Advances in Accounting xxx (2020) xxx

Contents lists available at ScienceDirect
Advances in Accounting
journal homepage: www.elsevier.com/locate/adiac

Female leadership in corporate social responsibility reporting: Effects on writing, readability and future social performance

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ARTICLE INFO

Article history:
Received 6 September 2019
Received in revised form 10 May 2020
Accepted 10 May 2020
Available online xxxx

Keywords:
Female leadership
CSR report
Solidarity
Certainty
Readability
Firms' social performance

ABSTRACT

This study examines how the gender of corporate social responsibility (CSR) leaders (as signers of the CSR reports) could affect two psychometric properties (i.e., solidarity and certainty) and the readability of the reports. We also investigate how these gender-based differences are associated with firms' future perceived social performance. We conduct textual analyses on a sample of 346 firms in the S&P500 index that issued annual CSR reports during the period of 2006 to 2015. Our findings show that CSR reports with a female (vis-à-vis male) executive as the signer or co-signer are more readable, show more solidarity with readers, but express less certainty in the narratives. In examining their impacts, we find that readability and solidarity, but not certainty, are positively associated with firms' future social performance. Our results suggest the value relevance of leveraging greater female representation in firms' CSR reporting leadership teams so as to help firms enhance their social objectives and signal their future social performance.

1. Introduction

The growing awareness toward environmental and social issues such as climate change, water scarcity and human rights, coupled with recent corporate noncompliance revelations, has heightened investors' demand for non-financial disclosures as an alternative information source to assess firms' financial condition (Ernst and Young (EY), 2016, 2017; KPMG International, 2015, 2017). EY's survey (2016) revealed that investors have increasingly valued the role of firms' environmental, social, and governance (ESG) performance in their investment decision-making and many have expressed a growing interest in increased ESG disclosure requirements.[1]

The increased pressure from investors has driven an increasing trend in voluntary corporate social responsibility (CSR) reporting. In its 2017 report, KPMG showed a significant growth in global corporate responsibility reporting since 1993, revealing that 75% of the top 100 firms in each of the 49 countries in the study and 93% of the top 250 largest global companies issued voluntary CSR reports. A survey by the Boston College Center for Corporate Citizenship (2017) and Ernst and Young (EY) (2016) expounded four main reasons why companies issue CSR reports: transparency with stakeholders, competitive advantage, risk management, and stakeholder pressure. Similarly, the survey results of Ernst and Young (EY) (2017) identified building corporate reputation with key stakeholders such as customers, complying with regulatory requirements, responding to investor requests for disclosure, and demonstrating risk management as the key motivations for CSR reporting.

As investors and other key stakeholders demand more disclosures on ESG performance, firms seek to improve their external communication of CSR activities. CSR reports have become essential tools for communicating ESG matters. Identifying the best way to communicate ESG initiatives in CSR reports thus becomes an important quest for firms' management. Research in sociolinguistics has previously documented gender differences in writing styles (Coates, 2013; Pennebaker, 2011; Rubin & Green, 1992). In our study, we extend this line of research by examining whether and how the gender of CSR leaders (latter as the CSR report signers) may play an important role in determining the psychometric properties (i.e., solidarity and certainty) and readability of the reports. We further investigate whether these gender-based differences in psychometric properties and readability affect firms' future social performance.

Unlike annual reports to shareholders, CSR reports are not audited and hence are less likely to follow a boilerplate reporting format. Since CSR reporting is voluntary and not currently under the scrutiny of

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[1] In April 2016, the U.S. Securities and Exchange Commission issued a "Concept Release" (81 FR 23916), seeking public comment on business disclosure topics, including disclosure of sustainability or ESG matters (see https://www.gpo.gov/fdsys/granule/FR-2016-04-22/2016-09056).

https://doi.org/10.1016/j.adiac.2020.100475
0882-6110/

regulatory agencies such as the U.S. Securities and Exchange Commission, CSR reports provide a medium to examine how gender differences in writing could affect the psychometric properties and readability of the reports' narratives. While it is plausible that the person who signs or co-signs may not be the only person who prepares the report, recent research has shown that shareholders perceive the report as a manifestation of a firm's CSR leadership (McCarthy, Oliver, & Song, 2017; Petrenko, Aime, Ridge, & Hill, 2016) and thus will be inclined to punish the firm for any CSR-linked violations (e.g. Christensen, 2016; Goss & Roberts, 2011). Based on the above rationale, we argue that those signing or co-signing the report have compensation and career incentives to play a significant role in influencing the tone of the report. With the CSR leader assuming the roles of both signer and de facto preparer, we henceforth use the gender of the person signing or co-signing the CSR report in determining the gender of the report's preparer.

We empirically test our hypotheses using textual analyses on a sample of 346 firms in the S&P500 index that issued annual CSR reports during the period of 2006 to 2015. We find that female signers, by issuing reports with greater number of words expressing solidarity, seek to address a broader group of stakeholders than do male signers. Meanwhile, male signers, by issuing reports with greater number of words expressing certainty, seek to convey a more confident outlook of the firm's CSR standing. In terms of readability, CSR reports with female signers are more readable than those with male signers. We also find that CSR report readability as well as the use of words expressing solidarity, but not certainty, are positively associated with firms' perceived future social performance.

Examining CSR report writing through the gender perspective of the signers, this study provides support for including greater female representation in the formation of firms' CSR reporting leadership teams. More broadly, our findings suggest that a firm's efforts to promote female representation, in the quest toward a gender-balanced CSR leadership team, may appeal to shareholders and other key stakeholders, and in turn, these stakeholders will be more inclined to perceive the firm as having higher CSR performance. Earlier studies showed a positive financial impact emanating from either a gender-diverse board (Gul, Srinidhi, & Ng, 2011) or better CSR disclosure readability (Muslu, Mutlu, Radhakrisnan, & Tsang, 2019). Nazari, Hrazdil, and Mahmoudian (2017) also demonstrated a positive association between CSR report readability and firms' contemporaneous CSR performance. Our study contributes to the stream of research in CSR disclosure by showing how gender differences in communication affect the narrative attributes of CSR reports, which in turn, could impact stakeholders' perceptions of firms' future social performance.

The rest of the paper is structured as follows. The next section discusses the relevant literature and presents our hypotheses. In the subsequent section, we describe our sample formation, present the descriptive statistics, results, and the robustness tests. In the final section, we summarize the findings and implications of our study.

2. Hypotheses and research questions

Upper echelons theory by Hambrick and Mason (1984) provides an important insight as to why organizations make certain choices. The theory suggests that personal characteristics of top executives (in such areas as experiences, values and personalities) play an essential role in steering the firms' strategic choices and directions (Hambrick, 2007; Hambrick & Mason, 1984). Similarly, from a CSR perspective, to understand firms' motivations, we should first consider the characteristics of those individuals who are making the CSR decisions.

Research in leadership studies (Eagly & Johannesen-Schmidt, 2001; Eagly, Johannesen-Schmidt, & Van Engen, 2003; Eagly & Johnson, 1990) have shown male leaders as generally more transactional (i.e., promoting compliance with goals and expectations) and more likely to adopt autocratic or directive leadership style. Female leaders, on the other hand, are generally seen as more relationship-oriented (i.e., communal) and more transformational (i.e., serving as a role model to improve employee engagement) and more likely to adopt democratic or participative leadership style.

Eagly's (1987) social role theory offers some explanations for gender differences in leadership. The theory has suggested that the traditional division of labor in society, in which men are breadwinners and women are homemakers, shapes people's expectations and beliefs for what are deemed the appropriate behavior of men and women. These expectations and beliefs result in the phenomenon of gender stereotyping (Eagly, 1987). The theory also suggests that ignoring others' expectations about how men and women should behave could lead to negative consequences (Eagly, Wood, & Diekman, 2000).

Linking social role theory with studies in leadership, Eagly and Karau (2002) introduced the role congruity theory of prejudice toward female leaders, arguing that female leaders suffer an inherent perceived incongruity between their traditional gender and leadership roles (Rudman, Moss-Racusin, Phelan, & Nauts, 2012). Female leaders who conform to their gender role (i.e., more communal and tending to the morale and welfare of others) are likely viewed as weak, thereby failing to meet the requirements of their leadership role. In contrast, female leaders who conform to their leadership role by adopting a male-agentic style could suffer negative reactions from their subordinates because of the cognitive conflicts arising from these leaders' perceived gender norm (Brescoll, 2016; Brescoll, Okimoto, & Vial, 2018). Such prejudice toward female leaders inadvertently affects their leadership styles. Ultimately, in seeking to realign both their conventional gender and leadership roles, women are more inclined to abandon their male leadership traits and instead adopt a participative leadership style (Eagly et al., 2003; Eagly & Johannesen-Schmidt, 2001; Eagly & Johnson, 1990).

How social role theory affects gender differences in leadership extends and mirrors those gender-based, stylistic differences observed in communication. Consistent with their traditional gender role, women use communication for enhancing social relationships and connections, while men use it for social dominance (Basow & Rubenfeld, 2003; Leaper, 1991; Maltz & Borker, 1982). Men also tend to be self-assertive and dominant, while women are tentative and social (Basow and Rubenfield, 2003). In linguistics, one approach (i.e., the *difference* approach) for examining gender differences in the use of language is to view men and women as members of different sociolinguistic subcultures (Maltz & Borker, 1982), and to focus on the differences in social beliefs and norms that influence language differences between men and women (Coates, 2013). Pajares (2003) and Pajares and Valiante (1999) examine the writing motivation and achievement at the middle school level and find that gender differences in writing style could be driven by differences in beliefs. This adheres to the linguistics literature attributing moral voices, empathy, and social values as the main drivers for gender differences in writing (Eisenberg, Martin, & Fabes, 1996; Matsui, 1994).

Prior philosophy and psychology literature also examined how being members of a gender group influences individuals' views on social responsibilities, ethics, and moral values. Gilligan (1982) introduced the concept of ethics of care, suggesting that women gravitate toward a greater sense of virtuous responsibility and moral interdependency than do men. The ethics of care views women as exhibiting awareness in attending and meeting the needs of others, thereby recognizing that human beings are dependent on one another (Held, 2006). Using the gender socialization theory (Stockard, 1999), Spence (2016) espouses women as more inclined to emphasize interpersonal relationship and the care for others than do men. Research in epistemology similarly show that women tend to view the world in terms of interpersonal connections characterized by responsibility, group membership, and solidarity (Belenky, Clinchy, Goldberger, & Tarule, 1986; Gilligan, 1982).

Consistent with prior studies examining gender differences in leadership and communication, the first characteristic of written

narratives that we examine is solidarity with readers. Hyland (2001) describes writing as a "social act," and therefore, effective written communications must show the writers' ability to engage with their audience. He suggests the use of inclusive and second person pronouns to build interpersonal relationship and solidarity with readers. Prior sociolinguistic studies find gender differences in writing with respect to the "involvement–informational" dimension (Biber, Conrad, & Reppen, 1998; Palander-Collin, 1999). "Involved" written documents contain features that typically express interactions between the writer and the reader and could better capture readers' attention. Biber et al. (1998) suggests that female writing is more "involved" while male writing is more "informational." Female writing tends to engage in a more personalized correspondence with greater social involvement while male writing focuses more on controlling the information conveyance process (Ishikawa, 2015; Poynton, 1989; Tannen, 1990).

Researchers have also found a sociolinguistic pattern toward the use of words that stress solidarity with readers in female writing (Holmes, 1984, 1988; Tannen, 1990). Female writers use more pronouns to establish connections between the writer and the readers, while male writers tend to use more nouns and noun specifiers (Argamon, Koppel, Fine, & Shimoni, 2003; Koppel, Argamon, & Shimoni, 2002; Newman, Groom, Handelman, & Pennebaker, 2008). Female writers tend to build a greater sense of personalization in their writing by using third-person, singular personal pronouns to make explicit connection to the gender of the subject of interest. In contrast, male writers have a greater tendency to use generic first personal pronouns.

The preceding discussion provides evidence to show that females' (vis-à-vis males') writing styles exhibit more solidarity with their audience using second (i.e., you) and third personal pronouns (i.e., she, he, or they) than first personal pronouns (i.e., I or we). Given the risk of significant adverse consequences (e.g., negative stock price reaction, loss of executive bonuses, or, even job losses) in the event of any CSR reporting missteps (Amernic & Craig, 2006; Christensen, 2016; Goss & Roberts, 2011), the top CSR leadership is less likely to delegate any communication with potentially significant reputational consequences to their subordinate preparers and/or professional writers. Facing such high stakes, a firm's top CSR leader will be likely to set the overall tone of the report. Thus, given the sociolinguistic differences, female CSR leaders (as signers of the CSR reports) are more likely to emphasize others than themselves (i.e., solidarity) in the course of determining how the reports are crafted than are their male counterparts. Our first hypothesis is thus put forth as follows:

H1. With firms' CSR leaders (as signers) determining how the CSR reports are written, female CSR leadership is positively associated with a writing style that expresses solidarity.

Prior communication studies have documented that men are more dominant and self-assertive than women (Cameron, 2014; Coates, 2013; Wood, Christensen, Hebl, & Rothgerber, 1997). In contrast, as women use communication to build social relationships and connections, they are more tentative than men (Basow and Rubenfield, 2003). Hedges are linguistic forms used when a speaker tries to mitigate the proposition being discussed. Lakoff (1975) shows that female communication styles, commonly associated with attributes such as politeness, deference, and camaraderie, are associated with hedges, and hence, less certainty. She argues that women generally believe that being forceful and strongly asserting themselves are not desirable feminine traits. Coates (2013) reviews multiple studies regarding the use of hedges and finds that women use more hedges than do men, describing female communication style as more tentative.

Applying the theories of gender differences to writing, Poynton (1989) indicates that male writing style contains *controlling* codes with the objective "to control things, events, and most crucially, people." Female writing style, on the other hand, comprises *corresponding* codes showing the "responsiveness to things, events, and particularly, people." Therefore, female writing is less assertive as compared to male writing. In a similar vein, Tannen (1990) ascribes male writing as focusing on providing a factual report with a masculine undertone, and female writing as building a rapport to maintain an ongoing relationship with the audience.

Consequently, as opposed to male writing that emphasizes certainty (e.g., precisely, absolutely, always, never), female writing is characterized by a greater use of hedges or words that make statements less assertive (e.g., maybe, almost, perhaps, somewhat). Since CSR leaders (as signers) are likely to determine how the CSR reports are written and female leaders are more likely to use words exhibiting tentativeness, female CSR leaders are thus less likely to use words conveying certainty. Our second hypothesis is put forth as follows:

H2. With firms' CSR leaders (as signers) determining how the CSR reports are written, female CSR leadership is negatively associated with the use of words expressing certainty.

In 2014, Grammarly, a leading company providing automated proofreading services, conducted a linguistics-based survey with over 3000 respondents to examine the gender difference in writing ability.[2] The results show that women, vis-à-vis men, are considered superior writers because women spend more time developing characters and providing thorough descriptions of their points, making their writing easier to read and understand. In academia, Hengel (2016) examines the readability and complexity of the abstracts of articles published in academic journals. She finds that women use simpler sentences and fewer complex words and show more clarity in their writing than do men. She also finds that this gender gap in readability tends to widen over the course of the peer review process.

Readability is the ease with which readers can understand the text and its intended message (Dale & Chall, 1949; Flesch, 1948; Loughran & McDonald, 2016; McLaughlin, 1969). Even though studies have so far documented overarching gender differences in writing (Pennebaker, 2011; Rubin & Green, 1992), to the best of our knowledge, there has been no study to date that examines how gender-based differences in social values and beliefs could affect the readability of written business reports, particularly in the realm of CSR reporting. Due to the limited evidence on the association between gender and readability in this regard, we explore the following research question instead of formulating a hypothesis:

RQ1. Is female leadership in CSR reporting associated with the readability of CSR reports?

Firms issue CSR reports largely in response to investors' demand for information and to influence investors' assessment of firm value (EY, 2016, 2017). Prior studies have generally shown a significant association between corporate disclosures and investors' assessment of firm value, and also between corporate disclosures and analysts' earnings forecasts, suggesting that disclosure properties are useful for investors and analysts in assessing firm value and predicting future earnings (e.g. Brooks & Oikonomou, 2018; Jiao, 2011). Muslu, Radhakrishnan, Subramanyam, and Lim (2015) also document the value relevance of information regarding future performance, as investors incorporate such information into the stock prices. In terms of CSR reporting, Dhaliwal, Radhakrishnan, Tsang, and Yang (2012) find an association between CSR report issuance and lower analyst forecast error, while Plumlee, Brown, Hayes, and Marshall (2015) show that a firm's voluntary environmental disclosure score is associated with the firm's value, proxied by the firm's cash flow and cost of equity components.

As companies strive to connect with their stakeholders through the CSR reports, more desirable textual characteristics in these reports could enhance communication with the target audience and strengthen the companies' reputation for addressing social issues, leading to a

[2] See https://www.thedailybeast.com/poll-women-are-better-writers-than-men

higher assessment of the firms' social performance by users such as the social-index rating agencies. Indeed, Nazari et al. (2017) previously find that increased CSR disclosure and a more readable CSR report are associated with better contemporaneous CSR performance. However, there have been no studies to date examining the association between psychometric properties and firms' *future* social performance. Arguably, better communication through the presence of more desirable textual characteristics in the report may signal corporate commitment to stakeholders, management confidence in addressing social issues, thereby providing a signal to stakeholders about better future social performance. To investigate the value relevance of psychometric properties of CSR reports (i.e., solidarity, certainty and readability) to stakeholders, we thus examine the relationship between these psychometric properties and firms' future perceived social performance by putting forth our second research question as follows:

RQ2. Are the solidarity, certainty, and readability of CSR reports associated with firms' future perceived social performance?

3. Tests and results

3.1. Sample formation

We downloaded CSR reports from the Corporate Register database and company websites. We converted all PDF files into TXT files. We deleted all photographs, captions, images, tags, logos, graphs, charts, tables, forms-of-address, greetings, file name references, line breaks, text-continuation and Unicode characters. We then used two computerized text analysis software, Linguistic Inquiry and Word Count (LIWC) 2015 (Pennebaker, Boyd, Jordan, & Blackburn, 2015), and DICTION 6.0 (Hart & Carrol, 2012), to construct our psychometric properties and readability measures. Each program contains separate repositories of words representing the different psychological and cognitive processes that, when used together, help us measure our variables. We chose the firms listed on the Standard and Poor (S&P) 500 index because they represent 80% of the market capitalization in the United States. We collected 2060 CSR reports across 361 firms issuing CSR reports during the ten-year period from 2006 to 2015. We manually examined whether the person signing (co-signing) the CSR report is male or female.[3]

We merged the CSR report sample with several datasets: Compustat and CRSP for financial information and stock returns, MSCI ESG (KLD) Stats for environment, social, and governance (ESG) scores, Institutional Shareholder Services (ISS) for female representation in corporate boards and audit committees, I/B/E/S for the number of analysts following, and Thomson 13F for the percentage of institutional ownership. Our final sample consists of 1807 firm-years across 346 firms from 2006 to 2015.

3.2. Main variables

3.2.1. Psychometric properties of narratives

We examine writing styles with respect to the two psychometric properties of solidarity and certainty. We use two variables (proxies) to measure solidarity. OTHER-REFERENCE is the percentage of pronouns referencing others (i.e., you, he, she, they) relative to the total word count. SELF-REFERENCE is a self-focused (i.e., opposite) measure of OTHER-REFERENCE, defined as the standardized z-score for first-person reference words (i.e., I, me, my, mine, myself).[4] Solidarity is considered higher when OTHER-REFERENCE (SELF-REFERENCE) is higher (lower).

We use three variables to measure certainty. OPTIMISM is the standardized z-score related to words endorsing persons, groups, concepts or events, thereby highlighting their positive entailments. CERTAIN is the percentage of certainty words (e.g., always, never) indicating resoluteness, inflexibility, completeness, and tendency to speak ex cathedra relative to the total word count. Certainty is higher when one positively believes he/she can control the outcome with greater certainty. TENTATIVE is the percentage of hedge words (e.g., doubt, perhaps, maybe) relative to the total word count, hence an opposite measure of CERTAIN. Certainty is thus higher when CERTAIN or OPTIMISM (TENTATIVE) is higher (lower). In constructing the linguistic measures, we use the outputs from the LIWC software, except for SELF-REFERENCE and OPTIMISM that were constructed from the DICTION software.[5]

3.2.2. Readability measure

We use the SMOG (Simple Measure of Gobbledygook) index (McLaughlin, 1969) and the FOG index (Gunning, 1952). We construct these indexes using the outputs from the LIWC software. The SMOG index is computed as 1.043 * ((number of polysyllables) * (30/number of sentences))$^{0.5}$ + 3.129. The FOG index is computed as 0.4 * (words per sentence + percentage of complex words). SMOG and FOG indexes estimate the number of years in formal education a person needs to understand the text. Both index values increase as the number of words and complex words increases. Higher values of SMOG and FOG indexes suggest lower readability. Since SMOG and FOG measures are both unidirectional, we average our SMOG and FOG index values to compute readability.

3.2.3. Alternative measures of female leadership

We construct three different measures of female leadership in CSR reporting. Our first, main measure is a dummy variable for female sole signer or co-signer of a CSR report (WSIGNED). Our second measure is a dummy variable for female chief executive officer (WCEO). A third measure uses PCTWBOARD, defined as the number of female directors serving on the corporate board divided by the total number of directors.

3.2.4. Measures of firms' future social performance

For firms' future social performance, similar to prior studies (Muslu et al., 2019; Nazari et al., 2017; Wang, Hsieh, & Sarkis, 2017), we use one-year ahead CSR score difference, i.e. CSR strengths minus CSR concerns, from the Morgan Stanley Capital International–Environmental, Social and Corporate Governance (MSCI ESG) or KLD Stats (CSR(t + 1)). We also use the one-year-ahead ESG total scores compiled by the Bloomberg ESG (ESG(t + 1)).[6]

3.3. Control variables

There has been a movement toward standardization of CSR reports for a more uniform, informative, and transparent reporting model guided by the Global Reporting Initiative (GRI) standards (e.g., Brown, de Jong, & Lessidrenska, 2009; Etzion & Ferraro, 2010). Therefore, we include an indicator variable (DGRI) for firms issuing their CSR reports according to the GRI standards. To control for firm characteristics, we include variables measuring firm size (total assets [SIZE] and net revenues [REV]), financial leverage (total debt to total assets [LEV]), investment decisions (research and development expense [RNDR], advertising expense [ADVR], capital expenditures [CAPXR]),

[3] For signers with unisex first names, two research assistants and a co-author unanimously assigned their gender based on visual inspections of the signers' photos on their company or related websites.

[4] The standardized z-score takes into account the variability in the CSR report length.

[5] For comparability, we standardize all variables obtained from the LIWC and DICTION software.

[6] Firms typically issue their official CSR reports once a year (see https://www.imanet.org/-/media/0830fcd907cd41a7bd760b8900fe7b94.ashx), and these firms' CSR (and ESG) performance is formally reviewed by the rating agency annually, based on the issuing companies' official CSR reports (see https://www.msci.com/eqb/methodology/meth_docs/Executive_Summary_MSCI_ESG_Ratings_Methodology.pdf). Therefore, our samples' data variables are only available on a yearly basis, rendering t + 1 as the shortest time frame we could formally use to draw future social performance inferences.

Please cite this article as: M.A. Harjoto, I. Laksmana and W.E. Lee, Female leadership in corporate social responsibility reporting: Effects on writing, readability and ..., Advances in Accounting, https://doi.org/10.1016/j.adiac.2020.100475

Table 1
Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max	WSIGNED	NON-WSIGNED	t-statistics
OTHER-REFERENCE	1807	0.567	0.313	0	2.43	0.66	0.56	3.63***
SELF-REFERENCE	1807	0.604	2.120	0	50.62	0.40	0.62	−2.16**
OPTIMISM	1807	51.469	2.313	36.02	76.22	51.30	51.48	−0.86
CERTAIN	1807	1.027	0.253	0	3.34	0.939	1.033	−4.21***
TENTATIVE	1807	0.931	0.279	0	3.6	0.93	0.90	2.18**
SMOG	1807	20.246	6.803	6.204	91.964	18.96	20.35	−2.28**
FOG	1807	20.299	6.791	4.141	98.199	19.04	20.40	−2.23**
WSIGNED	1807	0.074	0.262	0	1	1	0	–
WCEO	1807	0.077	0.267	0	1	1	0	–
PCTWBOARD	1807	0.180	0.087	0	0.556	0.26	0.17	10.65***
CSR(t + 1)	1807	2.853	4.215	−10	19	4.08	2.75	3.52***
ESG(t + 1)	1807	37.736	13.114	5.785	77.272	40.56	37.51	2.59***
DGRI	1807	0.835	0.372	0	1	0.90	0.83	2.22**
SIZE	1807	10.017	1.265	7.082	14.761	10.39	9.99	3.55***
REV	1807	9.538	1.159	6.523	13.089	9.76	9.52	2.26**
LEV	1807	24.045	13.987	0	81.048	29.78	23.59	4.96***
RNDR	1807	3.513	6.175	0	45.091	1.69	3.66	−3.56***
ADVR	1807	1.273	2.676	0	27.334	1.02	1.29	−1.12
CAPXR	1807	9.022	12.711	0	77.703	9.32	9.00	0.28
ROA	1807	0.065	0.065	−0.632	0.349	0.06	0.07	−0.93
FIRMAGE	1807	42.236	24.808	0	90	41.57	42.29	−0.32
HHI	1807	0.939	0.060	0.234	0.989	0.92	0.94	−2.97****
SALEGRW	1807	0.089	0.336	−0.920	0.985	0.07	0.09	−0.75
RISK	1807	1.801	0.902	0.608	10.913	1.58	1.82	−2.97***
PCTINSTI	1807	72.351	14.774	0.056	100	67.04	72.78	−4.34***
PCTINDEP	1807	83.693	8.996	41.67	100	84.64	83.62	1.26
LOGANAL	1807	2.627	0.538	0.452	4.001	2.59	2.63	−0.76
# Analyst followings	1807	15.802	7.929	1.5	54.667	15.78	16.01	−0.31
Mining	1807	0.062	0.241	0	1	0	0.07	−3.09***
Construction	1807	0.009	0.094	0	1	0	0.01	−1.14
Manufacturing	1807	0.474	0.499	0	1	0.34	0.48	−3.16***
Transport	1807	0.183	0.387	0	1	0.25	0.18	2.19**
Wholesale	1807	0.013	0.115	0	1	0.01	0.01	−0.17
Retail	1807	0.073	0.260	0	1	0.03	0.08	−1.99**
Finance	1807	0.091	0.287	0	1	0.13	0.09	1.83*
Service	1807	0.085	0.278	0	1	0.22	0.07	6.07***
PublicAdm	1807	0.004	0.066	0	1	0	0.005	0.82

***, **, and * represent statistically significant at 1%, 5%, and 10% level. See Appendix A for variable definitions.

profitability (return on assets [ROA]) and reputational capital (firm age [FIRMAGE]). Other control variables that may influence firms' reporting quality include product market competition (the Herfindahl-Hirschman index [HHI]), firm growth (annual revenue growth rate [SALEGRW]), and firm risk (the volatility of daily stock returns [RISK]).

Finally, we include three corporate governance measures: the percentage of institutional ownership (PCTINSTI); the percentage of independent directors on the board (PCTINDEP), a proxy for board monitoring effectiveness; and the number of analysts following (LOGANAL), a proxy for external monitoring by analysts. Appendix A provides a list of the variable definitions.

3.4. Descriptive statistics and univariate results

Table 1 reports the descriptive statistics of the dependent and independent variables in the regression models and the *t*-tests for the differences in the values for the sample firms with female executives and those with only male executives signing the CSR reports. CSR reports with female signers have greater number of solidarity words (OTHER-REFERENCE) and fewer first-person reference words (SELF-REFERENCE). Also, CSR reports with female signers have fewer certainty words (CERTAIN) and more words indicating hedges (TENTATIVE) than those with only male signers. We also find that the average values of the SMOG and FOG indexes are 20.246 and 20.299 years, respectively. Firms with female signers have significantly lower values of SMOG and FOG index scores (18.96 and 19.04 years), or more readable CSR reports, than those with only male signers (20.35 and 20.40 years). We also find that firms with female signers are more likely to adopt GRI reporting standards and have higher future social performance (i.e., CSR and ESG scores). All these differences are statistically significant at the 0.05 level or better. Overall, the univariate results suggest that the gender of the CSR leaders (as CSR report signers) is associated with the tone and readability of the CSR reports, and in turn, with future social performance. The univariate results provide preliminary support for our hypotheses and research questions.

We also find that firms with female signers tend to be larger, have higher financial leverage and lower R&D investments. Firms with female signers also tend to operate in less competitive product markets (HHI), have lower risk and a lower percentage of institutional ownership. We find that female signers vary across different industries (sectors), and therefore, we include industry dummy variables in all regressions to control for industry differences.

Table 2 provides correlation coefficients among all variables used in this study. WSIGNED and WCEO are each positively correlated with greater number of solidarity words (OTHER-REFERENCE) and negatively correlated with words endorsing persons, groups, concepts or events (OPTIMISM). WSIGNED and WCEO are also each correlated negatively with SMOG and FOG, suggesting that the presence of female leaders is associated with higher readability (i.e., lower SMOG and FOG index scores).

3.5. Regression results

Table 3 reports the ordinary least square (OLS) regression results for measuring solidarity in CSR reports. Compared to those with male-only signers, reports with a female signer (WSIGNED) show 7.5% more

Table 2
Correlation coefficients.

No	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	OTHER-REFERENCE	1												
2	SELF-REFERENCE	−0.0344	1											
3	OPTIMISM	−0.0501*	−0.0015	1										
4	CERTAIN	0.0032	0.0089	0.0143	1									
5	TENTATIVE	0.0165	0.0391	0.1360*	0.0028	1								
6	SMOG	−0.1731*	−0.0159	0.0822*	−0.0129	−0.2722*	1							
7	FOG	−0.2095*	−0.0155	0.0732*	−0.0139	−0.2801*	0.9779*	1						
8	WSIGNED	0.0852*	−0.0273	−0.0987*	−0.0202	−0.0278	−0.0536*	−0.0525*	1					
9	WCEO	0.0826*	−0.0274	−0.0970*	−0.0214	−0.0266	−0.0518*	−0.0506*	0.9766*	1				
10	PCTWBOARD	0.0079	−0.0024	0.0128	−0.0331	0.0341	−0.1024*	−0.1027*	0.2431*	0.2464*	1			
11	CSR(t + 1)	−0.0187	−0.0116	−0.0483*	−0.0132	0.0336	−0.0725*	−0.0778*	0.0825*	0.0754*	0.2656*	1		
12	ESG(t + 1)	−0.2107*	0.0197	0.0159	0.0195	0.1702*	−0.2036*	−0.2045*	0.0610*	0.0598*	0.1862*	0.3316*	1	
13	DGRI	−0.0992*	0.0231	−0.0215	0.0181	0.0912*	−0.1047*	−0.0991*	0.0521*	0.0566*	0.018	0.0668*	0.2198*	1
14	SIZE	0.0208	0.0249	−0.1083*	0.0159	0.0372	−0.1115*	−0.1087*	0.0832*	0.0809*	0.1124*	0.0121	0.2740*	0.0206
15	REV	0.0470*	0.0022	−0.0356	0.0067	−0.0048	−0.1593*	−0.1613*	0.0532*	0.0539*	0.1730*	0.0134	0.2579*	−0.0086
16	LEV	−0.0777*	−0.014	−0.0276	−0.0285	−0.0278	0.0263	0.029	0.1160*	0.1119*	0.0546*	−0.0747*	−0.0292	−0.0517*
17	RNDR	−0.0710*	−0.0169	−0.0203	−0.0391	−0.0173	0.1475*	0.1359*	−0.0836*	−0.0879*	−0.0178	0.2664*	0.0707*	0.0659*
18	ADVR	0.0641*	−0.0359	0.0095	0.0132	−0.0652*	−0.022	−0.0357	−0.0263	−0.0256	0.1365*	0.1658*	0.0778*	0.0016
19	CAPXR	−0.1454*	0.0599*	−0.0448	0.0053	0.0776*	−0.0213	−0.0198	0.0066	0.004	−0.1183*	−0.1256*	0.0922*	0.0283
20	ROA	0.0336	−0.0147	0.0621*	0.0049	−0.0067	−0.0134	−0.0205	−0.022	−0.0205	0.0139	0.1198*	0.0231	−0.0171
21	FIRMAGE	−0.1624*	0.0123	−0.0262	0.0016	0.0185	−0.0930*	−0.0898*	−0.0075	−0.0099	0.1522*	0.0219	0.2042*	0.0879*
22	HHI	0.0624*	0.0158	−0.1024*	−0.0292	0.0473*	0.0159	0.0112	−0.0697*	−0.0705*	−0.0356	−0.0031	−0.0349	−0.0042
23	SALEGRW	−0.0205	−0.0063	0.0106	−0.0104	0.0211	−0.0061	−0.0056	−0.0177	−0.0172	0.0143	0.038	0.0079	0.0053
24	RISK	−0.0182	−0.0101	0.0608*	0.0244	0.0163	0.0429	0.0493*	−0.0699*	−0.0657*	−0.1797*	−0.2049*	−0.1500*	0.0907*
25	PCTINSTI	0.0201	0.0059	0.0660*	−0.0313	0.0027	0.0868*	0.0951*	−0.1018*	−0.0975*	−0.1410*	−0.0069	−0.1564*	−0.0033
26	PCTINDEP	−0.0057	0.0245	−0.0388	−0.0441	0.0177	−0.0458	−0.0379	0.0298	0.0283	0.1164*	0.0577*	0.1467*	−0.0168
27	LOGANAL	0.0934*	0.0267	0.0443	−0.0176	0.0586*	0.0096	0.0067	−0.0179	−0.0294	0.0531*	0.2268*	0.1988*	−0.1388*

No	Variables	14	15	16	17	18	19	20	21	22	23	24	25	26
14	SIZE	1												
15	REV	0.7646*	1											
16	LEV	−0.0655*	−0.1395*	1										
17	RNDR	−0.1196*	−0.1357*	−0.2026*	1									
18	ADVR	−0.0708*	0.0088	0.0104	0.0027	1								
19	CAPXR	0.0698*	−0.1556*	0.1510*	−0.1867*	−0.1559*	1							
20	ROA	−0.2300*	0.0316	−0.2613*	0.1913*	0.1324*	−0.2800*	1						
21	FIRMAGE	0.2304*	0.2918*	0.0557*	−0.0768*	−0.0015	0.0544*	−0.0111	1					
22	HHI	0.0853*	−0.0549*	−0.018	−0.0195	−0.1579*	0.1855*	−0.1038*	−0.0914*	1				
23	SALEGRW	−0.0115	−0.0193	0.0142	0.03	−0.0102	0.0036	0.0427	−0.0139	0.0458	1			
24	RISK	−0.0517*	−0.0797*	−0.1167*	0.0292	−0.0679*	−0.0109	−0.1741*	−0.1798*	0.0056	−0.0299	1		
25	PCTINSTI	−0.3422*	−0.3128*	−0.0629*	0.0579*	−0.015	−0.037	−0.0113	−0.2281*	−0.0562*	0.0536*	0.2210*	1	
26	PCTINDEP	0.1033*	0.0588*	0.1129*	0.0086	−0.1928*	0.0932*	−0.0435	0.2372*	0.1384*	0.0068	−0.1423*	0.021	1
27	LOGANAL	0.1913*	0.2046*	−0.1519*	0.1974*	0.0668*	0.0497*	0.1004*	−0.0931*	0.0229	0.0359	−0.2671*	−0.1164*	0.026

* Statistically significant at 5% level.

Table 3
The Relationships between Female Signers (Leaders) and Solidarity in CSR Reports' Narratives.

	OTHER- REFERENCE	SELF-REFERENCE	OTHER-REFERENCE	SELF-REFERENCE	OTHER-REFERENCE	SELF-REFERENCE
WSIGNED	0.07476	−0.22890				
	(2.56)**	(1.93)*				
WCEO			0.06910	−0.21621		
			(2.42)**	(1.88)*		
PCTWBOARD					0.17513	−0.13547
					(2.21)**	(1.74)*
DGRI	−0.06418	0.14408	−0.06407	0.14404	−0.05792	0.12980
	(2.80)***	(1.40)	(2.79)***	(1.40)	(2.52)**	(1.31)
SIZE	−0.03957	0.16021	−0.03937	0.15966	−0.03973	0.15769
	(1.88)*	(2.15)**	(1.89)*	(2.14)**	(1.92)*	(2.12)**
REV	0.03353	−0.15029	0.03344	−0.14995	0.03725	−0.15534
	(1.53)	(1.95)*	(1.54)	(1.94)*	(1.73)*	(1.95)*
LEV	−0.00107	−0.00193	−0.00106	−0.00196	−0.00097	−0.00222
	(1.58)	(0.67)	(1.57)	(0.68)	(1.43)	(0.76)
RNDR	−0.00397	−0.01324	−0.00397	−0.01326	−0.00397	−0.01294
	(2.99)***	(1.33)	(2.99)***	(1.33)	(2.99)***	(1.30)
ADVR	0.00704	−0.01995	0.00702	−0.01991	0.00762	−0.01987
	(2.70)***	(1.74)*	(2.69)***	(1.74)*	(2.91)***	(1.67)*
CAPXR	−0.00112	0.00740	−0.00112	0.00741	−0.00102	0.00709
	(1.62)	(0.73)	(1.62)	(0.74)	(1.50)	(0.70)
ROA	−0.13430	0.22522	−0.13351	0.22347	−0.13472	0.20058
	(1.34)	(0.45)	(1.33)	(0.45)	(1.31)	(0.41)
FIRMAGE	−0.00087	0.00100	−0.00087	0.00099	−0.00086	0.00108
	(2.77)***	(0.60)	(2.76)***	(0.60)	(2.68)***	(0.64)
HHI	−0.01080	0.48903	−0.01409	0.49547	−0.07908	0.67167
	(0.11)	(0.88)	(0.14)	(0.89)	(0.82)	(1.12)
SALEGRW	−0.02065	−0.02696	−0.02072	−0.02678	−0.02041	−0.02526
	(0.92)	(0.23)	(0.92)	(0.23)	(0.90)	(0.22)
RISK	−0.02431	−0.08114	−0.02434	−0.08109	−0.02691	−0.07775
	(2.11)**	(1.32)	(2.11)**	(1.32)	(2.31)**	(1.25)
PCTINSTI	0.00009	0.00467	0.00008	0.00469	−0.00006	0.00502
	(0.17)	(2.22)**	(0.15)	(2.22)**	(0.12)	(2.34)**
PCTINDEP	0.00226	0.00025	0.00226	0.00027	0.00253	−0.00016
	(2.26)**	(0.08)	(2.26)**	(0.09)	(2.51)**	(0.05)
LOGANAL	0.10070	0.15594	0.10064	0.15584	0.09413	0.17107
	(4.53)***	(1.69)*	(4.52)***	(1.69)*	(4.23)***	(1.87)*
Intercept	0.55265	−0.10938	0.55325	−0.10950	0.60387	−0.20907
	(3.79)***	(0.12)	(3.80)***	(0.12)	(4.10)***	(0.23)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807
R-squared	0.16846	0.01887	0.16809	0.01882	0.16696	0.01818

***, **, and * represent statistically significant at 1%, 5%, and 10% level.

solidarity words, i.e., you, he, she and they (OTHER-REFERENCE), and are 22.9% lower in the standardized z-scores for words referring to self, i.e., I and we (SELF-REFERENCE).[7] Our results suggest that female CSR leaders adopt a writing style that expresses greater solidarity with their audience, potentially making better connection with stakeholders, than their male counterparts. The results provide support for H1. Results remain unchanged when we use WCEO or PCTWBOARD as the proxy for female leaders in CSR reporting.

Table 4 presents the OLS regression results for measuring use of words expressing certainty (CERTAIN), positive endorsement (OPTIMISM), as well as the use of hedges (TENTATIVE) in CSR reports. The coefficients of WSIGNED are negative and statistically significant for both the regressions of CERTAIN and OPTIMISM. The results suggest that, compared to CSR reports with male signers, those with female signers (WSIGNED) use 7.3% fewer words expressing certainty (CERTAIN), and fewer words highlighting accomplishments (OPTIMISM). In addition, WSIGNED are associated with 3.8% greater use of hedges (TENTATIVE), making statements less assertive or forceful. Overall, the results support H2. Results remain unchanged when we use WCEO or PCTBOARD as the proxy for female leaders in CSR reporting.

Table 5 presents the OLS regression results for the readability indexes. The SMOG and FOG index scores are reduced by 1.09837 and 1.05346 years (i.e., increased readability), respectively, when CSR reports are signed by female CSR leaders. These figures represent a reduction of more than 5% of the mean of SMOG and FOG index scores (20.246 and 20.299, respectively). Overall, in answering RQ1, we find a positive association between female CSR leaders and CSR report readability.[8] We find a similar positive association using WCEO or PCTWBOARD as the proxy for female leaders in CSR reporting.[9,10]

In Table 6, we examine the association of each of the three attributes (i.e., solidarity, certainty and readability) with two future perceived social performance measures (i.e., CSR and ESG scores). As put forth by our second research question, we would like to examine whether

[7] We also performed additional analysis to examine the use of personal self-references ("we" vs. "I) between female and male CSR leaders. Our results suggest that the female leaders show a greater tendency to use the more inclusive word "we," while the male leaders show a greater tendency to use the word "I," when making self-reference.

[8] For robustness check, we further removed commonly used sustainability-related words like "sustainability," "sustainable," and "sustainably" from the CSR reports in measuring readability. Untabulated results remain qualitatively consistent with the main findings and our conclusions remain unchanged.

[9] To control for the CSR reports' content, which are likely to be driven by CSR activities, we further used contemporaneous CSR and ESG scores for Tables 3, 4 and 5 to control for CSR actions of the leaders. Untabulated results are consistent with the main findings and our conclusions remain unchanged.

[10] We re-ran the regressions in Tables 3, 4, and 5 without the control variables. Untabulated results of these analyses show that coefficients of the main independent variables remain statistically significant and have the expected signs.

Please cite this article as: M.A. Harjoto, I. Laksmana and W.E. Lee, Female leadership in corporate social responsibility reporting: Effects on writing, readability and ..., Advances in Accounting, https://doi.org/10.1016/j.adiac.2020.100475

Table 4
The relationships between female signers (Leaders) and certainty in CSR reports' narratives.

	CERTAIN	OPTIMISM	TENTATIVE	CERTAIN	OPTIMISM	TENTATIVE	CERTAIN	OPTIMISM	TENTATIVE
WSIGNED	−0.07316	−0.35142	0.03802						
	(4.04)***	(1.73)*	(1.84)*						
WCEO				−0.07008	−0.34990	0.02651			
				(4.00)***	(1.78)*	(2.06)**			
PCTWBOARD							−0.12515	−0.98908	0.17541
							(1.89)*	(1.92)*	(2.10)**
DGRI	0.00717	0.14717	0.07661	0.00721	0.14814	0.08360	0.00161	0.13982	0.07992
	(0.39)	(0.99)	(3.73)***	(0.39)	(1.00)	(4.13)***	(0.09)	(0.95)	(3.98)***
SIZE	−0.00589	0.07770	0.03582	−0.00606	0.07710	0.03575	−0.00608	0.06476	0.03672
	(0.49)	(0.66)	(2.33)**	(0.50)	(0.66)	(2.30)**	(0.49)	(0.55)	(2.35)**
REV	−0.01042	−0.03905	−0.03703	−0.01030	−0.03826	−0.03545	−0.01333	−0.02792	−0.03862
	(0.80)	(0.31)	(2.39)**	(0.79)	(0.30)	(2.27)**	(1.00)	(0.22)	(2.42)**
LEV	−0.00030	−0.00869	−0.00084	−0.00031	−0.00871	−0.00082	−0.00039	−0.00916	−0.00085
	(0.59)	(1.78)*	(1.39)	(0.60)	(1.79)*	(1.37)	(0.77)	(1.87)*	(1.42)
RNDR	−0.00487	−0.01878	−0.00078	−0.00488	−0.01885	−0.00081	−0.00484	−0.01743	−0.00089
	(3.31)***	(1.70)*	(0.58)	(3.32)***	(1.70)*	(0.59)	(3.27)***	(1.58)	(0.64)
ADVR	−0.00268	0.00732	−0.00640	−0.00268	0.00732	−0.00651	−0.00304	0.01301	−0.00725
	(1.12)	(0.34)	(2.89)***	(1.12)	(0.34)	(2.93)***	(1.25)	(0.60)	(3.23)***
CAPXR	−0.00040	0.00646	−0.00006	−0.00040	0.00650	0.00005	−0.00049	0.00593	0.00002
	(0.48)	(1.05)	(0.07)	(0.47)	(1.06)	(0.06)	(0.59)	(0.97)	(0.03)
ROA	0.09969	0.73926	0.21252	0.09928	0.73921	0.21569	0.09711	0.62401	0.22316
	(1.05)	(0.62)	(2.20)**	(1.04)	(0.62)	(2.21)**	(1.00)	(0.53)	(2.26)**
FIRMAGE	−0.00023	−0.00046	0.00033	−0.00023	−0.00049	0.00030	−0.00023	0.00011	0.00026
	(0.81)	(0.19)	(0.98)	(0.82)	(0.19)	(0.88)	(0.82)	(0.04)	(0.74)
HHI	−0.04279	−1.43587	0.01254	−0.04149	−1.43988	−0.03722	0.02097	−1.23432	−0.00515
	(0.38)	(1.12)	(0.12)	(0.37)	(1.12)	(0.35)	(0.18)	(0.97)	(0.05)
SALEGRW	0.01284	−0.01605	0.01468	0.01289	−0.01597	0.01499	0.01289	−0.00619	0.01421
	(0.70)	(0.10)	(0.69)	(0.70)	(0.10)	(0.71)	(0.71)	(0.04)	(0.68)
RISK	0.01511	−0.00648	0.02463	0.01512	−0.00656	0.02356	0.01713	−0.01496	0.02578
	(1.62)	(0.07)	(2.05)**	(1.62)	(0.07)	(2.01)**	(1.80)*	(0.15)	(2.22)**
PCTINSTI	0.00024	−0.00558	0.00077	0.00025	−0.00558	0.00069	0.00038	−0.00542	0.00078
	(0.57)	(1.49)	(1.39)	(0.58)	(1.48)	(1.25)	(0.87)	(1.45)	(1.42)
PCTINDEP	−0.00074	−0.00919	0.00004	−0.00073	−0.00915	0.00022	−0.00095	−0.00854	−0.00001
	(0.89)	(1.43)	(0.05)	(0.88)	(1.43)	(0.26)	(1.15)	(1.33)	(0.01)
LOGANAL	0.02124	−0.26785	0.02417	0.02114	−0.26913	0.01983	0.02709	−0.25949	0.02367
	(1.16)	(1.52)	(1.27)	(1.15)	(1.53)	(1.05)	(1.44)	(1.48)	(1.25)
Intercept	1.32159	53.13826	0.53425	1.32191	53.14474	0.58682	1.27805	53.15592	0.55196
	(7.80)***	(40.26)***	(4.07)***	(7.79)***	(40.25)***	(4.51)***	(7.43)***	(40.31)***	(4.26)***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807	1807	1807	1807
R-squared	0.07903	0.02324	0.05291	0.07882	0.02329	0.05045	0.07546	0.02299	0.05241

***, **, and * represent statistically significant at 1%, 5%, and 10% level.

characteristics exhibited by the three attributes have an impact on future CSR and ESG scores.

We run two-stage least square regressions (2SLS). The first stage regressions model the determinants of the three attributes of CSR narratives. The independent variables in the first stage regressions are the overall measure of solidarity (OTHER-REFERENCE minus SELF-REFERENCE, both are stated in standardized z-scores), the overall measure of certainty (CERTAIN plus OPTIMISM minus TENTATIVE, all are stated in standardized z-scores), and the average readability index (the average of SMOG and FOG index values). Panel A of Table 6 reports the results. Consistent with our main results in Tables 3, 4 and 5, WSIGNED are associated with greater solidarity with the audience, fewer words expressing certainty, and greater readability.[11]

Panel B of Table 6 reports the second stage regressions of future (i.e. one year ahead) CSR score (i.e., CSR(t + 1)) and ESG score (i.e., ESG(t + 1)) on the three attributes of CSR reports. We find that our overall measure of solidarity (OTHER-REFERENCE minus SELF-REFERENCE) is positively associated with both CSR(t + 1) and ESG(t + 1). However, we find that our overall measure of certainty (CERTAIN plus OPTIMISM minus TENTATIVE) is not associated with both CSR(t + 1) and ESG (t + 1). Finally, we find that readability is positively associated with CSR(t + 1), but not with ESG(t + 1). Overall, in answering RQ2, our mixed results present a nuanced interpretation, suggesting that only solidarity and readability, but not certainty, are positively associated with the firms' future perceived social performance. We find similar results using WCEO or PCTWBOARD as the proxy for female leaders in CSR reporting.

3.6. Robustness tests

We conduct several tests to check the robustness of our results. First, we re-estimate our models using the fixed-effect panel data regressions (not tabulated). Results remain consistent with those in Tables 3, 4 and 5. Second, we exclude utility and financial firms from our sample as they operate in industries that are subjected to more stringent regulatory requirements and social responsibility reporting. Our results (not tabulated) are consistent with those of the main analyses. Third, since CSR reports vary in length, we add the word count as a control variable and re-run our regressions. Again, the results are consistent with

[11] We use three combined variables (OTHER-REFERENCE minus SELF-REFERENCE, CERTAIN plus OPTIMISM minus TENTATIVE, and {SMOG plus FOG} divided by 2) for our three respective composite textual characteristics (i.e., solidarity, certainty and readability) to use in the second stage of the 2SLS regressions. If we do not combine these variables, we will have two individual proxies for solidarity (OTHER-REFERENCE and SELF-REFERENCE), three individual proxies for certainty (CERTAIN, OPTIMISM, and TENTATIVE), and two individual proxies for readability (SMOG and FOG). Running these seven proxies separately will render the results-reporting too cumbersome. Nonetheless, our results from regressing the individual variables (both with and without the control variables) remain consistent with those reported in Table 6.

Please cite this article as: M.A. Harjoto, I. Laksmana and W.E. Lee, Female leadership in corporate social responsibility reporting: Effects on writing, readability and ..., Advances in Accounting, https://doi.org/10.1016/j.adiac.2020.100475

Table 5
The Relationships between Female Signers (Leaders) and CSR Reports' Readability.

	SMOG	FOG	SMOG	FOG	SMOG	FOG
WSIGNED	−1.09837	−1.05346				
	(2.61)***	(2.45)**				
WCEO			−0.96130	−0.91568		
			(2.35)**	(2.19)**		
PCTWBOARD					−6.00754	−5.60074
					(3.11)***	(3.00)***
DGRI	−1.99383	−1.87449	−1.99849	−1.87933	−1.98127	−1.86441
	(4.11)***	(3.63)***	(4.12)***	(3.64)***	(4.12)***	(3.63)***
SIZE	0.24893	0.31564	0.24523	0.31200	0.18642	0.25691
	(0.83)	(0.99)	(0.82)	(0.98)	(0.62)	(0.81)
REV	−0.87829	−0.95354	−0.87781	−0.95318	−0.79751	−0.87861
	(2.39)**	(2.44)**	(2.39)**	(2.44)**	(2.14)**	(2.22)**
LEV	0.02313	0.02371	0.02291	0.02349	0.02164	0.02229
	(1.76)*	(1.70)*	(1.74)*	(1.68)*	(1.64)	(1.59)
RNDR	0.18251	0.15980	0.18256	0.15987	0.18893	0.16584
	(3.85)***	(4.36)***	(3.85)***	(4.36)***	(3.94)***	(4.45)***
ADVR	−0.04827	−0.08169	−0.04785	−0.08126	−0.01688	−0.05233
	(0.68)	(1.09)	(0.67)	(1.08)	(0.23)	(0.68)
CAPXR	−0.03391	−0.04033	−0.03398	−0.04041	−0.03574	−0.04208
	(1.28)	(1.41)	(1.28)	(1.41)	(1.34)	(1.47)
ROA	−1.00022	−1.01980	−1.01976	−1.03946	−1.54908	−1.53578
	(0.35)	(0.35)	(0.36)	(0.35)	(0.53)	(0.52)
FIRMAGE	−0.00405	−0.00449	−0.00403	−0.00447	−0.00121	−0.00183
	(0.48)	(0.52)	(0.48)	(0.51)	(0.14)	(0.21)
HHI	−1.44180	−1.48919	−1.35193	−1.39810	−1.00389	−1.05858
	(0.68)	(0.67)	(0.63)	(0.63)	(0.48)	(0.49)
SALEGRW	−0.27331	−0.28931	−0.27162	−0.28762	−0.22481	−0.24377
	(0.66)	(0.68)	(0.66)	(0.67)	(0.55)	(0.57)
RISK	−0.22218	−0.14978	−0.22131	−0.14890	−0.28195	−0.20527
	(1.02)	(0.68)	(1.02)	(0.68)	(1.28)	(0.93)
PCTINSTI	0.01580	0.02000	0.01600	0.02020	0.01542	0.01969
	(0.91)	(1.39)	(0.92)	(1.41)	(0.89)	(1.38)
PCTINDEP	−0.03617	−0.03316	−0.03619	−0.03320	−0.03099	−0.02837
	(1.89)*	(1.78)*	(1.89)*	(1.78)*	(1.66)*	(1.53)
LOGANAL	−0.27916	−0.19334	−0.27489	−0.18885	−0.28924	−0.20101
	(0.60)	(0.42)	(0.59)	(0.41)	(0.62)	(0.44)
Intercept	25.41774	24.55088	25.38887	24.52085	25.88878	24.97968
	(7.03)***	(7.23)***	(7.03)***	(7.22)***	(7.17)***	(7.37)***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807
R-squared	0.08509	0.08350	0.08476	0.08319	0.08849	0.08639

***, **, and * represent statistically significant at 1%, 5%, and 10% level.

those of the main analyses. Fourth, we split our sample into the two subsamples representing the pre- and post-financial crisis period of 2008, since the financial crisis had hastened the push for more corporate governance reforms. Our results (not tabulated) remain consistent with those in Tables 3, 4 and 5). Notably, the results from the post-financial crisis period show a significantly greater readability of CSR reports from companies with a female signer, a female CEO, or those with greater female representation on the corporate board.

Fifth, we create a different measure of CSR female leadership by devising an ordinal variable to account for varying number of CSR report co-signers from different genders. Our sample firms have at most three co-signers. Hence, the new variable takes on a value of one if the only signer or all co-signers are males, two if one co-signer is female and two co-signers are males, three if one co-signer is female and another co-signer is male, four if two co-signers are females and another co-signer is male, and five if the only signer or all co-signers are females. Our results (not tabulated) are consistent with the results reported in Tables 3, 4 and 5. Sixth, we examine the impact of a change in leadership from male to female CSR leaders (signers) on solidarity, certainty, and readability. We use two dummy variables, CHGWSIGNED to measure the change from a male signer to a female signer, and CHGWCEO to measure the change from a male CEO to a female CEO. We find that CHGWSIGNED and CHGWCEO are both associated with greater solidarity, lower certainty, and greater readability. These results are consistent with those using WSIGNED and WCEO in Tables 3, 4 and 5.

Seventh, extant literature has documented that corporate female leadership is endogenously determined by firms' characteristics and female participation in the labor market. Hence, we conduct a two-stage least square (2SLS) regression. We estimate the determinants of female leadership in the first stage (not tabulated) and examine the impact of female leadership on the solidarity, certainty and readability of CSR reports in the second stage. We adopt the first stage model from Srinidhi, Gul, and Tsui (2011), Hillman, Cannella Jr., and Harris (2002) and Hillman, Shropshire, Albert, and Cannella (2007). Table 7 presents the second stage regressions. Results are consistent with the OLS regression results in Tables 3, 4 and 5.

Eighth, since the textual characteristics of CSR narratives are analyzed and determined simultaneously, these characteristics are not statistically independent. Therefore, the error terms of the multivariate regressions are most likely correlated to one another. To address this issue, we use Zellner's Seemingly Unrelated Regression (SUR), or Zellner estimation method (Zellner, 1962), a technique that would allow all the characteristics of the CSR narratives to be simultaneously analyzed using multivariate regressions. The results of the SUR regressions (not tabulated) are consistent with those reported in Tables 3, 4 and 5.

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Table 6
The Relationships between Solidarity, Certainty, Readability, and Firms' Future Perceived Social Performance Two-Stage Least Square (2SLS).

Panel A. First-Stage Regression

	OTHER-REFERENCE minus SELF-REFERENCE	CERTAIN plus OPTIMISM minus TENTATIVE	(SMOG plus FOG) divided by 2		OTHER-REFERENCE minus SELF-REFERENCE	CERTAIN plus OPTIMISM minus TENTATIVE	(SMOG plus FOG) divided by 2		OTHER-REFERENCE minus SELF-REFERENCE	CERTAIN plus OPTIMISM minus TENTATIVE	(SMOG plus FOG) divided by 2
WSIGNED	0.03580	−0.01790	−1.05451	WCEO	0.03318	−0.01763	−0.91759	PCTWBOARD	0.07451	−0.02770	−5.78188
	(2.97)***	(1.90)*	(1.70)*		(2.81)***	(1.92)*	(2.51)**		(2.00)**	(1.95)*	(3.02)***
DGRI	−0.02919	−0.01942	−1.93124	DGRI	−0.02915	−0.01939	−1.93588	DGRI	−0.02635	−0.02006	−1.91850
	(3.46)***	(2.95)***	(4.45)***		(3.46)***	(2.95)***	(4.46)***		(3.13)***	(3.05)***	(4.44)***
SIZE	−0.01970	−0.01017	0.26856	SIZE	−0.01960	−0.01021	0.26456	SIZE	−0.01960	−0.01070	0.20717
	(3.07)***	(2.03)**	(0.81)		(3.05)***	(2.04)**	(0.80)		(3.05)***	(2.13)**	(0.63)
REVT	0.01701	0.00606	−0.90261	REVT	0.01696	0.00610	−0.90183	REVT	0.01853	0.00631	−0.82350
	(2.56)**	(1.17)	(2.64)***		(2.55)**	(1.18)	(2.64)***		(2.78)***	(1.21)	(2.41)**
LEV	−0.00039	0.00002	0.02371	LEV	−0.00039	0.00002	0.02350	LEV	−0.00035	−0.00000	0.02232
	(1.53)	(0.09)	(1.78)*		(1.51)	(0.08)	(1.77)*		(1.36)	(0.02)	(1.68)*
RNDR	−0.00136	−0.00140	0.17201	RNDR	−0.00136	−0.00140	0.17210	RNDR	−0.00137	−0.00134	0.17827
	(2.08)**	(2.75)***	(5.13)***		(2.08)**	(2.75)***	(5.13)***		(2.10)**	(2.64)***	(5.32)***
ROA	−0.05951	−0.02315	−1.00707	ROA	−0.05915	−0.02318	−1.02611	ROA	−0.05926	−0.02750	−1.53295
	(1.06)	(0.53)	(0.35)		(1.06)	(0.53)	(0.36)		(1.06)	(0.63)	(0.53)
ADVR	0.00331	0.00112	−0.06420	ADVR	0.00330	0.00112	−0.06374	ADVR	0.00354	0.00131	−0.03389
	(2.77)***	(1.20)	(1.04)		(2.76)***	(1.21)	(1.04)		(2.92)***	(1.39)	(0.55)
CAPXR	−0.00060	−0.00005	−0.03698	CAPXR	−0.00060	−0.00005	−0.03705	CAPXR	−0.00056	−0.00008	−0.03870
	(1.62)	(0.18)	(1.94)*		(1.62)	(0.18)	(1.94)*		(1.51)	(0.27)	(2.04)**
FIRMAGE	−0.00038	−0.00015	−0.00430	FIRMAGE	−0.00038	−0.00015	−0.00429	FIRMAGE	−0.00037	−0.00013	−0.00158
	(2.59)***	(1.32)	(0.57)		(2.58)***	(1.33)	(0.57)		(2.53)**	(1.13)	(0.21)
HHI	−0.01433	−0.01951	−1.47173	HHI	−0.01581	−0.01956	−1.38234	HHI	−0.04611	−0.00785	−1.05604
	(0.23)	(0.40)	(0.46)		(0.25)	(0.40)	(0.43)		(0.75)	(0.16)	(0.33)
SALEGRW	−0.00810	−0.00053	−0.28640	SALEGRW	−0.00813	−0.00052	−0.28495	SALEGRW	−0.00797	−0.00019	−0.24062
	(0.90)	(0.07)	(0.62)		(0.90)	(0.07)	(0.61)		(0.88)	(0.03)	(0.52)
RISK	−0.00846	−0.00235	−0.18940	RISK	−0.00847	−0.00235	−0.18862	RISK	−0.00957	−0.00253	−0.24725
	(1.64)	(0.58)	(0.71)		(1.64)	(0.58)	(0.71)		(1.84)*	(0.63)	(0.93)
PCTINSTI	−0.00005	−0.00020	0.01802	PCTINSTI	−0.00006	−0.00020	0.01822	PCTINSTI	−0.00012	−0.00019	0.01768
	(0.21)	(1.08)	(1.45)		(0.23)	(1.08)	(1.46)		(0.51)	(1.00)	(1.42)
PCTINDEP	0.00093	−0.00039	−0.03466	PCTINDEP	0.00092	−0.00039	−0.03469	PCTINDEP	0.00105	−0.00038	−0.02967
	(2.49)**	(1.33)	(1.81)*		(2.48)**	(1.33)	(1.81)*		(2.79)***	(1.29)	(1.54)
LOGANAL	0.03826	−0.00305	−0.24508	LOGANAL	0.03824	−0.00311	−0.24082	LOGANAL	0.03528	−0.00236	−0.25543
	(4.03)***	(0.41)	(0.50)		(4.02)***	(0.42)	(0.49)		(3.71)***	(0.32)	(0.52)
Intercept	0.22946	0.90180	24.99397	Intercept	0.22972	0.90205	24.96427	Intercept	0.25267	0.89946	25.44776
	(2.93)***	(14.75)***	(6.19)***		(2.93)***	(14.75)***	(6.18)***		(3.21)***	(14.68)***	(6.31)***
Industry dummies	Yes	Yes	Yes	Industry dummies	Yes	Yes	Yes	Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Year dummies	Yes	Yes	Yes	Year dummies	Yes	Yes	Yes
Observations	1807	1807	1807	Observations	1807	1807	1807	Observations	1807	1807	1807
R-squared	0.15695	0.07829	0.08497	R-squared	0.15652	0.07832	0.08466	R-squared	0.15466	0.07688	0.08819

Panel B. Second Stage Regression for Firms' Future Perceived Social Performance.

Measure of female signers (leaders) in the 1st stage	WSIGNED		WCEO		PCTWBOARD	
	CSR(t + 1)	ESG(t + 1)	CSR(t + 1)	ESG(t + 1)	CSR(t + 1)	ESG(t + 1)
OTHER-REFERENCE minus SELF-REFERENCE	2.82026	26.64141	2.03610	26.52430	2.53017	25.83118
	(6.25)***	(5.54)***	(6.23)***	(5.49)***	(5.17)***	(6.64)***
CERTAIN plus OPTIMISM minus TENTATIVE	−3.00507	−21.23623	−2.90029	−22.61579	−1.69954	−8.63264
	(0.45)	(1.25)	(0.43)	(1.33)	(0.21)	(0.52)
(SMOG plus FOG) divided by 2	−0.29606	−0.36363	−0.30731	−0.38048	−0.58099	−0.04874
	(2.17)**	(1.07)	(2.22)**	(1.11)	(3.74)***	(0.16)
DGRI	0.77899	8.11571	0.76381	8.12231	0.25095	7.30950
	(1.87)*	(7.41)***	(1.81)*	(7.39)***	(0.51)	(7.01)***
SIZE	0.15853	0.77277	0.16302	0.75408	0.26272	1.01145
	(0.83)	(1.58)	(0.84)	(1.53)	(1.15)	(2.14)**
REVT	−0.30433	2.69854	−0.31646	2.72227	−0.59292	2.28150
	(1.24)	(4.28)***	(1.28)	(4.30)***	(2.05)**	(3.79)***
LEV	−0.01089	−0.04793	−0.01050	−0.04852	−0.00356	−0.03741
	(1.07)	(1.71)*	(1.02)	(1.72)*	(0.29)	(1.38)
RNDR	0.21479	0.04679	0.21703	0.04357	0.25838	0.09438
	(6.58)***	(0.54)	(6.55)***	(0.50)	(6.59)***	(1.14)
ADVR	0.11848	0.65802	0.11672	0.66013	0.08998	0.64391
	(2.27)**	(4.87)***	(2.22)**	(4.87)***	(1.43)	(4.90)***
CAPXR	0.02399	0.04806	0.02422	0.04787	0.02090	0.03070
	(1.91)*	(1.43)	(1.91)*	(1.42)	(1.38)	(0.94)
FIRMAGE	0.01363	−0.01233	0.01379	−0.01234	0.01366	−0.02049
	(2.17)**	(0.73)	(2.17)**	(0.72)	(1.79)*	(1.24)
HHI	−0.71550	−9.00975	−0.72024	−9.25326	−0.26614	−5.10072
	(0.30)	(1.46)	(0.30)	(1.50)	(0.09)	(0.85)
SALEGRW	0.01833	0.79757	0.01665	0.80624	−0.06367	0.59767
	(0.05)	(0.81)	(0.05)	(0.81)	(0.14)	(0.62)
RISK	−0.26050	−0.78885	−0.25806	−0.78730	−0.20166	−0.74303
	(1.71)*	(2.02)**	(1.68)*	(2.01)**	(1.09)	(1.95)*
PCTINSTI	0.01334	−0.03705	0.01359	−0.03746	0.01975	−0.02814
	(1.37)	(1.46)	(1.38)	(1.47)	(1.69)*	(1.15)
PCTINDEP	−0.01227	0.16440	−0.01280	0.16477	−0.02267	0.15750
	(0.79)	(4.11)***	(0.81)	(4.11)***	(1.20)	(4.05)***
LOGANAL	1.18634	2.65653	1.18769	2.65230	1.14270	2.86473
	(4.44)***	(3.79)***	(4.40)***	(3.77)***	(3.55)***	(4.21)***
Intercept	9.19689	8.20555	9.39245	9.02079	15.55498	7.77691
	(1.50)	(0.54)	(1.51)	(0.59)	(2.08)**	(0.52)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807
R-squared	0.2610	0.2337	0.2603	0.2312	0.2531	0.2339

***, **, and * represent statistically significant at 1%, 5%, and 10% level.

Table 7
Robustness test: The Two-Stage Least Square (2SLS) second stage regression results.

Panel A. Solidarity

	OTHER-REFERENCE	SELF-REFERENCE	OTHER-REFERENCE	SELF-REFERENCE	OTHER-REFERENCE	SELF-REFERENCE
WSIGNED	2.07076	−0.18830				
	(2.05)**	(1.85)*				
WCEO			2.29148	−0.44051		
			(1.93)*	(2.11)**		
PCTWBOARD					0.14644	−0.89950
					(2.80)***	(2.10)**
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807
R-squared	0.1693	0.0198	0.1681	0.0191	0.1718	0.0176

Panel B. Certainty

	CERTAIN	OPTIMISM	TENTATIVE
WSIGNED	−0.54169	−0.59734	0.60969
	(2.19)**	(2.56)**	(2.17)**
Control Variables	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	1807	1807	1807
R-squared	0.0749	0.0283	0.0466
	CERTAIN	OPTIMISM	TENTATIVE
WCEO	−0.28272	−0.39330	0.63761
	(1.83)*	(1.91)*	(2.13)**
Control Variables	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	1807	1807	1807
R-squared	0.0717	0.0270	0.0430
	CERTAIN	OPTIMISM	TENTATIVE
PCTWBOARD	−1.19532	−0.56086	0.88020
	(2.51)**	(2.88)***	(1.93)*
Control Variables	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	1807	1807	1807
R-squared	0.0744	0.0284	0.0464

Panel C. Readability.

	SMOG	FOG	SMOG	FOG	SMOG	FOG
WSIGNED	−1.19120	−1.14167				
	(1.86)*	(1.80)*				
WCEO			−1.03490	−0.98440		
			(1.65)*	(1.89)*		
PCTWBOARD					−6.36568	−6.02973
					(3.25)***	(3.11)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1807	1807	1807	1807	1807	1807
R-squared	0.0851	0.0841	0.0847	0.0857	0.0891	0.0879

***, **, and * represent statistically significant at 1%, 5%, and 10% level.

4. Conclusions

This paper examines the association between the gender of CSR report leader-signers and the three textual attributes (i.e., solidarity, certainty, and readability) of CSR report narratives, and in turn, these attributes' impact on firm's future perceived social performance (using one-year ahead CSR and ESG scores). We find that, as compared to male CSR report signers, female signers are associated with reports that are more inclusive but less assertive, thus showing more solidarity but less certainty in communicating corporate CSR initiatives with the target audience. In terms of readability, female signers produce CSR reports that are easier to read. Firms issue CSR reports largely in response to investors' demand for information and to influence investors' assessment of firm value (e.g., Christensen, 2016). In terms of how the three textual attributes are associated with future perceived social performance, we find that solidarity is positively associated with both future CSR and ESG scores. However, certainty is not associated with either of the social performance ratings. Finally, readability is positively associated with the future CSR score, but not with the future ESG score.

Our findings provide important implications for CSR reporting practices. Firm management should become more cognizant of the gender composition of their firms' CSR leadership teams, as our findings show that stakeholders with social interests do respond to the gender-driven textual cues in CSR reports. Our results suggest that female CSR leaders (signers) are associated with desirable textual attributes of CSR narratives such as greater solidarity with the audience

Please cite this article as: M.A. Harjoto, I. Laksmana and W.E. Lee, Female leadership in corporate social responsibility reporting: Effects on writing, readability and ..., Advances in Accounting, https://doi.org/10.1016/j.adiac.2020.100475

(stakeholders) and greater readability of the reports. Furthermore, the female attributes of solidarity and readability, but not the male attribute of certainty, are positively associated with future social performance. One could argue that having female leader-signers influencing the preparation of CSR reports could appeal more to the various social-index rating bodies. The latter perhaps view greater sincerity, clarity, and credibility in having females communicate the firms' social objectives, thereby rewarding the firms with higher future social scores. Higher social scores could attract and beget a wider investment attention, particularly with recent evidence showing that female investors are increasingly interested in investing their wealth for "social and environmental good" (UBS, 2017). Thus, a CSR leadership team with greater female representation could ideally accentuate the positive future outcomes in social terms.

Readers should interpret these results in light of some limitations and note the avenues for future research. First, one could point to the caveat that preparers of the CSR reports are often not the CSR leader-signers. Our findings, however, are premised on CSR leader-signers having a significant influence in determining how the CSR reports are written, regardless of whether the signers are actually the preparers. Further, a counter-argument is that this caveat (i.e., CSR leader-signers do not play a determinative role in crafting the CSR report) would only work against finding gender differences on the various textual attributes of CSR reports. Nonetheless, future researchers could broaden this gendered leadership research to an international setting, examining whether such gender effects in CSR reporting still hold true in varying sociocultural or regulatory environments across different countries. Second, our findings of future social performance implication used only one-year-ahead impact. Future studies could examine a potentially longer time frame across different macroeconomic conditions. Third, notwithstanding our findings of the impact that gender-based narrative differences have on firms' future perceived social performance, we did not examine the issue of ethical leadership (e.g., Brown & Treviño, 2006; Treviño, Brown, & Hartman, 2003) and hence provide no prescriptive dialogue in this regard. Future research could investigate the ethical perspective of gender-driven narrative differences across leaders of different sociopolitical settings.

Declaration of Competing Interest

None.

Acknowledgements

The authors would like to thank Dennis Caplan (editor), Joseph Ugrin, the two anonymous reviewers, and all the 2019 Advances in Accounting Research Conference attendees, specifically Monica Banyi (discussant), Richard Schneible, Alfred Liu, Cameron Morrill and Joe Comprix, for all of their constructive comments and recommendations. Harjoto acknowledges financial support from the 2019-2021 Denney Academic Chair Endowment at Pepperdine Graziadio Business School. Laksmana and Lee acknowledge professional development support from Kent State University and the University of Northern Iowa.

Appendix A. Variable definitions

Variable	Definition
OTHER-REFERENCE	Percentage of pronouns referencing others (he, she, they, you), a measure of solidarity, relative to total word count (LIWC)
SELF-REFERENCE	Standardized z-score for first-person reference words (I, me, my, mine, myself) (DICTION)
OPTIMISM	Standardized z-score for words endorsing persons, groups, concepts or events, or highlighting their positive entailments (DICTION)
CERTAIN	Percentage of certainty words (always, never) indicating resoluteness, inflexibility, completeness and tendency to speak ex cathedra relative to total word count (LIWC)
TENTATIVE	Percentage of words indicating hedges (doubt, perhaps, maybe) relative to total word count (LIWC)
SMOG	Readability measure based on McLaughlin's (1969) SMOG index, computed as 1.043 * ((number of polysyllables)*(30-/number of sentences))$^{0.5}$ + 3.129
FOG	Readability measure based on Gunning's (1952) FOG index, computed as 0.4 * (words per sentence + percentage of complex words)
WSIGNED	An indicator variable equal to one when the person signing or co-signing the firm's corporate social responsibility (CSR) report is female, or zero otherwise
WCEO	An indicator variable equal to one when the CEO is female, or zero otherwise
PCTWBOARD	Number of female directors serving on the corporate board divided by the total number directors
CSR(t + 1)	One-year-ahead CSR performance calculated as the score difference of CSR strengths minus concerns (MSCI ESG Stats)
ESG(t + 1)	One-year-ahead environmental, social, and corporate governance (ESG) total scores (Bloomberg)
DGRI	An indicator variable equal to one when a firm's CSR report is rated by the Global Reporting Initiative (GRI)
SIZE	Natural log of total assets (in millions of dollars)
REV	Natural log of total net revenue (in millions of dollars)
LEV	Total debt divided by total assets (in percentage)
RNDR	Research and development expense divided by total revenue (in percentage)
ADVR	Advertising expense divided by total revenue (in percentage)
CAPXR	Capital expenditures divided by total revenue (in percentage)
ROA	Income before taxes and extraordinary items divided by total assets
FIRMAGE	Number of years the firm is listed in the CRSP database
HHI	Market competition computed as one minus the Herfindahl-Hirschman Index (HHI) for market concentration, based on total net revenue in each sector, measured across nine sectors listed in Table 1. Higher HHI indicates that the firm is operating in a more competitive product market.
SALEGRW	One-year sales growth rate
RISK	Standard deviation of daily stock returns during one year (in percentage).
PCTINSTI	Total shares held by institutional owners divided by total shares outstanding (in percentage)
PCTINDEP	Number of independent directors serving on the corporate board divided by the total number of directors (in percentage)
LOGANAL	Natural log of the number of analysts following

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Please cite this article as: M.A. Harjoto, I. Laksmana and W.E. Lee, Female leadership in corporate social responsibility reporting: Effects on writing, readability and ..., Advances in Accounting, https://doi.org/10.1016/j.adiac.2020.100475