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A Literature Review on the Reporting and Assurance of Climate-related and Other Non-financial Information

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A Literature Review on the Reporting and Assurance of Climate-related and Other Non-financial Information

A Research Report for the Auditing and Assurance Standards Board (AUASB)

By Dr Shan Zhou

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Introduction

There has been increasing global attention on climate-related and other emerging sustainability/Environmental, Social and Governance (ESG) issues. The newly established International Sustainability Standards Board (ISSB) by the IFRS Foundation has published two proposed standards, one focusing on climate-related disclosures built on the recommendations from the Task Force on Climate-Related Financial Disclosures (TCFD) and a second setting out general sustainability disclosures. The trend is also moving from voluntary reporting to mandatory requirements by jurisdictions throughout the world.

With these global developments, demand for assurance engagements to enhance the confidence of the intended users of sustainability/ESG/non-financial reporting (or extended external reporting, EER) is growing. The newly approved work plan of the International Auditing and Assurance Standards Board (IAASB) sees ESG assurance as a prominent addition and will see increased time and resourcing for 2022-2023.

This literature review aims to inform practice and standard-setting by summarizing and discussing key publications in the area of (i) climate-related disclosures (ii) Assurance on climate-related disclosures (iii) EER and (iv) Assurance on EER. The review is focused on studies using the archival method in accounting journals as I am constrained by my expertise area. The review focuses on the most recent publications (last 5 years) and highlights studies conducted in an Australian setting.

The review utilizes practitioner surveys such as the KPMG sustainability report survey and other academic literature synthesis pieces. The review is performed with regulatory implications in mind and therefore dedicates more attention to descriptive evidence on current practice and consequences from mandatory reporting and/or assurance schemes.

Section1: Climate-related disclosures

1.1. Description of current practice

Australian Securities & Investments Commission (ASIC) published report 593 in September 2018 recording their key observations and findings from a surveillance project examining climate risk disclosure by listed companies in Australia. They conducted a review of climate risk disclosures by 60 listed companies in the ASX 300, in 25 recent initial public offering (IPO) prospectuses and across 15,000 annual reports. The key findings form their survey are that only 17 percent of listed companies identified climate risk as a material risk in their operating and financial reviews (OFRs). The disclosure practices are fragmented which makes comparisons difficult and there is limited climate-risk-related disclosure outside of the ASX200. Finally, a number of listed companies intended to adopt the recommendations (either in full or in part) of the Task Force on Climate-related Financial Disclosures (TCFD) (ASIC 2018).

A more recent survey conducted by the HWL EBSWORTH Lawyers on the top 100 ASX publicly listed companies identified climate-related disclosures in the annual reports and Environment, Social and Governance (ESG) reports from 2015 to 2020. Their findings show a clear upward trend. Specifically, only 21 of the ASX100 disclosed climate-related financial risks prior to 2016 but this number climbs to 80 by 2020. They also identified practices of addressing climate-related disclosures in a dedicated report or reference to the TCFD recommendations (HWL EBSWORTH Lawyers 2021).

Note that the HWL EBSWORTH survey covers sustainability, ESG, CSR and annual reports while the ASIC survey focuses on the annual reports. This is noted in the ASIC survey that while only 17 percent of the listed companies selected explicitly identified climate change or climate risk as a material business risk in the OFR, the majority of companies in the ASX 100 had considered climate risk in some other manner. For example, 70 percent of those companies provided disclosure through the CDP (formerly the Carbon Disclosure Project).

When it comes to the quality of disclosures however, the ASIC survey finds that the disclosure practices are fragmented which makes comparisons difficult hence they made the recommendation for companies to consider reporting under the TCFD framework. Furthermore, general climate-related disclosures such as company position statements on climate change or broader environmental policies is not useful for assessing climate risk exposures. They recommend consideration be given to disclosing

climate separately to other general risk categories, such as environmental or regulatory risk, and focus on ensuring risk disclosure is sufficiently clear and specific.

The ASIC's findings on the disclosure quality of climate-related disclosures are consistent with the findings in a recent academic paper, i.e. Wedari et al. (2021). In this paper, they constructed a 273 item environmental disclosure index based on G20 recommendations, GRI-04, ISO14064, and the Refinitive ASSET4[1] environmental pillar. The index is used as a benchmark in scoring the extent of environmental disclosures (with a focus on climate-change-related issues) for 150 company-year observations subject to the Australia's National Greenhouse and Energy Reporting Act (NGER Act) in Australia during 2016-2017. They report a mean disclosure score of 24.093 with a range of 0 to 113, which they describe as disappointingly low compared with the potential maximum of 216 for product-oriented companies or 163 for service-oriented companies.

Globally, KPMG reviewed corporate reporting by the world's 250 largest companies (G250) for climate risk and net zero reporting. Their review includes annual financial or integrated reports, sustainability reports, stand-alone reports and company websites between 2019 and 2020. The reporting quality is assessed against 12 quality criteria for good climate risk and net zero reporting developed by KPMG professionals covering four areas: Governance of climate-related risks; Identifying climate-related risks; Impacts of climate-related risks and Reporting and net zero transition. Their research suggests that the G250 companies are still some way from demonstrating good practice in reporting on climate risk and net zero transition. However, there are notable variations in reporting quality between companies in different geographies and operating in different sectors. Japan, France and Germany are leading in most areas of reporting. Australia only has three companies (1%) in the G250 sample hence there is not much detailed information being disclosed in the research.

The release of the TCFD final report with recommendations for climate-related disclosures in 2017 has spawned more research into the extent of companies' disclosures in alignment with the TCFD recommendations/framework.

Eccles and Krzus (2019) conducted a "field experiment" to evaluate how difficult it will be for companies to implement the recommendations of the TCFD by examining the disclosures of 15 of the largest oil & gas companies by market cap that

[1] Refinitive ASSET4 is a third-party data provider.

had filed a 10-K or 20-F in 2016 before the TCFD's recommendations were published. They found uneven reporting for that year with some TCFD categories fairly well covered and others less well covered. They also found variation across companies and most of the disclosures were in voluntary sustainability reports instead of the financial filings as recommended by the TCFD. They conclude that their analyses suggest it is feasible for companies in this sector to follow the TCFD's recommendations if they are interested in doing so.

More recent studies have resorted to machine learning techniques to survey practice. For example, in the TCFD's status reports, they conducted an "AI review," using a supervised learning approach. They identified compliance with the TCFD recommended disclosures but did not assess the quality of the disclosed information, nor the type of risk (TCFD 2020, 2021). This approach is refined in academic papers. For example, Bingler et al. (2021) developed context-based algorithm based on the BERT model, a deep neural network in natural language processing (NLP). They named it "ClimateBERT" and apply it to a sample of annual reports from more than 800 TCFD-supporting companies over the last six years to identify climate-related financial information from TCFD reports. Their results show that supporting the TCFD seems to be cheap talk and is associated with cherry-picking disclosures on those TCFD categories containing the least materially relevant information. They observe a slight increase in the information disclosed as required by the TCFD categories since 2017, relative to the periods before the TCFD recommendations launch. Disclosures on strategy, and metrics and targets, are particularly poor for all sectors besides energy and utilities. Bingler et al. (2021) thus conclude from their analyses that the only way out is to turn voluntary reporting into regulatory disclosures.

Friederich et al. (2021) use machine learning to automatically identify disclosures of climate-related risks for the annual reports of 337 European firms over the last 20 years. They find that risk disclosure is increasing with disclosure of transition risks growing more dynamically than physical risks, and there are marked differences across industries with energy, basic materials and utilities industries disclosing most transition risks. Country-specific dynamics indicate that regulatory environments potentially have an important role to play for increasing disclosure as numerous policies to encourage or mandate climate risk reporting have been enacted in Europe since 2015 (Steffen 2021). For example, companies in France which has a disclosure mandate, and the United Kingdom saw a marked rise in both transition and physical risk reporting

since 2015, while Germany and Switzerland exhibited a lower (but still clearly visible) growth during the same period.

1.2. Empirical evidence from regression analyses

The following paragraphs provide a summary of key academic papers on climate-related disclosures. The papers can be grouped into two broad categories, one on the determinants of climate-related disclosures and/or performance. The other on the various outcomes of climate-related disclosures and/or performance. The measures used in academic studies for climate-related disclosures include data from third-party providers, most notably CDP, while climate-related performance is most commonly measured using the level of emissions data.

1.2.1. Determinants of climate-related disclosures

The review papers of Hahn et al. (2015), Borghei (2021) and He et al. (2021) provide summaries of the common determinants of climate-related disclosures. Both papers highlight that governmental or stock exchange regulations such as the ratification of Kyoto Protocol and the Emission-Trading Schemes (ETS), play significant roles in increasing the tendency to disclose climate-related information in various countries including Australia (e.g. Cowan and Deegan 2011; Luo et al. 2012; Liu et al. 2017). Guidance from nongovernmental institutions, such as the Global Reporting Initiative and CDP, can also positively influence the extensiveness and credibility of corporate carbon disclosure (e.g. Rankin et al. 2011).

Companies' tendencies to disclose climate-related disclosures also vary significantly across industries. It is generally found that those in carbon-intensive sectors tend to make more carbon disclosures (e.g. Rankin et al. 2011; Choi et al. 2013; Tang and Luo 2016) which is perhaps not surprising given the higher regulatory, industry and peer pressure for these companies.

At company level, company size is a key driver for the likelihood and extent of climate-related disclosures (e.g. Freedman and Jaggi 2005; Luo et al. 2012; Choi et al. 2013). Other company characteristics that have been found to be significantly associated with climate-related disclosures include corporate governance such as the overall quality of corporate governance (e.g. Choi et al. 2013) and specific board characteristics including the percentage of female directors on the board and independent directors (e.g. Liao et al. 2015). Results relating to other characteristics such as profitability, leverage and growth opportunities tend to be mixed.

1.2.2. **Consequences of climate-related disclosures**

Academic studies have investigated various outcomes associated with climate-related disclosures and performance including capital market outcomes and performance outcomes (i.e. financial performance and carbon performance). In the following paragraphs, I separately discuss studies providing evidence on the consequences from voluntary disclosures and those examining mandatory schemes.

1.2.2.1. **Voluntary climate-related disclosures**

Studies have generally relied on the survey data from CDP to examine the impact of voluntary disclosures of climate-related information including the level of emissions.

Australia

Jung et al. (2018) use a sample of 255 firm-year observations from eight industries which met the publishing thresholds under the NGER Act over the period 2009-2013. They measure carbon-related risk exposure as the firm's historical carbon emissions and the primary measure of carbon risk awareness is based on firm's willingness to respond to the CDP survey. They document a positive association between cost of debt and carbon risk for firms failing to respond to the CDP. They conclude that the penalty of a higher cost of debt is effectively negated for firms exhibiting carbon risk awareness.

In an another Australian study, Balachandran and Nguyen (2018) find subsequent to the ratification of the Kyoto Protocol in Australia, that the probability of paying dividends and dividend payout ratio is lower for high emitting (polluting) firms relative to non-polluters (using GICS industry classification from Morningstar DatAnalysis).

US and Canada

Matsumura et al. (2014) find a negative association between the level of carbon emissions and firm value. Meanwhile, firms that disclose their carbon emissions have higher firm values than non-disclosing firms. They conclude that the markets penalize all firms for their carbon emissions, but a further penalty is imposed on firms that do not disclose emissions information. Similarly, Griffin et al. (2017) finds that investors price firms' carbon emissions as a negative component of equity value, but they find that this valuation discount does not differ between firms that voluntarily disclose to the CDP and non-disclosing firms. Interestingly, Griffin et al. (2021) examine the relevance to investors of carbon emissions of publicly traded Canadian firms over 2006

to 2018, and document that firm value varies positively with the level of emissions. This result suggests that the Canadian setting differs from those studied previously, notably because of low climate litigation risk and national and subnational expenditure policies to offset climate impacts on the economy.

Flammer et al. (2021) find that environmental shareholder activism increases the voluntary disclosure of climate change risks (from the CDP database), especially if initiated by institutional investors, and even more so if initiated by long-term institutional investors. They also find that companies that voluntarily disclose climate change risks following environmental shareholder activism achieve a higher valuation post disclosure, suggesting that investors value transparency with respect to firms' exposure to climate change risks.

Kolbel et al. (2020) use BERT, an AI-based algorithm for language understanding, to quantify regulatory climate-risk disclosures and analyze their impact on the term structure in the credit default swap (CDS) market. They find that disclosing transition risks increases CDS spreads, especially after the Paris Climate Agreement of 2015, while disclosing physical risks decreases CDS spreads.

Europe

Schiemann and Sakhel (2018) examine a sample of 717 EU companies over 2011 to 2013 from the CDP database and distinguish between firms that did and did not provide information about their physical risk exposure via the CDP questionnaire. They find that the decision to voluntarily disclose physical risk information is associated with lower levels of information asymmetry but only for firms falling under the regulation of the EU ETS.

International

Ioannou et al. (2016) examines how target difficulty of carbon emissions reduction affects the degree of target completion in long-term non-financial performance for a sample of global firms participating to the CDP surveys. They find that firms setting more difficult targets complete a higher percentage of such targets and this effect is conditioned (negatively) by the provision of monetary incentives. Further, target difficulty is more effective for carbon reduction projects requiring more novel knowledge and in high-polluting industries.

1.2.2.2. **Mandatory schemes on climate-related disclosures**

Australia

Studies conducted using Australian companies generally utilize the NGER scheme to provide evidence on the impact of the mandatory reporting of carbon emission levels. Choi et al. (2021) find that the level of direct emissions (reported by Australian companies under the NGER scheme) is negatively associated with a firm's market value, and this relationship is stronger during the period when the Clean Energy Bill became effective in Australia. Further, these negative effects are only significant in the group with low disclosure scores (from CDP) and in the group with poor carbon management performance.

Herbohn et al. (2017) find evidence which suggests that investors perceive that banks incorporate carbon risk considerations into their lending decisions. They use a sample of 120 bank loan announcements for ASX-listed firms over the period 2009-2015 and document positive and significant excess loan announcement returns for loan renewals for high carbon risk firms (firms that meet the reporting threshold of the NGER scheme), but not for loan initiations. The significant loan announcement return is more significant for renewals with favourable term revisions.

Earlier studies such as Chapple et al. (2013) and Luo and Tang (2014) find that firms in carbon-intensive sectors suffered a reduction in value upon the release of news that indicated an increased probability of carbon legislation (a carbon tax and ETS) passing in the Australian parliament.

US

The US studies commonly use the guidance from the Securities and Exchange Commission (SEC) in 2010 that material information related to climate risk should be included in SEC regulatory filings to study the impact of climate-related disclosures. Berkman et al. (2018) find that firms' climate risk exposure (derived from climate risk disclosure in Form 10-K) is negatively associated with firm value and positively associated with implied cost of capital and beta. They use a measure publicly available from the Ceres/CookESG database which is based on textual analysis depending on both the length as well as the relevance of the language used.

Matsumura et al. (2020) hand-collect firms' decision to disclose or not to disclose climate-change risk (CCR) in 10-K for about 4,000 firm-year observations of S&P 500 firms for 2008 to 2016 to test the association between disclosing CCR in 10-K's and firm risk (proxied by cost of equity (COE)). They find that disclosing firms'

COE is 26 basis points lower than non-disclosers overall. In industries where the market expects CCR to be material, disclosing firms' COE is 51 basis points lower than non-disclosers, while in industries where the market expects CCR not to be material, disclosing firms' COE is 20 basis points lower than non-disclosers.

Note that Berkman et al. (2018) interpret their measure as a measure of climate risk exposure rather than as a measure of disclosure quality yet Matsumura et al. (2020)'s measure is more a measure of disclosure quality. Hence the results from these two studies suggest that high exposure to climate risk is associated with low firm value and high cost of capital, yet high quality disclosure of climate-change risks helps reduce cost of capital.

Europe and UK

Clarkson et al. (2015) is one of the earlier studies examining the valuation relevance of greenhouse gas emissions under the European Union Carbon Emissions Trading Scheme. They find that firms' carbon allowances are not associated with firm valuation but the allocation shortfalls are negatively associated. They also find that the negative association between firm values and carbon emission shortfalls is mitigated for firms with better carbon performance relative to their industry peers and for firms in less competitive industry sectors. They conclude based on the results that the valuation impact of carbon emissions is unlikely to be homogenous across firms or industrial sectors.

Baboukardos (2017) provides evidence on the potential benefits of mandatory environmental reporting for listed firms' market valuation using the regulation that requires all listed firms in the UK to report their annual greenhouse gas (GHG) emissions in their annual reports in 2013. The findings show that the magnitude of the negative association between GHG emissions and the market value of listed firms decreased after the introduction of the reporting regulation. The author attributes the decline to regulation forestalling shareholders' negative reflexive reaction toward firms' carbon disclosures.

in a more recent paper, Mesonnier and Nguyen (2022) investigate the effects of mandatory climate-related disclosure by financial institutions on the funding of carbon-intensive industries. They utilize the French law which came into force in January 2016 requiring institutional investors (i.e., insurers, pension funds and asset management firms), but not banks, to report annually on both their climate-related exposure and climate change mitigation policy. Using a difference in difference design where the

"treated" institutions are French insurance companies and pension funds and asset management firms, and "control" institutions are French banks and all types of financial institutions in all other euro area countries, they find that institutional investors subject to the new disclosure requirements curtailed their financing of fossil energy companies compared to investors not subject to the requirements.

Overall, these studies document largely consistent evidence that markets penalize high levels of carbon emissions. Climate-related disclosures however appear to be beneficial in reducing information asymmetry. Mandatory reporting schemes (either on the level of emissions or more recently general climate-related disclosures) have real effects on behaviours and the capital market participants factor the cost of regulation in their pricing mechanisms.

Section 2: Assurance on climate-related disclosures

2.1. Description of current practice

Academic studies on current assurance practice of climate-related disclosures are sparse. Green and Zhou (2013) examined 3,008 assurance reports across 43 countries during the period 2006 to 2008 and provided detailed information on the assurance practice of carbon emission at the time.

Their results revealed a 37.1 percent rate of assurance in the sample. Australia was one of the top five countries (5.1%) with companies' carbon emissions assured following the UK (16.2%), the US (14.6%), Japan (13.7%) and France (6.8%). Carbon emissions were commonly assured among other sustainability data (two thirds of the time) and only one third of the assurance engagements were on carbon-related information specifically. The majority of the assurance statements were issued as part of sustainability reports during the three sample years (e.g.,71% in 2009) although there was a clear growing trend for both the stand-alone statements (growth of 6%, 7% and 20% over the three years) and also for integrating the statement into the annual report (growth of 6%, 7%, 9% over the three years). Almost two thirds of the assurance engagements provided only limited assurance (e.g., 64% in 2009). A variety of assurance standards were used for the assurance engagements with ISAE3000 (e.g., 55% in 2009) and AA1000 (e.g., 20% in 2009) being the dominant ones.

In terms of assurance provider, specialist providers had a larger market share (58%) during those early years compared to audit and assurance services firm providers

(42%). Audit and assurance services firm providers tended to be involved more in assuring the sustainability data as a whole in the form of sustainability report assurance. Companies appeared to be more willing to choose the assurance services from specialist providers if the subject assured is GHG only. Audit and assurance services firm providers were also more likely to provide the assurance at a limited level while the specialist providers are more likely to offer a reasonable level of assurance.

In another study, Zhou et al. (2016) examined 2,194 assurance reports on climate related information between 2007 to 2010. Their results show that just over 40 percent of disclosing companies purchased third-party assurance services on climate-related information, companies in Spain (88.89 percent) and France (71.90 percent) were most likely to purchase assurance, and those in Canada (24.18 percent) and the U.S. (27.18 percent) were least likely to do so. Australia was found to have one of the lower assurance rates of 39.32 percent during this sample period.

The accounting firm providers provided the assurance services for over half (51.83 percent) of the companies during the sample period with significant variation in choice of assurance provider among the countries. For example, the proportion of assurance provided by the accounting profession ranged from a high of 95.40 percent in France to a low of 9.62 percent in the U.S.

Datt et al. (2021) provides more updated information on the assurance practices for carbon emissions disclosures across 45,563 firm-year observations from 2010 to 2017. Different to Green and Zhou (2013) and Zhou et al. (2016), they rely on survey data from the CDP without examining the assurance reports. Green and Zhou (2013) and Zhou et al. (2016) identified significant reporting errors in the CDP database on assurance. For example, some companies regard the outsourcing of their carbon emissions disclosures to an outside consulting company as a means of assurance. The certification of the Environmental Management System (EMS) by a certification body has also been considered as assurance. Zhou et al. (2016) further document that 11.66 percent of responding companies to CDP claimed independent third party assurance when no assurance of public GHG disclosures could be verified, and that 2.83 percent of the responding companies claimed their public disclosures were not assured even though they were able to identify an assurance report.

Datt et al. (2021) report a 62.8 percent assurance rate on carbon emissions disclosures with a clear upward trend during the sample period. The trend also indicates that accounting firms are being hired increasingly more often (35.4%); however,

specialist firms still dominate the market (47.9%). The top five countries for audit and assurance service providers were France (12%), the UK (10%), Japan (8%), the US (7%) and Australia (7%). The top five countries where firms chose specialist firms were the USA (31%), the UK (15%), Japan (7%), South Korea (6%) and South Africa (4%).

Because the assurance engagement on carbon emissions is commonly performed by specialist providers, as the engagement often requires specific subject matter expertise related to carbon emissions (Huggins et al. 2011; Green and Taylor 2013), another stream of studies focus on the different dynamics between specialist providers and accounting firm providers to contribute to the debate on which type of provider delivers higher assurance quality. For example, Green and Taylor (2013) and Green and Li (2012) use a survey to show that expectation gaps exist among different groups of stakeholders regarding the perceived quality of the assurance provider and the responsibilities of assurers and managers. Huggins et al. (2011) highlight the unique and complementary skill sets that professionals from accounting and non-accounting backgrounds bring to the assurance engagements on carbon emissions and, coupled with the inherent complexities in this type of work, underscore the benefit of multi-disciplinary assurance teams. They also point to the trend of integrating climate-related information into financial statements which offers the possibility that assurance engagements on climate-related information will become a natural domain for assurers from the accounting profession.

The limited amount of studies on the assurance of climate-related information could possibly be due to the fact that (i) the climate-related information disclosed in early years is primarily limited to the level of carbon emissions, i.e. the scope 1, 2, 3 of carbon emissions. (ii) the majority of the assurance engagements on the level of carbon emissions are performed with other sustainability indicators to which a much larger body of literature is devoted. However, with the increasing awareness that climate-related risk is one of the most pressing sustainability risks, and the issuance of more comprehensive and standard reporting pronouncements on climate-related information, it is expected that academic research into this area will grow as more companies start to disclose climate-related information following the guidance from the newly established ISSB.

Another noticeable trend is the inclusion of climate-related risks into financial statement auditors' Key Audit Matters (KAMs). Deloitte and EY included for the first time climate risks and the energy transition in their KAMs in the audits of BP and Royal

Dutch Shell respectively for the 2019 financial year, in which they explained how the Paris Agreement was considered in their review of management accounts and whether the assumptions aligned with the goal of limiting global warming to less than 2 degrees Celsius above pre-industrial levels (Carbon Tracker 2021). Investors representing over $9 trillion called for auditors to sound the alarm where they identified financial statements that ignore the global move to net zero by 2050. The investor group further pressed auditors to identify unsustainable dividends predicated on continued or rising fossil fuel consumption (Landell-Mills 2021). The Global Public Policy Committee (GPPC, the global forum of representatives from the six largest accounting networks: BDO, Deloitte, EY, Grant Thornton, KPMG, and PwC) published a letter to announce their commitment to "playing their part" when it comes to assuring that climate risk is properly reflected in company financial statements. This trend to integrate non-financial items into the financial statement audit report is expected to spur more research into this emerging area.

2.2. Empirical evidence from regression analyses

2.2.1. Determinants of assurance on climate-related disclosures

Archival studies using regression analyses have been focusing on the determinants of voluntary assurance and the choice of assurance providers. Zhou et al. (2016) consider the interactions between country-level and firm level characteristics in driving the decision to purchase third-party assurance and the choice of assurance providers for engagements on carbon emissions. They find that country level factors, i.e. the business culture (stakeholder versus shareholder orientation) and legal enforcement systems significantly affect the decision to purchase assurance and the choice of accounting firms as assurance providers. The effect however is conditional on the strength of company-level corporate governance mechanisms. Other related studies including Datt et al. (2019a) and Datt et al. (2019b) find that firms with higher levels of emissions, better carbon management and governance are more likely to purchase third-party assurance. Those with better carbon management mechanisms (e.g. firms that adopt carbon reduction incentives) tend to choose specialist firms as the assurance provider (Datt et al. 2019b). Another recent study, Fan et al. (2021) document that companies with higher carbon information asymmetry (e.g. carbon emissions, energy structure) are more likely to engage independent assurance.

As far as I'm aware, there are no published empirical studies on the consequences of mandatory or voluntary assurance on climate-related disclosures yet.

Section 3: Extended External Reporting (EER)

3.1. Description of current practice

KPMG's surveys of sustainability reporting provide summaries of the trend in EER including sustainability reporting, integrated reporting and more recently climate-related reporting. In their 2020 survey (KPMG 2020b), they find that 80 percent of N100 companies worldwide (the top 100 companies by revenue in 52 countries and jurisdictions) now report on sustainability, up by 5 percent since the last survey in 2017, while the reporting rate has reached 90 percent or more for the G250 group (the world's largest 250 companies by revenue) since 2011. Australia is one of the global leaders in sustainability reporting with 92 percent rate among the N100 companies, up from 77 percent in the 2017 survey.

Meanwhile, the trend for companies to include sustainability information in their annual reports is static across the N100 (60% in 2017 survey, and 61% in 2020 survey) and G250 groups (78% in 2017 survey and 76% in 2020 survey). The top 3 countries leading the trend are India (98%), Malaysia (97%) and South Africa (96%), where they attribute the higher rate to the regulatory requirement from the stock exchanges in these countries. India and Malaysia have also seen significant growth in integrated reporting since 2017. In other countries, the growth in integrated reporting continues but remains a minority practice (less than 50%) except for in South Africa (94%), Japan (73%) and Sri Lanka (53%).

When it comes to the reporting guidelines and standards, GRI remains the most used framework in both the N100 (67%) and G250 (73%) groups. Other commonly used guidelines and standards include the Sustainability Accounting Standards Board (SASB) framework and International Standards Organization (ISO) standards. In a 2021 benchmarking practice conducted by the International Federation of Accountants (IFAC) in collaboration with AICPA & CIMA focusing on the 1400 largest companies globally by capitalization, an increasing amount of the largest companies are reporting using the United Nations Sustainable Development Goals (62%), the Task Force on climate-related financial disclosures (24%) and the Sustainability Accounting

Standards Board standards (15%) in addition to using the GRI standards (69%). Further, the use of multiple standards is prevalent among these largest companies (68%).

3.2. Empirical evidence from regression analyses

Christensen et al. (2019) provide an extensive review of the academic literature on sustainability/corporate social responsibility reporting in accounting, economics, finance and management. The research focuses on the economic effects of standards for disclosure and reporting, and discusses possible economic consequences, including capital market effects, real effects in firm behaviour, and implementation issues related to the adoption of CSR standards. The discussions in the following paragraphs will be based on Christensen et al. (2019) supplemented by more recent relevant publications.

3.2.1. Determinants of EER

The key determinants of voluntary CSR reporting identified from prior studies include firm size, ownership (e.g. dispersed versus concentrated ownership), corporate governance (e.g. managerial incentive schemes, number of board meetings) and management characteristics (e.g. manager's educational levels and training). There is inconclusive evidence on the association between CSR performance and CSR disclosure practice, while some event studies provide evidence that companies tend to increase their CSR disclosures following reputational damages or environmental catastrophes (Pattern 1992; Heflin and Wallace 2017; Bonetti et al. 2015; Chakravarthy et al. 2014; Christensen 2016; Lins et al. 2017). External pressure from various stakeholders including social activists, institutional investors, governments and policymakers are found to affect CSR reporting (Huang and Watson 2015; Reid and Toffel 2009; Dhaliwal et al. 2011; Marquis and Qian 2014).

Another stream of research performs event studies to provide evidence on companies' CSR disclosure practice following external events such as accidents or environmental catastrophes. For example, Patten (1992) finds that after the Exxon Valdez oil spill in 1989, there is a significant increase in CSR disclosures by petroleum firms other than Exxon. A similar effect is documented around the BP oil spill in 2010 (Heflin and Wallace 2017) or the Fukushima nuclear disaster in 2011 (Bonetti et al. 2015).

3.2.2. Consequences of EER

3.2.2.1. Voluntary EER

A large body of literature has documented various impacts of voluntary CSR reporting/disclosures, from firm value to capital market effects to other stakeholders such as customers, employees. Studies generally find a positive association between the quality of voluntary EER and these outcomes including higher firm value (Plumlee et al. 2015; Gao and Zhang 2015), higher stock liquidity (Grewal 2021), lower cost of equity capitals (Dhaliwal et al.2011; El Ghoul et al. 2011), lower cost of debt (Cheng et al. 2014), more mutual fund flows (Hartzmark and Sussman 2017), more accurate analysts' forecasts (Dhaliwal et al. 2012), more positive analysts' recommendations (Ioannou and Serafeim 2015). In addition, companies' CSR engagement affects consumer perceptions positively which in turn increase customer loyalty, future sales, or their willingness to pay for products and services (Luo and Bhattacharya 2006; Habel et al. 2016). CSR engagement has also been found to be an effective tool to build up reputation and/or repair damaged reputation such as following earnings restatement (Chakravarthy et al. 2014; Christensen et al. 2016; Lins et al. 2017).

3.2.2.2. Mandatory EER policy

Empirical evidence on the real effects of CSR reporting mandates is still relatively scarce as polices requiring companies to disclosure CSR information have only recently been initiated in some countries such as the EU, UK, South Africa and China. The following paragraphs discuss key papers documenting the consequences from mandatory EER polices.

The EU non-financial directive requires large firms to include non-financial information in their annual reports beginning from fiscal year 2017 onward. The directive covers topics like environmental matters, social and employee aspects, respect for human rights, anti-corruption issues, and diversity in the board of directors.

Grewal et al. (2017) examine the equity market reaction to events leading up to the passage of an EU Directive mandating the increased disclosure of nonfinancial (CSR) information by firms. They find that the market reaction is, on average, negative but less so or even positive for firms with higher pre-directive, voluntary CSR disclosures (and stronger CSR performance). The results suggest that investors view the CSR reporting mandate as costly, particularly for firms that provide few CSR disclosures on a voluntary basis and, hence, would be forced to provide more CSR

information. The findings also suggest that the negative reaction is related to proprietary and political costs of such disclosures.

Fiechter et al. (2019) document that companies regulated by the EU non-financial directive, in particular those with a pre-directive low level of CSR activities and disclosures, increase their CSR activities in response to the regulation, and they started doing so before the disclosure mandate came into force. These affected companies also alter their CSR infrastructure towards more CSR oriented business models. The study concludes that widespread adoption of a CSR disclosure mandate creates real effects across industries and jurisdictions.

Wang et al. (2021) examines the mandatory adoption of strategic reporting (which is akin to integrated reporting) in the UK from 2013. They document that companies producing high quality strategic reports enjoy capital market benefits including higher stock liquidity, lower cost of capital and more accurate and less dispersed analysts' forecasts. More importantly, the effect of higher liquidity and lower cost of capital are more pronounced after the adoption of strategic reporting compared to the previous reporting regime of enhanced business review. Their evidence provides support for the global move towards a more integrated way of corporate reporting.

Outside the EU and UK, Christensen et al. (2017) use the rule requiring SEC-registered firms to include information regarding mine-safety performance in their regulatory filings (i.e., 10-K, 10-Q, and in some cases 8-K filings) and examine the effect of the mine-safety disclosure provision on mine safety and the productivity of coal mines. They find that safety improves following the disclosure requirement. However, productivity declines relative to non-registered firms.

Rajgopal and Tantri (2021) investigate the mandate from the Indian government that requires firms to spend at least 2 percent of their profits on CSR. They find that mandated companies that voluntarily engaged in CSR before the mandate reduce their CSR spending significantly after the mandate, and the 2 percent mandate negatively impacts valuations and operating performance. They conclude that regulatory intervention in CSR diminishes its signaling value.

The mandate of integrated reporting in South Africa has spawned a body of research into the consequences of the mandate. Most studies (e.g. Barth et al. 2017; Zhou et al. 2017) document positive capital market outcomes including higher stock liquidity, lower cost of capital and improved analysts' forecast properties associated with high quality integrated reporting after the mandate.

Finally, the Chinese stock exchanges mandated that a subset of larger firms issue a CSR report together with their annual report in 2008. Chen et al. (2017) use this setting to examine how a CSR disclosure mandate affects pollution levels and firms' financial performance. They find decreases in overall industrial wastewater and SO2 emission levels in cities with more regulated firms. Consistent with CSR activities being costly to firms, they also find that firms subject to the disclosure requirements experienced a reduction in profitability, similar to the findings in Christensen et al. (2017).

In summary, most academic studies on the effects of mandatory CSR disclosures find that companies subject to CSR disclosure requirements tend to expand and adjust their CSR activities. However, the mandates also come at a cost to companies (e.g., in the form of lower productivity and financial profitability) and could have unintended consequences (e.g. reduced CSR spending).

Section 4: Assurance on EER

4.1. Description of current practice

KPMG (2020b) find that the assurance of sustainability has become the practice for a majority of N100 companies, exceeding 50 percent for the first time since 1993. The assurance rate is 71% among the G250 companies. The two countries that have the greatest growth in third-party assurance of sustainability reporting since 2017 are Spain (+38%) and Singapore (+35%). The International Federation of Accountants (IFAC) in collaboration with AICPA & CIMA performed a benchmarking global practice in sustainability assurance and published their findings in 2021. One thousand four hundred companies across 22 jurisdictions were reviewed. Companies were selected based on largest market capitalization as of March 2021 and attributed to jurisdictions based on the location of the company's headquarters. One hundred companies were examined for the six largest jurisdictions (based on GDP) and 50 companies were examined for 16 additional jurisdictions

Their key findings include (i) 51 percent of companies (44% excluding EU) that report sustainability information provide some level of assurance on it. France, South Korea, Spain, Italy and US are among the top countries with assurance. (ii) 63 percent of these assurance engagements were conducted by audit or audit affiliated firms. Audit and audit affiliated firms dominate the market in most countries except for US, Hong

Kong, and South Korea (iii) 88 percent of assurance engagements employing an audit firm use ISAE3000 while other service providers often use alternative assurance standards, mainly the AA1000AS and the ISO 14064-3. (iv) 83 percent of all assurance engagements provide limited assurance. The audit firm and the affiliated firms are predominantly providing limited assurance (over 90%) while other service providers provide limited assurance less than 60 percent of the time (v) there are significant differences across jurisdictions.

In Australia, the majority of the sustainability reporting is in the sustainability report (72%) with 14 percent in annual report and 14 percent in integrated report. Seventy percent of the Australian sample use GRI standard followed by SDG (62%), TCFD (54%) and others (40%)[2]. One hundred percent of the Australian sample use audit firm as the assurance provider and 68 percent of engagements use ASAE3000 as the assurance standard followed by ISAE3000 (32%), ISAE3410 (11%) and AA1000AS (4%)[3].

The Governance & Accountability Institute (GA Institute, 2020) reports on an analysis of the 2019 ESG disclosures of the S&P 500 and they only 29 percent of the S&P 500 engage external assurance. Of these assurance engagements, 55 percent is on specified sections, 40 percent on carbon emissions disclosures only and 5 percent on the entire sustainability report. In terms of assurance provider, 52 percent are engineering firms, 24 percent are accountants and 24 percent are small consultancies. When it comes to the assurance level, 78 percent are limited/moderate, 8 percent high, 2 percent combination and 12 percent not specified.

4.2. Empirical evidence from regression analyses

Venter and Eck (2021) provide an overview of academic literature on EER assurance including 121 articles on EER assurance published between 2009 to 2020 across 35 journals. The following discussions provide summary of some of the sections in Venter and Eck (2021) supplemented by recently published studies.

4.2.1. Determinants of assurance on EER

Similar to the determinants of EER and climate-related disclosure and assurance, the determinants of EER assurance from prior literature generally include

[2] Companies can refer to multiple reporting frameworks hence they add up to more than 100%.
[3] An assurance engagement can refer to multiple assurance standards hence they add up to more than 100%.

firm level, industry level and country level characteristics. Firm-level characteristics examined in prior studies mainly are firm size (Simnett et al. 2009; Casey and Grenier 2015), profitability (Branco et al. 2014; Kend 2015), leverage (Branco et al. 2014; Casey and Grenier 2015), the extent/level and quality of non-financial disclosures, social and environmental performance (Cho et al. 2014; Clarkson et al. 2019), corporate governance characteristics (Peters and Romi 2015; Liao et al. 2018; Wang et al. 2021).

Studies discussing industry level drivers generally find the adoption of assurance is more common among firms operating in industries with greater social and/or environmental impacts (Simnett et al. 2009; Cho et al. 2014).

Studies using international samples often consider the impact of country legal system/origin (i.e., code law versus common law) (Kolk & Perego 2010; Simnett et al. 2009), the strength of the legal environment and legal enforcement, and pressure toward sustainable corporate practices (Simnett et al. 2009; Kolk and Perego 2010; Zhou et al. 2016; Bollas-Araya et al. 2019; Simoni et al. 2020) find that firms domiciled in stakeholder-oriented countries (i.e., code law countries) and in countries with a strong legal environment are more likely to adopt assurance.

4.2.2. Consequences of assurance on EER

4.2.2.1. Voluntary EER assurance

The outcomes associated with voluntary EER assurance examined in prior studies include EER disclosure quality (Moroney et al. 2012; Braam et al. 2016) and contents (Rossi and Tarquinio 2017; Hummel et al. 2019); performance outcomes (Akisik and Gal 2019; Steinmeier and Stich 2019) and capital market outcomes (Casey and Grenier 2015).

Studies have documented some evidence that EER assurance helps improve quality of the underlying subject matter disclosure including environmental reports, ESG reports and integrated reports (Moroney et al. 2012; Braam et al. 2016; Maroun 2019). Other studies have further examined the impact of different assurance providers and generally find that accounting providers improve reporting quality to a greater extent than non-accounting providers (Ballou et al. 2018; Martínez-Ferrero et al. 2018; Bollas-Araya et al. 2019) although opposing evidence exists that non-accounting assurance providers issue broader and more extensive assurance reports compared to accounting assurance providers (Rossi and Tarquinio 2017; Hummel et al. 2019).

In terms of performance outcomes and capital market outcomes, studies have found a positive association between financial performance and EER assurance (Akisik and Gal (2019) including stock price growth, return on equity and return on assets and sustainability investment efficiency (Steinmeier and Stich 2019). Further, studies (Casey and Grenier 2015; Martínez-Ferrero and García-Sánchez 2017; Clarkson et al. 2019) document positive capital market effects of CSR assurance including lower cost of capital, lower analyst forecast errors, and lower analyst forecast dispersion which is more pronounced when the provider is from an accounting firm. Nonetheless some other studies do not find a significant effect of EER assurance (e.g. Cho et al. 2014). In the integrated reporting context, Zhou et al. (2019) examine whether the implementation and quality of combined assurance disclosure in integrated reports is associated with lower information asymmetry. The authors provide evidence that the implementation and quality of combined assurance disclosure are associated with lower analysts' forecast errors and dispersion, and lower bid-ask spreads.

Finally, an emerging research question is whether there are benefits to a single assurance provider for both financial and EERs. Maso et al. (2020) find that auditors of firms who use the same Big Four audit firm for the financial statement audit and the provision of CSR assurance issue more frequent going-concern opinions. Lu et al. (2021) investigates the determinants and consequences of using the same provider for financial statement audit and EER assurance. They find that companies with the same provider have higher financial statement quality without significantly different audit fees. The findings from both studies are indicative of a complementary role between EER assurance and financial reporting quality.

4.2.2.2. Mandatory EER assurance

The EER assurance remains largely voluntary around the world. Krasodomska et al. (2021) provides an overview of the current EU regulation for EER assurance. Three EU Member States (France, Spain, and Italy) require mandatory independent assurance (12%). Other EU countries apply the minimum requirement for statutory auditors to check whether the non-financial statement is provided (46%) or have an additional requirement to check whether the provided information is consistent with the financial statements (42%).

Gillet-Monjaret (2018) finds a greater standardization of the content of assurance reports following the introduction of the Grenelle II Law in France that

mandates the assurance of CSR information by an independent third party. I'm not aware of other studies examining the impact of mandatory EER assurance yet.

Ferguson and Pündrich (2015) examine the market reaction to the mandatory assurance of public resources/reserves disclosures made under the Joint Ore Reserves Committee ("JORC") Code by Australian Mining Development Stage Entities. They document very weak evidence of greater abnormal returns evident when reserve disclosures are provided by specialist mining consultants. They conclude that their findings support the insurance hypothesis, in that mandatory specialist assurance matters little where litigation risk is low.

Conclusion

The review on the large body of literature on voluntary EER generally document positive outcomes associated with high quality EER, although voluntary EER is also subject to criticisms of being cherry picking and the research design using voluntary EER suffers from self-selection bias. Evidence on consequences associated with mandatory EER is relatively limited, although it is expected to increase with the trend to move towards mandatory requirements. The limited evidence generally supports the move towards a mandatory system albeit with some costs.

Studies on climate-related disclosures largely focus on the disclosure of the levels of carbon emissions. The consensus appears to be that the market penalizes high level of emissions, but holding the level of emissions constant, transparent disclosures of carbon emissions help mitigate the negative impact. With the future release of the climate-related reporting standard from the ISSB, research on disclosure practices in alignment with a common framework are expected to be the future direction of research into this area.

Studies on the assurance of EER is relatively limited, especially on climate related disclosures and mandatory assurance policies. This is perhaps not that surprising given that climate-related disclosures are typically assured within the broader range of other ESG topics and there are not many jurisdictions currently mandating the assurance of EER. The trend for climate-related disclosures to be a distinct subject matter with its own standard, and the potential more widespread requirement on EER assurance will help promote more research into these areas.

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