

Baier, Philipp; Berninger, Marc; Kiesel, Florian

Article — Published Version

Environmental, social and governance reporting in annual reports: A textual analysis

Financial Markets, Institutions & Instruments

Provided in Cooperation with:

John Wiley & Sons

Suggested Citation: Baier, Philipp; Berninger, Marc; Kiesel, Florian (2020) : Environmental, social and governance reporting in annual reports: A textual analysis, Financial Markets, Institutions & Instruments, ISSN 1468-0416, Wiley, Hoboken, NJ, Vol. 29, Iss. 3, pp. 93-118, <https://doi.org/10.1111/fmii.12132>

This Version is available at:

<https://hdl.handle.net/10419/230148>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<http://creativecommons.org/licenses/by-nc-nd/4.0/>

Environmental, social and governance reporting in annual reports: A textual analysis

Philipp Baier¹ | Marc Berninger¹ | Florian Kiesel²

¹ Technical University of Darmstadt,
Darmstadt 64289, Germany

² Grenoble Ecole de Management, Grenoble
38000, France

Correspondence

Marc Berninger, Department of Business
Administration, Economics and Law, Technical
University of Darmstadt, 64289 Darmstadt,
Germany.

Email: berninger@bwl.tu-darmstadt.de

Declarations of interest: This research did
not receive any specific grant from funding
agencies in the public, commercial, or not-for-
profit sectors

Abstract

Considering environmental, social, and governance (ESG) factors becomes increasingly important for companies and investors. However, “ESG” is not clearly defined so far and, therefore, it is difficult to measure the ESG activity of companies. We analyze the extent and changes in 10-K reports and proxy statements on ESG, using a textual analysis and creating an ESG dictionary. The results show an average of 4.0 % ESG words on total words in the reports. The ESG word list with 482 items can be used to quantitatively examine the extent of ESG reporting, which will be helpful especially for SRI investors. Our classification of 40 subcategories allows a highly granular analysis of different ESG related aspects. Moreover, indications for a relation between changes in reporting and real events, especially negative media presence, are detected. Regulatory bodies have to be aware of the use of such words and how they are used.

KEYWORDS

Content analysis, Environment, ESG, Governance, Investor communication, Social, Sustainability measurement, Textual analysis

JEL CLASSIFICATION

C80, G30, K32, Q01, Q58

1 | INTRODUCTION

It was recently reported that its new ethic guidelines cost the Norwegian sovereign wealth fund €1.3 billion over the last decade (Handelsblatt, 2017). The fund does not invest in companies producing weapons or infringing human rights.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2020 The Authors. *Financial Markets, Institutions & Instruments* published by New York University Salomon Center and Wiley Periodicals LLC

The major fund manager announced to stay with this strategy because it shares the opinion of the Norwegian public. Corresponding investment strategies are summarized under the term socially responsible investment (SRI). Moreover, the total assets under management in the US using socially responsible screens when creating a stock portfolio grew to \$8.7 trillion in 2016. This is an increase of 33 % since 2014. In total, one of five dollars under professional management is invested respecting SRI criteria (Forum for Sustainable and Responsible Investment, 2016).

Typically, when facing a capital allocation decision, criteria for choosing the best investment are simply of a financial nature. In contrast, SRI is a process that identifies investments with high contribution to environmental, social, and governance (ESG) values (see e.g., Auer & Schuhmacher, 2016; Renneboog, Ter Horst, & Zhang, 2008). It integrates sustainability criteria into investment decisions. Thereby, it is also possible to create social benefit and not only financial profit (Bollen, 2007). The main reason for the increasing popularity is the growing pressure concerning sustainability exerted by regulators and society. This effect was reinforced by the recent global financial crisis which lowered confidence in financial markets and caused new regulations and policies (Sahut & Pasquini-Descomps, 2015). Since the turmoil of the financial crisis, shareholders want to know how their money is invested and whether it corresponds to the company's and their own interests (Hopkins, 2016).

This raises the question of how to define ESG criteria. So far, there is no standardized definition, but firms show their commitments to SRI by voluntary signings to responsible investment organizations. These organizations create own definitions and guidelines. For example, the US SIF is an organization, which aims to advance sustainable and responsible investing across all asset classes. Their aim is to generate a more sustainable and equitable society by assessing ESG impacts of investment decisions (Forum for Sustainable and Responsible Investment, 2016). These three major topics are widely used in SRI literature (e.g., Auer & Schuhmacher, 2016; Dimson, Karakaş, & Li, 2015; Lokuwaduge & Heenetigala, 2016).

The increased attention of SRI among investors begs the question of how companies deal with ESG topics. One could assume that especially companies who neglected sustainability issues in the past adapt their behavior, since especially public listed companies depend on investors to buy shares of stock. Following ESG criteria as a firm is often referred to as corporate social responsibility (CSR). The current problem that results from SRI research is the measurement of CSR activity, since it is based on qualitative information. Most SRI research relies on SRI ratings provided by third party organizations, such as rating agencies. However, not all companies are rated which might lead to a selection bias.

This paper contributes to the literature in different ways. The first aim of this paper is to measure directly CSR announced by the firm. Financial reporting, or more precisely annual reports, are identified to be the most reliable disclosure to quantify a firm's contribution to CSR. Simultaneously, it is observed that methods of textual analysis are increasingly applied in accounting and finance literature on various research questions (e.g., Antweiler & Frank, 2004; Tetlock, 2007; Li, 2008). These methods are used to obtain quantitative from narrative data. Studies analyzing annual reports concerning ESG issues already apply methods of textual analysis (e.g., Giles & Murphy, 2016; Lokuwaduge & Heenetigala, 2016; Loughran, McDonald, & Yun, 2009; Wilmshurst & Frost, 2000). Some of them require text reading in their entirety and to manually classify the sentences. The extent of ESG reporting is judged using checklists or decision rules (e.g., Giles & Murphy, 2016; Tilling & Tilt, 2010). Due to manual reading, they only allow to analyze small sample sizes and include the problem of personal opinions. Other authors develop measures based on the GRI framework. Those studies mostly try to include further disclosures or information besides annual reports (e.g., Lokuwaduge & Heenetigala, 2016; Verbeeten, Gamerschlag, & Möller, 2016).

The method of using a word list tries to draw conclusions from the frequency of certain words in documents (Loughran & McDonald, 2016). A different extent of self-contribution in the creation of word lists is determined in literature. It depends on the availability of an appropriate word list. Analyzing annual reports utilizing a word list is done by many researchers in the field of accounting and finance (e.g., Loughran & McDonald, 2011; Tetlock, 2007). Regarding ESG issues, a few researchers use word count methods. Loughran et al. (2009) search for ethics-related terms applying only some keywords. Wilmshurst and Frost (2000) count words on environmental issues without providing a word list. Verbeeten et al. (2016) develop a list of 32 keywords based on Global Reporting Initiative (GRI) framework

indicators, representing social and environmental topics. Their list includes word chains and only provides a limited view due to its small size. A useful list of words covering all ESG topics cannot be found in literature so far. Hence, the second contribution of this paper is to generate a structured list of words which can be used to analyze a company's CSR in their annual reports. Following the methodology of Bodnaruk, Loughran, and McDonald (2015), Matsumoto, Pronk, and Roelofsen (2011), and Larcker and Zakolyukina (2012), we create the word list by actively judging the words of a sample. This eliminates the central point of criticism that several words of general lists may have different meanings. In contrast to other methods of textual analysis, generating a black box should be avoided by explicitly demonstrate the development process. Other studies supportively use dictionaries (e.g., Tetlock, 2007). Therefore, further strategies are applied to face the problem of missing out certain dimension.

Furthermore, this study investigates how much a certain company reports on several different ESG aspects. This allows to analyze whether companies reacted on the rising awareness of SRI by paying attention to CSR issues in their annual reports. In general, recent literature indicates that social responsible reporting in annual reports has increased over the last years – including a growing range of sustainability reporting tools (Siew, 2015). Numerous research on the financial benefit of SRI finds varying results regarding different ESG categories or industry sectors. In the first place, the aim of the paper is to identify and quantify differences and special characteristics in the extent of ESG reporting.

The remainder of this paper is organized as follows. Section 2 discusses the related studies on SRI and ESG reporting. Section 3 defines ESG and its relevant subcategories. Section 4 describes the data selection process and the sample. The word analysis and the methodology are presented in Section 5. Section 6 applies the ESG word list on the firms' financial reports. Finally, the last section briefly summarizes the main results and concludes the paper.

2 | CURRENT SRI MEASUREMENTS AND THE IMPACT OF ESG DISCLOSURES

SRI investment strategies aim to choose investments not only to maximize profits but also for moral purposes. Regarding the benefit of SRI, the non-financial utility is undisputed while there is a differentiated view on the economic advantages. SRI lacks the fact that SRI investors are sometimes willing to forgo financial returns to reach social or ethical goals (Renneboog et al., 2008). Before being able to assess the financial success of SRI, there must be a measure to identify a possible investment and to determine the degree of sustainability of an organization. Two forms of exercising SRI can be found:

- *Exclusion-based strategies* exclude certain investments for moral purpose (e.g., weapons, alcohol, tobacco).
- *Screening strategies* systematically search for companies with high ESG ratings (Sahut & Pasquini-Descomps, 2015).

In response to the demand of SRI investors for reliable data on the social performance of firms, a large amount of ESG rating agencies have emerged. These agencies independently certify firms in terms of their ESG related efforts. Even if a consolidation process can be observed by now, there are still numerous data providers with a multiplicity of different methodologies (Avetisyan & Hockerts, 2017). It seems likely that most of these scores are associated with problems, e.g., how positive and negative assessments are offset (Escrig-Olmedo, Muñoz-Torres, Fernández-Izquierdo, & Rivera-Lirio, 2014). Furthermore, there is also a fundamental disagreement between the ESG ratings of different rating agencies documented in the literature (Berg, Koelbel, & Rigobon, 2020).

2.1 | SRI from investor's point-of-view

An investment decision typically consists of two parts. On the one side, there is an investor and on the other side an investment object. To find an investment object with specific requirements, the investor depends on relevant information discloses. A voluntary initiative in terms of SRI is the United Nations Global Compact (UNGC). It targets on companies to comply their fundamental responsibilities in the areas of human rights, labor, environment and anti-corruption.

According to the UNGC, it is not only about basic responsibilities to people and planet, but also ensuring long-term success. The amount of business and non-business participants committing those values by voluntary signings is rising. Sjöström and Welford (2009) document an increasing contribution to CSR reporting, supporting the assumption that companies adapt their behavior in response to the rising awareness of SRI to meet investors' requirements.

For companies, it is also an important question how CSR affects their market performance. There is evidence that a high CSR ranking positively correlates to performance and enables firms to financially benefit from their engagements (e.g., Kang, Germann, & Grewal, 2016; Kiessling, Isaksson, & Yasar, 2016). Bénabou and Tirole (2010) emphasize to consider the motivation behind CSR. They summarize three different views on CSR and their impact on firm value in literature. The first more holistic understanding is that management wants to sustainably maximize future profits. It means investors should focus on long-term perspectives. This understanding includes a positive influence on firm value. This is in line with the results of Tang, Hull, and Rothenberg (2012) who state that companies benefit more from slowly and consistently engaging in CSR. The two other views aim at a more individual social responsibility. The second one is a kind of delegated philanthropy which means companies emphasize personal values of their stakeholders. According to Glac (2014), this type of CSR gains in importance because shareholders increasingly submit social proposals on annual meetings and cooperate with the management to positively influence social issues. It has also a positive effect on firm value. The third view is that CSR can negatively impact performance if managers peruse personal ambitions to commit themselves socially. This view is also called "CEO narcissism" (Petrenko, Aime, Ridge, & Hill, 2016).

2.2 | SRI from academia's point-of-view

Nevertheless, not only investors but also most current SRI studies rely on these ratings provided by specialized organizations or rating agencies to identify investments. In order to evaluate the financial utility, the common procedure is to compare the performance of socially responsible mutual funds to benchmark portfolios or conventional funds. Some researchers obtain a different result depending on regions, industries or ESG subcategories. Brammer, Brooks, and Pavelin (2006) find a positive correlation between ESG ratings and stock returns for the category "employment" and a negative correlation for the categories "community" and "environment". Their overall social score implies that companies with high social scores tend to have lower returns. Sahut and Pasquini-Descomps (2015) analyze monthly stock market returns in three different countries conditional on a news-based ESG rating. They however find a small significant impact for changes of some subcategory ratings. Auer and Schuhmacher (2016) find that depending on the region and industry focus an investment based on ESG criteria maximally achieves an average market performance but can also be less profitable. The results are obtained by comparing the performance of low- and high-rated ESG portfolios to each other and to passive benchmarks. Their study relies on ESG scores provided by Sustainalytics. Bollen (2007) examines investors' cash inflows and outflows of socially responsible and conventional mutual funds as well as their sensitivity to lagged returns. He finds that investors benefit from the socially responsible attribute. Kempf and Osthoff (2007) apply ratings provided by KLD Research & Analytics and examine whether investors can improve their performance based on a straight forward trading strategy: Buy stocks with high SRI ratings and sell stocks with low SRI ratings. They show that it is possible to create significant abnormal returns exercising this strategy. Dimson et al. (2015) use an alternative measure for ESG and analyze special ESG engagements of companies. These engagements are structured in different ESG categories. The results show one-year abnormal returns following successful ESG engagements. Hence, the findings on financial utility of SRI are very heterogeneous.

2.3 | ESG reporting as a foundation for SRI

Thus, there is a very differentiated picture of SRI and CSR. On the one hand, researchers find positive, negative and neutral effects of SRI strategies on realized returns. They even receive different results depending on subcategories or

industries within a single study. Hence it is not entirely clear whether SRI is beneficial from a single financial standpoint. On the other hand, the effect of CSR on the firm value also depends on the implementation and inner motivation of the management (Wijethilake, 2017). A reason for the differentiated image is that CSR is hard to measure (Pérez & Rodríguez del Bosque, 2013). It is based on qualitative characteristics. Most studies apply ratings provided by ratings agencies or other organizations. This means to rely on the quality of their metrics without understanding underlying factors.

However, investors need information to make investment decisions. Companies constantly disclose information themselves. Therefore, other researchers directly focus on various forms of disclosure (e.g., websites, environmental reports, annual reports) when examining CSR (e.g., Buhr & Freedman, 1996; Clarkson, Fang, Li, & Richardson, 2013; Tilling & Tilt, 2010; Williams & Ho Wern Pei, 1999). According to Bebbington, Larrinaga, and Moneva (2008), the extent of social and environmental disclosures has risen over the last decade. However, Kim, Park, and Wier (2012) analyze if showing CSR results in a responsible, transparent and reliable way of reporting financial information to shareholders. Their results document that social responsible companies are in fact less likely to manipulate financial information and to be subject to investigations. It is risky to draw conclusions in the other direction, especially facing voluntary social and environmental disclosures without paying attention to the motivations behind the decision to disclose (Bouten, Everaert, & Roberts, 2012).

In contrast to voluntary disclosures, financial reporting of public listed firms is compulsory. It is subject to high reporting framework quality standards and enables comparability and reliability (La Cuesta & Valor, 2013). Therefore, researchers analyzing CSR in firms' disclosures often focus on annual reports (e.g., Giles & Murphy, 2016; Lokuwaduge & Heenetigala, 2016; Wilmshurst & Frost, 2000). Connecting financial and sustainability information is called integrated reporting (IR). The usage of IR varies across countries and is related to country-level determinates like investor and employment protection laws or environmental and social development (Jensen & Berg, 2012). IR does not necessarily have to be better for the company than stand-alone ESG reporting. Nevertheless, it is a useful tool to integrate ESG issues in the core business model (Maniora, 2017). According to Eccles and Serafeim (2014), IR is essential to satisfy the rising awareness on sustainability issues. Despite strong regulation, there are researchers identifying companies applying ESG reporting in annual reports only to contradict critique on their business operation or to distract from negative towards more positive aspects. Those authors base their findings on legitimacy theory (e.g., Giles & Murphy, 2016; Patten, 1992; Tilling & Tilt, 2010). This theory states that managers implement strategies, including disclosures, to demonstrate society to meet its expectations. As managers have different perception, they will adopt different strategies to influence public awareness. In case of considerable events, which negatively influence a company's reputation, its legitimacy is threatened (Deegan, Rankin, & Tobin, 2002). This is particularly the case if events cause strong media response as this can induce public pressure (Kuo & Yi-Ju Chen, 2013).

In the United States public held companies are obligated by law to publish annual reports on form 10-K. The 10-K reports are comprehensive reports on a company's business and financial condition. The US Securities and Exchange Commission (SEC) regulates this type of disclosure. Accounting researchers have been examining numerical financial data in those reports for decades (Li, 2010). However, SRI is about introducing new criteria apart from financial criteria in investment decisions. Consequently, the problem is to convert qualitative narrative data on the contribution of companies to CSR from annual reports into quantitative results. Therefore, methods of textual analysis can be applied.

3 | CATEGORIZATION AND DEFINITION OF ENVIRONMENT, SOCIAL, AND GOVERNANCE

In order to determine the ESG activity of a firm, we define and quantitatively describe the ESG content in financial reports. Therefore, we create an ESG word list which subsequently can also be used for various research on CSR and SRI investment strategies. Based on existing textual analysis literature a procedure is developed, which enables us to create a meaningful list.

TABLE 1 Topics, categories and subcategories of the ESG word list

Governance		
Corporate governance	Business ethics	Sustainability management and reporting
Audit and control	Bribery and corruption	Disclosure and reporting
Board structure	Political influence	Stakeholder engagement
Remuneration	Responsible marketing	UNGC compliance
Shareholder rights	Whistle-blowing system	Governance of sustainability issues
Transparency ^b		
Talent ^a		
Environmental		
Ecosystem service	Climate change	Environmental management
Access to land	Biofuels	Environmental standards
Biodiversity management	Climate change strategy	Pollution control
Water	Emissions management and	Product opportunities
	reporting	Waste and recycling
Supply chain environmental standards		
Social		
Public health	Human rights	Labor standards
Access to medicine	Community relations	Diversity
HIV and AIDS	Privacy and free expression	Health and safety
Nutrition	Security	ILO core conventions
Product safety	Weak governance zones	Supply chain labor standards
Society ^a		
Charity ^a		
Education ^a		
Employment ^a		

^aAdditional (sub-)category added to the categorization by Dimson et al. (2015).

^bRenamed (original: Transparency and performance).

Following Prasad's (2008) guidelines for methods of content analysis, content categories have to be developed. The computational linguistics literature emphasizes that the quality of results is extremely dependent on the categories. Categories must be expressed explicitly and face the problem (Berelson, 1952). The word list is based on three main topics: environmental, social and governance. There are several ESG categorization schemes (e.g., Dimson et al., 2015; Giles & Murphy, 2016; Lokuwaduge & Heenetigala, 2016). Since the structure and categories of Dimson et al. (2015) are considered meaningful, they are adopted for our ESG word list. During the creation process, further categories are added to reach a more comprehensive definition. We apply a three level approach and subdivide the ESG topics by 10 categories and assign in total 40 subcategories in this paper. Table 1 provides an overview of our topics and (sub-)categories. The goal is to find words by assigning them to the respective categories.

4 | SAMPLE DESCRIPTION

4.1 | Sample selection

The sample consists of 10-K reports and proxy statements of the 25 largest companies (by market capitalization) in the S&P 100 index. Included are the filings of the last four years to be able to identify changes within the investigation period. This leads to a final sample of 100 reports. We selected these companies for our sample because they published a suitable amount of ESG related information for the whole sample period. Furthermore, these companies represent a broad variety of different industries (see subsequent Table 6). We include the proxy statements, because the items 10–14 of form 10-K are typically set forth in the following proxy statement. The proxy statement is also called “annual report to shareholders”. The shifted items 10–14 deal with ESG related topics like corporate governance, executive compensation, board structure or director independence. The 10-K reports and proxy statements are downloaded from the EDGAR database.

4.2 | Sample editing

Following Bodnaruk et al. (2015) an instruction is developed which standardizes the creation of text files. They examine texts using HTML format. For example, the applied program ignores blanks, line breaks, numbers and punctuation marks so they do not have to be removed (especially tables, page numbers and hyphens). The standardized process requires to remove parts like SEC headers, table of contents, appendixes, phrases in footers, etc. All steps of the entire procedure are presented in Appendix 2.

5 | ESG WORD LIST CREATION AND ANALYSIS

5.1 | Reduction of term-document matrix

In this section, we describe the procedure of extracting ESG words from our sample. Therefore, we create a list of all relevant words appearing in a report including their frequency. In textual analysis, this information is represented in a term-document matrix, so this strategy is named “reduction of term-document matrix” (RTDM). It is based on actively judging all words appearing in a report. First, three reports are randomly selected from the sample. The main rule is to assign a word to the ESG word list if the word appears in an ESG context in the majority of its occurrences. The context is judged and words are assorted to the respective ESG category. Moreover, the word must appear in at least 5 % of all reports.¹ This approach is common in related word list literature (e.g., Bodnaruk et al., 2015; Larcker & Zakolyukina, 2012; Loughran & McDonald, 2011; Matsumoto et al., 2011).

Our categories are based on Dimson et al. (2015) who do not use a word list to evaluate CSR engagements. In some cases, it is not possible to assort a word to the subcategory level because it is used in the context of several subcategories or even categories. Therefore, the final list also contains words on the topic and category level. Conversely, it does not mean that a subcategory is not addressed at all if it does not contain words. It can partially be covered by more general ESG words as well. Those subcategories are kept in the structure since they contribute to a precise definition of their category.

We explicitly search for single words. Loughran et al. (2009) use two panels. Panel A only permits single words and panel B also allows word chains. It is important to not just mix them up otherwise one distorts the result by double counting. For example, if a list contains the word “ethic” and the term “code of ethic”, the term would be counted twice. They can handle this problem because panel A only consists of four words which are not contained in panel B individually. This separation is not possible when a broad topic is examined because the word list becomes much larger.²

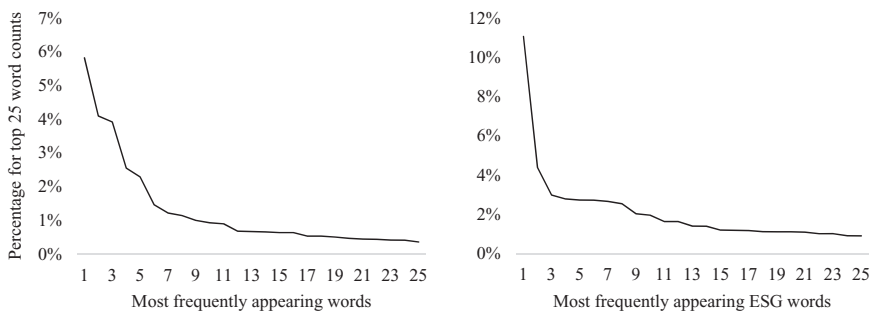


FIGURE 1 Proportions of the top 25 most frequently appearing words in all reports of the sample for both “all words” and “ESG words”

Loughran und McDonald (2016) argue that the context is a “signal-to-noise tradeoff”. In our case, the noise of double counting is stronger than the additional signal and we forego to add word chains in our word list as their meaning can typically be covered by a single word of the ESG list.

5.2 | Stop lists and Zipf’s law

Applying the RTDM strategy is time consuming and further procedures have to be implemented. An approach which is often used in literature is the concept of stop lists (Henry, 2008). This is based on Zipf’s law. By taking a deeper look at the distribution of words in a corpus it is possible to determine a certain regularity. Typically, a few words dominating the distribution (Manning & Schütze, 2000). This fact is visualized by plotting the relative frequency of appearance (word counts/total words) of all words and the relative frequency of ESG words (word counts ESG/total words ESG) appearing in the sample. Figure 1 shows that the distribution of words is dominated by few top words. Words occurring so often that they include no discriminatory power are defined as stop words. For example, the top 5 words of the full corpus are “the”, “of”, “and”, “to” and “in”. Using methods of textual analysis, it is common to exclude them from the analysis list (Henry, 2008).

Besides using a stop list, Zipf’s law shows another important aspect when applying a word list. The cumulative percentage of the top 25 ESG words on all ESG words in the sample is about 53.8 %. They have the highest impact when using the results for the further analysis. Therefore, Loughran and McDonald (2016) emphasize that research applying word classifications must clearly reveal the proportions of the words with the highest frequency of appearance. This allows to identify possible misclassifications due to the subjective decisions of the author.³

We use a stop list provided by Lextek (2016) after checking for possibly relevant ESG words and enlarge the stop list step by step. Examining the words of the first report only the predefined stop list is excluded. The first step of enlarging the stop list takes place while examining all words contained in this report. Besides searching for ESG words, words are marked stop words if they obviously never signal an ESG topic. When finding words, which match a certain group of words, it is tried to add further words belonging to that group. Those lists and groups do not claim for completeness. The final procedure to reduce the number of words is to use words which have neither been chosen to be ESG nor to be stop words. If a word is not considered to be one of these two categories in at least two reports it will be assigned to the stop list as well.

5.3 | Outliers diagnostic

Since the word list is based on few reports so far, there is a low statistical expressiveness of the words. Some of them have been considered ESG based on a small number of appearances. Therefore, we conduct an outlier diagnostic.

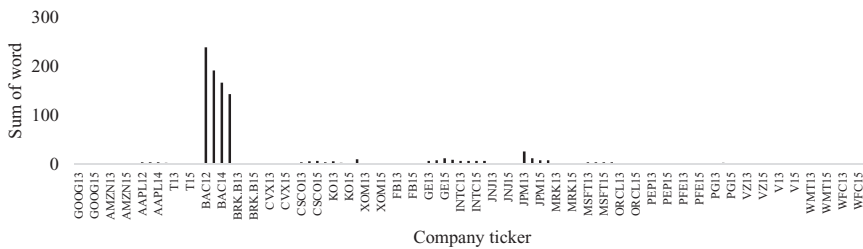


FIGURE 2 Frequency distribution of the word *warranties* in all reports of the sample

Coming from a preliminary word list created with the RTDM strategy, the frequency of appearance in all 100 reports is counted. If a word appears more often in another report than in initial reports, it is considered as an outlier. The preliminary word list contains 318 words. Nearly every word on this list is an outlier in at least one of the 100 reports. Words are verified by executing a context check for the two largest outliers. If two reports do not confirm a word distinctly a third report is checked and so on. An example for a rejected word is “warranties”. It was considered ESG in the category “product safety” based on reports of manufacturing companies. In these reports, it appears less than ten times in total. The outlier diagnostic shows extremely high outliers (up to 238) in reports of companies operating in the financial sector. This situation is illustrated in Figure 2. In this sector, the word is not only used as a protection against defects of products but also as a financial product. Thus, the word was removed from the initial ESG list.⁴ The outlier diagnostic has several further positive effects, besides improving the statistical power. In addition, words are rechecked and new reports are reviewed in parts of the text which are assumed to deal with ESG topics. Thereby, some potential ESG words are extracted for further analysis. The outlier diagnostic reduced the word list from 318 potential words to 284 words but also adds 73 new potential ESG words.

5.4 | Further rectifying strategies

The 10-K reports and proxy statements are analyzed in a merged file containing up to 6,000 different words. Since creating our ESG word list using the RTDM strategy is still time consuming as it is mainly based on the first three reports. This bears the risk of missing words which are contained in other reports. The following section demonstrates additional strategies facing this problem and providing a broader perspective.

5.4.1 | Initial word list

One strategy to search for words is the usage of an “initial word list” (IWL). As described, the ESG categories are based on Dimson et al. (2015). In some cases, the denominations of those categories and their subcategories are words themselves but mostly they are word chains. In order to make them useable they are divided into single words. Afterwards it must be judged whether they are still relevant ESG words. For example, “transparency and performance” consists of three words. The only relevant word which is included in the initial word list is “transparency”. The word “and” is a classical stop word and “performance” alone does not make the impression to be a relevant ESG word. The result of this procedure is the initial word list.

5.4.2 | Existing general dictionaries

This strategy is based on the idea that several authors build their word lists on dictionaries or existing word list. So far, a predefined ESG list does not exist. We use Lexis Nexis for our initial word list. It provides a comprehensive list of terms

TABLE 2 Forms of the word “to evaluate”

<i>verb</i>	<i>3rd person</i>	<i>past simple</i>	<i>past participle</i>	<i>person</i>	<i>person (pl.)</i>
evaluate	evaluates	evaluated	–	evaluator	evaluators
<i>gerund</i>	<i>noun (pl.)</i>	<i>noun</i>	<i>adjective</i>	<i>adverb</i>	<i>abbreviation</i>
evaluating	evaluations	evaluation	evaluative	–	–

sorted by subjects. Each of the 19 subjects contains numerous subcategories which themselves are separated again and so on. In total, there are 6,070 terms consisting out of 3,186 different words. Some terms appear more than ones because it is possible that they fit in more than one category. In most cases the terms are word chains. Consequently, there is a list of 6,070 word chains to filter words for our ESG list which contains only single words. Three steps are executed to extract possible words.

The first step is to check which subjects match ESG topics. Therefore, the relevance of first level terms (19) and second level terms (357) is reviewed. If a term is selected to possibly contain ESG words also its lower levels are included. The result is a list of 2,071 terms consisting of 1,480 words. In the next step, we examine if the selected terms contain potential ESG words. A word is selected if there is the probability that it is an appropriate ESG word. The intermediate result are 516 potential ESG words. Finally, words which already appeared in examined reports are deleted. 430 words are left to undergo a context check.

5.4.3 | Root words

This strategy is about inflections of root words (Loughran & McDonald, 2011; Turney & Pantel, 2010). A root word is always adapted to the respective usage so there are different forms of a word. Some forms of ESG words are not contained in the preliminary word list but they can appear in one of the 97 remaining reports. Since those forms have a similar meaning there is a high chance to consider them ESG words. Checking the preliminary ESG list, words are categorized by twelve possible forms. An example is given in Table 2. The idea of this strategy is to add missing types. The total procedure of this section generates a list of 176 potential ESG words.

It is not meaningful to add all types for each word. There are four reasons. Technical reasons for not adding them are, if they...

1. *do not exist*. Some forms do not exist for certain words.⁵
2. *are identical*. Mostly, this is the case for the noun and the verb of a root word. Examples are the words: “vote”, “control” and “review”.

Additionally, adding inflections of root words is not meaningful, if...

1. the contained word represents a word chain. There are word chains which are addressed by one of their words. They are only considered ESG in that specific context.⁶
2. they obviously do not have an ESG meaning in the context of 10-K reports and proxy statements.

5.5 | Context check

After completing all “further strategies” (IWL, Nexis, root words), there are several word lists. These lists are merged to a list of potential ESG words. After deleting double words, it comprises 650 words. Executing a context check is

still necessary to verify them. 190 of them do not appear in any report of the dataset. 95 appear in less than 5 % of the reports. In order to verify the rest, the context is reviewed in at least two reports with the highest frequency of appearance. A word is considered as ESG related when it is used in ESG context in the majority of its appearances. This step leads to the final ESG word list with 482 words provided in Table 3.

6 | ESG ADDRESSED IN FINANCIAL REPORTING

After generating the final ESG word list, the aim of the subsequent section is to verify the robustness of the results and thereby to quantify and analyze the usage of ESG vocabulary in financial reports. Hence, we begin our analysis with an overview on the distribution of ESG words. Moreover, we analyze the different categories and their subcategories.

6.1 | Distribution of ESG words

In a first step, we shed light on the question how many ESG words are used in reports without differentiating between categories or years. The total share of all ESG words across all reports is 3.7 %. The average share on total words is slightly higher, around 4.0 %.⁷ Looking at single reports, there is a significant difference of ESG words between reports with the most and the least ESG words. The report with the lowest share consists of only 1.8 % ESG words was published by Berkshire Hathaway Inc. in 2015, whereas the 2012 Johnson & Johnson report contains 6.5 % ESG related words.

The percentage of ESG-related words in financial reports is provided in Table 4. It is remarkable that the three topics are addressed to a different extent. 88.9 % of ESG words are governance related, which is 3.4 % of all words in the sample reports. The second most is "social" which makes up to 8.8 % of ESG words. The share of environmental words of all ESG words is only 2.3 %. A reason might be that corporate governance related topics are on the shareholders' agenda for a longer time than the remaining categories which are emerging at present. Furthermore, the regulation is more oriented towards corporate governance than social or environmental reporting terms.

Table 5 shows that all topics are addressed to a greater extend in proxy statements than in 10-K reports. The biggest difference is observed for the topic governance. The reason is the strong role of the category "corporate governance" which mainly contains shareholder-related subcategories. Thus, the influence of "corporate governance" can be explained by the mandatory content of proxy statements. They mainly contain shareholder-relevant information on voting procedures as well as background and compensation of nominated candidates.

6.1.1 | Governance

The high percentage of governance words is not surprising. First, the topic governance is a broadly formulated term. It deals with issues of leading a company and considering stakeholders' interests and sustainability. Second, the categories and subcategories of governance are by now mostly mandatory contents in financial reports. Certain issues are even part of compulsory headlines of a 10-K report like: "corporate governance", "board structure", "director independence", "controls", and "executive compensation".

The categories of governance are unequally distributed. 1.1 % of all governance words are categorized in "business ethics", 7.6 % in "sustainable management and reporting", whereas 85.9 % are assorted to the category "corporate governance". That group focuses among others on shareholders' interests. Hence, public hold companies pay remarkable higher attention to their shareholders than to other stakeholder groups. The great effect of corporate governance is mainly triggered by three subcategories. The subcategories "remuneration" (33.3 %), "audit and control" (19.9 %), and

TABLE 3 ESG word list^a

Topic	Category	Subcategory
Governance: align, aligned, alignment, aligns, by/law, bylaws, charter, charters, culture, death, duly, parents, independent	Corporate governance: compliance, conduct, conformity, governance, misconduct, parachute, parachutes, perquisites, plane, planes, poison, retirement	Audit and control: approval, approvals, approve, approved, approves, approving, assess, assessed, assesses, assessing, assessment, assessments, audit, audited, auditing, auditor, auditors, audits, control, controls, coso, detect, detected, detecting, detection, evaluate, evaluated, evaluates, evaluating, evaluation, evaluations, examination, examinations, examine, examined, examines, examining, irs, oversee, overseeing, oversees, oversight, review, reviewed, reviewing, reviews, rotation, test, tested, testing, tests, treadmill
		Board structure: backgrounds, independence, leadership, nomination, nominations, nominee, nominees, perspectives, qualifications, refreshment, skill, skills, succession, tenure, vacancies, vacancy
		Remuneration: appreciation, award, awarded, awarding, awards, bonus, bonuses, cd, compensate, compensated, compensates, compensating, compensation, eip, iso, isos, payout, payouts, pension, prsu, prsus, recoupment, remuneration, reward, rewarding, rewards, rsu, rsus, salaries, salary, severance, vest, vested, vesting, vests
		Shareholder rights: ballot, ballots, cast, consent, elect, elected, electing, election, elections, elects, nominate, nominated, plurality, proponent, proponents, proposal, proposals, proxies, quorum, vote, voted, votes, voting
		Transparency: brother, clicking, conflict, conflicts, family, grandchildren, grandparent, grandparents, inform, insider, insiders, inspector, inspectors, interlocks, nephews, nieces, posting, relatives, siblings, sister, son, spousal, spouse, spouses, stepchildren, stepparents, transparency, transparent, visit, visiting, visits, webpage, website

(Continues)

TABLE 3 (Continued)

Topic	Category	Subcategory
		Talent: attract, attracting, attracts, incentive, incentives, interview, interviews, motivate, motivated, motivates, motivating, motivation, recruit, recruiting, recruitment, retain, retainer, retainers, retaining, retention, talent, talented, talents
	Business ethics: cobc, ethic, ethical, ethically, ethics, honesty	Bribery and corruption: bribery, corrupt, corruption, crimes, embezzlement
		Political influence: grassroots, influence, influences, influencing, lobbied, lobbies, lobby, lobbying, lobbyist, lobbyists
		Responsible marketing: -
		Whistle-blowing system: whistleblower
	Sustainability management and reporting: announce, announced, announcement, announcements, announces, announcing, communicate, communicated, communicates, communicating, erm, fairly, integrity, liaison, presentation, presentations, sustainable	Disclosure and reporting: asc, disclose, disclosed, discloses, disclosing, disclosure, disclosures, fasb, gaap, objectivity, press, sarbanes
		Governance of sustainability issues: -
		Stakeholder engagement: engagement, engagements, feedback, hotline, investor, invite, invited, mail, mailed, mailing, mailings, notice, relations, stakeholder, stakeholders
Environmental: clean, environmental, epa, sustainability		UNGC compliance: compact, ungc
	Climate change: Climate, warming	Biofuels: biofuels, biofuel

(Continues)

TABLE 3 (Continued)

Topic	Category	Subcategory
		Climate change strategy: green, renewable, solar, stewardship, wind
		Emissions management and reporting: emission, emissions, ghg, ghgs, greenhouse, atmosphere, emit
		Access to land: zoning
	Ecosystem Service: agriculture, deforestation, pesticide, pesticides, wetlands	
		Biodiversity management: biodiversity, species, wilderness, wildlife
		Water: freshwater, groundwater, water
	Environmental management: cleaner, cleanup, coal, contamination, fossil, resource	Environmental standards: -
		Pollution control: air, carbon, nitrogen, pollution, superfund
		Product opportunities: -
		Supply chain environmental standards: -
		Waste and recycling: biphenyls, hazardous, householding, pollutants, printing, recycling, toxic, waste, wastes, weee, recycle
	Social: citizen, citizens, csr, disabilities, disability, disabled, human, nations, social, un, veteran, veterans, vulnerable	Public health: children, epidemic, health, healthy, ill, illness, pandemic Access to medicine: childbirth, drug, medicaid, medicare, medicine, medicines

(Continues)

TABLE 3 (Continued)

Topic	Category	Subcategory
		HIV and AIDS: hiv
		Nutrition: alcohol, drinking
		Product safety: bugs, conformance, defects, fda, inspection, inspections, minerals, standardization, warranty
	Human rights: dignity, discriminate, discriminated, discriminating, discrimination, equality, freedom, humanity, nondiscrimination, sexual	Community relations: communities, community
		Privacy and free expression: expression, marriage, privacy
		Security: peace
		Weak governance zones: -
	Labor standards: bargaining, eeo, fairness, fla, harassment, injury, labor, overtime, ruggie, sick, wage, wages, workplace	Diversity: bisexual, diversity, ethnic, ethnically, ethnicities, ethnicity, female, females, gay, gays, gender, genders, homosexual, immigration, lesbian, lesbians, lgbt, minorities, minority, ms, race, racial, religion, religious, sex, transgender, woman, women
		Health and safety: occupational, safe, safety, safety
		ILO core conventions: ilo, labour
		Supply chain labor standards: eicc
	Society: endowment, endowments, people, philanthropic, philanthropy, socially, societal, society, welfare	Charity: charitable, charities, charity, donate, donated, donates, donating, donation, donations, donors, foundation, foundations, gift, gifts, nonprofit, poverty
		Education: courses, educate, educated, educates, educating, education, educational, learning, mentoring, scholarships, teach, teacher, teachers, teaching, training
		Employment: employ, employment, headcount, hire, hired, hires, hiring, staffing, unemployment

^aAn electronic version of the ESG word list is online available at <https://sites.google.com/site/fkieselde/research>.

TABLE 4 Distribution of all ESG words in the sample on the topics, categories and subcategories

	total	rel. % topic	Cumulative	Cum. %
GOVERNANCE	16268	5.39%	301830	100.00%
Corporate governance	20531	6.80%	259151	85.86%
Audit and control	59990	19.88%		
Board structure	16681	5.53%		
Shareholder rights	38068	12.61%		
Transparency	6486	2.15%		
Remuneration	100620	33.34%		
Talent	16775	5.56%		
Business ethics	1114	0.37%	3451	1.14%
Bribery and corruption	359	0.12%		
Political influence	1968	0.65%		
Responsible marketing	0	0.00%		
Whistle-blowing system	10	0.00%		
Sustainability management and reporting	4428	1.47%	22960	7.61%
Disclosure and reporting	8756	2.90%		
Governance of sustainability issues	0	0.00%		
Stakeholder engagement	9755	3.23%		
UNGC compliance	21	0.01%		
SOCIAL	3884	13.00%	29897	100.00%
Public Health	3427	11.47%	6930	23.19%
Access to medicine	1929	6.45%		
HIV and AIDS	69	0.23%		
Nutrition	18	0.06%		
Product safety	1487	4.98%		
Human rights	309	1.03%	1836	6.14%
Community relations	948	3.17%		
Privacy and free expression	547	1.83%		
Security	32	0.11%		
Weak governance zones	0	0.00%		
Labor Standards	1189	3.98%	7631	25.50%
Diversity	5138	17.19%		
Health and safety	1289	4.31%		
ILO core conventions	6	0.02%		
Supply chain labor standards	9	0.00%		
Society	1358	4.54%	9616	32.17%
Charity	1930	6.46%		
Education	1282	4.29%		
Employment	5046	16.88%		

(Continues)

TABLE 4 (Continued)

	total	rel. % topic	Cumulative	Cum. %
<i>ENVIRONMENTAL</i>	2360	29.71%	7943	100.00%
Climate Change	713	8.98%	2524	31.78%
Biofuels	23	0.29%		
Climate change strategy	731	9.20%		
Emissions management and reporting	1057	13.31%		
Ecosystem Service	73	0.92%	797	10.03%
Access to land	11	0.14%		
Biodiversity management	39	0.49%		
Water	674	8.49%		
Environmental management	590	7.43%	2262	28.48%
Environmental standards	0	0.00%		
Pollution control	724	9.11%		
Product opportunities	0	0.00%		
Supply chain environmental standards	0	0.00%		
Waste and recycling	948	11.94%		

TABLE 5 Average share of ESG words on total words for topics and categories (10K vs. proxy)

	10-K	proxy	combined
<i>ESG</i>	1.66%	6.60%	3.98%
<i>GOVERNANCE</i>	1.29%	6.04%	3.52%
Corporate governance	1.025%	5.261%	3.029%
Business ethics	0.024%	0.063%	0.042%
Sustainability management and reporting	0.184%	0.360%	0.259%
<i>SOCIAL</i>	0.28%	0.46%	0.35%
Public health	0.121%	0.042%	0.077%
Human rights	0.017%	0.026%	0.021%
Labor standards	0.059%	0.140%	0.093%
Society	0.052%	0.184%	0.115%
<i>ENVIRONMENTAL</i>	0.10%	0.11%	0.10%
Climate change	0.032%	0.027%	0.041%
Ecosystem service	0.009%	0.011%	0.006%
Environmental management	0.029%	0.029%	0.031%

All topics/categories include their respective subordinated levels.
 For reasons of space this table contains only results up to category level.

“shareholder rights” (12.6 %) make up two thirds of all governance related words. These findings confirm the strong shareholder-oriented reporting in these parts of the reports.

TABLE 6 Sector classification (based on GICS sectors)

<i>IT software</i>	<i>Financials</i>	<i>Consumer Staples</i>
Facebook	Bank of America	Coca-Cola
Google	Berkshire Hathaway	PepsiCo
Microsoft	JP Morgan Chase	Procter & Gamble
Oracle	Wells Fargo	Wal-Mart
Visa		
<i>IT hardware</i>	<i>Health Care</i>	<i>Telecommunications Services</i>
Apple	Johnson & Johnson	AT&T
Cisco Systems	Merck & Co	Verizon
Intel	Pfizer	
<i>Energy</i>	<i>Industrials</i>	<i>Consumer Discretionary</i>
Exxon Mobil	General Electric	Amazon
Chevron		

6.1.2 | Social

The shares of the categories on all social words are distributed more equally. The distribution of “society” (32.2 %), “labor standards” (25.5 %) and “public health” (23.2 %) are relatively similar. We only find that the share of the category “human rights” (6.1 %) is smaller. Two subcategories have to be highlighted. The biggest share of all social words is categorized in “diversity” (17.2 %), so that this subcategory is responsible for the large share of “labor standards”. However, it is not always possible to separate “diversity” and the category “human rights”. For example, when words like “gay”, “minority” or “ethnicity” are used, it is mostly about the willingness of companies to strive for diversity in their workforce, but sometimes the transition to human rights issues is fluent. The definition of “human rights” is more focused on the company’s environment whereas “diversity” could be reached by internal measures. Empirical evidence shows that SRI investors are willing to pay a price for investing ethical and therefore addressing these topics in reports emerges to obtain these investors. (Belghitar, Clark, & Deshmukh, 2014). In fact “diversity” is obviously most important for the examined companies. E.g. Li et al. (2017) demonstrate the importance of gender diversity on the board for the development of the firm’s environmental policy as well as for the improvement of its corporate governance.

6.1.3 | Environment

Environmental words have currently the lowest share in the financial reports. In average, a financial report approximately contains 80 environmental words. Even environmental statements are not mandatory, the number of environmental-related words shows that it is worth to conduct a more detailed examination.

It is noteworthy that the words being assorted directly to the topic represent a big share of 29.3 % on all environmental-related words. Therefore, it is not possible to draw more conclusions without reading the context. In line with the current public debate, the most discussed category also in financial reports is “climate change” (31.8 %). It mainly includes the management of emissions and strategies on climate change. This topic has not only an emerging financial impact on a global perspective (Goldman Sachs Group, 2009; Nijhof, Lenssen, Roger, & Kievit, 2014), current literature also shows that on a firm level, disclosures of greenhouse gas emissions and carbon performance are significant value relevant (Liesen, Figge, Hoepner, & Patten, 2017). The category “ecosystem service” (10.0 %) is the least mentioned category. Almost the entire impact is caused by its subcategory “water”. The subcategory “biodiversity”

TABLE 7 Average share of ESG words on total words for topics (Industry sectors)

	ESG	Environmental	Social	Governance
Health care	5.05%	0.07%	0.69%	4.29%
Teleco services	4.81%	0.06%	0.41%	4.34%
Energy	4.47%	0.35%	0.38%	3.75%
Consumer staples	4.28%	0.12%	0.36%	3.80%
IT software	3.81%	0.04%	0.27%	3.50%
IT hardware	3.63%	0.06%	0.27%	3.29%
Consumer discretionary	3.31%	0.08%	0.26%	2.97%
Industrials	3.10%	0.12%	0.21%	2.77%
Financials	3.06%	0.10%	0.26%	2.69%

For reasons of space this table contains only results of the topic level. Min/max values in each category are marked **bold**.

only represents a marginal share. Despite containing some very specific words, it is rarely an issue for the examined companies. Further subcategories belonging to the topic environmental which may play a great role are “waste and recycling” (11.9 %) and “pollution control” (9.1 %). Both are assorted to the category “environmental management” which makes up 28.5 % of all environmental-related words. This finding is not surprising as companies of different sectors are affected in various ways by the previous mentioned subcategories and also the possibilities to affect these emissions differ. Hence, especially for these terms a more sophisticated analysis is noteworthy.

6.2 | ESG across industries

The subsequent section aims to analyze differences and characteristics of ESG reporting across industries. In general, there are various business classifications in economy. Our analysis mainly follows the Global Industry Classification Standard (GICS) sector group classification. However, the sector information technology is separated into two groups by having a closer look at GICS industries. They are entitled “IT hardware” and “IT software”. We expect differences in the ESG reporting especially for environmental topics because of the very different business models. This separation is also in line with SIC divisions categorization which separates these companies into “manufacturing” (hardware) and “service companies” (software). The categories and the respective companies for each category are shown in Table 6. The sectors industrials and consumer discretionary have only assorted one company in each case.

Table 7 shows the average share of ESG words on total words for each sector. The dominating sector with the highest shares of ESG words is health care (overall 5.1 %). Only in the subcategory *environmental* dominates the energy sector strongly. This industry sector is currently in the publics’ focus regarding the climatic change. Energy production indicates high natural resources, emission of pollutants or interfering in ecosystems. Therefore, these companies might face a high demand on information about sustainability strategies by the shareholders, also because stricter governmental regulations about e.g., pollution control directly affects their business model. In contrast, companies belonging to financials address ESG topics in a distinct lower frequency (3.1 %). The information demand in this sector might still be more oriented on the financial statement. Overall, it can be seen that the amount of ESG reporting is highly related to underlying business models and cultures (Lies et al., 2012; Sethi, Martell, & Demir, 2017).

TABLE 8 Trend of average share of ESG words on total words for topics and categories (2012 - 2015)

	2012	2013	2014	2015	2012–2015
ESG	3.88%	3.94%	4.13%	3.95%	1.70%
GOVERNANCE	3.46%	3.52%	3.67%	3.45%	–0.12%
Corporate governance	3.004%	3.015%	3.156%	2.927%	–2.56%
Business ethics	0.033%	0.046%	0.042%	0.050%	52.48%
Sustainability management and reporting	0.235%	0.261%	0.269%	0.274%	16.43%
SOCIAL	0.35%	0.34%	0.35%	0.37%	7.35%
Public health	0.081%	0.076%	0.072%	0.081%	–0.12%
Human rights	0.020%	0.021%	0.022%	0.023%	15.05%
Labor standards	0.086%	0.089%	0.096%	0.104%	21.38%
Society	0.116%	0.112%	0.116%	0.114%	–1.38%
ENVIRONMENTAL	0.08%	0.09%	0.11%	0.12%	55.53%
Climate change	0.020%	0.023%	0.038%	0.046%	126.29%
Ecosystem service	0.008%	0.009%	0.010%	0.010%	25.53%
Environmental management	0.027%	0.025%	0.029%	0.034%	23.10%

All topics/categories include their respective subordinated levels.

For reasons of space this tables contains only results up to category level.

6.3 | Emerging topics in ESG reporting

Table 8 provides the average shares of ESG words on total words in all reports between 2012 and 2015. We find an upward trend, documenting the increasing importance of ESG topics for corporate disclosures. In total, the average share increased by 1.1 pp over the sample period.

The trend of the average share of governance words on total words looks similar to the trend of all ESG words. The reason is the dominant role of governance-related words within all ESG words.

The category “corporate governance” dominates the topic governance. However, we find a slight decrease in the share of “corporate governance”. While it is still the leading category, a level of saturation might be reached in the reports. It is also the category with the longest history, while the other two categories are more emerging during the last years. In line with this development, they both show an upward trend. “Business ethics” almost doubled its share in the sample period, indicating strong increased attention in this topic after the financial crisis (Fassin & Gosselin, 2011; Kemper & Martin, 2010).

We also find a general upward trend in the topic social. This trend is especially driven by the category “labor standards”. “Diversity” and “employment” are the most impactful subcategories within the topic “social”. This development might be driven by the insight that an active diversity management could also affect a firm’s financial performance (Conyon & He, 2017; Vieira, 2017) and furthermore retroacts to other directly ESG related intents (Li et al., 2017; Velte, 2016). In addition, when Generation Y in the foreseeable future will dominate the workforce (Eisner, 2005) and millennials will succeed them, their specific values and understanding of work will become increasingly relevant for employers (Cennamo & Gardner 2008; Wong, Wan, & Gao, 2017). Especially in terms of corporate disclosures this information might be relevant not only for shareholders but also for recruiting talented new employees (Albinger & Freeman, 2000).

The topic showing the steadiest growth in the average share of its words is “environmental”. Coming from a comparably low level in 2012 the average share of this topic almost doubled in 2015. This growth was mainly caused by the category “climate change”. It is by far the largest gain of average share on total words among all categories of the ESG

word list. This development indicates a rising awareness of companies concerning their impact on climate change. The related category “environmental management” also grows strongly.

7 | CONCLUSION

The awareness of SRI among investors is rising. Literature indicates that CSR also increased in response. Measuring a company's contribution and thereby identifying sustainable investments is difficult, since CSR is based on qualitative data. Most current SRI research applies socially responsible ratings and SRI investors have therefore to rely on third party information. In contrast, this paper approaches the problem by analyzing company data such as annual reports as the most reliable sources of firm information. The aim is to convert unstructured narrative content into quantitative data using textual analysis. For this purpose, we generated an exhaustive ESG word list based on 10-K reports and proxy statements and structured this list in 10 categories and 40 subcategories. Afterwards, we manually analyzed 100 reports and found that the typical ESG vocabulary in the reports is quite similar. Hence, the number of included reports in our analysis seems reasonable but it should potentially be extended in the future to accommodate newly emerging topics. This structured list allows a sophisticated analysis of ESG reports and a direct quantification of several different aspects of ESG reporting. Textual analysis in this context could be a helpful instrument to make large amounts of unstructured data comparable and to support human decision-making.

Furthermore, we use this list to analyze the ESG content companies state in their annual reports and thereby provide the robustness of our word selection methodology. The results show a current 4.0 % average share of ESG words on total words. We find that the three ESG topics are addressed to a different extent. Governance, especially its category corporate governance, dominates the topics social and environmental. Due to our definitions, this indicates a remarkable higher focus on shareholders than stakeholders in general. Historically, this is also the most persisting ESG topic while the other aspects are strongly emerging during the past decade.

This paper contributes to literature in several ways. First, it helps to understand the usage of a topic-based word list in accounting and finance. Second, the ESG word list can be used to examine the extent of ESG reporting in a unique granular way. It enables to reveal differences in the ESG levels as well as conspicuous changes, without reading the reports. Third, indications for a relation between changes in reporting and real events, especially negative media presence, are detected. In a next step, it could be interesting to prove this relation on a broader basis. Fourth, one outcome of this study is a relatively exhaustive ESG word list. Researchers and investors can easily adopt the list to their own needs and apply it for various research issues on SRI and CSR. It could be of general interest to examine the relation between the usage of ESG words and corporate performance indicators or stock returns. At the current state, our aim is to expand generally the textual analysis methodology to the emerging field of ESG reporting. Our ESG word list may therefore serve as a general basis for future research in this topic.

ENDNOTES

- ¹ Words which are directly related to ESG or are root words are not affected by the 5 % rule.
- ² The problem of only using single words is that most words appear in different contexts.
- ³ The most 50 frequently ESG words in the 10-K reports and the proxy statements are shown in Appendix 1.
- ⁴ Another example is the word “aircraft”. It was assorted to the topic governance in the category business ethics. The original reason is that in some reports it appears in the context of regulations regarding private and business use of the company's aircraft. The outlier diagnostic shows that companies operating in the aviation sector or being part of its supply chain use it in the context of their products as well.
- ⁵ For example, there are no other forms of the words brother and sister except their plurals. Another example is that there is no verb for the word talent. The list also contains some proper nouns like „ruggie“.
- ⁶ An example is the word nations. It is part of the chain united nations in the majority of its appearances. Abbreviations are also counted to this category because they represent a word chain. For example, the term CSR stands for „corporate social responsibility“.

⁷ In order to calculate the total words of a document, we exclude letters and roman numbers that are not representing words. There most likely usage is in enumerations.

REFERENCES

- Albinger, H. S., & Freeman, S. J. (2000). Corporate social performance and attractiveness as an employer to different job seeking populations. *Journal of Business Ethics*, 28, 243–253. <https://doi.org/10.1023/A:1006289817941>
- Auer, B. R., & Schuhmacher, F. (2016). Do socially (ir) Responsible investments pay? New evidence from international ESG data. *The Quarterly Review of Economics and Finance*, 59, 51–62. <https://doi.org/10.1016/j.qref.2015.07.002>
- Bebbington, J., Larrinaga, C., & Moneva, J. M. (2008). Corporate social reporting and reputation risk management. *Accounting, Auditing & Accountability Journal*, 21, 337–361. <https://doi.org/10.1108/09513570810863932>
- Belghitar, Y., Clark, E., & Deshmukh, N. (2014). Does it pay to be ethical? Evidence from the FTSE4Good. *Journal of Banking & Finance*, 47, 54–62. <https://doi.org/10.1016/j.jbankfin.2014.06.027>
- Bénabou, R., & Tirole, J. (2010). Individual and corporate social responsibility. *Economica*, 77, 1–19. <https://doi.org/10.1111/j.1468-0335.2009.00843.x>
- Berelson, B. R. (1952). *Content Analysis in communication research*. New York: Free Press. <https://doi.org/10.1177/000271625228300135>
- Berg, F., Kölbel, J., & Rigobon, R. (2020). Aggregate confusion: The divergence of ESG ratings. MIT Sloan School Working Paper 5822-19, <https://ssrn.com/abstract=3438533>.
- Bodnaruk, A., Loughran, T., & McDonald, B. (2015). Using 10-K text to gauge financial constraints. *Journal of Financial and Quantitative Analysis*, 50, 623–646. <https://doi.org/10.1017/S0022109015000411>
- Bollen, N. P. B. (2007). Mutual fund attributes and investor behavior. *Journal of Financial and Quantitative Analysis*, 42, 683–708. <https://doi.org/10.1017/S0022109000004142>
- Bouten, L., Everaert, P., & Roberts, R. W. (2012). How a two-step approach discloses different determinants of voluntary social and environmental reporting. *Journal of Business Finance & Accounting*, 39, 567–605. <https://doi.org/10.1111/j.1468-5957.2012.02290.x>
- Brammer, S., Brooks, C., & Pavelin, S. (2006). Corporate social performance and stock returns: UK evidence from disaggregate measures. *Financial Management*, 35, 97–116. <https://doi.org/10.1111/j.1755-053X.2006.tb00149.x>
- Buhr, N., & Freedman, M. (1996). A comparison of mandated and voluntary environmental disclosure: The case of Canada and the United States. *Paper presented at the Critical Perspectives on Accounting Conference, New York*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.195.3647&rep=rep1&type=pdf>
- Cennamo, L., & Gardner, D. (2008). Generational differences in work values, outcomes and person-organisation values fit. *Journal of Managerial Psychology*, 23, 891–906. <https://doi.org/10.1108/02683940810904385>
- Clarkson, P. M., Fang, X., Li, Y., & Richardson, G. (2013). The relevance of environmental disclosures: Are such disclosures incrementally informative? *Journal of Accounting and Public Policy*, 32, 410–431. <https://doi.org/10.1016/j.jaccpubpol.2013.06.008>
- Canyon, M. J., & He, L. (2017). Firm performance and boardroom gender diversity: A quantile regression approach. *Journal of Business Research*, 79, 198–211. <https://doi.org/10.1016/j.jbusres.2017.02.006>
- Deegan, C., Rankin, M., & Tobin, J. (2002). An examination of the corporate social and environmental disclosures of BHP from 1983–1997. *Accounting, Auditing & Accountability Journal*, 15, 312–343. <https://doi.org/10.1108/09513570210435861>
- Dimson, E., Karakaş, O., & Li, X. (2015). Active ownership. *Review of Financial Studies*, 28, 3225–3268. <https://doi.org/10.1093/rfs/hhv044>
- Eccles, R. G., & Serafeim, G. (2014). *Corporate and integrated reporting: A functional perspective* (Working Paper). Cambridge. Retrieved from http://www.hbs.edu/faculty/Publication%20Files/14-094_30b9b0a2-4acb-47ec-bddc-8c1d810e3cde.pdf
- Erwin, P. M. (2011). Corporate codes of conduct: The effects of code content and quality on ethical performance. *Journal of Business Ethics*, 99, 535–548. <https://doi.org/10.1007/s10551-010-0667-y>
- Escrig-Olmedo, E., Muñoz-Torres, M. J., Fernández-Izquierdo, M. Á., & Rivera-Lirio, J. M. (2014). Lights and shadows on sustainability rating scoring. *Review of Managerial Science*, 8, 559–574. <https://doi.org/10.1007/s11846-013-0118-0>
- Fassin, Y., & Gosselin, D. (2011). The collapse of a European bank in the financial crisis: An analysis from stakeholder and ethical perspectives. *Journal of Business Ethics*, 202, 169–191. <https://doi.org/10.1007/s10551-011-0812-2>
- Financial Times. (2012). Global warming ‘manageable’, says Exxon chief. Retrieved from <https://www.ft.com/content/1ff711c8-c066-11e1-982d-00144feabdc0>
- Forum for Sustainable and Responsible Investment. (2016). About us. Retrieved from <http://www.ussif.org/about>
- Giles, O. A., & Murphy, D. (2016). SLAPPed: The relationship between SLAPP suits and changed ESG reporting by firms. *Sustainability Accounting, Management and Policy Journal*, 7, 44–79. <https://doi.org/10.1108/SAMPJ-12-2014-0084>
- Glac, K. (2014). The influence of shareholders on corporate social responsibility. *Economics, Management & Financial Markets*, 9, 34–72.

- Goldman Sachs Group. (2009). Change is coming: A framework for climate change – a defining issue of the 21st century. Available at Retrieved from <http://www.goldmansachs.com/our-thinking/archive/crossing-the-rubicon-immersive/change-is-coming-a-framework-for-climate-change.pdf>
- Handelsblatt. (2017). Ethik-Richtlinien kosten Staatsfonds 1,3 Milliarden Euro. Retrieved from <http://www.handelsblatt.com/finanzen/anlagestrategie/fonds-etf/norwegen-ethik-richtlinien-kosten-staatsfonds-1-3-milliarden-euro/19548816.html>
- Henry, E. (2008). Are investors influenced by how earnings press releases are written? *Journal of Business Communication*, 45, 363–407. <https://doi.org/10.1177/2F0021943608319388>
- Hopkins, M. (2016). *CSR and sustainability: From the margins to the mainstream: A textbook*. Sheffield, UK: Greenleaf Publishing.
- Jensen, J. C., & Berg, N. (2012). Determinants of traditional sustainability reporting versus integrated reporting: An institutional approach. *Business Strategy and the Environment*, 21, 299–316. <https://doi.org/10.1002/bse.740>
- Kang, C., Germann, F., & Grewal, R. (2016). Washing away your sins? Corporate social responsibility, corporate social irresponsibility, and firm performance. *Journal of Marketing*, 80, 59–79. <https://doi.org/10.1509/jm.15.0324>
- Kemper, A., & Martin, R. L. (2010). After the fall: The global financial crisis as a test of corporate social responsibility theories. *European Management Review*, 7, 229–239. <https://doi.org/10.1057/emr.2010.18>
- Kempf, A., & Osthoff, P. (2007). The effect of socially responsible investing on portfolio performance. *European Financial Management*, 13, 908–922. <https://doi.org/10.1111/j.1468-036X.2007.00402.x>
- Kiessling, T., Isaksson, L., & Yasar, B. (2016). Market orientation and CSR: Performance implications. *Journal of Business Ethics*, 137, 269–284. <https://doi.org/10.1007/s10551-015-2555-y>
- Kim, Y., Park, M. S., & Wier, B. (2012). Is earnings quality associated with corporate social responsibility? *The Accounting Review*, 87, 761–796. <https://doi.org/10.2308/accr-10209>
- Kuo, L., & Yi-Ju Chen, V. (2013). Is environmental disclosure an effective strategy on establishment of environmental legitimacy for organization? *Management Decision*, 51, 1462–1487. <https://doi.org/10.1108/MD-06-2012-0395>
- La Cuesta, M. de, & Valor, C. (2013). Evaluation of the environmental, social and governance information disclosed by Spanish listed companies. *Social Responsibility Journal*, 9, 220–240. <https://doi.org/10.1108/SRJ-08-2011-0065>
- Larcker, D. F., & Zakolyukina, A. A. (2012). Detecting deceptive discussions in conference calls. *Journal of Accounting Research*, 50, 495–540. <https://doi.org/10.1111/j.1475-679X.2012.00450.x>
- Lextek. (2016). Stop Word List 1. Retrieved from <http://www.lextek.com/manuals/onix/stopwords1.html>
- Li, F. (2010). Textual analysis of corporate disclosures: A survey of the literature". *Journal of Accounting Literature*, 29, 143–165.
- Li, J., Zhao, F., Chen, S., Jiang, W., Liu, T., & Shi, S. (2017). Gender diversity on boards and firms' environmental policy. *Business Strategy and the Environment*, 26, 306–315. <https://doi.org/10.1002/bse.1918>
- Liesen, A., Figge, F., Hoepner, A., & Patten, D. M. (2017). Climate change and asset prices: Are corporate carbon disclosure and performance priced appropriately? *Journal of Business Finance & Accounting*, 44, 35–62. <https://doi.org/10.1111/jbfa.12217>
- Lokuwaduge, C. S. D. S., & Heenetigala, K. (2016). Integrating environmental, social and governance (ESG) disclosure for a sustainable development: An Australian study. *Business Strategy and the Environment*, 26, 438–450. <https://doi.org/10.1002/bse.1927>
- Loughran, T., & McDonald, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10Ks. *The Journal of Finance*, 66, 35–65. <https://doi.org/10.1111/j.1540-6261.2010.01625.x>
- Loughran, T., & McDonald, B. (2016). Textual analysis in accounting and finance: A survey. *Journal of Accounting Research*, 54, 1187–1230. <https://doi.org/10.1111/1475-679X.12123>
- Loughran, T., McDonald, B., & Yun, H. (2009). A wolf in sheep's clothing: The use of ethics-related terms in 10-K reports. *Journal of Business Ethics*, 89, 39–49. <https://doi.org/10.1007/s10551-008-9910-1>
- Maniora, J. (2017). Is integrated reporting really the superior mechanism for the integration of ethics into the core business model? An empirical analysis. *Journal of Business Ethics*, 140, 755–786. <https://doi.org/10.1007/s10551-015-2874-z>
- Manning, C. D., & Schütze, H. (2000). *Foundations of statistical natural language processing* (2nd ed). Cambridge, Mass.: MIT Press.
- Matsumoto, D., Pronk, M., & Roelofs, E. (2011). What makes conference calls useful? The information content of managers' presentations and analysts' discussion sessions. *The Accounting Review*, 86, 1383–1414. <https://doi.org/10.2308/accr-10034>
- New York Times. (2015). Exxon Mobil investigated for possible climate change lies by New York attorney general. Retrieved from https://www.nytimes.com/2015/11/06/science/exxon-mobil-under-investigation-in-new-york-over-climate-statements.html?_r=2
- Nijhof, A., Lenssen, G., Roger, L., & Kievit, H. (2014). How to finance the transition to a more sustainable global economy and society? *Corporate Governance*, 14. <https://doi.org/10.1108/CG-10-2014-0117>
- Patten, D. M. (1992). Intra-industry environmental disclosures in response to the Alaskan oil spill: A note on legitimacy theory. *Accounting, Organizations and Society*, 17, 471–475. [https://doi.org/10.1016/0361-3682\(92\)90042-Q](https://doi.org/10.1016/0361-3682(92)90042-Q)
- Patten, D. M. (2002). The relation between environmental performance and environmental disclosure: A research note. *Accounting, Organizations and Society*, 27, 763–773. [https://doi.org/10.1016/S0361-3682\(02\)00028-4](https://doi.org/10.1016/S0361-3682(02)00028-4)

- Pérez, A., & Rodríguez del Bosque, I. (2013). Measuring CSR image: Three studies to develop and to validate a reliable measurement tool. *Journal of Business Ethics*, 118, 265–286. <https://doi.org/10.1007/s10551-012-1588-8>
- Petrenko, O. V., Aime, F., Ridge, J., & Hill, A. (2016). Corporate social responsibility or CEO narcissism? CSR motivations and organizational performance. *Strategic Management Journal*, 37, 262–279. <https://doi.org/10.1002/smj.2348>
- Prasad, D. B. (2008). *Content analysis: A method of Social Science Research*. In D. K. Lal Das (Ed.), (ed) *Research Methods for Social Work*. New Delhi: Rawat Publications, 2008.
- Renneboog, L., & Zhang, C., & (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, 32, 1723–1742. <https://doi.org/10.1016/j.jbankfin.2007.12.039>
- Sahut, J.-M., & Pasquini-Descomps, H. (2015). ESG impact on market performance of firms: International evidence. *Management International*, 19, 40–63. <https://doi.org/10.7202/1030386ar>
- Siew, R. Y. (2015). A review of corporate sustainability reporting tools (SRTs). *Journal of Environmental Management*, 164, 180–195. <https://doi.org/10.1016/j.jenvman.2015.09.010>
- Sjöström, E., & Welford, R. (2009). Facilitators and impediments for socially responsible investment: A study of Hong Kong. *Corporate Social Responsibility and Environmental Management*, 16, 278–288. <https://doi.org/10.1002/csr.210>
- Sethi, S. P., Martell, T. F., & Demir, M. (2017). An evaluation of the quality of corporate social responsibility reports by some of the world's largest financial institutions. *Journal of Business Ethics*, 140, 787–805. <https://doi.org/10.1007/s10551-015-2878-8>
- Tang, Z., Hull, C. E., & Rothenberg, S. (2012). How corporate social responsibility engagement strategy moderates the CSR-financial performance relationship. *Journal of Management Studies*, 49, 1274–1303. <https://doi.org/10.1111/j.1467-6486.2012.01068.x>
- Tilling, M. V., & Tilt, C. A. (2010). The edge of legitimacy. *Accounting, Auditing & Accountability Journal*, 23, 55–81. <https://doi.org/10.1108/09513571011010600>
- Turney, P. D., & Pantel, P. (2010). From frequency to meaning: Vector space models of semantics. *Journal of Artificial Intelligence Research*, 37, 141–188. <https://doi.org/10.1613/jair.2934>
- Velte, P. (2016). Women on management board and ESG performance. *Journal of Global Responsibility*, 7, 98–109. <https://doi.org/10.1108/JGR-01-2016-0001>
- Verbeeten, F. H., Gamerschlag, R., & Möller, K. (2016). Are CSR disclosures relevant for investors? Empirical evidence from Germany. *Management Decision*, 54, 1359–1382. <https://doi.org/10.1108/MD-08-2015-0345>
- Vieira, E. S. (2018). Board of directors characteristics and performance in family firms and under the crisis. *Corporate Governance: The International Journal of Business in Society*, 18, 119–142. <https://doi.org/10.1108/CG-01-2017-0010>
- Wijethilake, C. (2017). Proactive sustainability strategy and corporate sustainability performance: The mediating effect of sustainability control systems. *Journal of Environmental Management*, 196, 569–582. <https://doi.org/10.1016/j.jenvman.2017.03.057>
- Williams, S., & Ho Wern Pei, C.-A. (1999). Corporate social disclosures by listed companies on their web sites: An international comparison. *The International Journal of Accounting*, 34, 389–419. [https://doi.org/10.1016/S0020-7063\(99\)00016-3](https://doi.org/10.1016/S0020-7063(99)00016-3)
- Wilmschurst, T. D., & Frost, G. R. (2000). Corporate environmental reporting. *Accounting, Auditing & Accountability Journal*, 13, 10–26. <https://doi.org/10.1108/09513570010316126>
- Wong, I. A., Wan, Y. K. P., & Gao, J. H. (2017). How to attract and retain Generation Y employees? An exploration of career choice and the meaning of work. *Tourism Management Perspectives*, 23, 140–150. <https://doi.org/10.1016/j.tmp.2017.06.003>

How to cite this article: Baier P, Berninger M, Kiesel F. Environmental, social and governance reporting in annual reports: A textual analysis. *Financial Markets, Inst & Inst*. 2020;29:93–118. <https://doi.org/10.1111/fmii.12132>

APPENDIX 1: 50 MOST FREQUENTLY OCCURRING ESG WORDS IN 10-K REPORTS AND PROXY STATEMENTS

Word	% of ESG	Cumulative %	Word	% of ESG	Cumulative %
compensation	11.06%	11.06%	ms	0.90%	54.66%
awards	4.39%	15.45%	oversight	0.85%	55.51%
independent	2.99%	18.44%	notice	0.83%	56.34%
audit	2.79%	21.22%	vest	0.77%	57.11%
vote	2.73%	23.95%	independence	0.76%	57.87%
award	2.72%	26.67%	bonus	0.70%	58.57%
incentive	2.66%	29.34%	disclosure	0.68%	59.25%
governance	2.54%	31.87%	website	0.67%	59.92%
control	2.03%	33.90%	reviews	0.66%	60.58%
pension	1.96%	35.86%	gaap	0.65%	61.23%
voting	1.64%	37.49%	votes	0.65%	61.88%
proposal	1.63%	39.13%	proposals	0.64%	62.52%
retirement	1.40%	40.53%	controls	0.64%	63.15%
vesting	1.40%	41.92%	assessment	0.62%	63.77%
approval	1.20%	43.12%	conduct	0.60%	64.37%
leadership	1.19%	44.31%	elected	0.59%	64.96%
review	1.18%	45.48%	nominee	0.59%	65.56%
compliance	1.12%	46.60%	nominees	0.59%	66.15%
approved	1.11%	47.71%	investor	0.53%	66.68%
salary	1.11%	48.82%	evaluation	0.48%	67.16%
rsus	1.10%	49.92%	human	0.48%	67.64%
election	1.02%	50.93%	qualifications	0.46%	68.10%
employment	1.01%	51.95%	environmental	0.45%	68.55%
vested	0.91%	52.86%	reviewed	0.45%	69.00%
health	0.90%	53.76%	payout	0.44%	69.44%

APPENDIX 2: STANDARDIZED PROCESS OF MERGING AND EDITING 10-K REPORTS AND PROXY STATEMENTS

-
1. Open 10-K report (filing 10-K) on the SEC website, copy paste in TXT file.
 2. Remove SEC header and table of contents (technically everything above PART I).
 3. Remove signatures, power of attorney and index to exhibits.
 4. Open proxy statement (filing DEF 14A), copy paste in TXT file.
 5. Remove header (in most cases everything above salutation) and table of contents.
 6. Remove appendixes like admission ticket, directions, proxy/voting instruction card.
 7. Remove the phrases "table of contents" and "back to contents" (which can appear as hyperlinks at the top of each page).
 8. Remove terms like *2015 proxy statement*, *2015 Form 10-K* as well as company names in the form *AT&T Inc.*, *Bank of America 2015* or *Chevron Corporation* if they appear at the end of each page.
 9. Remove the word *page* if it appears in conjunction with page numbers.
 10. Remove the term "LOGO" (which appears because of copy and paste images).
 11. Remove text sequences being crossed out or written in languages other than English.
-