 1 if firm *i* belongs to an industry with a more pronounced negative impact on the environment or society (i.e., mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; construction; wholesale and retail trade, repair of motor vehicles and motorcycles; transport and storage; information and communication), and 0 otherwise	Dafne database
$Size_{i,t}$	Firm size measured as the natural logarithm of total assets of firm *i* at the end of year *t*	Dafne database
$ROA_{i,t}$	Profitability measured as net income of firm *i* in year t divided by total assets at the end of year *t*	Dafne database
$PPE_{i,t}$	Property, plant and equipment of firm *i* at the end of year *t* divided by total assets at the end of year *t*	Dafne database

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Figure

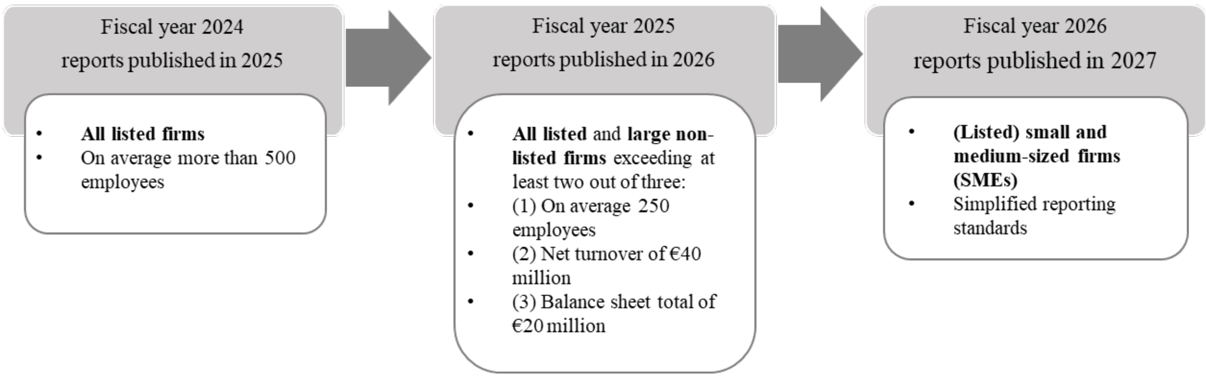

Fig. 1 Timeline of the scope of the CSRD
Note: This figure presents the timeline for application of the CSRD by EU firms according to their characteristics. It is based on Deloitte (2022).

Tables

Table 1: Sample selection process

	Non-NFRD firms	NFRD firms	Total
Initial random sample	60	60	120
Less: missing sustainability reports	9	9	18
Thereof consolidated in parent firm's sustainability report	9	1	10
Thereof sustainability report 2022 not published	0	8	8
Less: missing firm-level data	1	2	3
Unique firms in final sample	50	49	99
Firm-years in final sample	**150**	**147**	**297**

Note. This table reports the sample selection process which starts with the initial random selection of 60 firms not subject to the NFRD (i.e., non-NFRD firms) and 60 firms subject to the NFRD (i.e., NFRD firms). The former group contains listed non-NFRD firms (with less than 500 employees) and private non-NFRD firms (large or medium-sized). The selection process excludes firms with missing sustainability reports or firm-level data in any year of the sample period 2020-2022.

Table 2: Descriptive statistics for the total sample, non-NFRD firms and NFRD firms

Variable	Mean	Median	SD	Min	Max
SustReport (total, n=297)	0.540	1.000	0.499	0.000	1.000
SustReport (non-NFRD firms, n=150)	0.090	0.000	0.282	0.000	1.000
SustReport (NFRD firms, n=147)	1.000	1.000	0.000	1.000	1.000
SustReportQuality (total, n=297)	2.070	2.000	0.891	1.000	4.000
SustReportQuality (non-NFRD firms, n=13)	1.380	1.000	7.680	1.000	3.000
SustReportQuality (NFRD firms, n=147)	2.130	2.000	8.780	1.000	4.000
Directive (total, n=297)	0.670	1.000	0.472	0.000	1.000
Directive (non-NFRD firms, n=150)	0.670	1.000	0.473	0.000	1.000
Directive (NFRD firms, n=147)	0.670	1.000	0.473	0.000	1.000
IndustryNeg (total, n=297)	0.570	1.000	0.497	0.000	1.000
IndustryNeg (non-NFRD firms, n=150)	0.620	1.000	0.487	0.000	1.000
IndustryNeg (NFRD firms, n=147)	0.510	1.000	0.502	0.000	1.000
Size (total, n=297)	12.906	12.557	2.793	8.105	19.515
Size (non-NFRD firms, n=150)	10.827	10.600	1.602	8.105	18.754
Size (NFRD firms, n=147)	15.027	14.776	2.054	11.233	19.515
ROA (total, n=297)[a]	0.000	0.030	0.237	-2.243	0.650
ROA (non-NFRD firms, n=150)[a]	-0.043	0.018	0.315	-2.243	0.531
ROA (NFRD firms, n=147)	0.044	0.035	0.094	-0.204	0.650
PPE (total, n=297)	0.200	0.163	0.167	0.000	0.733
PPE (non-NFRD firms, n=150)	0.142	0.087	0.156	0.000	0.707
PPE (NFRD firms, n=147)	0.260	0.244	0.156	0.000	0.733

Note. This table reports summary statistics of our variables for the total sample (n=297) and observations from the non-NFRD firms (n=150) and NFRD firms (n=147) separately. *SustReportQuality* for non-NFRD firms can only be calculated for firms with a voluntary sustainability report (n=13). Variable definitions are provided in Appendix A. [a]) We acknowledge that one firm-year observation has an extremely negative ROA. But to preserve our sample size, we abstain from truncating the sample at the extreme percentiles of variable distributions.

Table 3: Components of the SR quality score over time

Firms which scored on a component	2020	2021	2022
SustReportQuality – **component 1**			
Non-NFRD firms	4	4	5
NFRD firms	49	49	49
SustReportQuality – **component 2**			
Non-NFRD firms	0	1	1
NFRD firms	14	19	26
SustReportQuality – **component 3**			
Non-NFRD firms	1	1	1
NFRD firms	22	25	31
SustReportQuality – **component 4**			
Non-NFRD firms	0	0	0
NFRD firms	9	8	12

Note. This table presents each component of the SR quality score per year and shows the number of non-NFRD firms with a voluntary sustainability report and NFRD firms which scored on each component. The SR quality score's (*SustReportQuality*) definition is provided in Appendix A.

Table 4: Industry composition of non-NFRD firms, NFRD firms and all firms

Industry	% of non-NFRD firms	% of NFRD firms	% of all firms
Professional, scientific and technical activities	27	40	33
Manufacturing	18	30	24
Wholesale and retail trade, repair of motor vehicles and motorcycles	22	6	14
Information and communication	10	12	11
Other business activities	4	4	4
Construction	4	2	3
Electricity, gas, steam and air conditioning supply	2	2	2
Education	4	0	2
Real estate activities	0	2	1
Hotel and restaurants	0	2	1
Transport and storage	2	0	1
Arts, entertainment and recreation	2	0	1
Mining and quarrying	2	0	1
Unique firms in final sample	**100**	**100**	**100**

Note. This table presents industry classification breakdown (in %) for non-NFRD (n=50) and NFRD firms (n=49) as well as all unique firms in the final sample (n=99). Industries in Dafne database are based on the Classification of Economic Activities, issue 2008 (WZ 2008) from the German Federal Statistical Office (2008).

Table 5: Correlation matrix

Panel A: Regression model for voluntary reporting

	(1)	(2)	(3)	(4)	(5)	(6)
(1) *SustReport*	1.000					
(2) *Directive*	0.017	1.000				
(3) *IndustryNeg*	0.241*	0.000	1.000			
(4) *Size*	0.344*	0.066	-0.024	1.000		
(5) *ROA*	0.067	0.079	0.184*	0.132	1.000	
(6) *PPE*	-0.053	-0.019	0.083	0.068	-0.037	1.000

Panel B: Regression model for sustainability reporting quality

	(1)	(2)	(3)	(4)	(5)	(6)
(1) *SustReportQuality*	1.000					
(2) *Directive*	0.159*	1.000				
(3) *IndustryNeg*	-0.156*	0.004	1.000			
(4) *Size*	0.529*	0.035	-0.035	1.000		
(5) *ROA*	-0.021	0.240*	-0.161*	0.897	1.000	
(6) *PPE*	0.275*	-0.022	-0.177*	0.193*	-0.117	1.000

Note. Tables in Panels A and B report Pearson's correlation coefficients between the variables used in models (1) and (2), respectively. We use model (1) to test H1 about voluntary sustainability reporting (n=150). We use model (2) to test H2 about the quality of sustainability reporting (n=147). * indicates significance at the 5% level or better. Variable definitions are provided in Appendix A.

Table 6: Effects of the CSRD on voluntary sustainability reporting and reporting quality

	SustReport	*SustReportQuality*
	(1)	(2)
Directive	-0.059	0.890**
	0.933	0.013
IndustryNeg		-0.685**
		0.038
Size	0.528***	0.505***
	0.001	0.000
ROA	0.015	-0.019
	0.483	0.292
PPE	-0.014	0.023**
	0.526	0.033
Constant	-8.137	
	0.000	
Threshold 1		6.743
		0.000
Threshold 2		9.285
		0.000
Threshold 3		11.221
		0.000
N	150	147
Nagelkerke R^2	0.198	
-2 Log Likelihood	74.576	312.003

Note. This table reports estimations of models (1) and (2) to test H1 and H2, respectively. In column 1, the dependent variable *SustReport* indicates if a non-NFRD firm publishes a sustainability report. We estimate a logistic model (n=150). Because all observations publishing sustainability reports belong to the same industry (*IndustryNeg*=1) this control variable cannot be included in the model. In column 2, the dependent variable *SustReportQuality* captures the quality of sustainability reporting for an NFRD firm via a four-point score. We estimate an ordinal logistic model (n=147). The reported thresholds indicate cut-off values between the four components of the score. The main variable of interest is *Directive* which indicates the CSRD's announcement and passing. ** indicates significance at the 5% level and *** indicates significance at the 1% level or better. Variable definitions are provided in Appendix A.