



The Effect of CEO Turnover on ESG Disclosure

*A study of listed US firms' ESG disclosure in the Management's
Discussion and Analysis section of 10-K filings and CEO turnover
in the period 2011-2019*

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Abstract

This paper examines the relationship between chief executive officer (CEO) turnovers and environmental, social and governance (ESG) disclosure. We find that firms led by newly appointed CEOs improve our measure of ESG disclosure by 2.84% during the two years following the replacement of the CEO. Our results also show a significant increase in the prioritisation of ESG topics during this period. We measure firms' written ESG disclosure in the Management's Discussion and Analysis (MD&A) section of their 10-K filings by employing textual analysis and an ESG dictionary. We document that the relationship is likely to be causal by utilising propensity score matching in an event study framework around CEO turnovers. The results suggest that CEO turnover is a mechanism for breaking patterns of recycling corporate statements, leading to improved ESG disclosure practices.

Keywords – NHH, master thesis, ESG disclosure, CEO turnover, textual analysis

Contents

1	Introduction	1
2	Related literature	4
3	Data	5
3.1	Retrieving 10-K filings	5
3.2	Measuring ESG disclosure and its importance	6
3.2.1	Constructing disclosure measures	6
3.2.2	Validating the context of ESG disclosure	9
3.2.3	Validating our measure of ESG disclosure against Refinitiv CSR score	13
3.3	Classifying CEO turnovers	14
3.4	Determining baseline control variables	14
3.5	Summary statistics for high- and low-tenured CEOs	15
4	Analysis	17
4.1	Baseline results from OLS regressions	17
4.2	Identification strategy	19
4.2.1	Enhancing comparability through propensity score matching	19
4.2.2	Estimating the treatment effect	22
4.2.3	Falsification tests supporting a parallel trend	25
4.2.4	The effect of an externally hired CEO on ESG disclosure	28
5	Conclusion	29
	References	32
	Appendix	35
A1	Variable definitions	35
A2	ESG dictionary	36
A3	Summary statistics of full sample	37
A4	Annual relative change in disclosure scores	38

List of Figures

3.1	Word cloud of the most frequently used ESG words	7
3.2	Relationship between our disclosure measures and Refinitiv CSR score .	13
4.1	Change in disclosure scores from the year before the CEO turnover to the year after	25
4.2	Development in control variables post-treatment	28
A4.1	Disclosure changes relative to CEO turnover event period	38

List of Tables

3.1	Development in disclosure scores	9
3.2	Word in context frequency table for three selected ESG words	10
3.3	Excerpts from the MD&A sections for various firms	12
3.4	Sample distribution of CEO turnovers by fiscal year	14
3.5	Summary statistics for high- and low-tenured CEOs	16
4.1	Baseline regressions with disclosure variables	18
4.2	Distributional properties for treated, nontreated and control firms in pre- turnover analysis.	21
4.3	Difference-in-difference analysis of CEO turnover	23
4.4	Falsification tests for prior and subsequent periods	27
4.5	The effect of an externally recruited CEO on disclosure	29
A1.1	Definitions of dependent and independent variables	35
A2.1	ESG dictionary from Baier et al. (2020)	36
A3.1	Summary statistics of full sample	37

1 Introduction

Firms' *Environmental, Social and Governance* (ESG) risks and opportunities have a significant impact on firm valuations (Schoenmaker & Schramade, 2019), and investors' demand for disclosure of ESG information is increasing. Still, firms are slow to adapt and transform their reporting routines. A documented underlying mechanism for this is the propensity to defaulting to prior responses to a task (Cohen, Malloy, & Nguyen, 2016). Firms tend to recycle their statements from one period to the next, causing *disclosure inertia* in their reporting practices. While certain aspects of ESG disclosure are compulsory and required by governmental regulations, obtaining complete and comparable ESG data require firm managers to disclose the information voluntarily. This leads to managerial preferences being an important factor in relation to ESG transparency. Thus, we expect that a change in the management, specifically the Chief Executive Officer (CEO), is an event that will break this disclosure inertia and influence firms' ESG disclosure practices.

We find in this paper that firms with newly appointed CEOs are associated with an improvement in our measure of ESG disclosure by approximately 2.84% in the two years following the CEO replacement, relative to firms not experiencing turnovers. This is the result of a difference-in-difference OLS regression in which we control for CEO and firm characteristics, and include fixed effects for firm and time. Our sample consists of listed US firms in the period from 2011 to 2019. The two main challenges related to our research are (i) to quantify a measure for ESG disclosure, and (ii) to make causal interpretations of the results.

Our findings support that the measure is capturing ESG disclosure and not arbitrary information. We measure ESG disclosure by analysing a large sample of corporate annual reports from listed US firms using textual analysis and a dictionary of ESG words. The measure is based on the prevalence of ESG words in the Management's Discussion and Analysis (MD&A) section of firms' 10-K filings. Through qualitative assessments, we find that the ESG words we use are suitable for measuring ESG disclosure, as the words are mainly appearing in the context of ESG topics. In addition, our measure yields a statistically significant positive correlation with an ESG disclosure score from Refinitiv.

Our results are subject to identification challenges relating to potential compositional differences and non-parallel trends between firms with CEO turnovers and firms without

turnovers. We get closer to causal interpretations of our results by following a matching procedure, and by successfully performing relevant falsification tests.

To deal with compositional differences, we use propensity score matching to match firms that change CEO to control firms which do not. Our matching procedure shows that we achieve a significantly more balanced set of observations, based on pre-turnover characteristics, after matching compared to before matching. The matching leaves us with a sample of 527 firms with CEO turnovers and an equal amount of firms in the control group, which we analyse over a two-year window. We also show that variables not expected to be affected by a CEO turnover do not diverge in the subsequent period between the turnover and the control group.

To investigate a parallel trend between the groups, we perform falsification tests. We replicate the difference-in-difference model with prior non-turnover years as placebo events. There are no significant coefficients in these tests, which supports the parallel-trend assumption. We also look for treatment reversal and perform a falsification test with a subsequent non-turnover year as placebo event. The coefficient is still insignificant. Overall, the falsification tests reinforce a causal interpretation of our results.

This paper provides additional findings. Along with our ESG disclosure measure, we create a measure to capture priority, or importance, of ESG topics. Turnover firms, relative to control firms, show an increase in our measure of importance by 0.79 units. We base the measure on the relative position of ESG words in the MD&A section, where we score firms on a scale from 0 to 100, which represent low priority and high priority, respectively. These results arise from running the same model for the importance score as for the ESG disclosure measure. The finding is interesting since we expect firms to disclose topics of importance early in corporate statements (Rust & Quaadman, 2019).

Our final subject of interest is the relation between the origin of the CEO successor and ESG disclosure. We document that there are no significant differences between turnover firms with externally hired, versus internally hired, CEO successors. The motivation for the research is based on literature suggesting that externally hired CEOs are better suited to implement new policies, while internally hired CEOs are better suited to implement the firm's current policies (Parrino, 1997). In such case, external CEOs have a higher propensity to change disclosure relative to the internally hired CEOs.

Our paper is closely related to that of McBrayer (2018), who finds that CEO tenure is negatively associated with ESG disclosure quality and variability. The author shows that a CEO turnover increases the median "Bloomberg ESG disclosure score" by 9.7% in the two years following the replacement of the CEO. Our results are similar to the findings of McBrayer (2018), supporting that a CEO turnover breaks the inertia of firms' reporting, leading to an improvement in ESG disclosure.

Despite the similarities between the findings of McBrayer (2018) and our results, our paper contains distinctive differences. First, a key difference, and a key contribution from our work, is how we measure ESG disclosure. Whereas the author uses an established ESG disclosure score from Bloomberg, we apply textual analysis algorithms to analyse ESG disclosure. Our method is commonly available and reproducible, and allow for analysis of ESG disclosure in specific documents, such as the MD&A section. Further, McBrayer (2018) does not account for whether it matters for disclosure persistence if the CEO is recruited from outside or inside the firm. Our paper contributes by examining the relationship between the origin of the new CEO and ESG disclosure. Finally, while the author uses a sample 10 096 firm-year observations from 2006 to 2015, we employ a larger data sample from a more recent period, which enables us to capture the latest development in ESG disclosure practices.

The findings in this paper are relevant due to market responses to ESG disclosure. The world's leading proponent for responsible investments, the United Nations-backed *Principles for Responsible Investments* (PRI), with signatories such as BlackRock and Norges Bank Investment Management, has six principles for responsible investments. The third principle states "We will seek appropriate disclosure on ESG issues by the entities in which we invest" (PRI Association, 2020). Further, Dhaliwal, Li, Tsang, and Yang (2011) find that firms which voluntary disclose corporate social responsibility activities experience a lower cost of equity capital. The finding is consistent with the general voluntary disclosure literature, which suggests that managers seek to reduce information asymmetry through voluntary disclosure to achieve a lower cost of capital (Healy & Palepu, 2001).

This paper contributes to the research on voluntary ESG disclosure. We point towards mechanisms, other than governmental regulations, that affect firms' ESG disclosure

practices. Our findings are relevant for explaining how firms improve their ESG disclosure and how it relates to a firm's top management. We show that CEO turnovers are a mechanism for breaking firms reporting inertia, which we document to increase the ESG disclosure.

2 Related literature

Most relevant to our paper is previous literature that analyses the relationship between management turnover and corporate reporting. Cohen et al. (2016)¹ examine textual content similarity in 10-K and 10-Q filings from one period to the next. They find that when firms deviate from their routine content in 10-K and 10-Q filings, it yields important and superior information for future firm performance. By isolating sections from 10-K filings, they show that the MD&A has the lowest similarity from one period to the next, which is also the section with the most flexibility in terms of content (Cohen et al., 2016). Further, they find that mentions of CEO turnover is related to less similarity in the reporting. Although the focus in the paper lies in corporate disclosure and how it affects future firm performance, it shows significant *inertia* in corporate disclosure, i.e. that firms tend to recycle their corporate statements. Thus, this may simply lead to no changes or lower quality in ESG disclosure. We add to their findings that not just mentions of CEO turnover, but actual turnover is related to changes in reporting.

Prior literature has shown that there is a link between CEO tenure and voluntary environmental disclosure. Lewis, Walls, and Dowell (2014) study how managerial characteristics affect firms' likelihood of disclosing environmental information. Using a sample of US firms from 2002 to 2008 and data from the Carbon Disclosure Project (CDP), which comprises of a questionnaire addressing environmental issues, they find that firms with newly appointed CEOs are more likely to disclose environmental information. We contribute to this paper by covering the additional social and governance dimension. Further, while the authors analyse CEOs' propensity to respond to the CDP questionnaire, we examine textual changes of ESG disclosure and quantify the magnitude.

Lastly, this paper is closely related to that of Meng, Zeng, Tam, and Xu (2013) and

¹The most recent version of this paper was published in The Journal of Finance on 28 January 2020 (Cohen, Malloy, & Nguyen, 2020). Details closely related to our research are more thoroughly explained in a previous version of this paper (10 February 2016).

Bernard, Godard, and Zouaoui (2018). Meng et al. (2013) analyse the relationship between top executives' turnover and environmental information disclosure in 782 listed companies in China from 2006 to 2008. They find that an involuntary and forced CEO departure is negatively associated with environmental information disclosure. Bernard et al. (2018) examine the relationship between CEO turnovers and firms' ESG performance. Using a sample of 88 public companies in France from 1999 to 2011, they find a positive relationship between CEO turnover and ESG performance five years after the turnover. Moreover, the relationship is stronger when a CEO is recruited externally.

The results from these two papers suggest that there is a significantly positive relationship between CEO turnovers and ESG practices. Key differences from these papers are the geographical area they cover and the time frame. We contribute to their research by examining comparable relationships in the US market in a recent time frame. While Meng et al. (2013) focus on disclosure within the environmental dimension and Bernard et al. (2018) use ESG *performance*, we undertake a different approach by examining the relationship between CEO turnover and ESG *disclosure*, which extends the work by employing a different measure of ESG concerns.

3 Data

3.1 Retrieving 10-K filings

Our sample consists of publicly traded firms on NYSE, AMEX, and NASDAQ in the US from 2011 to 2019. We limit our sample to firms for which we have reliable data on CEO characteristics from the ExecuComp² database. We choose this period of interest as there has been an increasing focus on sustainability reporting in financial filings over the past ten years (Robinson, Vodovoz, Sullivan, & Burns, 2019). Also, we restrict our sample from 2011 due to a change in interpretive guidance on climate change in 10-K filings, released by the U.S. Securities and Exchange Commission (SEC) in 2010³. We focus on Item 7 in 10-K filings, the Management's Discussion and Analysis section (MD&A).

²The ExecuComp database contains executive compensation data from the S&P 1500 active, inactive, current and previous members, from 1992 to present.

³This guidance applies to climate changes matters and is intended to assist companies in satisfying disclosure obligations under federal laws and regulations. If climate issues are material to a given company, SEC requires companies to report how climate change affect their current and future business (Securities and Exchange Commission, 2010).

We do this because i) it provides less boilerplate disclosure and is the section where the management has the most influence (U.S. Securities and Exchange Commission, 2008), and ii) guidance from the Sustainability Accounting Standard Board (SASB), which provides sustainability accounting standards and disclosure guidance, encourage companies to disclose on sustainability topics in the MD&A section (Sustainability Accounting Standard Board, 2017).

To download 10-K filings, we rely on the "edgar" package in R. This package enables us to retrieve, search and parse all available filings on the EDGAR server (Gunratan, Lonare and Bharat, Patil, 2020). The package also provides a function, *getMgmtDisc*, that extracts the MD&A section from 10-K filings. We use the function to download 10-K filings from the EDGAR database from 2011 to 2019 (fiscal year 2011 to fiscal year 2018). From each 10-K filing, the function reads, cleans, removes tables and parses the MD&A section. To ensure that we can match MD&A sections with firm and CEO data, we also define a function to extract the fiscal year related to the MD&A section. Further, we remove stopwords, punctuation, whitespace, numbers and convert all words to lowercase. The result is a sample of 11 486 firm-year MD&A sections. Similar to Loughran and McDonald (2011), we exclude MD&A sections with less than 250 words. The final sample comprises of 10 553 firm-year observations and 1769 unique companies.

3.2 Measuring ESG disclosure and its importance

3.2.1 Constructing disclosure measures

To construct an ESG disclosure measure, we use a predefined dictionary created by Baier, Berninger, and Kiesel (2020). They analyse the prevalence and changes of ESG disclosure in 10-K filings and proxy statements using textual analysis. The dictionary consists of 482 words, broken down to 55 environmental words, 151 social words and 276 governance words. We provide the dictionary in Appendix A2. Figure 3.1 shows the top 20 most frequent words from the environmental, social and governance dimensions. The font size represents the frequency of the word across the MD&A sections in our sample. The colours represent each the E, S and G dimensions, which are green, red and blue, respectively. The figure reveals that the governance dimension has the highest word frequency. This is consistent with Baier et al. (2020), who also document that governance topics dominate

The word "compensation" appears in almost all the documents, while "poverty" appears in only a few. The second term in Equation 3.1 adjusts the first term based on how many documents in which a word appears. This implies that "compensation" will decrease its weight while "poverty" will increase its weight because it appears in only a few documents. We sum the tf.idf weights of the ESG words for each MD&A section, yielding an aggregated tf.idf measure. By taking the natural logarithm of one plus the tf.idf measure, we achieve a score which is close to normally distributed. We label the score *ESG disclosure* when we utilise the entire dictionary. The same procedure is repeated for the separate E, S, and G dimensions in the dictionary. These are labelled *Environmental disclosure*, *Social disclosure* and *Governance disclosure*, respectively.

Finally, we calculate a score based on the location of ESG disclosure in the MD&A section. There has been an increasing demand from investors to use non-financial information in their decision-making, but most investors do not see this information valuable if it is inconsistent and unavailable (Nelson, 2018). Thus, one can argue that if ESG related information is material to a given company, one would expect them to allocate space early in the report, addressing the most important information first. We label our score *Importance* and define the score for firm i in fiscal year t as:

$$Importance_{i,t} = 100 - \frac{\sum_{j=1}^{X_{i,t}} x_{i,t,j}}{X_{i,t}} \text{ where } x_{i,t,j} = \frac{p_{i,t,j}}{P_{i,t} * 0.01} \quad (3.2)$$

$P_{i,t}$ is the total word count in the MD&A section for firm i in fiscal year t , $p_{i,t,j}$ is the index of ESG word appearance j this MD&A section, $x_{i,t,j}$ is the relative position of ESG word appearance j in the MD&A section, and $X_{i,t}$ is the total ESG word appearances in the MD&A section for firm i in fiscal year t .

A high score indicates that the average ESG word position is located at the beginning of the MD&A section, while a low score would indicate that the average position is at the end. Table 3.1 provides an overview of the development of our disclosure scores by fiscal year.

The *ESG disclosure* score and *Governance disclosure* score fluctuate most across our sample period. Note that *Governance disclosure* has higher scores than *Environmental disclosure* and *Social disclosure*, which seems to be the main driver behind the increase in

Table 3.1: Development in disclosure scores

Fiscal year	ESG disclosure	Environmental disclosure	Social disclosure	Governance disclosure	Importance
2011	3.51	1.04	2.03	3.11	46.69
2012	3.51	1.02	2.03	3.11	47.03
2013	3.50	1.02	2.00	3.10	47.35
2014	3.52	1.02	2.01	3.12	47.00
2015	3.55	1.03	2.01	3.16	46.77
2016	3.56	1.03	2.03	3.18	46.68
2017	3.57	1.04	2.03	3.18	46.85
2018	3.53	1.03	1.99	3.15	47.20

This table presents the development of disclosure scores from 1 June 2011 until 31 May 2019. We analyse disclosure through dimensions of a composite ESG disclosure score, an Environmental disclosure score, a Governance disclosure score, a Social disclosure score, and an Importance score. *ESG disclosure* is a composite tf.idf score defined as $\log(1 + \text{tf.idf})$ and is elaborated in Equation 3.1. The same procedure is used on each ESG component. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2.

ESG disclosure. This is not surprising as the topic governance is broadly formulated in 10-K filings, consistent with what we observe from Figure 3.1. In addition, governance is the most represented category in the dictionary.

3.2.2 Validating the context of ESG disclosure

Although our ESG disclosure measure considers the frequency and importance of ESG words in the dictionary, it can be problematic if the ESG words have several meanings. For example, if the word "independent" refers to a firm's effort to operate independently in the market, then we would capture the firm's market strategy, rather than an ESG strategy. On the other side, if the word "independent" refers to independent third-party assurance of asset valuation, then we would capture the firm's ESG efforts. Thus, we have to examine whether our ESG disclosure measure reflects environmental, social and governance effort.

To evaluate the validity of our ESG disclosure measure, we select three words from the dictionary, "emissions", "safety" and "independent". These words are broadly used among firms in MD&A sections. We analyse the adjacent words in a Key Words In Context (KWIC) table. A KWIC table shows the context in which each keyword appears. It provides information that helps determine the semantic of a given word (Weber, 1990). For each particular ESG word, we include three words immediately adjacent before (left) and after (right). Table 3.2 provides a summary of the top ten most used words surrounding

the selected ESG word for the left and the right context.

Table 3.2: Word in context frequency table for three selected ESG words

emissions		safety		independent	
Left context	Right context	Left context	Right context	Left context	Right context
ghg	standards	health	products	company	company
reduce	epa	environmental	environmental	cash	distributors
gas	greenhouse	food	efficacy	flows	third-party
greenhouse	existing	public	security	sales	contractors
air	gases	sales	services	largely	third
carbon	air	mine	regulations	obtained	sales
regulations	water	aid	health	market	valuation
reducing	power	first	quality	market	pricing
nox	reduction	product	systems	management	cash
dioxide	discharges	company	performance	prices	agents

This table provides a summary from a Key Word In Context (KWIC) analysis where we show the ten most frequent words surrounding the selected keyword for the left and right context. The words are ordered descendingly by frequency. For example, out of three words in the left context of the word "emissions", counting for all firms in total, the most used word is "ghg".

One of the most frequent words in the surrounding of "emissions" is "reduce", which appears in both the left and right context. To examine whether the word "reduce" actually refers to firms' effort of reducing emissions, we select a sample of three firms and extract paragraphs from the MD&A sections that mention "emissions". We provide the selected paragraphs for context analysis in Table 3.3. For instance, in Panel A, Conoco Philips refers to their R&D and resource effort on emissions reductions, American Axle provides new methods that will reduce the emissions, and NRG Energy mentions emission reduction through plant modifications.

Further, Table 3.2 shows that "health" and "environmental" are the most frequent words in the surrounding of "safety". Thus, we would expect "safety" to be used in context with firms' effort to ensure a safe workplace for their employees. The paragraphs from Panel B of Table 3.3 show that AMERISAFE undertakes proactive safety reviews to promote safer workplaces, Steel Dynamics drives innovation to improve safety, and BMC Stock Holdings refers to improving driver safety in their delivery fleet through technology.

The semantic of the word "independent" initially seems to be more ambiguous, judging by Table 3.2, as the most common word surrounding "independent" is "company". However, in Panel C of Table 3.3, all three firms selected are referring to independent assurance, which is essential for ensuring that information is trustworthy. Overall, our qualitative

assessment of the context of ESG words is that the firms are mostly referring to ESG efforts when utilising these words, and not arbitrary information.

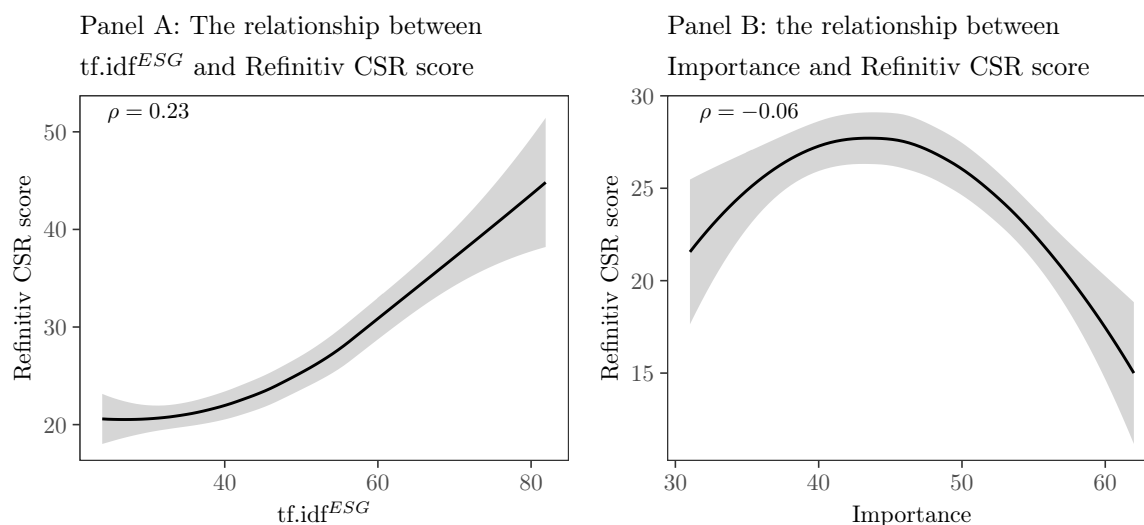
Table 3.3: Excerpts from the MD&A sections for various firms

Company	Panel A: Keyword = emissions
Conoco Philips 2015.02.24	"In 2014 we tested new technology as a means to provide remote monitoring capability, as well as new methods that could increase production and reduce water usage and emissions from assets, such as the oil sands and unconventional reservoirs."
American Axle 2019.02.05	"We are responding with ongoing research and development (R&D) efforts that focus on fuel economy, emissions reductions and environmental improvements by integrating electronics and technology."
NRG Energy 2017.02.28	" Given the anticipated reductions in carbon emissions resulting from these modifications, combined with the expected operating profiles for the units, the four plants are expected to reduce their combined carbon footprint by more than 80%."
	Panel B: Keyword = safety
AMERISAFE 2019.02.28	" We provide proactive safety reviews of employers workplaces. These safety reviews are a vital component of our underwriting process and also promote safer workplaces."
Steel Dynamics 2019.02.27	"Through employee creativity and ingenuity, we drive innovation to improve safety , quality and productivity, implementing innovative technologies and processes in order to perform at the highest level and consistently achieve excellence in all that we do driving innovation."
BMC Stock Holdings 2018.03.01	"Further, we pay careful attention to our logistics function and have implemented GPS-enabled telematics technology across our delivery fleet to improve customer service, driver safety and the productivity of our shipping and handling costs."
	Panel C: Keyword = independent
CVB Financial Corp 2013.03.01	"During the second quarter of 2018, and as part of the Corporation plan to remediate a material weakness identified in the preparation of financial statements included in the 2017 Annual Report on Form an 10-K, an independent third party engaged by the Corporation completed its assessment of the commercial allowance for loan losses framework and the appropriateness of assumptions used in the analysis."
Federated Investors 2019.02.22	" We utilise internal auditors and independent professional service firms to test key controls of operational processes and to audit information systems, compliance management program, and loan review and trust services."
First BanCorp 2019.03.01	" Ernst & Young LLP, independent registered public accounting firm, has audited the consolidated financial statements included in this annual report and has audited the effectiveness of the internal control over financial reporting."

This table shows paragraphs from the MD&A section from nine firms. The keywords we have searched for are "emissions", "safety" and "independent". The keywords are highlighted in yellow and the context in grey. The date below each firm name is the date of the 10-K filing.

3.2.3 Validating our measure of ESG disclosure against Refinitiv CSR score

To further validate our measure of ESG disclosure, we download an ESG score from Thomson Reuters Datastream to test for correlation. The score is a "Corporate Social Responsibility (CSR) Strategy Score" which reflects the firms' disclosure practices in how they incorporate the ESG dimensions in their day-to-day business (Thomson Reuters Eikon, 2020). We show the relationship in our composite ESG measure in Panel A of Figure 3.2 and the relation to our importance score in Panel B.



This figure shows the smoothed relationship between our disclosure measures and a Refinitiv CSR score, in a subsample of 5046 firm-year observations. $tf.idf^{ESG}$ is our measure of ESG disclosure and is elaborated in Equation 3.1. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. The Refinitiv CSR score reflects firms' disclosure practices in how they incorporate the ESG dimensions in their day-to-day business. Panel A provides the relation between our measure of ESG disclosure and the Refinitiv CSR score. Panel B provides the relation between our Importance score and the Refinitiv CSR score. The smoothed line is a local, non-parametric, least square regression, which use localised subsets of our data to estimate the Refinitiv CSR score variable. The grey bands represent 95% confidence interval for the estimates.

Figure 3.2: Relationship between our disclosure measures and Refinitiv CSR score

The correlation coefficient ρ in panel A is 0.23, which indicates a positive relationship between our measure of ESG disclosure and the Refinitiv CSR score. Results from a linear regression also support the positive relationship with a p-value approximate 0. Thus, our measure performs as desired. The correlation in panel B is -0.06, and the p-value from the linear regression is 0.22, which indicates no significant relationship between our importance score and the Refinitiv CSR score. This is not entirely surprising, as our Importance score primarily captures the prioritisation of the ESG topics disclosed and not the extent of the disclosure.

3.3 Classifying CEO turnovers

We use data from ExecuComp to measure CEO tenure and to identify a CEO turnover. We measure CEO tenure as the number of consecutive years the CEO has been in the position within a given firm. When firms experience several turnovers during a single fiscal year, we count this as one turnover. To identify whether the new CEO was appointed externally or internally, we follow Graham, Kim, and Leary (2020) and create a dummy variable that takes the value one if the newly appointed CEO was not a previous c-suite executive within the same firm the year before, and zero otherwise. Table 3.4 provides an overview of the number of turnovers and the number of externally hired CEOs for our sample period. The annual turnover is around 11% on average, and out of these, around 36% are recruited externally.

Table 3.4: Sample distribution of CEO turnovers by fiscal year

Fiscal Year	N	Turnovers	External	% Turnovers	% External
2011	1344	134	46	9.97%	34.33%
2012	1348	131	37	9.72%	28.24%
2013	1367	155	63	11.34%	40.65%
2014	1356	131	44	9.66%	33.59%
2015	1359	170	66	12.51%	38.82%
2016	1333	140	47	10.50%	33.57%
2017	1290	143	55	11.09%	38.46%
2018	1230	146	55	11.87%	37.67%

This table provides a breakdown of CEO turnovers, showing the number of observations, CEO turnovers and externally recruited CEOs. "% Turnovers" are the number of observations with turnovers divided by total observations, and the "% External" column shows the number of externally hired CEOs divided by the number of turnovers.

3.4 Determining baseline control variables

We select control variables consistent with prior literature examining sustainability disclosure in order to eliminate confounding effects (Meng et al., 2013; McBrayer, 2018; Fatemi, Glaum, & Kaiser, 2018; Bernard et al., 2018). First, we include a control for CEO gender. Further, lower CEO compensation can indicate equality focus and ESG related policies in a firm (Cai, Jo, & Pan, 2011), which we control for through the CEO's total annual compensation. CEO-chairman duality may result in inferior governance as the CEO can make himself more entrenched in the board's decision-making (Ferrell, Liang, & Renneboog, 2016). This can reduce the likelihood of a turnover. Moreover, prior literature

shows that CEO duality is positively related to ESG disclosure (Tamimi & Sebastianelli, 2017). Thus, we control for CEO-chairman duality. The variable is equal to one if the CEO simultaneously holds the chairman position and zero otherwise. Executive's age may affect the ESG disclosure as well as the probability for a turnover. Therefore, we control for executive age.

To control for firm size, we calculate market equity. We also control for debt, serving as a proxy for financial risk, as executive turnovers are more prevalent in financial distressed firms (Gilson, 1990). Differences in firm age may indicate how well firms know their impact on sustainability. Thus, we control for firm age. Prior firm performance is shown to be negatively related to the probability of a turnover event (Weisbach, 1988). Therefore, to control for firm performance, we calculate the firms' cumulative returns for the past 12 months. The length of the MD&A sections varies among firms and is positively related to ESG disclosure. To control for differences in length, we count the number of words for each MD&A section. We also control for profitability, investment intensity and market-to-book, as defined on Kenneth French's website⁴.

3.5 Summary statistics for high- and low-tenured CEOs

Table 3.5 provides descriptive statistics of disclosure variables and control variables. We compare the means and medians of all variables between the top and bottom quartile of CEO tenure. On average, the *ESG disclosure* score is 2.3% higher among firms with low tenure compared to firms with higher tenure per firm-year⁵. We observe the same trend for each ESG dimension, which are all significantly higher for firms with low tenure. This indicates that firms with lower tenure disclose more ESG related information in their MD&A section. *Importance* follow the opposite pattern.

⁴https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/variable_definitions.html (accessed 23 May 2020).

⁵The equivalent difference in the non-transformed $tf.idf^{ESG}$ measure is approximately 8.5%.

Table 3.5: Summary statistics for high- and low-tenured CEOs

Variables	Top quartile tenure				Bottom quartile tenure			
	N	Mean	Median	Std. dev	N	Mean	Median	Std. dev
Dependent variables								
ESG disclosure	2638	3.48	3.48	0.51	2638	3.56***	3.53***	0.53
Environmental disc.	2638	0.81	0.65	0.85	2638	1.07***	0.84***	1.04
Social disc.	2638	2.00	2.00	0.75	2638	2.04*	2.06**	0.74
Governance disc.	2638	3.11	3.11	0.50	2638	3.16***	3.16***	0.49
Importance	2638	48.03	48.61	9.91	2638	46.7***	46.39***	9.37
Independent variables								
Document size	2638	8.73	8.73	0.51	2638	8.80***	8.80***	0.50
Tenure	2638	17.79	15.92	5.67	2638	1.26***	1.17***	0.73
Executive age	2638	60.21	60.00	7.02	2638	53.93***	54.00***	6.30
Gender	2638	0.98	1.00	0.16	2638	0.94***	1.00***	0.24
Chairman	2638	0.69	1.00	0.46	2638	0.19***	0.00***	0.39
Compensation	2638	8.19	8.24	1.01	2638	8.17	8.27	0.98
Investments	2638	0.04	0.02	0.08	2638	0.03***	0.02***	0.10
Profitability	2638	0.36	0.24	0.80	2638	0.35	0.24	0.77
Debt ratio	2638	0.20	0.15	0.20	2638	0.25***	0.23***	0.21
Firm age	2638	2.96	3.04	0.70	2638	2.96	3.08***	0.94
Cumulative returns	2638	0.15	0.11	0.36	2638	0.12***	0.08***	0.39
Market-to-book	2638	3.14	2.17	3.17	2638	2.69***	1.88***	3.00
Market equity	2638	7.62	7.51	1.58	2638	7.73**	7.61***	1.66
Within-firm variation								
σ_{ESG}	2601	0.18	0.15	0.17	2601	0.20***	0.14	0.19
$\sigma_{Environmental}$	2601	0.27	0.25	0.25	2601	0.30***	0.26***	0.27
σ_{Social}	2601	0.28	0.23	0.20	2601	0.30***	0.24***	0.23
$\sigma_{Governance}$	2601	0.19	0.15	0.17	2601	0.20**	0.15	0.18
$\sigma_{Importance}$	2601	3.50	2.93	2.25	2601	3.72***	3.04**	2.54

This table presents summary statistics for observations in the top 25% quartile and the bottom 25% quartile of CEO tenure. The five lowermost variables are the within-firm standard deviations of the disclosure scores. We conduct t-tests for differences between the means, and Wilcoxon-Mann-Whitney tests for the medians. Variable definitions are provided in Appendix A1. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

In terms of other CEO characteristics, firms with low tenure have on average lower executive age and a lower share of CEO-chairman duality. The gender distribution is similar between the quartiles, and CEO compensation does not differ significantly between firms with high and low tenure. For firm characteristics, firms with low tenure have on average lower investment rate, higher debt ratio, lower cumulative returns, lower market-to-book and higher market equity. The document size is on average larger across firms with low tenure. Profitability and firm age do not differ significantly between firms with low and high tenure. The within-firm variation in our disclosure scores shown at the bottom of table 3.5 indicate that the within-firm variation is low compared to the total variation. E.g., the standard deviation of *ESG disclosure* is 0.51, while the within-firm average standard deviation for the variable is 0.18. This implies that the greater part of the

variation in disclosure arises from variation between firms. Differences across the sample relates to individual practises in a firm, the industry they operate in, and time-trends. As tenure and CEO turnovers are firm-specific, we seek to examine how this affects ESG disclosure practices *within* the firm. Therefore, we choose to use to include fixed effects for fiscal year and firm, which also implicitly controls for industry-driven effects, going into the regressions in the next part of this paper.

4 Analysis

4.1 Baseline results from OLS regressions

To establish a baseline relationship between low tenure CEOs and disclosure of ESG topics, we estimate an ordinary least squares regression:

$$Disclosure_{i,t} = \beta Tenure_{i,t} + \gamma Z_{i,t} + Firm_i + Fiscal\ year_t \quad (4.1)$$

The dependent variable is *ESG disclosure*_{*i,t*}, *Importance*_{*i,t*}, *Environmental disclosure*_{*i,t*}, *Social disclosure*_{*i,t*} or *Governance disclosure*_{*i,t*}. $Z_{i,t}$ represents the CEO, firm and document characteristics described in Section 3.4. We want to estimate the effect of a turnover within firms and expect disclosure changes to be partly driven by unobserved year effects, so we include fixed effects for firm and fiscal year. Robust standard errors are clustered by fiscal year and industry (based on two-digit SIC code), as the disclosure residual is likely to be correlated for firms operating in the same industry in a given year.

The results in Table 4.1 indicate a negative relationship between CEO tenure and disclosure of ESG topics. The statistically significant ($t = -9.4$) coefficient of *Tenure* in model (1) suggests that one more year of CEO tenure is associated with a drop of approximately 0.31% in the $tf.idf^{ESG}$ measure of ESG disclosure⁶. The coefficient of *Tenure* is negative in all models but is not statistically significant in the model using *Environmental disclosure*, *Social disclosure* and *Importance*. This result indicates that the governance dimension contributes the most to the composite ESG score, and that we are not able to see a strong relationship between tenure and the Importance score through the baseline OLS.

⁶The $tf.idf^{ESG}$ is the ESG measure before log-transformation. Regressions on $\log(tf.idf^{ESG})$ and $\log(1 + tf.idf^{ESG})$ yield similar results.

Table 4.1: Baseline regressions with disclosure variables

	ESG disclosure (1)	Environmental disclosure (2)	Social disclosure (3)	Governance disclosure (4)	Importance (5)
Tenure	-0.311*** (-9.431)	-0.274 (-1.507)	-0.211 (-0.958)	-0.282*** (-3.992)	-0.025 (-0.996)
Executive age	0.106* (1.910)	0.120 (0.680)	0.215 (1.333)	0.053 (0.974)	0.005 (0.272)
Gender	-6.413** (-2.202)	-4.321 (-0.794)	-10.859 (-1.598)	-5.333* (-1.775)	-0.974* (-1.955)
Chairman	1.691* (1.759)	3.710** (2.088)	-1.557 (-0.843)	1.772 (1.312)	-0.504** (-1.991)
Compensation	-1.432*** (-6.190)	-0.615 (-0.737)	-0.914 (-1.560)	-1.522*** (-4.354)	-0.055 (-0.483)
Investments	3.152 (1.598)	4.328 (0.701)	15.796*** (5.116)	-1.247 (-0.436)	-0.276 (-0.438)
Profitability	0.504** (2.236)	0.003 (0.005)	1.219* (1.958)	0.373 (1.094)	-0.078 (-1.282)
Debt ratio	-15.667*** (-6.701)	-2.066 (-0.392)	-18.317*** (-4.394)	-12.586*** (-4.824)	0.079 (0.100)
Cumulative returns	-0.073 (-0.095)	-3.373*** (-2.853)	-1.135 (-1.269)	0.963 (0.972)	-0.061 (-0.325)
Market-to-book	0.038 (0.364)	0.107 (0.622)	0.186 (1.003)	0.023 (0.199)	-0.065*** (-2.713)
Market equity	0.196 (0.241)	3.794*** (2.647)	1.088 (0.824)	-1.329* (-1.672)	0.231 (0.992)
Firm age	1.410 (0.559)	10.334*** (3.476)	5.993 (1.263)	-1.613 (-0.705)	0.471 (1.388)
Document size	90.585*** (31.018)	61.885*** (11.279)	86.191*** (29.176)	85.292*** (41.828)	1.266* (1.658)
Firm FE	Y	Y	Y	Y	Y
Fiscal year FE	Y	Y	Y	Y	Y
Observations	10 553	10 553	10 553	10 553	10 553
Adjusted R ²	0.894	0.871	0.821	0.877	0.792

This table reports coefficients from our ordinary least square regressions examining the relationship between disclosure scores, CEO tenure and various control variables. The dependent variables are *ESG disclosure*, *Environmental disclosure*, *Social disclosure*, *Governance disclosure* and *Importance*. *ESG disclosure* is a composite tf.idf score defined as $\log(1+\text{tf.idf})$ and is elaborated in Equation 3.1. The same procedure is used on each ESG component. Coefficients in model (1) to (4) are multiplied by 100. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. Details on the independent variables are provided in Appendix A1. All regressions include firm and fiscal year fixed effects. Standard errors are clustered on industry (based on two-digit SIC code) and fiscal year. The parentheses report the t-ratios. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

The signs of other control variables are consistent with our expectations and the literature. For example, *Compensation* has a negative sign in all the regressions, similar to the findings of Cai et al. (2011). Further, firms led by male CEO versus female CEOs are associated with 6.4% lower composite ESG disclosure score. According to Banahan and Hasson (2018), gender diversity is positively related to ESG performance.

4.2 Identification strategy

So far, we have shown that there is a robust negative relationship between CEO tenure and ESG disclosure. Despite this, it does not allow us to make causal interpretations. Our baseline regression models do not account for differences between the firms that experience a turnover, and the firms that do not. Confounding firm and CEO characteristics could have a poor distributional overlap, and we see these tendencies in Table 3.5. If the firms exposed to a turnover does not look like the firms which do not experience a turnover, we have a problem making inference.

In order to address the problem, we explore the association between CEO tenure and ESG disclosure in a difference-in-difference matching estimator framework. The underlying reason for our identification strategy is to create an as-if randomised treatment assignment. More specifically, we use CEO turnovers as a shock to CEO tenure and study the change in ESG disclosure from before a CEO is being replaced to the period after. We examine a one to two-year period subsequent to the turnover because (McBrayer, 2018) finds that changes in reporting are likely to occur in the two years following the replacement of a CEO. Among the CEO turnovers, we identify a set of treated turnovers as turnovers between fiscal year 2012 and 2017 with at least an observation prior to the turnover and an observation after the turnover. Thus, our sample of treated observations consists of firms that have three consecutive firm-year observations, where the turnover event occurs during the second year. To obtain a sample of nontreated observations, we first identify firms that have not experienced a CEO turnover between fiscal year 2011 and 2018. Second, we restrict our nontreated sample to have at least three consecutive firm-year observations.

4.2.1 Enhancing comparability through propensity score matching

To control for differences in industries and firm characteristics contributing to a CEO turnover event, we implement a propensity score matching (PSM) procedure, introduced by Rosenbaum and Rubin (1983). Using quasi-experimental data, PSM has proven to be a useful method to evaluate treatment effects (Austin, 2011; Rosenbaum & Rubin, 1983). A propensity score is defined as the conditional probability that a subject will receive a treatment, given specified characteristics of the subject. The propensity score allows us to match individuals in the nontreated group with individuals in the treated group

sharing a similar propensity score to create a control group (Holmes, 2013). Firms might be different in observable and unobservable characteristics. The idea is that if we can match the observable characteristics and mitigate differences in observables, then we are likely also to reduce differences in the unobservables.

Before we match individuals in the nontreated group with individuals in the treated group, we limit our matching sample to include firm-year observations for matching on pre-treatment characteristics. The firm-year observations in the treated group eligible for matching is the $t = 0$ observation, which is the year before the turnover. Valid nontreated potential matches are firm-year observations with at least two consecutive observations after.

We first run a logistic regression model on pre-treatment characteristics with CEO turnover (the treatment) as the dependent variable, examining which firm- and CEO characteristics that affect the likelihood of a firm experiencing a CEO turnover. *CEO tenure*, *Executive age*, *Chairman* and *Cumulative returns* are all statistically significant in explaining the likelihood of experiencing a CEO turnover. *CEO tenure* has a self-reinforcing effect where long tenure is negatively related to a turnover. *Executive age* is naturally positively related to the probability of a turnover. *Chairman* is negatively related to the turnover, indicating that CEOs are less likely to be replaced if the CEO serves as the chairman of the board. This is consistent with the findings of Goyal and Park (2002), and could also be affected by CEOs abandoning their chairman position prior to planned retirement. The variable *Cumulative returns* is negatively related to a turnover event, as also found by Weisbach (1988). We also include *Market equity* in our matching procedure, since we show in Table 3.5 that firms with low *Tenure* have higher *Market equity*.

Followed by our logistic regression results, we run the PSM procedure using nearest neighbour matching where we match firms from the nontreated group with firms from the treated group based on the closest distance. A treated firm is matched to a nontreated firm when the absolute difference in propensity score between the two is the smallest among n neighbours which are potential matches (Heckman, Ichimura, & Todd, 1997). We rely on the "Nearest Neighbour" algorithm because it allows us to match both categorical and numerical variables. We match on *Tenure*, *Executive age*, *Chairman*, *Cumulative returns* and *Market equity*. To further enhance the comparability of treatment and control

observations, we conduct an exact match on the two-digit SIC code and fiscal year. Each treated observation is matched with one nontreated observation without replacement. The matching procedure leaves us with an equal amount of treated and control firm-year observations, which are labelled $t = 0$ for both groups.

We are left with 527 treated turnovers evenly distributed from fiscal year 2012 to 2017, and an equal amount of treated and control observations each fiscal year. If a CEO turnover has a causal effect on ESG disclosure, then treated firms should be followed by a greater increase in ESG disclosure compared to control firms.

In Table 4.2, we report the mean of CEO and firm characteristics before and after matching in the pre-treatment period. On the left-hand side of Table 4.2, we show that there are significant differences in means among almost all variables used in the matching procedure between nontreated and treated observations. The standardised mean difference⁷ is also larger than 0.1, which is a recommended threshold for declaring imbalance between the two groups (Stuart, Lee, & Leacy, 2013). On the right-hand side of Table 4.2, we show

Table 4.2: Distributional properties for treated, nontreated and control firms in pre-turnover analysis.

	Nontreated vs. Treated				Control vs. Treated			
	Nontreated	Treated	p-value	SMD	Control	Treated	p-value	SMD
Tenure	9.42	8.44	0.00***	0.14	8.64	8.48	0.71	0.02
Executive age	55.77	59.64	0.00***	0.58	57.21	59.69	0.00***	0.38
Chairman	0.96	0.42	0.02**	0.11	0.44	0.42	0.42	0.05
Cum. returns	0.17	0.10	0.00***	0.22	0.13	0.10	0.09*	0.10
Market equity	7.68	7.80	0.08*	0.08	7.84	7.79	0.63	0.03
Gender	0.96	0.97	0.46	0.03	0.95	0.97	0.21	0.08
Investments	0.05	0.04	0.06*	0.09	0.05	0.04	0.11	0.10
Profitability	0.36	0.37	0.80	0.01	0.37	0.37	0.98	0.00
Debt ratio	0.21	0.25	0.00***	0.17	0.23	0.24	0.14	0.09
Firm age	2.88	2.98	0.02**	0.11	2.84	2.98	0.01**	0.15
Document size	8.79	8.79	0.89	0.00	8.81	8.79	0.58	0.03

This table shows the distributional properties before and after propensity score matching in the pre-treatment period. The *Nontreated vs. Treated* column reports the means for *Nontreated* and *Treated* observations, the p-value for difference in means, and the standardised mean difference (SMD). The *Control vs. Treated* column reports the means for *Nontreated* and *Control* observations, p-value for difference in means, and the standardised mean difference (SMD). The p-values are calculated from using a t-test. *Control* observations is a subset of *Nontreated* observations matched with *Treated* observations. *Control* observations are matched on two-digit SIC code and fiscal year (exact match), *Tenure*, *Executive age*, *Chairman*, *Cumulative returns* and *Market equity* using a Nearest Neighbour propensity score matching procedure. We conduct a 1:1 ratio matching without replacement. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

⁷The standardised mean difference (SMD) is the absolute difference in the mean outcome between the groups divided by the standard deviation of the outcome among all participants.

the means after matching for the control observations and the treated observations in the pre-treatment period. All variables, except one, used in the matching procedure are no longer significantly different between the two groups. The exception is *Executive age*, which remains significantly different. This is not entirely surprising. *Executive age* is a strong determinant to explain the likelihood of a turnover, as high executive age is a natural explanation of retirement. Although the variable is still significantly different between the two groups, the SMD is reduced after matching. *Firm age* differs significantly before and after matching, but we do not find this problematic. The variable is neither a determinant of treatment nor significantly different between high and low tenure firms, as shown in Table 3.5.

Note that one would expect treated firms to have the same mean values after matching. The reason why the values slightly deviate is due to the strict match on two-digit SIC code and fiscal year, which result in losing a few treated firms during the matching procedure. Compared to the SMD values before matching, the remaining variables all show an SMD within the threshold (below 0.1) after matching. Thus, this provides evidence that the two groups are more balanced after matching, which should reduce bias in our difference-in-difference analysis. The two following firm-year observations subsequent to the matched observations in $t = 0$ are labelled $t = 1$ and $t = 2$.

4.2.2 Estimating the treatment effect

Many CEO turnovers take place close to the fiscal year-end, and it is reasonable that new CEOs have limited impact on the 10-K filing for those observations. To maintain a clear demarcation between the pre- and post-turnover period, we follow the setup suggested by Islam and Zein (2020) and exclude the turnover year. We are left with the observations categorised as $t = 0$ to $t = 2$, and the $t = 1$ observation is excluded. We restrict our event study to this two-year window, since extending the post-turnover period would reduce our pool of turnovers and limit the possibility to investigate the most recent turnovers.

We define a *Post* indicator variable equal to one for all control and treated observations in $t = 2$. *Treated* is a dummy variable equal to one in $t = 0$ and $t = 2$ for firms with a CEO turnover during $t = 1$. The difference-in-difference coefficient *Treated*Post* is the interaction term, which we expect to be significantly positive if a CEO turnover has a

causal impact on ESG disclosure.

Consistent with the baseline regression, the dependent variables in Equation 4.2 are *ESG disclosure*_{*i,t*}, *Environmental disclosure*_{*i,t*}, *Social disclosure*_{*i,t*}, *Governance disclosure*_{*i,t*} and *Importance*_{*i,t*}. $Z_{i,t}$ represent the CEO, firm and document characteristics described in Section 3.4. We control for firm and fiscal year fixed effects.

$$Disclosure_{i,t} = \beta Treated * Post_{i,t} + \beta Post_{i,t} + \gamma Z_{i,t} + Firm_i + Fiscal\ year_t \quad (4.2)$$

We report the results from the models in Table 4.3. The coefficient of the interaction term is statistically significant and can be interpreted as a CEO turnover is associated with an approximately 2.84% improvement in the $tf.idf^{ESG}$ measure of ESG disclosure (before log-transformation) relative to firms in the control group.

Table 4.3: Difference-in-difference analysis of CEO turnover

	ESG disclosure	Environmental disclosure	Social disclosure	Governance disclosure	Importance
	(1)	(2)	(3)	(4)	(5)
Treated*Post	2.838** (2.290)	5.579** (2.101)	-0.609 (-0.193)	2.120 (1.410)	0.787** (1.997)
Post	-0.962 (-0.864)	-11.172*** (-3.824)	0.026 (0.016)	1.402 (1.227)	-0.476 (-1.389)
Baseline controls	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Fiscal year FE	Y	Y	Y	Y	Y
Observations	2108	2108	2108	2108	2108
Adjusted R ²	0.895	0.874	0.826	0.875	0.841

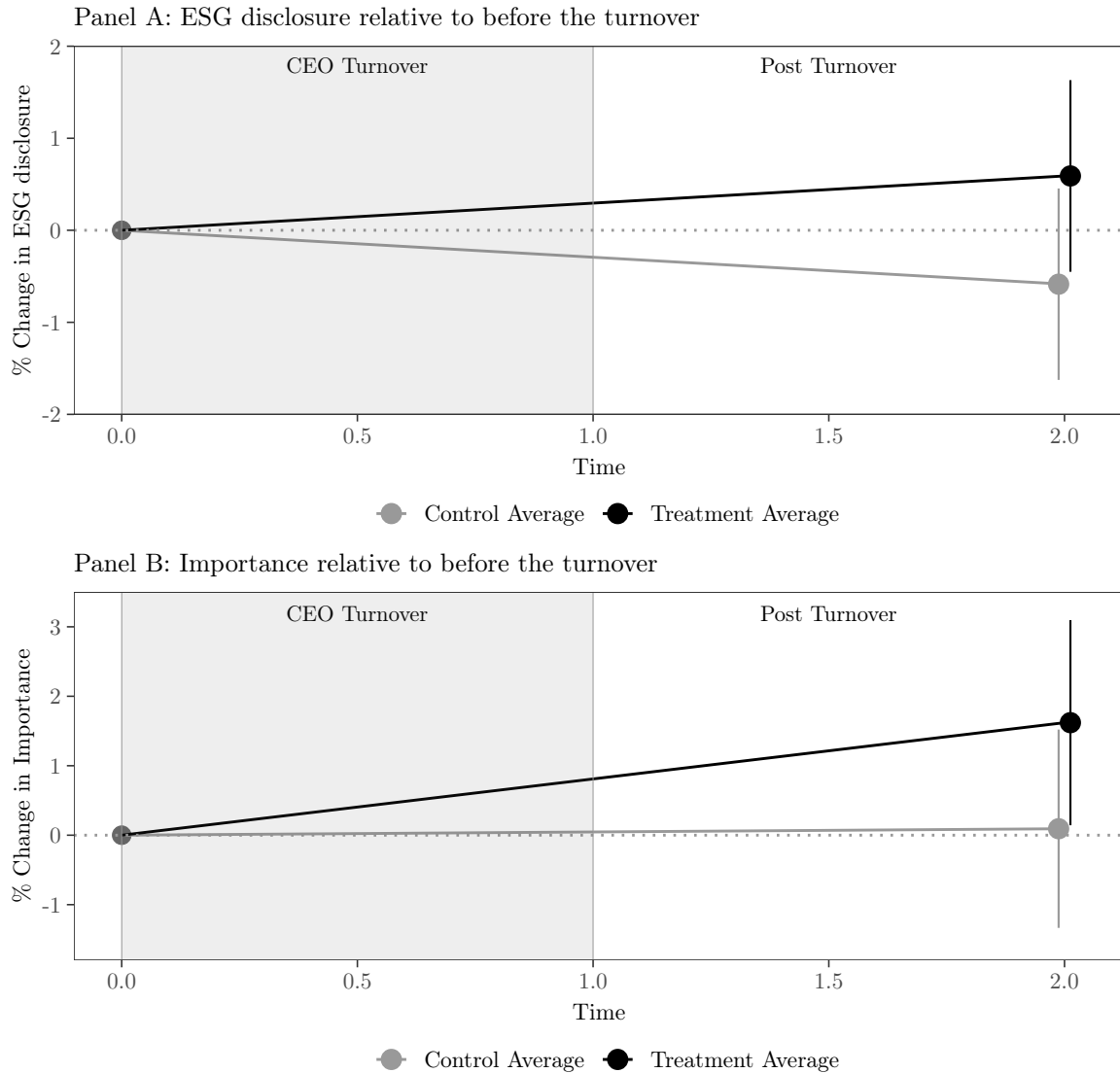
This table presents the results of our difference-in-difference analysis of CEO turnover events. The dependent variables are *ESG disclosure*, *Environmental disclosure*, *Social disclosure*, *Governance disclosure* and *Importance*. *ESG disclosure* is a composite $tf.idf$ score defined as $\log(1 + tf.idf)$ and is elaborated in Equation 3.1. The same procedure is used on each ESG component. Coefficients in model (1) to (4) are multiplied by 100. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. *Treated* is a dummy variable that takes the value of one for firms with a CEO turnover, both for pre- and post-turnover observations, and zero otherwise. *Post* is equal to one in the post-turnover period and zero otherwise. All regressions include firm and fiscal year fixed effects and all baseline control variables. Standard errors are clustered on industry (based on two-digit SIC code) and fiscal year. The parentheses report the t-ratios. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

As opposed to our baseline regression, we find a significant relationship between *Importance* and the CEO turnover event. On a scale from 0 to 100, which represent low priority and high priority, respectively, a CEO turnover is related to a move of 0.79 units in a positive direction for firms experiencing a CEO turnover relative to the control group. Out of

Environmental disclosure, *Social disclosure* and *Governance disclosure*, only the first is statistically significant, indicating an improvement in environmental disclosure. As seen in the baseline regression, the composite *ESG disclosure* score has a stronger t-value than the individual components⁸.

We visualise the evolution in *ESG disclosure* and *Importance* from the year before the turnover to the year after in Figure 4.1. The figure shows that the treated group have a clear upward slope compared to the control group in both panels. We investigate how the groups evolve prior to the turnover and find that the control and treatment groups follow more similar patterns in the years prior to the CEO turnover compared to after. This is reported in Appendix A4.

⁸We also run the same model set up with firm and fiscal year fixed effects, but without control variables. Our results remain similar.



This figure plots the change in *ESG disclosure* (Panel A) and *Importance* (Panel B) from the year before the CEO turnover to the year after. The vertical lines in $t = 2$ represent the 90% confidence interval. *ESG disclosure* is the composite *tf.idf* score defined as $\log(1 + \text{tf.idf})$ and is elaborated in Equation 3.1. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. The CEO turnover occurs within the grey band.

Figure 4.1: Change in disclosure scores from the year before the CEO turnover to the year after

4.2.3 Falsification tests supporting a parallel trend

When we find causal effects where they should not be, this is often a sign of hidden confounders and a failure of the identification strategy (Keele, 2015). Our difference-in-difference rely on the assumption that the treated and control observations follow the same trajectories in the pre-turnover period. We also want to investigate whether there seems to be a treatment reversal subsequent to the turnover. The data sample allows us

to study data in the years before the turnover and after the turnover, with still having a reasonable sample size. We examine the yearly change in the composite *ESG disclosure* score and *Importance* score relative to their value in the year before the turnover for the treated and control groups. We find that the control group mean is within the 90% confidence interval of the treatment group mean in all periods except $t = 2$, and vice versa. This is documented in Appendix A4. To formally test the assumption, we provide falsification tests on prior periods. To address the possibility of treatment reversal, where the observed effect found in Table 4.3 would be reversed after treatment, we also test a subsequent period to the turnover event.

We replicate the difference-in-difference model around placebo turnover events. If there are no significant coefficients of the interaction terms in the placebo turnover model, we strengthen the assumption of parallel trends. The placebo turnovers are designated to three different points in time during the pre- and post-turnover periods. In the pre-turnover period, we assign a placebo turnover to $t = -3$ and $t = -1$. We design the model setup identically to Table 4.3, and test for changes in *ESG disclosure* and *Importance* from $t = -4$ to $t = -2$, and from $t = -2$ to $t = 0$. In the subsequent period, we do a similar exercise with a placebo turnover in $t = 3$ and run the regressions from $t = 2$ to $t = 4$. The results from our falsification tests are reported in Table 4.4.

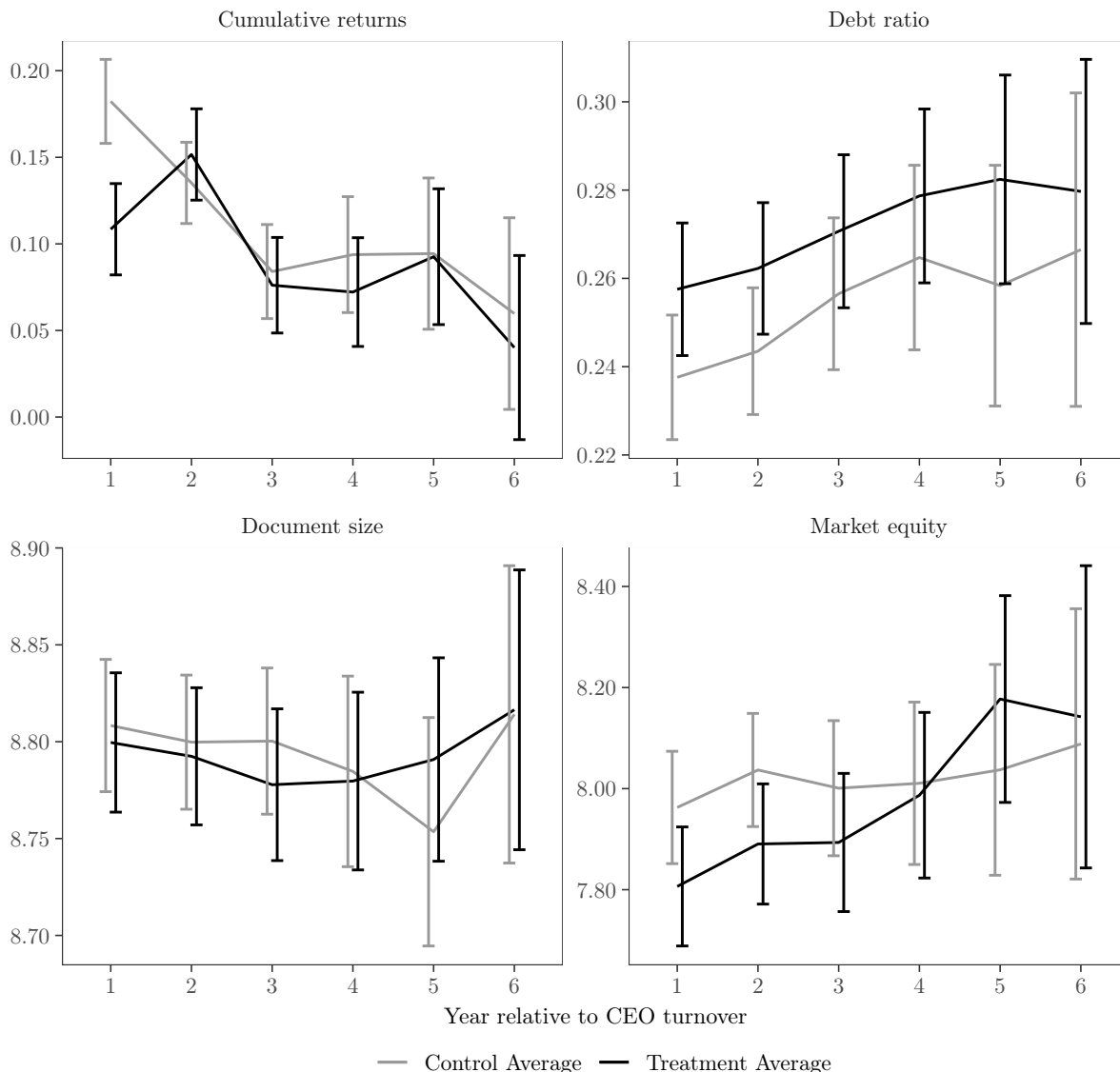
The results from the falsification tests indicate no significant difference-in-difference estimates in the pre- and post-turnover periods, except for a significantly positive coefficient of *Importance* in the post-turnover regression. This could indicate that the total effect of the treatment on *Importance* is captured during the *four* subsequent years to the turnover, and not only the first two. It is important to notice that the falsification tests do not provide evidence that the identification strategy holds, but has not provided evidence *against* the validity.

Table 4.4: Falsification tests for prior and subsequent periods

	$t = -4 \rightarrow t = -2$		$t = -2 \rightarrow t = 0$		$t = 2 \rightarrow t = 4$	
	ESG	Importance	ESG	Importance	ESG	Importance
	disclosure		disclosure		disclosure	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post	1.615 (0.691)	0.836 (1.371)	0.184 (0.128)	-0.223 (-0.518)	-1.716 (-0.192)	4.259* (1.690)
Post	-5.029** (-2.137)	-0.938** (-2.079)	-3.709** (-2.099)	0.738 (1.428)	-1.389 (-0.779)	-0.990** (-2.158)
Baseline controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Fiscal year FE	Y	Y	Y	Y	Y	Y
Observations	304	304	924	924	936	936
Adjusted R ²	0.932	0.834	0.925	0.816	0.886	0.818

This table presents the results from the falsification tests applied to two periods prior to the CEO turnover event, and one period after. We construct placebo turnovers in $t = -3$ (model 1 and 2), $t = -1$ (model 3 and 4) and $t = 3$ (model 5 and 6). The dependent variables are *ESG disclosure* and *Importance*. *ESG disclosure* is a composite tf.idf score defined as $\log(1 + \text{tf.idf})$ and is elaborated on in Equation 3.1. Coefficients in model (1), (3) and (5) are multiplied by 100. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. *Treated* is a dummy variable that takes the value of one for all observations for firms with a CEO turnover during and $t = 1$, and zero otherwise. *Post* is equal to one after the placebo CEO turnover in $t = -3$, $t = -1$ or $t = 3$ for model pairs (1, 2), (3, 4) and (5, 6), respectively, and zero otherwise. All regressions include firm- and fiscal year-fixed effects and all baseline control variables. Standard errors are clustered on industry (based on two-digit SIC code) and fiscal year. The parentheses report the t-ratios. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Finally, we investigate the development of variables that are not expected to be affected by the CEO turnover in the years after the turnover. If outcome variables that should be unaffected by the event are actually affected by the treatment, we might question both the matching procedure and model design. To address this potential problem, we plot the development of the control variables expected to be unaffected by a CEO turnover. We find no patterns of diverging trends in the relevant control variables when we inspect the plots. To visualise the findings, we report four selected control variables in Figure 4.2. We show the development in *Cumulative returns*, *Debt ratio*, *Document size* and *Market equity*.



This figure shows the development post-turnover of selected control variables for control and treated firms. Variable definitions are provided in Appendix A1. The error bars represent the 90% confidence interval of the mean. Treatment is defined as firms that experience a turnover during $t = 1$, and control firms do not experience CEO turnover.

Figure 4.2: Development in control variables post-treatment

4.2.4 The effect of an externally hired CEO on ESG disclosure

Finally, we analyse the effect of an externally hired CEO on ESG disclosure. We follow the same set up as in Table 4.3 with an additional term, *External*, which is equal to one if the newly appointed CEO is hired from outside the firm, and zero otherwise. We include the term through a triple interaction for the treated firms in the post period with externally hired CEO. Table 4.5 reports the results from the new model specification. Among all disclosure scores, we find that there is no significant difference in ESG disclosure between firms with an externally appointed CEO and firms with an internally appointed CEO.

Thus, this suggests that the type of CEO succession, externally or internally hired, does not affect ESG disclosure.

Table 4.5: The effect of an externally recruited CEO on disclosure

	ESG disclosure	Environmental disclosure	Social disclosure	Governance disclosure	Importance
	(1)	(2)	(3)	(4)	(5)
Treated*Post*External	0.355 (0.167)	-0.010 (-0.228)	-0.063 (-0.026)	0.011 (0.489)	-0.388 (-1.102)
Treated*Post	2.687** (2.057)	0.060* (1.788)	-0.581 (-0.178)	0.017 (0.868)	0.951** (2.360)
Post	-0.945 (-0.856)	-0.112*** (-3.813)	0.023 (0.014)	0.015 (1.267)	-0.495 (-1.520)
Baseline controls	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Fiscal year FE	Y	Y	Y	Y	Y
Observations	2108	2108	2108	2108	2108
Adjusted R ²	0.895	0.874	0.826	0.875	0.841

The table presents the results from our regressions, analysing the effect of an externally recruited CEO on ESG disclosure and importance. The dependent variables are *ESG disclosure*, *Environmental disclosure*, *Soc. disclosure*, *Governance disclosure* and *Importance*. *ESG disclosure* is a composite tf.idf score defined as $\log(1 + \text{tf.idf})$ and is elaborated in Equation 3.1. The same procedure is used on each ESG component. Coefficients in model (1) to (4) are multiplied by 100. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. *Treated* is a dummy variable that takes the value of one for firms with a CEO turnover, both pre and post the turnover event, and zero otherwise. *Post* is equal to one for the post-turnover period and zero otherwise. *External* takes the value of one if the new CEO was hired externally and zero otherwise. All regressions include firm and fiscal year fixed effects and all baseline control variables. Standard errors are clustered on industry (based on two-digit SIC code) and fiscal year. The parentheses report the t-ratios. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

5 Conclusion

Voluntary ESG disclosure is difficult to measure. Firms follow different standards and are affected by industry practices. Investors' demand for ESG disclosure is indisputable, but still, many firms struggle to transform. In our study, we suggest that this *disclosure inertia* is partially related to managers' practices of recycling prior statements and that a CEO replacement is a mechanism which interrupts the pattern.

We examine whether CEO turnover affects non-financial reporting related to ESG. Our sample comprises of listed US firms from 2011 to 2019. We construct an ESG disclosure measure by analysing MD&A sections of 10-K filings based on a Term Frequency-Inverse Document Frequency framework, and an Importance score based on the relative position

of ESG words in the MD&A section. We utilise a predefined dictionary of ESG words, consisting of 482 words across the environmental, social and governance dimensions. Our measure of ESG disclosure is positively correlated to a score from Refinitiv that measures ESG disclosure. Further, by examining the context in which the ESG words appear, we suggest that our measure captures ESG disclosure and not arbitrary information. At the baseline, we show a negative relationship between CEO tenure and our measure of ESG disclosure, suggesting that long-tenured CEOs are associated with less disclosure of ESG related information.

To move towards a causal interpretation, we first employ propensity score matching where firms with CEO turnovers are matched to firms without turnovers. After the matching procedure, we run an event study framework around the CEO turnovers and estimate how CEO turnovers affect ESG disclosure in a difference-in-difference model. We show that firms with newly appointed CEOs are associated with an improvement of approximately 2.84% in our ESG disclosure measure, relative to the control firms, in the two years following the replacement of a firm's CEO. Further, we find an increase in our Importance score of 0.79 units on a scale from 0 to 100, where 0 and 100 represent low priority and high priority, respectively. This suggests that newly appointed CEOs tend to prioritise ESG disclosure earlier in the MD&A section, relative to firms without a CEO turnover. Ultimately, we find no significant differences between firms with externally recruited CEOs and internally recruited CEOs. This finding contradicts our expectations of a greater change in ESG disclosure when the CEO is recruited from outside the firm. Falsification tests using placebo turnovers in prior non-turnover years do not yield significant coefficients, which supports a causal relationship.

Our evidence suggests that firms led by newly appointed CEOs are more likely to prioritise ESG disclosure than firms with long-tenured CEOs. What we learn from this research is that managers should recognise that the propensity to recycle prior statements increases with tenure. This ultimately results in a passivity related to keeping up with the progression of non-financial reporting related to ESG. Falling behind on ESG reporting can lead to a higher cost of capital and being excluded from investors' portfolios (Dhaliwal et al., 2011; PRI Association, 2020).

This paper is subject to limitations. First, we base our ESG disclosure measure on textual

content in 10-K filings. We recognise that firms use other channels, such as stand-alone corporate sustainability reports, integrated reporting, company website or other types of documents, to address ESG. Second, we use a predefined dictionary by Baier et al. (2020), which serves as a general basis for ESG reporting research, while there might exist even more exhaustive word lists. A third limitation of this paper is the potential endogeneity related to CEO turnovers, which implies that the effects we are finding could be related to factors affecting the decision of replacing the CEO. In our study, we are not able to say if the effects arise from the board's desire to change, or the perspective of a new CEO. Islam and Zein (2020) claim that firms whose CEO departs exogenously should not have systematic reasons to change either their corporate policies or their leadership styles drastically. This means that it is less likely that post-turnover changes are selected by the firm. Thus, we would have been able to examine the isolated effect of a new CEO if we studied exogenous turnovers. Identifying exogenous turnovers is a complex challenge, which we have not investigated in this paper.

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Appendix

A1 Variable definitions

Table A1.1: Definitions of dependent and independent variables

ESG variables	
tf.idf ^{ESG}	Our measure of ESG disclosure based on a weighting scheme, Term Frequency-Inverse Document Frequency (tf.idf), of ESG words from a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
ESG disclosure	The natural logarithm of one plus the tf.idf measure, from using all ESG words, of a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
Environmental disc.	The natural logarithm of one plus the tf.idf measure, from using environmental words, of a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
Social disc.	The natural logarithm of one plus the tf.idf measure, from using social words, of a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
Governance disc.	The natural logarithm of one plus the tf.idf measure, from using governance words, of a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
Importance	The average position of all ESG words in the MD&A section in a firm's MD&A section in 10-K filing for fiscal year t , where 0 is at the end and 100 is at the beginning of the section. Source: EDGAR
Document size	The natural logarithm of the word count of all words in a firm's MD&A section in 10-K filing for fiscal year t . Source: EDGAR
CEO variables	
Tenure	CEO tenure in years at the end of fiscal year t . Source: ExecuComp
Executive age	CEO age in years at the end of fiscal year t . Source: ExecuComp
Gender	Indicator variable equal to one if the CEO is male in fiscal year t . Source: ExecuComp
Chairman	Indicator variable equal to one if the CEO serves as chairman of the board at the end of fiscal year t . Source: ExecuComp
Compensation	The natural logarithm of CEO total compensation for fiscal year t , comprised of the following: salary, bonus, all other total. Source: ExecuComp
External turnover	Indicator variable equal to one after a turnover where the CEO did not hold a c-suite executive position in fiscal year $t - 1$. Source: ExecuComp
Firm characteristics variables	
Investments	Change in total assets from $t - 1$ to t divided by the total assets in $t - 1$. Source: Compustat
Profitability	Operating profitability in fiscal year t divided by book equity and minority interest in $t - 1$. Source: Compustat
Debt ratio	The long term debt and debt in current liabilities divided by total assets at the end of fiscal year t . Source: Compustat
Firm age	The natural logarithm of the number of years since a company's first listing on AMEX, NASDAQ or NYSE. Source: CRSP
Cumulative returns	The 12 months past returns based on monthly return observations in fiscal year t . Source: CRSP
Market-to-book	The market value of equity divided by the book equity at the end of fiscal year t . Source: CRSP/Compustat
Market equity	The natural logarithm of share price multiplied by shares outstanding at the end of fiscal year t . Source: CRSP

A2 ESG dictionary

Table A2.1: ESG dictionary from Baier et al. (2020)

Environmental	agriculture, air, atmosphere, biodiversity, biofuel, biofuels, biphenyls, carbon, clean, cleaner, cleanup, climate, coal, contamination, deforestation, emission, emissions, emit, environmental, epa, fossil, freshwater, ghg, ghgs, green, greenhouse, groundwater, hazardous, householding, nitrogen, pesticide, pesticides, pollutants, pollution, printing, recycle, recycling, renewable, resource, solar, species, stewardship, superfund, sustainability, toxic, warming, waste, wastes, water, weee, wetlands, wilderness, wildlife, wind, zoning
Social	alcohol, bargaining, bisexual, bugs, charitable, charities, charity, childbirth, children, citizen, citizens, communities, community, conformance, courses, csr, defects, dignity, disabilities, disability, disabled, discriminate, discriminated, discriminating, discrimination, diversity, donate, donated, donates, donating, donation, donations, donors, drinking, drug, educate, educated, educates, educating, education, educational, eeo, eicc, employ, employment, endowment, endowments, epidemic, equality, ethnic, ethnically, ethnicities, ethnicity, expression, fairness, fda, female, females, fl, foundation, foundations, freedom, gay, gays, gender, genders, gift, gifts, harassment, headcount, health, healthy, hire, hired, hires, hiring, hiv, homosexual, human, humanity, ill, illness, ilo, immigration, injury, inspection, inspections, labor, labour, learning, lesbian, lesbians, lgbt, marriage, medicaid, medicare, medicine, medicines, mentoring, minerals, minorities, minority, ms, nations, nondiscrimination, nonprofit, occupational, overtime, pandemic, peace, people, philanthropic, philanthropy, poverty, privacy, race, racial, religion, religious, ruggie, safe, safely, safety, scholarships, sex, sexual, sick, social, socially, societal, society, staffing, standardization, teach, teacher, teachers, teaching, training, transgender, un, unemployment, veteran, veterans, vulnerable, wage, wages, warranty, welfare, woman, women, workplace
Governance	align, aligned, aligning, alignment, aligns, announce, announced, announcement, announcements, announces, announcing, appreciation, approval, approvals, approve, approved, approves, approving, asc, assess, assessed, assesses, assessing, assessment, assessments, attract, attracting, attracts, audit, audited, auditing, auditor, auditors, audits, award, awarded, awarding, awards, backgrounds, ballot, ballots, bonus, bonuses, bribery, brother, bylaw, bylaws, cast, cd, charter, charters, clicking, cobc, communicate, communicated, communicates, communicating, compact, compensate, compensated, compensates, compensating, compensation, compliance, conduct, conflict, conflicts, conformity, consent, control, controls, corrupt, corruption, coso, crimes, culture, death, detect, detected, detecting, detection, disclose, disclosed, discloses, disclosing, disclosure, disclosures, duly, eip, elect, elected, electing, election, elections, elects, embezzlement, engagement, engagements, erm, ethic, ethical, ethically, ethics, evaluate, evaluated, evaluates, evaluating, evaluation, evaluations, examination, examinations, examine, examined, examines, examining, fairly, family, fasb, feedback, gaap, governance, grandchildren, grandparent, grandparents, grassroots, honesty, hotline, incentive, incentives, independence, independent, influence, influences, influencing, inform, insider, insiders, inspector, inspectors, integrity, interlocks, interview, interviews, investor, invite, invited, irs, iso, isos, leadership, liaison, lobbied, lobbies, lobby, lobbying, lobbyist, lobbyists, mail, mailed, mailing, mailings, misconduct, motivate, motivated, motivates, motivating, motivation, nephews, nieces, nominate, nominated, nomination, nominations, nominee, nominees, notice, objectivity, oversee, overseeing, oversees, oversight, parachute, parachutes, parents, payout, payouts, pension, perquisites, perspectives, plane, planes, plurality, poison, posting, presentation, presentations, press, proponent, proponents, proposal, proposals, proxies, prsu, prsus, qualifications, quorum, recoupment, recruit, recruiting, recruitment, refreshment, relations, relatives, remuneration, retain, retainer, retainers, retaining, retention, retirement, review, reviewed, reviewing, reviews, reward, rewarding, rewards, rotation, rsu, rsus, salaries, salary, sarbanes, severance, siblings, sister, skill, skills, son, spousal, spouse, spouses, stakeholder, stakeholders, stepchildren, stepparents, succession, sustainable, talent, talented, talents, tenure, test, tested, testing, tests, transparency, transparent, treadway, ungc, vacancies, vacancy, vest, vested, vesting, vests, visit, visiting, visits, vote, voted, votes, voting, webpage, website, whistleblower

This table shows the full ESG dictionary for each ESG dimensions created by Baier et al. (2020). The ESG dictionary is broken down to 55 environmental terms, 151 social terms and 276 governance terms.

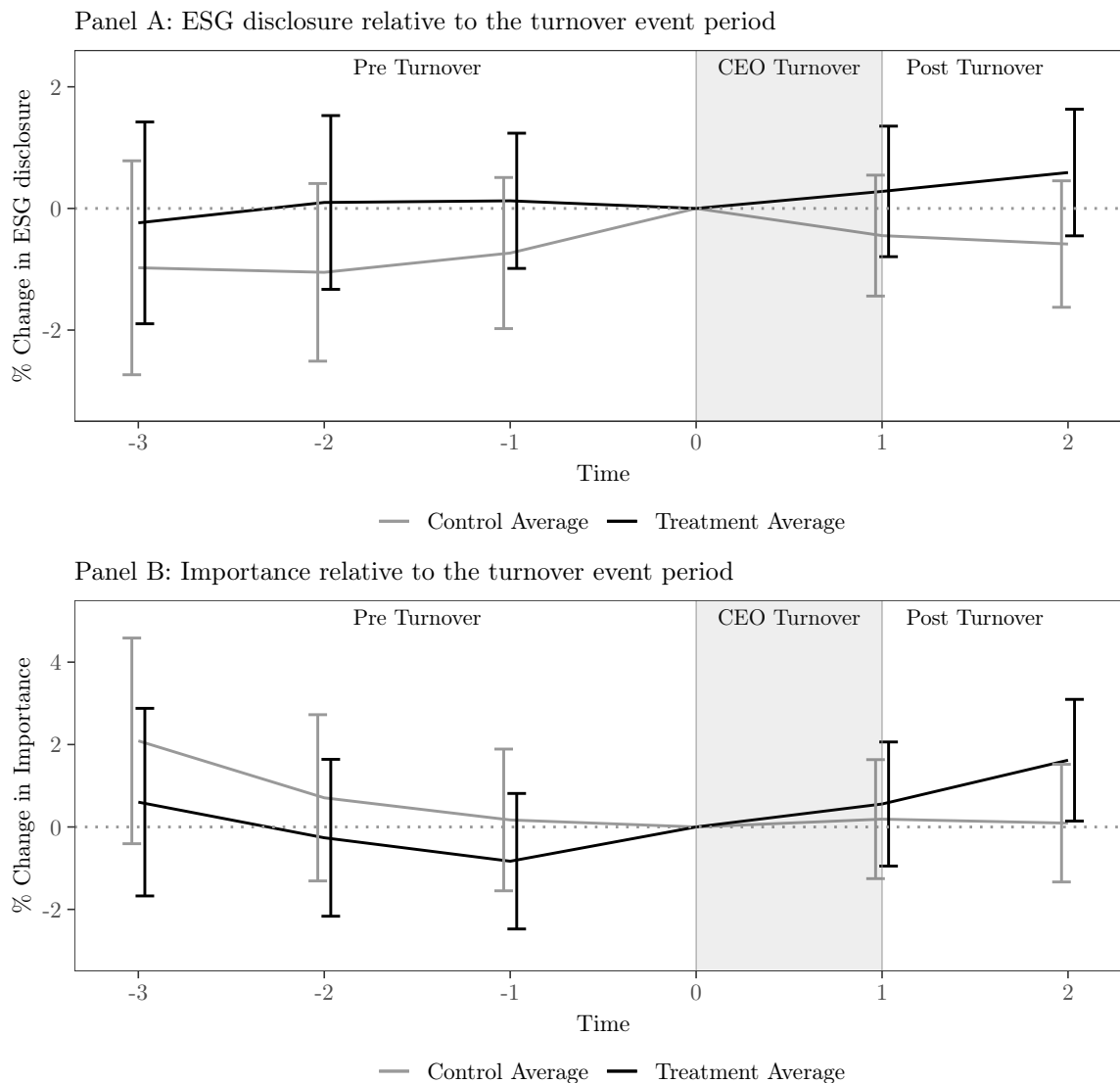
A3 Summary statistics of full sample

Table A3.1: Summary statistics of full sample

Variable	N	Mean	Std. dev	p5	p25	Median	p75	p95
tf.idf ^{ESG}	10 553	38.41	24.11	14.71	24.65	32.71	44.38	82.48
ESG disc.	10 553	3.53	0.54	2.75	3.24	3.52	3.82	4.42
Environmental disc.	10 553	1.03	1.01	0.00	0.00	0.82	1.63	3.02
Social disc.	10 553	2.02	0.75	0.70	1.56	2.04	2.52	3.21
Governance disc.	10 553	3.14	0.51	2.38	2.87	3.14	3.42	3.93
Importance	10 553	46.95	9.67	31.26	39.95	47.04	54.20	62.24
Document size	10 553	8.79	0.51	8.06	8.50	8.79	9.09	9.62
Tenure	10 553	7.79	6.92	0.50	2.58	5.83	10.92	23.42
Executive age	10 553	56.48	6.74	46.00	52.00	56.00	61.00	69.00
Gender	10 553	0.95	0.21	1.00	1.00	1.00	1.00	1.00
Chairman	10 553	0.41	0.49	0.00	0.00	0.00	1.00	1.00
Compensation	10 553	8.29	0.95	6.61	7.69	8.37	8.96	9.71
Investments	10 553	0.04	0.09	-0.05	0.00	0.02	0.06	0.19
Profitability	10 553	0.36	0.76	-0.12	0.15	0.25	0.39	1.27
Debt ratio	10 553	0.24	0.20	0.00	0.06	0.21	0.36	0.61
Firm age	10 553	2.97	0.86	1.23	2.56	3.07	3.56	4.21
Cumulative returns	10 553	0.13	0.36	-0.40	-0.10	0.10	0.32	0.76
Market-to-book	10 553	2.92	3.05	0.52	1.26	2.05	3.57	9.33
Market equity	10 553	7.80	1.59	5.32	6.73	7.67	8.84	10.64
σ_{ESG}	10497	0.19	0.18	0.05	0.10	0.14	0.21	0.52
$\sigma_{Environmental}$	10497	0.29	0.26	0.00	0.07	0.25	0.42	0.76
σ_{Social}	10497	0.29	0.22	0.06	0.14	0.24	0.38	0.75
$\sigma_{Governance}$	10497	0.20	0.17	0.05	0.11	0.15	0.23	0.50
$\sigma_{Importance}$	10497	3.64	2.47	1.02	2.04	3.00	4.52	8.32

This table provide summary statistics for all variables used in the paper and defined in Appendix A1. The non-transformed tf.idf composite ESG disclosure measure, defined in Equation 3.1, is included at the top, as well as the within-firm standard deviations of our disclosure scores at the bottom.

A4 Annual relative change in disclosure scores



This figure plots changes in *ESG disclosure* (Panel A) and *Importance* (Panel B) relative to before the CEO turnover event period. The error bars represent 90% confidence intervals. *ESG disclosure* is the composite *tf.idf* score defined as $\log(1 + \text{tf.idf})$ and is elaborated in Equation 3.1. *Importance* is the average position of ESG words in the MD&A section and is defined in Equation 3.2. Each data point is calculated as the difference between the score in the relevant year and the last data point before the CEO turnover divided by the latter. Treatment is defined as firms that experience a turnover during $t = 1$, and control firms do not experience CEO turnover.

Figure A4.1: Disclosure changes relative to CEO turnover event period