The Effects of Mandatory ESG Disclosure around the World*

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ABSTRACT

We examine the effects of mandatory ESG disclosure around the world using a novel dataset. Mandatory ESG disclosure increases the availability and quality of ESG reporting, especially among firms with low ESG performance. Mandatory ESG reporting helps to improve a firm's financial information environment: analysts' earnings forecasts become more accurate and less dispersed after ESG disclosure becomes mandatory. On the real side, negative ESG incidents become less likely, and stock price crash risk declines, after mandatory ESG disclosure is enacted. These findings suggest that mandatory ESG disclosure has beneficial informational and real effects.

Keywords: Sustainability reports; ESG reporting; Nonfinancial information; ESG incidents

JEL Classification: G14; G15; G18; G32; G38

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Environmental, social, and governance (ESG) considerations have become increasingly important for investment decisions by institutional investors. Yet, institutional investors frequently complain that the availability and quality of firm-level ESG disclosures are insufficient to make informed investment decisions (e.g., Ilhan et al. 2021).[1] In response to the gap between the demand for ESG information by investors and the supply of information by firms, several countries have initiated *mandatory* ESG disclosure regulations to force firms to properly disclose information on ESG issues in traditional financial disclosures or in specialized standalone reports (e.g., in sustainability, citizenship, or CSR reports).

Though the primary purpose of mandatory ESG disclosure rules is to enhance the supply of ESG information, it is unclear whether such regulations actually improve the ESG information environment.[2] For instance, some countries may issue disclosure requirements that contain low standards and loose guidelines, and some firms could choose to comply only superficially with any disclosure requirements (Leuz, Nanda, and Wysocki 2003; Burgstahler, Hail, and Leuz 2006; Christensen, Hail, and Leuz 2021). Further, some firms may have voluntarily reported high quality ESG information already prior to the introduction of mandatory disclosure mandates, which implies that additional disclosure requirements may not have large effects for these firms.

Even more importantly, it remains largely unexplored whether ESG-related mandatory disclosure requirements are associated with beneficial real outcomes. As stressed by Christensen, Hail, and Leuz (2021) in their review of the ESG disclosure literature, the empirical evidence on the real effects of CSR reporting mandates is still relatively scarce.

[1] Industry survey results often reveal the lack of ESG disclosure. One example is Ernst & Young's 2018 industry study on climate change and sustainability services titled "does your nonfinancial reporting tell your value creation story?".
[2] ESG reporting is also referred to as sustainability or CSR reporting and for simplicity we use the term "ESG reporting" throughout this paper.

In this paper, we make significant progress in this direction by constructing a novel international dataset of country-level mandatory ESG disclosure regulations between 2000 and 2017. Our dataset allows us to evaluate the informational and real effects of mandatory ESG disclosure around the world, as we identify 29 countries that introduced mandates for firms to disclose ESG information during the sample period, including Australia (2003), China (2008), South Africa (2010), or the United Kingdom (2013).

Before examining how firm-level outcomes are affected by mandatory ESG disclosure requirements, we provide evidence that the introduction of such disclosure rules is related to important country-level variables. Two findings stand out in light of the current ESG debate: the adoption of mandatory ESG regulation is more likely in countries with common law origins, and it is more likely in countries with higher *per capita* carbon emissions. The finding that common law countries have a stronger propensity to enact disclosure regulations relates to Liang and Renneboog (2017), who show that firm-level ESG performance is generally higher in civil law countries. Consequently, the gap between the supply of and demand for ESG information is possibly larger in common law countries, which implies a greater need for mandating ESG disclosure in such countries. The finding that countries with higher *per capita* emissions are more likely to introduce mandatory ESG disclosures may reflect that such disclosures are in part a disciplinary tool through which countries hope to reduce their firms' carbon footprints (e.g., Jouvenot and Krueger 2020; Tomar 2021).[3]

We then examine the impact of mandatory ESG disclosure on ESG reports filed in the databases of the Global Reporting Initiative (GRI) and of Asset4 ESG (now Refinitiv ESG). The

[3] This could be the case either if the regulation mandates carbon disclosures directly or, if it requires the disclosure of environmental risks more broadly (the disclosure requirement should then apply for firms where carbon risks constitute material components of such environmental risks).

GRI is an independent standards organization active in the area of nonfinancial reporting, and its data repository provides one of the main data sources for ESG reports of firms. Asset4 ESG is a commercial data vendor that provides subscribers of its database access information obtained from sustainability reports filed by firms around the world (it also provides ESG ratings). Reassuringly, across the full sample, the percentage of firms that file ESG reports in the GRI or Asset4 database increases by 2.9 percentage points (pp) after ESG disclosure is made mandatory, a large increase relative to the unconditional sample frequency of 8.6%. Somewhat surprisingly, mandatory disclosure *on average* does not increase the quality of the filed ESG reports, which we measure based on whether an ESG report's content adheres with the GRI Sustainability Reporting Standards—compliance with these standards is an important benchmark, as GRI provides the historically most comprehensive and most widely adopted ESG reporting standards.[4]

Importantly, these average treatment effects mask substantial heterogeneity across firms. Notably, we demonstrate that firms with lower ESG performance (measured using ESG ratings) are much more likely to file ESG reports after mandatory disclosure is introduced, and such firms also exhibit significant improvements in their ESG reporting quality. These effects are plausible as firms with better ESG qualities may have a higher propensity to already voluntarily disclose ESG information. As a result, these firms are less affected by mandatory disclosure requirements.[5] Our findings suggests that mandatory ESG disclosure is most effective among firms where ESG-related concerns as well as information demands by investors are largest.

[4] We find this result even after accounting for attrition effects, that is, for new firms entering the sample (or dropping from the sample) after (before) mandatory ESG disclosure is introduced. Other reporting standards include those defined by the International Integrated Reporting Council or ISO standards 14000 (standards for environmental management) and 26000 (guidelines for social responsibility).

[5] Firms with high ESG quality benefit from voluntary ESG disclosures if markets value the ESG quality of firms (see Christensen, Hail, and Leuz 2021 and the evidence therein).

It remains unclear to what extent these effects of ESG disclosure regulation translate into a better overall information environment, that is, whether and how they affect the transmission of timely and accurate ESG information to financial market participants. Hence, we consider how mandatory ESG disclosure affects the information set that market participants use when evaluating firms. It is difficult to directly observe this information set. However, financial analysts' earnings per share (EPS) forecasts have been shown to constitute a rich data source that allows us to capture such informational effects. We demonstrate that the accuracy of EPS forecasts increases, and above all the dispersion of analysts' EPS forecasts declines, after mandatory ESG disclosure is introduced. The effect sizes are meaningful—for example, forecast dispersion decreases by 0.082 after mandatory disclosure is introduced (about 14% of the variable's standard deviation). These results indicate beneficial informational effects resulting from mandatory ESG disclosure.

A natural question that follows from studying the informational effects of mandatory ESG disclosure is to ask whether and how real outcomes are affected by the regulations. In a first step, we examine whether mandatory ESG disclosure reduces the occurrence of negative firm-level ESG events. Mandatory ESG regulation should make it less likely that firms can hide ESG incidents *ex post*, which in turn should have *ex ante* disciplinary effects on firm management and should reduce the likelihood of ESG incidents. We measure negative ESG events using data on ESG incidents compiled by RepRisk, a company that collects firm-specific ESG news in multiple languages from a variety of public sources (e.g., the media, NGOs, etc.). We demonstrate that both the number of ESG incidents and their significance—as measured by a score that captures the reach of the news about ESG incidents—decrease after mandatory ESG disclosure is introduced. These findings suggest that mandatory ESG disclosure exerts positive real effects by reducing ESG incidents.

In a second step, we study the effect of ESG disclosure regulation on stock price crash risk. We consider crash risk for two nonmutually exclusive reasons. First, negative ESG incidents likely represent crash risk type of events (Hoepner et al. 2021), and the decline in ESG incidents after mandatory ESG disclosure regulation may in turn also decrease crash risk.[6] Second, crash risk has been shown to be related to the accumulation of bad news (Hong and Stein 2003; Jin and Myers 2006; Hutton, Marcus and Tehranian 2009). Specifically, when accumulated bad ESG news reaches a tipping point and are released to the market all at once, such batch-releases can result in sharp stock price declines.[7] Since mandatory disclosure regulations accelerates ESG information disclosure through ESG reports, crash risk may decline after the enactment of mandatory disclosure. Consistent with these mechanisms being at play, the likelihood of stock price crashes decreases by about 2.8pp after mandatory ESG disclosure is introduced (19% of the variable's unconditional probability).

Finally, we explore two important dimensions in the design of regulations used across countries when mandating ESG disclosures. First, we exploit that about one half of the countries implemented mandatory ESG disclosure *all-at-once* across the E,S, and G dimension, while the other half introduced the disclosure gradually *topic-by-topic* (e.g., first disclosure on G, then some years later on S, and later again on E). Understanding this variation is relevant for the many countries currently considering which regulatory design to choose in order to mandate ESG disclosure. We find that most of the effects of mandatory ESG disclosure originate from countries that introduced ESG disclosure broadly and at once. For firms in these countries, there is a strong

[6] Examples for such crash risk type ESG incidents include the BP oil spill in the Gulf of Mexico in 2010 or the climate-related wildfires caused by PG&E in 2019 in California (they eventually cause the bankruptcy of PG&E).
[7] For instance, the stock price of Volkswagen dropped by more than 20% after the firm admitted to have cheated on emission over an extended period of several years. See "Volkswagen Drops 23% After Admitting Diesel Emissions Cheat," *Bloomberg*, September 21, 2015.

increase in the issuing of an ESG report, a decline in negative ESG incidents, and a reduction in stock price crash risk. These results suggest that markets require information along all three dimensions to fully and accurately assess a firm's ESG profile.[8] Second, we perform a further decomposition of the effect of all-at-once ESG disclosure, exploiting variation in terms of which regulatory authority mandated ESG disclosure: in some countries the disclosure stems from a government authority and in others it is required from national stock exchanges. In particular the beneficial effects of all-at-once regulation for ESG incidents and crash risk originate from countries where governments are the relevant authority requiring the disclosure.

Overall, our findings suggest that mandatory ESG disclosure has beneficial informational and real effects. We thereby contribute to the literature that examines the effects of mandatory ESG disclosure requirements on firm behavior, and more generally, on the corporate information environment. While important prior research on the effects of nonfinancial disclosure regulation exists, the focus has so far predominantly been on financial and valuation effects in selected countries (e.g., Ioannou and Serafeim 2019); on how mandatory disclosure requirements affect ESG rating disagreement (Christensen, Serafeim, and Sikochi 2021); on specific ESG items such as carbon emissions (Jouvenot and Krueger 2021; Tomar 2021); or on the effects of one single nonfinancial reporting regulation (Chen, Hung, and Wang 2018; Grewal, Riedl, and Serafeim 2019). In contrast, we examine a much broader sample of mandatory nonfinancial disclosure regulations around the world with a focus on unexplored informational and real outcome variables. By showing that the availability of ESG reports increases and that earnings forecasts become more precise and less dispersed after the introduction of mandatory ESG disclosure, we highlight a

[8] This result is in line with Dyck et al. (2021), who document related evidence for such an E, S, and G complementarity outside of a disclosure environment. Specifically, they find that high environmental performance of firm usually requires the presence of effective governance. As our results largely originate from all-at-one mandatory disclosure, we do not explore the relative role of E versus S versus G disclosure requirements.

channel through which such disclosure regulation narrows the gap between investors' demand and firms' supply of nonfinancial information. Most related to our work is a contemporaneous and complementary paper by Gibbons (2021). Using also a global sample, he shows that improved nonfinancial disclosure requirements increases R&D and improves the quantity and quality of patenting. More broadly, our study also adds to the existing literature investigating how accounting treatments affect stock price crash risk (e.g., Hutton, Marcus and Tehranian 2009; Kim, Li and Zhang 2011a; DeFond et al. 2015).

1. Hypothesis Development

1.1 Effects of ESG Disclosure Regulation on the Availability and Quality of ESG Reports

If mandatory ESG disclosure regulation is properly designed and enforced, we expect improvements in ESG reporting, that is, more and better ESG reports after such regulation is introduced. However, ESG disclosure regulation may fail to achieve this goal. In contrast to financial information, ESG information is more complex, is often industry-specific, covers a wider range of topics, and is often unstructured and only partly quantifiable (Christensen, Hail, and Leuz 2021). These factors make it difficult to create standardized one-size-fits-all reporting structures for nonfinancial disclosures. As a result, in many countries no clear guidance exists on the metrics and information that firms have to provide. A particular issue is that some firms may exploit the lack of guidance and adopt minimum disclosure criteria to just meet regulatory requirements, disclosing little quality information.

Furthermore, the willingness and commitment to enact and enforce mandatory ESG disclosure requirements likely varies across countries because of differences in economic development,

environmental challenges, or political structures.[9] Weak enforcement could in turn hamper achieving the goal of improving the quality of ESG information. This is further complicated by some countries' decisions to adopt "comply-or-explain" approaches under which firms can simply choose to explain why they do not disclose ESG information. Hence, it is *ex ante* unclear whether mandatory ESG disclosure regulation enhances the availability and quality of ESG information. This leads to the following two hypotheses:

Hypothesis 1a: The availability of ESG reports increases after mandatory ESG disclosure is introduced.

Hypothesis 1b: The quality of ESG reports increases after mandatory ESG disclosure is introduced.

We test these hypotheses against the null hypothesis that mandatory ESG disclosure regulation has no effects on the availability and quality of ESG reports. We measure the availability of ESG reports based on whether firms file an ESG report in the GRI or Asset4 database. The filing of reports in these databases are a useful measure of the availability of ESG reports as they allows investors to easily access and bulk-download ESG reports that would otherwise need to be located at individual company webpages. We measure the quality of ESG reports based on whether the reports adhere to the GRI reporting guidelines (measurement details are provided below).

Importantly, we will explore the role of firm-level heterogeneity in explaining how the availability and quality of ESG reporting respond to mandatory disclosure regulation. We detail the specific predictions for the role of different firm-level variables in Section 4.2.

[9] For instance, it is argued that governments in China, France, and the UK have made significant progress in putting mandatory environmental information disclosure in place, while other countries (e.g., the United States) have been criticized for adopting only lax disclosure policies without strictly enforcing corporate actions.

1.2 Effect of Mandatory ESG Disclosure on Analyst Behavior

Even if the availability and quality of ESG reports increase, it is ambiguous whether and how mandatory ESG disclosure regulation eventually improves the information set used by financial market participants. While it is difficult to measure this information set directly, EPS forecasts issued by analysts can be used as a proxy variable. ESG disclosure may have two effects on EPS forecasts. First, the precision of analysts' forecasts may improve, as ESG disclosure regulation is expected to increase the availability and quality of firm-specific nonfinancial information, thereby improving information used by analysts to forecast earnings—this in turn should result in more precise EPS forecasts. Second, the mandatory provision of ESG information could reduce ambiguity about the fundamentals of a firm. Given that more and better information is available, the diversity of "opinions" may decrease, and EPS forecast dispersion should converge. Combining these two aspects, we examine the following two hypotheses:

Hypothesis 2a: Analysts' earnings forecast accuracy increases after mandatory ESG disclosure regulation is introduced.

Hypothesis 2b: Analysts' earnings disagreement decreases after mandatory ESG disclosure regulation is introduced.

We measure analyst forecast accuracy based on how close the consensus analysts EPS forecast is to the actual EPS, and we capture analyst disagreement based on the dispersion in analysts' EPS forecasts.

1.3 Effect of Mandatory ESG Disclosure on ESG Incidents

If an increase in the supply of ESG information results in an improvement of the overall information environment, this should makes it less likely that firms can hide negative ESG

incidents. Mandatory ESG disclosure may therefore discipline managerial misconduct on ESG issues. This argument points to a decline of negative ESG events after mandatory disclosure is introduced in a country:

Hypothesis 3: The frequency of negative ESG incidents decreases after mandatory ESG disclosure regulation is introduced.

We measure ESG incidents using a proxy variable constructed by RepRisk based on media reporting about negative ESG events. We also explicitly measure *new* ESG incidents (instead of ongoing incidents) to isolate the effects of new ESG disclosure regulation, and employ a measure of how "influential" (or severe) the ESG incidents are (we again provide variable details below).

1.4 Effect of Mandatory ESG Disclosure on Stock Price Crash Risk

If mandatory ESG regulation leads to a reduction in negative ESG incidents, then such regulation may eventually also translate into a reduced likelihood of stock price crashes. One reason is that negative ESG incidents, such as the BP oil spill in the Gulf of Mexico in 2010, represent tail risk events (e.g., Hoepner et al. 2021). Moreover, firms in compliance with ESG disclosure policies may face less litigation, lower fines or fewer sanction, all of which can reduce the risk of stock price crashes. Mandatory ESG disclosure may also trigger firms to alter their ESG policies and to take on projects that reduce ESG risk. For example, there is evidence that mandatory carbon disclosure triggers firms to reduce carbon emissions (Jouvenot and Krueger 2021; Tomar 2021), and reduced emissions have been shown to lower the tail risks related to climate regulation (Ilhan, Sautner, and Vilkov 2021).

Beyond these direct real channels, mandatory ESG disclosure might affect how firms disseminate ESG information to financial markets. In the absence of disclosure requirements,

managers may hold onto bad ESG information for longer periods of time, which can lead to temporary equity overvaluation.[10] When the accumulated bad news reaches a tipping point and is eventually revealed to the market in one instance, a sharp decline in the stock price could ensue (Jin and Myers 2006; Hutton, Marcus and Tehranian 2009). Hence, when mandatory ESG disclosure is introduced, firms should release bad ESG news in a timelier manner, which would result in a lower likelihood of stock price crashes.[11]

These two sets of considerations lead to the following hypothesis:

Hypothesis 4: Stock price crash risk decreases after mandatory ESG disclosure regulation is introduced.

We measure crash risk using the negative conditional firm-specific skewness of weekly returns, the down-to-up volatility, and an indicator of actual stock price crashes (details below).

2. Data

2.1 Sample

To create our sample, we use all publicly-listed firms in the Worldscope database between 2000 and 2017. We extract data on firm fundamentals from Worldscope, data on equity prices from Datastream, data on analysts' forecast from IBES, data on institutional ownership from FactSet, data on ESG performance from Sustainalytics and Asset4, and data on ESG incidents from RepRisk. After matching the different data sources, we obtain a global panel of 259,518 firm-

[10] Such information withholding could occur for a wide range of reasons including managers' compensation structures, their career concerns, or empire building (Kothari, Shu, and Wysocki 2009).
[11] That less information hoarding and a more gradual flow of information to the market is associated with a decrease in stock price crash risk has been documented in prior literature (e.g., Hutton, Marcus, and Tehranian 2009; Kothari, Shu, and Wysocki. 2009; Kim, Li and Zhang 2011a; 2011b).

year observations covering 37,129 unique firms across 52 countries. Internet Appendix Table 1 reports the sample distribution across countries. Descriptive statistics are reported in Table 1.

[Insert Table 1 about here]

2.2 Data on Mandatory ESG Disclosure Regulation

To build a dataset of mandatory ESG disclosure regulation, we collect information on countries' ESG policies and regulations from a variety of sources. Our primary sources are the Carrot & Sticks (C&S) project and the Sustainable Stock Exchange (SSE) Initiative. The C&S project collects data on country policies relating to the voluntary or mandatory reporting of ESG-related information across the world. The objective of the SSE Initiative is to enhance corporate transparency on ESG issues and encourage sustainable investment organized at the stock-exchange level.[12] The SSE initiative collects ESG reporting policies and regulations in jurisdictions around the world, including information on the type of rules, scope of application, applicable firms, or the way to comply (e.g., mandatory, voluntary, comply or explain). Since detailed information on some policies is not provided by Carrot & Stocks and the SSE Initiative, we complement and verify information on the disclosure timing and contents using data collected by the GRI and the Initiative for Responsible Investment (IRI) at Harvard University. Additionally, we use information from government agencies, stock exchanges, and newspapers to cross check the accuracy of the mandatory disclosure information in the jurisdictions in our sample. We also consulted regulators, practitioners and scholars in the field of ESG reporting to increase the accuracy of our data on mandatory disclosure.

[12] The SSE Initiative is a project of the United Nations and co-organized by UNCTAD, the UN Global Compact, UNEP FI, and PRI.

Using this information, we compile a dataset of country-level regulations related to mandatory ESG reporting. Internet Appendix Table 2 provides an overview of the regulations. By 2017, 29 out of the 52 sample countries require some form of mandatory disclosure of ESG information; half of these countries enacted mandatory disclosure regulation after 2010.

As some countries may not have introduced disclosure on E, S, and G all at once, Figure 1 decomposes disclosure regulation along the E, S, and G dimension. The figure displays in shaded grey those countries that introduced ESG disclosure all at once by requiring disclosure along all three ESG dimension at the same moment in time.

[Insert Figure 1 about here]

As displayed in the figure, 15 out of 29 countries implemented mandatory ESG disclosure all-at-once, while the remaining countries introduced E, S, and G disclosure gradually. For the latter countries, there are no obvious patters in terms of which ESG dimension was introduced first or last. For our subsequent tests, we assume that mandatory ESG disclosure has been introduced by a country at the time that disclosure encompassing *all three* dimension is required. Essentially, this assumption implies that there is some complementarity in E, S, and G disclosure to obtain the beneficial effects of disclosure on a firm's information environment. We corroborate this assumption below by demonstrating below that our effects largely originate from those countries that require E, S, and G disclosure all at once. Further, Dyck et al. (2021) provide evidence for such a complementarity outside of the disclosure environment by demonstrating that high environmental performance usually requires the existence of good governance.

The regulations also vary significantly across countries in terms of the relevant regulatory authority, the format of ESG disclosure, and the contents of the required reports. For example, in

Australia, the Financial Services Council and the Australian Council of Superannuation Investors issued an ESG Reporting Guide and mandated listed firm to disclose ESG data. In South Africa, the Johannesburg Stock Exchange collaborated with the Institute of Directors in Southern Africa to issue guidance notes on reporting ESG information. In the European Union, some member countries issued reporting guidance based on the EU Modernization Directive (Directive 2003/51/EC). In other countries, the regulators mandate firms to disclose ESG information without providing written guidance on ESG reporting. Some of our tests below explore the role of the relevant regulatory authority (we compare countries in which governments require the disclosure with those where the disclosure requirement is coming from national stock exchanges).

For our subsequent analysis, we create a dummy variable that equals one for all firm-year observations starting in the first year after a country introduced mandatory ESG disclosure, and zero otherwise.[13] Hence, this variable marks firm-year observations subject to a regulation or policy issued by a country that explicitly mandates listed firms to disclose ESG information in annual or sustainability reports. If a country only mandates certain firms to disclose ESG information, the variable equals one only for firm-year observations of the concerned firms, and zero otherwise.[14] As mentioned above, for countries introducing ESG disclosure gradually, we set the dummy variable equal to one once disclosure on all three dimensions is required.

Some countries introduced comply-or-explain regulation and—as in Ioannou and Serafeim (2019)—we consider such regulation as "mandatory ESG disclosure" for our main tests. The

[13] We set the variable equal to zero in the year of introduction as most disclosure regulations give firms some time buffer (usually until the next year) until they have to comply with the mandatory disclosure rules. Results are similar if we code the variable such that it equals one also in the year of introduction.

[14] For example, the Securities and Exchange Board of India (SEBI) issued a regulation that mandated only the top-100 listed firms in terms of market capitalization to include business responsibility reports as part of annual reports (since March 2012).

reason is that, while offering firms the option to hide ESG information, the requirement to explain why a firm did not disclose information still provides incentives to firms to provide some ESG information to the public. Yet, below we examine how and where our results change once we treat comply-or-explain regulation as non-mandatory regulation.

2.3 Data on ESG Reports

We measure the availability of ESG reports based on whether ESG reports are filed in the GRI or Asset4 database. GRI is an independent international organization, which has pioneered ESG reporting standards since 1997. GRI's standards are considered the first and most widely adopted global ESG reporting standards, and the GRI database is probably the most comprehensive data repository when it comes to ESG reports. As of December 2017, the GRI database contains more than 50,000 ESG report from more than 14,000 organizations from around the world. The Asset4 database is maintained by Asset4 ESG (now Refinitiv ESG), a commercial data vendor that provides subscribers access to sustainability reports filed by firms; Asset4 ESG also produces ESG ratings data. Both data repositories allow investors to easily access ESG reports, to conduct bulk-downloads of ESG reports, and hence to avoid the costly search of ESG reports on individual company webpages.[15]

Apart from collecting reports, the GRI and Asset4 databases contain information on whether a filed ESG report complies with the GRI's disclosure standards. For this purpose, GRI has developed a "content index" that allows firms to state their compliance with specific GRI disclosure guidelines. While Asset4 only flags whether or not an ESG report complies with the

[15] Mandatory ESG reporting does not necessarily require a whole report to be filed, but the mandated information could also be provided through standard disclosure documents.

GRI standards, the GRI database contains also information on the exact adherence levels (firm usually comply with the most recent guidelines).[16]

We create two variables: (1) *ESG report* equals one if a standalone or integrated ESG report is filed in the GRI or Asset4 database in a given firm-year, and zero otherwise; and (2) *GRI compliance* equals one if a firm's ESG report complies with any GRI standard in a firm-year, and zero otherwise. To create these variables, we extract all reports from the GRI and Asset4 databases, and then match the firm names on the reports with the firm names in Worldscope and Datastream. After performing this matching, 22,223 reports of 4,640 unique firms from 53 countries can be matched with our sample. Out of all 22,223 reports, a total of 14,507 reports (65%) comply with any GRI guidelines. When examining the reports, we find that English is the most widely used language (63% of reports), followed by Chinese (8.7%).[17] In term of the length of the reports, English reports consist of about 92 pages on average, while reports in Chinese are shorter and have about 34 pages on average.

Internet Appendix Table 3 reports the distribution of the filed ESG reports and of the GRI compliance across years, for the full sample and separately for the GRI and Asset4 databases.[18] Internet Appendix Table 4 displays the distribution of the adherence levels to the different GRI guidelines (this information is only available for ESG reports in the GRI database).

[16] Over time, GRI developed five versions of guidelines for ESG reports and, as a result, there are five different adherence levels, namely compliance with GRI-G1 (published in 2000), GRI-G2 (2002), GRI-G3 (2006), GRI-G3.1 (2011), GRI-G4 (2013), and GRI-Standards (published in 2016 and currently valid). The GRI database classifies ESG reports without a GRI content index, but with an explicit reference to the GRI Guidelines, as "Citing-GRI." The reports that do not satisfy the database requirements of the GRI-standards are classified as "Non-GRI."

[17] Information on the language of the reports is only available for ESG reports in the GRI database.

[18] In the GRI database, 9,038 out of 12,885 (70%) reports provide the GRI content index and adhere to a version of the GRI guidelines. According to the Asset4 database, 10,794 out of 16,346 reports (66%) comply with any GRI guidelines.

2.4 Data on Analyst Coverage and Behavior

We use IBES data to create three variables that measure analyst coverage and behavior: (1) *# Analysts* is the number of analysts that follow a firm in a firm-year;[19] (2) *Analyst accuracy* is calculated as -100*|Estimated EPS-Actual EPS|, scaled by the stock price; and (3) *Analyst dispersion* is the standard deviation of estimated EPS forecasts (multiplied by 100), scaled by the stock price. The estimated EPS forecasts is the median value of the EPS forecast. To construct the analyst variables, we use all nearest fiscal-year-end EPS forecasts of all analysts covering a firm within the year.

2.5 Data on ESG Incidents

To measure ESG incidents, we use data from RepRisk, which screens over 90,000 public media sources in 20 languages every day to search for news related to negative ESG incidents. The media sources include print media, online media, social media including Twitter and blogs, news by government bodies, regulators, or think tanks, and other online sources. RepRisk evaluates the potential impacts of ESG event based on the novelty and severity of an incident.

We construct three measures to characterize negative ESG incidents: (1) *# ESG incidents* is the number of negative ESG incidents in a firm-year; (2) *# Novel ESG incidents* is the number of *new* negative ESG incidents in a firm-year; (3) *ESG incidents influence* is the reach score of all ESG incidents in a firm-year and reflects the severity of ESG incidents. The reach score is based on the influence or readership of the source in which a risk incident was published—a higher number indicates that news about ESG incidents are more influential. We assume that more

[19] Results are unaffected if instead of *# Analysts* we consider an indicator that equals one if at least one analysts follows a firm in a firm-year, and zero otherwise;

influential ESG news reflect more severe ESG incidents, as such events are covered more broadly and in media with wider readership (e.g., newspapers with more subscribers).

2.6 Data on Stock Price Crash Risk

To measure stock price crash risk, we create three variables. Our first proxy is the negative conditional firm-specific skewness of weekly returns (*Negative skew*), which has been shown to be a good proxy for firm-specific crash risk (Hutton, Marcus and Tehranian 2009; Kim and Zhang 2011a, 2011b). Negative skew is computed as the negative coefficient of skewness, calculated by taking the negative of the third moment of firm-specific weekly returns for each year divided by the standard deviation of firm-specific weekly returns raised to the third power.

Further, we rely on the down-to-up volatility (*Down-to-up vol*) and an indicator variable capturing actual stock price crashes (*Crash*) as alternative measures. *Down-to-up vol* is calculated as the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than the annual mean ("down weeks"), divided by the standard deviation of weekly-stock returns during the weeks in which they are higher than the annual mean ("up weeks"). *Crash* equals one if a firm experienced one or more crash weeks in a year, and zero otherwise. A crash week is a week in which the weekly return fell 3.2 standard deviations below the mean of the weekly returns over a year (3.2 standard deviations generate a frequency of 0.1% in the normal distribution).

2.7 Data on Firm and Country Characteristics

To isolate the impact of mandatory ESG disclosure, we control for firm fundamentals, stock-market information, and specific country characteristics using primarily data from Worldscope, Datastream, and the World Bank. In terms of firm fundamentals, we account for firm risk (*Negative*

skew), stock turnover (Δ*Turnover*), firm-specific stock returns (*Equity returns*), volatility (*Equity volatility*), size (*Size*), profitability (*ROA*), financial leverage (*Leverage*), the opaqueness of accounting reports (*Opaqueness*), insider holdings (*% Insider shares*), and international sales (*% Int'l sales*).

Country-level controls include stock market performance (*Index returns*) and volatility (*Index volatility*), financial development (*Capital to GDP*), and growth (*GDP growth*). Country-level regressions also account for a country's legal origin (*Common*), property rights (*Property rights*), an index of the accounting information disclosure intensity (*CIFAR*), labor freedom (*Labor Freedom*), the percentage of Christians (*% Christians*), and carbon emissions *per capita* (*Carbon emissions*). Variables are defined in Data Appendix A. We winsorize control variables at the 1% level.

3. Country-Level Determinants of Mandatory ESG Disclosure

Before examining the firm-level effects of mandatory ESG disclosure, we try to better understand which country-level variable driver mandatory ESG disclosure regulation. We estimate the following Probit model for country *c* in year *t*:

$$Mandatory\ disclosure_{c,t} = \Phi(\boldsymbol{X}_{c,t-1}\beta + \delta_t + \varepsilon_{c,t}) \quad (1)$$

where *Mandatory disclosure* equals one for all country-years starting with the first year after a country introduced mandatory ESG disclosure regulation, and zero otherwise (see above). The vector $\boldsymbol{X}$ contains a series of country-level variables, some of which vary over time, and δ_t are year fixed effects. Standard errors are clustered at the country-year level.

We use *Common* to reflect the legal origin of a country, which has been shown to affect ESG practices by shaping the explicit and implicit contracts between shareholders and other stakeholders. Specifically, Liang and Renneboog (2017) show that ESG ratings are generally better when firms are headquartered in countries with a civil as opposed to common law origin. Consequently, the gap between the supply of and demand for ESG information is possibly larger in common law countries given that governance in these countries typically de-emphasizes the importance of non-shareholding stakeholders. Hence, we expect that common law countries have a stronger motivation to enact mandatory disclosure regulations.

Property rights reflects the legal protection of stakeholders' ownership of resources. Better legal ownership protection is usually associate with better regulation enforcement, which should facilitate the enforcement of mandatory disclosure. In addition, we control for an index published by the Center for International Financial Analysis and Research (CIFAR) that represents the transparency and quality of accounting reports at the country-level. The index has been used in prior literature and captures the extent to which a representative sample of firms in a country discloses 90 different accounting items (e.g., Barth, Landsman, and Lang 2008). We use *% Christian* to capture cultural differences across countries, *Labor freedom* to reflect the legal and regulatory framework of a country's labor market, and *Carbon emissions* (CO_2 emission *per capita*) to reflect a country's *per capita* contribution to climate change. To examine how economic and financial development affects a country's propensity to mandate ESG disclosure, we use *GDP growth*, *Capital to GDP* (to reflect financial development), and *Bank-based* (to reflect the structure of financial markets). Not all variables are available for all country-years, somewhat restricting the number of observations in our country-year panel.

[Insert Table 2 about here]

In Table 2, we find that countries with common law origin, higher *per capita* carbon emissions, better accounting reporting quality, and with a higher percentage of Christians are more likely to enact mandatory ESG disclosure regulation. In contrast, countries with a higher GDP growth rate, a bank-based market structure, better protection for property rights, and more labor freedom are less likely to pass regulation that mandates ESG disclosure.

We want to highlight two results that are most relevant for the current ESG debate. The first result is the finding that common law countries have a stronger propensity to enact disclosure regulations. As pointed out above, this relates to findings in Liang and Renneboog (2017) that firms in civil law countries have better ESG scores. Our evidence suggests that the gap between the supply of and demand for ESG information may therefore be bigger for firms headquartered in common law countries, implying a greater need for ESG disclosure regulation in such countries.

The second finding is that countries with higher *per capita* carbon emissions are more likely to introduce mandatory ESG disclosure. One plausible reason for this finding is that ESG disclosure can in part be used as a disciplinary tool through which countries hope to reduce the carbon emissions of their firms. This could be the case either if the regulation mandates carbon disclosures directly or if it requires the disclosure of E&S risks more broadly and carbon risks constitute material components of a firm's E&S risks. As shows in Jouvenot and Krueger (2021) and Tomar (2021), firms decrease carbon emissions more strongly when mandatory disclosure rules requires them to disclose the carbon footprint of their operations.[20]

[20] Examining the real effects of mandatory carbon reporting in the UK, Jouvenot and Krueger (2020) document strong reductions in carbon emissions for UK firms relative to control firms from other jurisdictions. Tomar (2021) studies the effects of the US Environmental Protection Agency's GHG Reporting Program.

4. Effect of Mandatory ESG Disclosure on the Quality and Quantity of ESG Reports

4.1 Average Treatment Effects

We use regressions to examine the impact of mandatory ESG disclosure on the availability and quality of ESG reports. Specifically, we estimate the following model for firm *i* in country *c* and year *t*:

$$y_{i,c,t} = \Phi(\alpha_0 + \alpha_1 Mandatory\ disclosure_{c,t-1} + \boldsymbol{X}_{i,c,t-1}\beta + \delta_c + \delta_t + \delta_j + \varepsilon_{i,c,t}) \qquad (2)$$

where y_t denotes a measure of the availability (*ESG report*) and quality (*GRI compliance*) of ESG reports, *Mandatory disclosure* reflects the introduction of mandatory ESG disclosure in a country, $\boldsymbol{X}$ is a vector of control variables, which vary at the firm or country level, and δ_c, δ_t, and δ_j are country, time and industry fixed effects. (In Internet Appendix Table 5, we show that our conclusions are robust to using firm fixed effects.) Standard errors are clustered at the country-year level. When explaining *GRI compliance*, we restrict the sample to firm-years in which an ESG report is filed in the GRI or Asset4 database. We use Probit and Logit regressions to estimate Equation (2) and report marginal effects.

In terms of firm-level controls, we follow prior literature (Dhaliwal et al. 2011) and account for firm-risk (*Negative skew*), stock turnover (Δ*Turnover*), stock return (*Equity returns*), volatility (*Equity volatility*), size (*Size*), profitability (*ROA*), financial leverage (*Leverage*), opaqueness of accounting reports (*Opaqueness*), insider holdings (*% Insider shares*), and international sales (*% Int'l sales*). Country-level controls include stock market performance (*Index returns*), volatility (*Index volatility*), financial development (*Capital to GDP*), and growth (*GDP growth*).

[Insert Table 3 about here]

According to Hypotheses 1a and 1b, we expect that the availability and the quality of ESG disclosures increases following mandatory ESG disclosure regulations. We test these predictions in Table 3. In Columns (1) and (2), we find positive and statistically significant coefficients for *Mandatory disclosure*, that is, the likelihood of filing an ESG report in the GRI database increases significantly after mandatory disclosure is introduced—this finding supports Hypothesis 1a. Economically, the propensity to file an ESG report increases by 2.6pp after mandatory ESG disclosure is introduced, a large effect relative to the unconditional frequency of 8.6% (the estimate implies that the likelihood to file an ESG report increases by about 30%).

[Insert Figure 2 about here]

Figure 2, Panel A, reports for countries that introduced mandatory ESG disclosure the percentage of sample firms hat file ESG reports in the GRI or Asset4 database before and after mandatory disclosure. The figure shows that all countries show an increase in their firms' file ESG reports, but also that there is substantial heterogeneity across countries; the overall increase is largest in South Africa, Austria and Spain.

One may wonder why disclosure rates do not increase to 100% after the introduction of the mandatory reporting requirements. This has several potential reasons. One explanation is that some firms may choose to disclose ESG information through annual reports that are not filed in the GRI or Asset4 database after disclosure becomes mandatory.[21] Relatedly, the disclosure requirements in some countries are on a comply-or-explain basis, and some firms may chose not to comply with

[21] Some mandatory disclosure requirements do not require the publication of a standalone ESG report. The GRI and Asset4 also contain so-called "integrated ESG" reports, which are a combination of traditional annual reports and ESG reports, but some firms may decide not to upload reports in these databases if the ESG information is integrated into traditional annual reports.

the rules. In any case, despite these measurement limitations, we do find a beneficial effect of mandatory ESG disclosure requirements on the availability of ESG reports.

Turning back to Table 3, we find no evidence in Column (3) and (4) that mandatory ESG disclosure *on average* statistically significantly affects *GRI compliance*, our proxy for the quality of the filed ESG reports. Hence, we cannot detect that mandatory ESG disclosure improves the quality of the average firm's ESG report, inconsistent with Hypotheses 1b. We demonstrate in Section 5 that this conclusion is robust to accounting for attrition effects, that is, to controlling for confounding effects from new firms entering the sample (or dropping from the sample) after (before) mandatory ESG disclosure is introduced. However, and more importantly, we also show that the absence of an average effect masks substantial treatment effect heterogeneity.

Figure 2, Panel B, also shows substantial heterogeneity across countries with respect to the effects on the quality of ESG reporting. Thus, though the average effect is zero, there is a large increase in the quality of ESG reporting for firms in countries such as Austria, Spain, the UK or South Africa.

Taken together, the results on the availability and quality of ESG reporting are consistent with an interpretation whereby *the average firm* initiates an ESG report to "superficially" comply with the minimum requirements of mandatory ESG disclosure regulation. Therefore, mandatory disclosure affects the propensity to file an ESG report, but it does not increase the average quality of such reports once they are filed.

4.2 Heterogeneous Treatment Effects across Firms

In this section, we show that the results in Table 3 mask important heterogeneity across firms in the treatment effects of ESG disclosure mandates. The presence of such heterogeneous treatment

effects is unsurprising given that there is an abundant literature on how firm-specific attributes are related to firms' ESG disclosure decisions (e.g., Christensen, Hail, and Leuz 2021).

In Table 4, to explore the effects of firm-level heterogeneity, we modify Equation (2) by introducing interaction terms between *Mandatory disclosure* and a series of time-varying firm characteristics. The dependent variable in Panel A is the propensity to file an ESG report, and in Panel B it is the extent to which a filed report complies with the GRI standards.

[Insert Table 4 about here]

We first explore the role of firm size, possibly one of the most important determinants for the availability—and possibly also the quality—of ESG disclosures. Large firms are monitored more closely by the public, which should incentivize them to better manage and voluntarily disclose ESG issues. Also, larger firms deal with more stakeholders and potentially impose more negative externalities on them because of their larger operations. This might lead to a stronger stakeholder demand for more and better ESG information production. In addition, disclosing ESG information is relatively less costly for large firms (the disclosure likely has a large fixed cost component), and large firms tend to have more resources available to hire staff to fulfill ESG disclosure requirements. Hence, if large firms already *voluntarily* disclosure more and better ESG nonfinancial information, we expect that mandatory disclosure has a less pronounced effect on them. *Vice-versa*, this implies that it is small firms for which mandatory disclosure should have the strongest effects on the availability and quality of ESG reporting.

Indeed, in Column (1) of Table 4, Panel A, we find a negative interaction term of *Mandatory disclosure* times *Size*, consistent with the view that—above all—smaller firms start disclosing as a result of mandatory ESG disclosure regulation. However, contrary to our expectation, Column

(1) of Table 4, Panel B, shows the *quality* of ESG disclosure increases more strongly among large firms. This finding suggests that mandatory disclosure improves the ESG reporting quality even—and in particular—among large firms with high *ex ante* incentives to voluntarily disclose ESG information.

Institutional ownership is related to firms' voluntary ESG disclosures through influence and selection effects. Dyck et al. (2019) show that institutional ownership is higher in firms with better ESG policies. Furthermore, Ilhan, Krueger, Sautner, and Starks (2021) demonstrate that institutional investors actively engage firms in order to improve their voluntary ESG disclosures (climate-related disclosures in their setting), but also that they choose to invest in firms with better ESG disclosures. Hence, one would expect that voluntary ESG disclosure is positively associated with institutional ownership. Thus, on the one hand, a prediction is that mandatory disclosure regulation may affect primarily firms with lower institutional ownership, because firms with higher institutional ownership already have better disclosures. On the other hand, however, firms with higher institutional ownership may respond more strongly to additional quality-related disclosure requirements that exceed what is already disclosed voluntarily. The reason is that such firms face stronger pressure by their institutional owners to comply with the new rules.

In Column (2) of Table 4, Panel A, when interacting *Institutional ownership* with *Mandatory disclosure*, we cannot find that the impact of mandatory disclosure on the availability of ESG reports varies across different levels of institutional ownership. (Yet, unconditionally, we find a positive and significant relationship between *Institutional ownership* and the propensity to file an ESG report.) In contrast, Column (2) of Table 4, Panel B, shows that the ESG reporting quality responds more strongly to mandatory ESG disclosure regulation among firms with higher institutional ownership.

Prior research shows that the impact of ESG performance on ESG disclosure can be positive or negative (e.g., Hummel and Schlick 2016; Clarkson et al. 2008). Disclosure theory suggests that the incentive to voluntarily disclose ESG information is stronger for the firms with good performance, while socio-political theories suggest that the disclosure incentive is stronger for firms with poor performance ("greenwashing"). It is hence theoretically ambiguous how changes in the ESG reporting quantity and quality after mandatory reporting vary across firms with high or low ESG performance. To capture the role of ESG performance we use two scores, *Sustainalytics ESG score* from Sustainalytics and *Asset4 ESG score* from Assets4 ESG (now Refinitiv ESG) and interact these scores with *Mandatory disclosure*—we note that these ratings are only available for a small subset of all sample firms.

Table 4, Panel A, documents in Columns (3) and (4) positive unconditional relationships between ESG performance and the availability of ESG reports, which supports disclosure theory.[22] Most importantly, the positive impact of mandatory disclosure regulation on the availability of ESG reports is more pronounced for firms with lower ESG performance. In Table 4, Panel B, we also find in Columns (3) and (4) that firms with low ESG performance increase the quality of their ESG reports particularly strongly after mandatory disclosure is introduced. This result, together with the evidence on the availability of ESG reporting, suggests that ESG reporting mandates positively affect the disclosures by firms where ESG-related concerns and information demands by investors are largest.

[22] As would be expected, firms that provide ESG scores are more likely to have an ESG rating. In our sample, the correlation between *ESG report* and the availability of a Sustainalytics (Asset4) ESG score is 0.53 (0.55).

Overall, the estimates in Table 4 show that the insignificant overall effects of disclosure regulation on the quality of ESG reporting in Table 3 mask economically important treatment effect heterogeneity across firms.

5. Effect of Mandatory ESG Disclosure on Financial Analyst Forecast

We have demonstrated how reporting by firms reacts to the introduction of mandatory ESG disclosure. Next, we explore the information effects of ESG disclosure regulation. Financial analysts collect and process financial and nonfinancial information in order to forecast key financial metrics, and analysts may—in that process—also make use of ESG information. An important question is therefore how a change in the supply of nonfinancial information affects the information environment of analysts. We predict in Hypotheses 2a and 2b that mandatory ESG disclosure regulation should have beneficial effects on analysts' forecast accuracy and dispersion. To test these two hypotheses, we amend Equation (2) by replacing the dependent variable with *# Analysts*, *Analyst accuracy*, and *Analyst dispersion*, respectively, and estimate OLS regressions.

[Insert Table 5 about here]

Results are reported in Table 5. We preview the tests for forecast accuracy and dispersion with an examination of the effect of mandatory ESG disclosure on analyst coverage. In Columns (1), we find no evidence that analyst coverage is affected by mandatory ESG disclosure regulation (in unreported regressions we also find no effect at the extensive margin using an indicator for whether or not a firm has analyst coverage). However, turning to our main variables of interest, we find effects when we consider how forecast accuracy and dispersion are affected by mandatory disclosure. In Columns (2) and (3), the accuracy of EPS forecasts significantly increases, and the dispersion of EPS forecasts decreases, after mandatory disclosure is enacted. The effects are

economically meaningful. In Column (2), forecast accuracy increases by 0.250 after mandatory disclosure is introduced, which represents about 5.5% of the variable's standard deviation. Relatively speaking, effects are stronger for forecast dispersion, suggesting that increases in available ESG information reduces disagreement about the fundamentals of the firm. Specifically, in Column (3) forecast dispersion decreases by 0.082 or about 14% of the variable's standard deviation.

The fact that we find no effects for analyst coverage but significant effects when looking at dispersion or forecast accuracy suggests that the informational effects are driven by an improvement in the information environment and not by an increase in analyst coverage. In other words, forecast precision and dispersion do not change because more analysts cover a firm (or because analysts start analyzing a firm), but rather because mandatory ESG disclosure regulation improves the information available to the analysts who are already covering a given firm. Below we also show that, above all the result on forecast dispersion, is robust to accounting for firm fixed effects and potential attrition bias (effects for forecast accuracy are weaker, as also reflected in the marginal significance of the variable's estimates in Table 5).

Overall, the evidence in Table 5 supports Hypotheses 2a and 2b, i.e. that mandatory disclosure has a strong and beneficial effect on the information environment by reducing the dispersion and increasing the accuracy of analysts' EPS forecasts.

6. Effect of Mandatory ESG Disclosure on ESG Incidents and Financial Markets

6.1 Effect of Mandatory ESG Disclosure on ESG Incidents

We predict in Hypothesis 3 that ESG incidents decrease after mandatory disclosure is enacted. To test this prediction in Table 6, we amend Equation (2) and use as dependent variables the logarithms of *# ESG incidents*, *# Novel ESG incidents*, and *ESG incidents influence*, respectively.

[Insert Table 6 about here]

In Column (1), which uses *# ESG incidents*, we find that the number of ESG incidents significantly decreases after the enactment of mandatory disclosure. In terms of economic magnitudes, ESG incidents decreases by about 5% after the adoption of mandatory disclosure (the log-specification implies that we can interpret the coefficient as a percentage change).

A concern with the regression in Column (1) is that the decrease in the number of ESG incidents might be driven by a decline of repeated news on a *prior* ESG incident, rather than by a decline in newly identified incidents. To mitigate a confounding impact of repeated incidents, we use in Column (2) *# Novel ESG incidents* as the dependent variable. The estimates show that the amount of *new* ESG incidents decreases significantly after mandatory disclosure. This adds more credence to the negative impact of mandatory disclosure on the revelation of ESG information.

Finally, we use in Column (3) *ESG incidents influence* to examine whether ESG events have become to be less impactful after mandatory disclosure. Column (3) shows a negative coefficient for *Mandatory disclosure*, suggesting that ESG incidents decline not just in numbers, but also in terms of influence or severity, after mandatory disclosure is introduced. These results are again robust to accounting for firm fixed effects and attrition effects, and if anything, stronger in these specifications (see below).

Overall, this evidence suggests that a potential positive effect of mandatory ESG disclosure lies in disciplining managerial misconduct on ESG issues, consistent with Hypothesis 3.

6.2 Effect of Mandatory ESG Disclosure on Stock Price Crash Risk

Hypothesis 4 predicts that an implication of mandatory ESG disclosure is that stock price crash risk decreases, because i) ESG incidents become less likely, and ii) negative ESG news is not accumulated and held back anymore, but rather released more gradually. To test this hypothesis, we measure stock price crash risk using the negative conditional firm-specific skewness of weekly returns (*Negative skew*), the down-to-up volatility (*Down-to-up vol*), and an indicator of actual stock price crashes (*Crash*).

[Insert Table 7 about here]

In Table 7, we find negative and significant coefficients on *Mandatory disclosure* for all three crash risk measures. This suggests that the likelihood of stock price crashes is significantly reduced after mandatory disclosure regulations are introduced. Economically, *Negative skew* and *Down-to-up vol* in Columns (1) and (2) decrease by -0.101 and -0.065, respectively. Compared to the standard deviations of these two variables, which are 0.892 and 0.605, respectively, the magnitudes of the risk reductions are economically significant (about 10% of the standard deviations). In Column (3), the likelihood of actual stock price crashes decreases by about 2.8pp after mandatory ESG disclosure is introduced, which equals about 19% of the variable's unconditional probability. However, we note that some of the effects in Table 7 are estimated with some noise and statistically significant only at the 10% level (results are stronger if we consider firm fixed effects in the robustness section).

7. Effect of Mandatory ESG Disclosure: Variation in Regulatory Designs across Countries

7.1 All-at-Once versus Gradual Introduction of ESG Mandatory Disclosure

As illustrated in Figure 1, a total of 15 out of 29 countries implemented mandatory ESG disclosure all-at-once, while 14 countries introduced ESG disclosure gradually topic-by-topic. This variation in regulatory design prompts the question of whether one or the other regulation choice has more pronounced effects in explaining our results. Specifically, it may be the case that markets may require information along all three dimensions in order to fully and accurately assess a firm's ESG profile.

To examine the role of such information complementarity, we decompose *Mandatory disclosure* into two separate indicator variables reflecting the country differences in regulatory designs. For countries introducing disclosure for E, S, and G all at once, *All-at-Once ESG disclosure* equals one starting with the first year that is requiring mandatory disclosure for E, S, and G, and zero otherwise. To the contrary, for countries introducing disclosure on a topic-by-topic basis over time, *Other ESG disclosure* equals one starting with the first year in which disclosure *on all three* dimensions is mandated.

[Insert Table 8 about here]

Table 8 shows that most of the effects documented in the prior tables originate from countries that introduced ESG disclosure broadly and all at once. For firms in these countries, there is a strong increase in ESG reports (in Panel A), a decline in ESG incidents (Panel C), and a reduction in stock price crash risk. In these panels, *All-at-Once ESG disclosure* is usually statistically significant while *Other ESG disclosure* is not (except for *ESG reports*, where also the latter indicator is significant), and the coefficient estimates of *All-at-Once ESG disclosure* are much

larger economically. There is one exception though, as we find the effects for the analyst variables to be stronger for *Other ESG disclosure*. That said, the effects for *Analyst accuracy* are larger economically for *All-at-Once ESG disclosure* (0.272 versus 0.241), albeit estimated with more noise (the effect becomes significant below when we condition on the authority that requires the disclosure). *All-at-Once ESG disclosure* does have the predicted negative effect on analyst dispersion, yet we find the estimate to be too noisy to be statistically significant. The finding that analyst dispersion decreases even more strongly in countries that introduce ESG disclosure mandates gradually is surprising. It suggests that analysts find it easier to agree on the impact of ESG factors if such information is provided gradually.

7.2. Government versus Non-Government Regulatory Authorities

We perform a further decomposition of the effect of mandatory all-at-once ESG disclosure in Table 9. In that table, we exploit the observation that countries exhibit variation in terms of which regulatory authority mandated ESG disclosure. While in some countries the disclosure stems from a government authority, in others it is required from national stock exchanges. We again create two indicator variables reflecting all-at-once disclosure mandated by either of the two organizations (*Government All-at-Once* versus *Non-Government All-at-Once*).

[Insert Table 9 about here]

Table 9 reveals that the effects of all-at-once regulation for ESG incidents and stock price crash risk are concentrated in countries where governments are the relevant authority requiring the disclosure (Panels C and D). In Panel A, disclosure regulation by both types of authorities increase the filing of ESG reports, though effects are larger in size when stock exchanges require the disclosure. Interestingly, in Panel B government all-at-once disclosure seems to have a strong

positive effect on analyst accuracy (no effect on dispersion), which is in isolation now even larger than the effect of *Other ESG disclosure*.

8. Robustness Checks and Role of Comply-or-Explain Regulations

As mentioned above, we perform several robustness tests that address different concerns with our analysis. In Internet Appendix Table 5, we address the concern that unobserved time-invariant heterogeneity at the firm level drives our estimates. The estimates show that many of our results, in particular those pertaining to the occurrence of negative events and stock price risk, are unaffected by firm fixed effects that identify effects from within-firm changes.

In Internet Appendix Table 6, we address the concern that our results are biased by attrition effects, that is, by new firms entering the sample (or dropping from the sample) after (before) mandatory ESG disclosure is introduced. Reassuringly, the estimates in the appendix table show that the results are unaffected if we remove firms that are in the sample only before, or only after, disclosure is introduced.

We next consider how our estimates change once we treat comply-or-explain disclosure regulation as "non-mandatory." Apart from being a robustness check, this analysis helps identify areas in which comply-or-explain regulation has weaker, stronger, or similar effects compared to stricter regulation. As twelve countries introduced ESG disclosure regulation via comply-or-explain rules (see Internet Appendix Table 2), this is an important dimension to explore. For this analysis, we modify the definition of *Mandatory disclosure* and set the indicator equal to one for all years with mandatory, non-comply-or-explain ESG disclosure regulation, and zero otherwise (i.e., the variable equals zero both in years without mandatory disclosure and in years with comply-or-explain ESG disclosure rules).

A few interesting insights emerge from this analysis, which is reported in Internet Appendix Table 7. The effects of strict mandatory disclosure on ESG incidents (Panel C) and risk measures (Panel D) are somewhat similar (if not stronger) in economic magnitude and statistical significance compared to those in the main tables. At least for these outcome variables, this implies that comply-or-explain rules have effects that are similar to those of stricter ESG disclosure mandates (otherwise, we would except to see an increase in economic magnitudes of the effects in this internet appendix). Second, some divergence arises for the effects on the availability of ESG reports and on analyst coverage. Perhaps surprisingly, the effect of mandatory disclosure on filed ESG reports decreases in size and becomes insignificant when we consider the stricter disclosure definition (Panel A). Further, there is an increase in analyst coverage among firms located in countries that introduced strict mandatory ESG disclosure, while we found no effects when considering the broader disclosure mandate definition.

9. Conclusion

We compile a novel and comprehensive dataset on mandatory environmental, social, and governance (ESG) disclosure around the world to analyze the effects of such disclosure requirements. We document a significant positive impact of mandatory ESG disclosure regulations on the propensity of firms to file ESG reports and on the quality of these reports, particularly among firms where ESG-related concerns and information demands by investors are largest.

Mandatory ESG disclosure increases the accuracy of analysts' earnings forecasts, lowers analyst forecast dispersion, reduces negative ESG incidents, and lowers the likelihood of stock price crashes. Overall, our results provide evidence in support of the view that mandatory ESG disclosure regulation improves the corporate information environment and leads to beneficial real

outcomes. Effects are strongest if the mandatory disclosure is introduced all at once for E, S, and G and if the relevant authority is a government instead of a national stock exchange. Our results are encouraging and support more regulatory changes for other countries that do not have mandatory ESG disclosure regimes yet.

Data Appendix A: Variable Definitions

Variable Name	Definition	Sources
Mandatory ESG Disclosure		
Mandatory disclosure	Indicator that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country, and zero otherwise. If ESG disclosure is not introduced all at once, we require for the indicator to be one that mandatory E, S, and G disclosure is present.	Hand-Collected
All-at-Once ESG disclosure	Indicator that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country if a country introduced ESG disclosure all at once, and zero otherwise.	Hand-Collected
Other ESG disclosure	Indicator that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country if a country introduced ESG disclosure gradually topic-by-topic instead of all at once, and zero otherwise. We set the indicator to one once mandatory E, S, and G disclosure is present.	Hand-Collected
Government All-at-Once	Indicator that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country if a country introduced ESG disclosure all at once and if the disclosure is mandated by a government authority, and zero otherwise.	Hand-Collected
Non-Government All-at-Once	Indicator that equals one for all years starting with the first year after the implementation of mandatory ESG disclosure in a country if a country introduced ESG disclosure all at once and if the disclosure is mandated by a national stock exchange (non-government authority), and zero otherwise.	Hand-Collected
ESG Reports		
ESG report	Indicator that equals one if a firm has uploaded a standalone or integrated ESG report in the Global Report Initiative (GRI) database in a firm-year, and zero otherwise.	GRI and Asset4 (Refinitiv) Database
GRI compliance	Indicator that equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise.	GRI and Asset4 (Refinitiv) Database
Financial Analysts' Behavior		
# Analysts	Number of analysts that follow a firm in a firm-year.	IBES
Analyst accuracy	Calculated as: $-\frac{100*\lvert Estimated\ EPS-Actual\ EPS\rvert}{Stock\ Price}$. Estimated EPS is the median of analysts' EPS forecasts in a fiscal year. Stock price is the fiscal-year end stock price of a firm.	IBES
Analyst dispersion	Calculated as: $\frac{100*Standard\ Deviation\ of\ Estimated\ EPS}{Stock\ Price}$. Standard deviation of Estimated EPS is the standard deviation of analysts' forecasted EPS in a fiscal year. Stock price is the fiscal-year end stock price of a firm.	IBES
ESG Incidents		
# ESG incidents	Number of ESG incidents in a firm-year (plus one) according to RepRisk.	RepRisk
# Novel ESG incidents	Number of novel ESG incidents in a firm-year (plus one) according to RepRisk.	

ESG incidents influence	Sum of the reach scores of all news about ESG incidents in a firm-year according to a rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news is more influential.	
Stock Price Crash Risk		
Negative skew	Negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power.	Worldscope
Down-to-up vol	Down-to-up volatility calculated as the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks).	Worldscope
Crash	Indicator that equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise. A crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year. 3.2 standard deviations generate a frequency of 0.1 percent in the normal distribution.	Worldscope
Firm-level Control Variables		
Sustainalytics ESG score	Score for the ESG performance in a firm-year provided by Sustainalytics. Higher numbers reflect better ESG performance.	Sustainalytics
Asset4 ESG score	Score for the ESG performance in a firm-year provided by Asset4 (Thomson Reuters). Higher numbers reflect better ESG performance.	Assets4 (Refinitiv)
Δ*Turnover*	Change of the average monthly turnover ratio in a firm-year.	Datastream
Equity returns	Mean of firm-specific weekly return in a firm-year.	Datastream
Equity volatility	Volatility of firm-specific weekly return in a firm-year.	Datastream
Size	Logarithm of total assets.	Worldscope
ROA	Net income before extraordinary items scaled by the total assets in a firm-year.	Worldscope
Leverage	Total debt scaled by the total assets in a firm-year.	Worldscope
MtoB	Market-to-book ratio in a firm-year.	Worldscope
Opaqueness	Absolute value of discretionary accruals (DISACC) in a firm-year (calculated as the average over the previous three years).	Worldscope
% Insider shares	Number of shares held by insiders as a proportion of the number of shares outstanding in a firm-year.	Worldscope
% Int'l sales	Aggregated foreign sales scaled by the total sales in a firm-year.	Worldscope
Country-level Control Variables		
Index volatility	Volatility of monthly return of equity market index in a country-year.	Datastream

Index returns	Annual return of equity market index in a country-year.	
Capital to GDP	Ratio of market capitalization to GDP in a country-year.	World Bank
GDP growth	Growth rate of GDP in a country-year.	World Bank
Common	Indicator that equals one if the legal origin of a country is English, and zero otherwise.	La Porta, et al. 1998; 2008
Bank-based	Indicator that equals one if the financial market in a country is bank-based, and zero otherwise.	Demirguc-Kunt and Levine, 1999
Property rights	World Bank index for property rights in a country-year.	World Bank
CIFAR	Index of accounting information disclosure intensity from the Center for Financial Analysis and Research.	CIFAR
% Christian	Percentage of Christians in the population in a country-year.	World Bank
Labor freedom	World Bank index for labor freedom in a country-year.	World Bank
Carbon emissions	Carbon emission *per capita* in a country-year.	World Bank

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Figure 1: Timelines of Mandatory ESG Disclosure Regulations around the World

This figure exhibits the timeline of the implementation of mandatory environmental, social and governance disclosure around the world during our sample period. The shaded countries implemented mandatory environmental, social and governance disclosure all at once, while the rest of countries implemented mandatory disclosure gradually. The figure only includes countries that eventually had E, S, and G disclosure mandates (i.e., not countries that had, for example, only a mandate to disclose on governance issues).

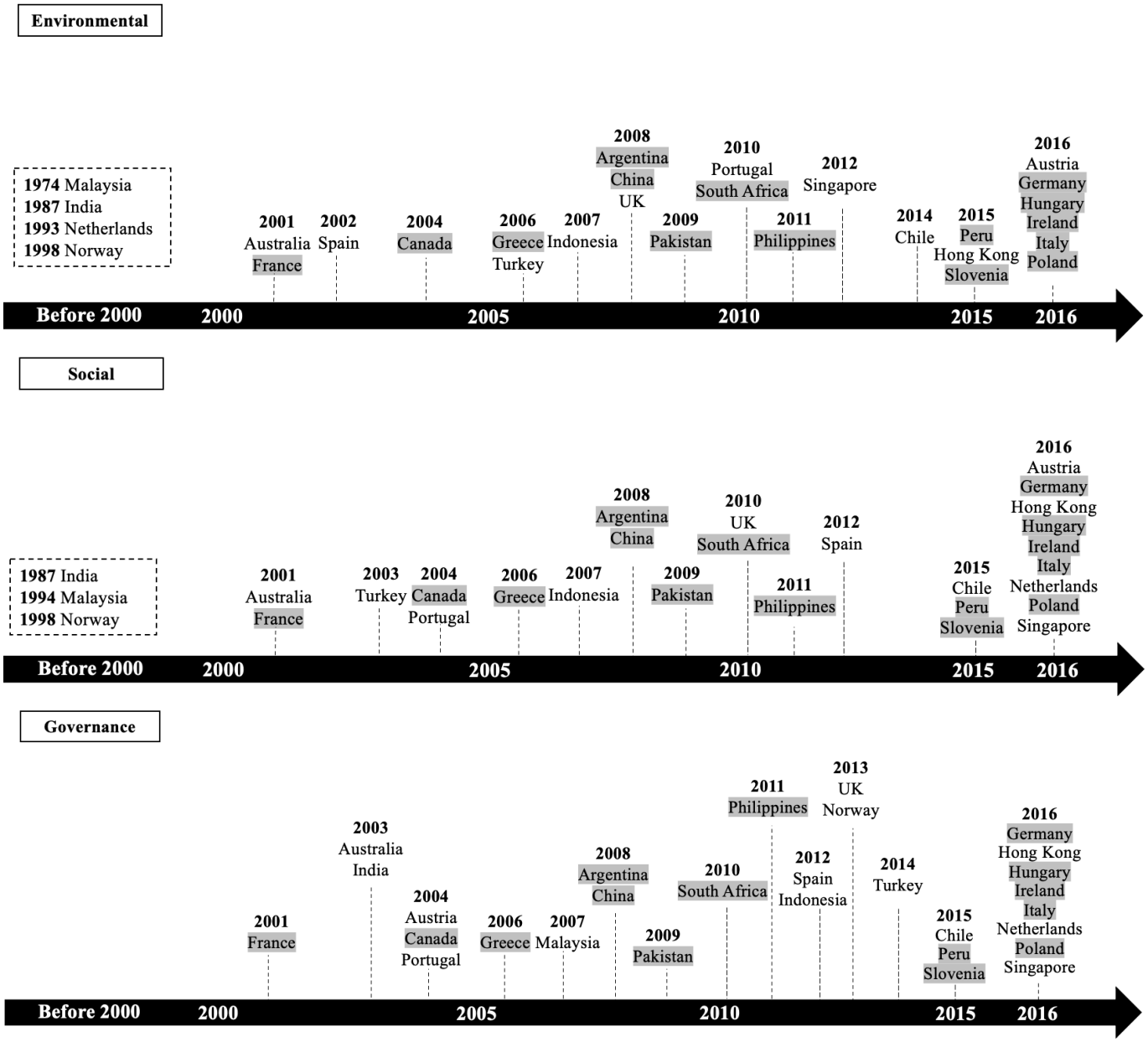
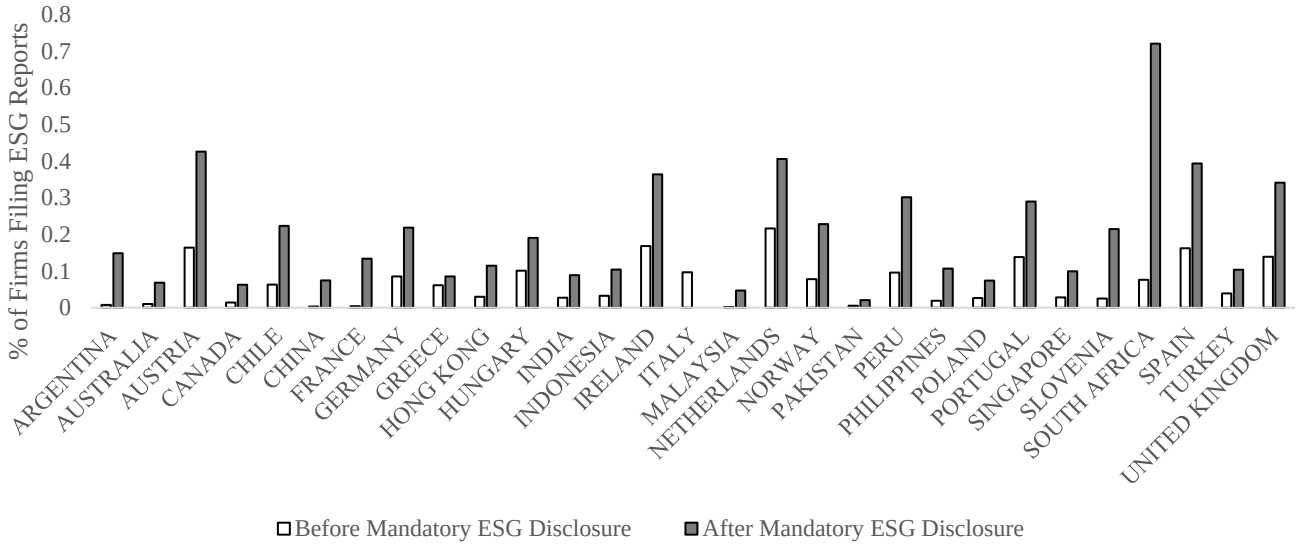


Figure 2: ESG Reports Before and After Mandatory ESG Disclosure Regulations across Countries

These figures compare for countries that introduced mandatory ESG disclosure the availability and quality of ESG reports before and after mandatory ESG disclosure regulations is introduced. Panel A reports the percentage of sample firms in a country that file ESG reports in the GRI or Asset4 database before and after mandatory disclosure. For each country, we calculate the average percentage of firms that file ESG report in the GRI and Asset4 databases in the sample years before and after mandatory disclosure is introduced. Panel B reports the percentage of ESG reports that comply with the GRI standards before and after mandatory disclosure. For each country, we calculate the average percentage of firms with an ESG report that complies with the GRI standards in the sample years before and after mandatory disclosure is introduced.

Panel A: Percentage of Firms Filing ESG Reports in the GRI and Asset4 Databases



Panel B: Percentage of ESG Reports Complying with GRI Standards

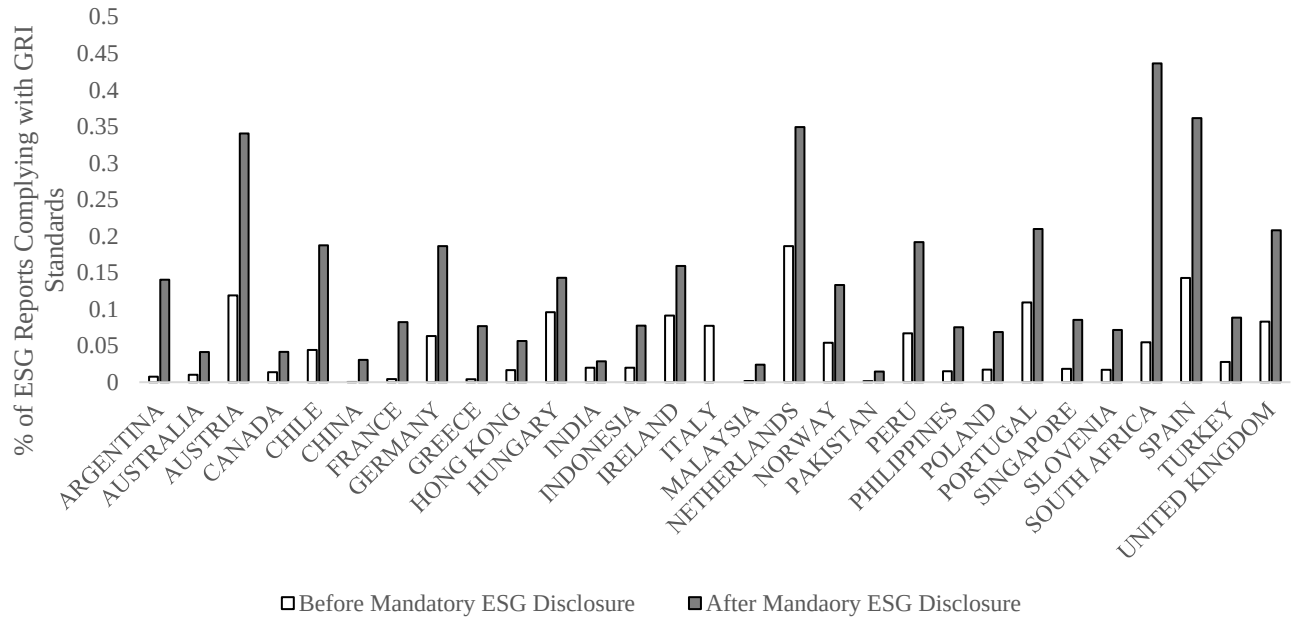


Table 1: Descriptive Statistics

This table reports summary statistics at the firm-year level of the variables used in the firm-level analysis. Definitions of all variables are reported in Data Appendix A.

Variable	# Obs.	Mean	Std. Dev	5%	Median	95%
Mandatory ESG Disclosure						
Mandatory disclosure$_{c,t}$	259,518	0.265				
GRI or Asset4 ESG Reports						
ESG report$_{i,c,t}$	259,518	0.086				
GRI compliance$_{i,c,t}$	22,223	0.650				
Financial Analysts' Behavior						
# Analysts$_{i,c,t}$	259,518	3.129	5.581	0.000	0.000	15.500
Analyst accuracy$_{i,c,t}$	122,549	-2.686	4.629	-11.64	-1.005	-0.084
Analyst dispersion$_{i,c,t}$	99,840	0.652	0.596	0.055	0.452	1.971
ESG Incidents						
# ESG incidents$_{i,c,t}$	64,946	1.545	7.877	0.000	0.000	6.000
# Novel ESG incidents$_{i,c,t}$	64,946	1.055	4.465	0.000	0.000	5.000
ESG incidents influence$_{i,c,t}$	64,946	2.732	14.780	0.000	0.000	11.000
Stock Price Crash						
Negative skew$_{i,c,t}$	259,518	-0.072	0.892	-1.388	-0.089	1.306
Down-to-up Vol$_{i,c,t}$	259,518	-0.043	0.605	-0.945	-0.063	0.906
Crashes$_{i,c,t}$	259,518	0.149				
Control Variables						
Sustainalytics ESG score$_{i,c,t}$	23,807	4.017	0.163	3.784	4.002	4.310
Asset4 ESG score$_{i,c,t}$	31,233	3.880	0.372	3.201	3.933	4.384
ΔTurnover$_{i,c,t}$	259,518	0.000	0.136	-0.132	0.000	0.133
Equity returns$_{i,c,t}$	259,518	-0.002	0.002	-0.006	-0.001	0.000
Equity volatility$_{i,c,t}$	259,518	0.051	0.028	0.019	0.044	0.107
Size$_{i,c,t-1}$	259,518	19.493	2.162	16.149	19.371	23.363
ROA$_{i,c,t-1}$	259,518	0.024	0.142	-0.183	0.036	0.164
Leverage$_{i,c,t-1}$	259,518	0.211	0.189	0.000	0.178	0.566
MtoB$_{i,c,t-1}$	259,518	2.179	4.133	0.337	1.297	6.200
Opaqueness$_{i,c,t-1}$	259,518	0.212	0.259	0.015	0.130	0.701
% Insider shares$_{i,c,t-1}$	259,518	0.347	0.293	0.000	0.331	0.831
% Int'l sales$_{i,c,t-1}$	259,518	0.152	0.275	0.000	0.000	0.840
Index volatility$_{c,t}$	259,518	0.086	0.245	-0.332	0.086	0.489
Index returns$_{c,t}$	259,518	0.162	0.075	0.067	0.153	0.301
Capital to GDP$_{c,t}$	259,518	1.289	1.896	0.258	0.897	2.632
GDP growth$_{c,t}$	259,518	0.033	0.030	-0.011	0.028	0.082

Table 2: Country-Level Determinants of Mandatory ESG Disclosure

This table reports regression at the country-year level to investigate the determinants of mandatory ESG disclosure regulation. *Mandatory disclosure* equals one for all country-years starting with the first year after a country introduced mandatory ESG disclosure regulation, and zero otherwise. *Common* equals one if the legal origin of a country is common law, and zero otherwise. *GDP growth* is the GDP growth rate in a country. *Capital to GDP* is the ratio of the equity market capitalization to GDP in a country. *Bank-based* equals one when the financial markets in a country are bank-based, and zero otherwise. *Property rights* is an index of the property rights in a country. *CIFAR* is an index of the accounting information disclosure intensity in a country. *Labor freedom* is an index for labor freedom in a country. *% Christian* is the percentage of Christians in the population of a country. *Carbon emissions* are the carbon emissions per capita in a country. Definitions of variables are in Data Appendix A. We report marginal effects of the probit estimates. Standard errors, reported in parentheses, are robust and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)
	Probit	Probit
Dependent variable:	*Mandatory disclosure*$_{c,t}$	*Mandatory disclosure*$_{c,t}$
Common$_{c,t-1}$	1.562***	1.632***
	(0.293)	(0.304)
GDP growth$_{c,t-1}$	-0.041	-0.022
	(0.028)	(0.037)
Capital to GDP$_{c,t-1}$	-0.001	-0.001
	(0.001)	(0.001)
Bank-based$_{c}$	-0.398**	-0.397**
	(0.181)	(0.189)
Property rights$_{c,t-1}$	-0.025***	-0.024***
	(0.007)	(0.006)
CIFAR$_{c,t-1}$	-0.009*	-0.008
	(0.005)	(0.005)
% Christian$_{c,t-1}$	0.012***	0.013***
	(0.003)	(0.003)
Labor freedom$_{c,t-1}$	-0.040***	-0.040***
	(0.009)	(0.009)
Log(Carbon emissions)$_{c,t-1}$	0.889***	0.852***
	(0.189)	(0.188)
Year Fixed Effect	No	Yes
# Obs.	309	309
Pseudo R^2	0.250	0.283

Table 3: Effect of Mandatory Disclosure on ESG Reporting

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on the availability and quality of ESG reports. We use two variables to measure the availability and quality of ESG reports. *ESG report* equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise. *GRI compliance* indicates whether a firm's ESG report complies with the GRI standards that are applicable in a given year. *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. Definitions of variables are in Data Appendix A. We report marginal effects of the Probit and Logit estimates. Standard errors, reported in parentheses, are clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
	Probit	*Logit*	*Probit*	*Logit*
Dependent variable:	*ESG report*$_{i,c,t}$	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.026***	0.027***	-0.002	-0.004
	(0.007)	(0.007)	(0.029)	(0.028)
Negative skew$_{i,c,t}$	0.002***	0.002***	-0.000	-0.000
	(0.001)	(0.001)	(0.004)	(0.004)
Δ*Turnover*$_{i,c,t}$	-0.003	-0.004	0.140***	0.141***
	(0.008)	(0.009)	(0.052)	(0.052)
Equity return$_{i,c,t}$	-6.362***	-4.540**	-6.990	-6.504
	(1.542)	(1.899)	(11.084)	(10.975)
Equity volatility$_{i,c,t}$	-0.624***	-0.548***	-1.696**	-1.643**
	(0.104)	(0.114)	(0.679)	(0.680)
Size$_{i,c,t-1}$	0.050***	0.051***	0.058***	0.058***
	(0.001)	(0.001)	(0.004)	(0.004)
ROA$_{i,c,t-1}$	0.023***	0.036*	-0.073*	-0.071
	(0.005)	(0.022)	(0.044)	(0.045)
Leverage$_{i,c,t-1}$	-0.049***	-0.048***	-0.026	-0.026
	(0.004)	(0.004)	(0.018)	(0.018)
MtoB$_{i,c,t-1}$	0.002***	0.002***	0.001	0.000
	(0.000)	(0.000)	(0.001)	(0.001)
Opaqueness$_{i,c,t-1}$	0.010***	0.005	0.036	0.036
	(0.003)	(0.004)	(0.022)	(0.023)
% Insider shares$_{i,c,t-1}$	-0.030***	-0.030***	0.018	0.018
	(0.003)	(0.003)	(0.015)	(0.015)
% Int'l sales$_{i,c,t-1}$	0.023***	0.022***	0.096***	0.096***
	(0.002)	(0.002)	(0.012)	(0.012)
Index volatility$_{c,t}$	-0.108***	-0.114***	0.405***	0.409***
	(0.029)	(0.030)	(0.100)	(0.101)
Index return$_{c,t}$	0.007	0.005	-0.009	-0.011
	(0.007)	(0.007)	(0.027)	(0.028)
Capital to GDP$_{c,t}$	-0.002**	-0.002**	0.007**	0.006*
	(0.001)	(0.001)	(0.004)	(0.004)
GDP growth$_{c,t}$	-0.311***	-0.337***	-0.339	-0.397
	(0.073)	(0.075)	(0.314)	(0.329)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
# Obs.	259,518	259,518	22,223	22,223
Pseudo R^2	0.505	0.509	0.122	0122

Table 4: Effect of Mandatory Disclosure on ESG Reporting: Firm-Level Heterogeneity

This table reports regressions at the firm-year level to investigate the impact of firm-level fundamentals on the relationship between mandatory ESG disclosure and measures of the availability and quality of ESG reports. *ESG report* equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise. *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. Definitions of variables are in Data Appendix A. We report marginal effects of the probit estimates. Standard errors, reported in parentheses, are clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: Availability of ESG Reports				
	(1)	(2)	(3)	(4)
	Probit	Probit	Probit	Probit
Dependent variable:	*ESG report*$_{i,c,t}$	*ESG report*$_{i,c,t}$	*ESG report*$_{i,c,t}$	*ESG report*$_{i,c,t}$
Firm fundamental:	*Size*	*Institutional ownership*	*Sustainalytics ESG score*	*Asset4 ESG score*
Mandatory disclosure$_{c,t-1}$ *x Firm fundamental*$_{i,c,t-1}$	-0.004***	-0.001	-0.006***	-0.001
	(0.001)	(0.019)	(0.001)	(0.000)
Firm fundamental$_{i,c,t-1}$	0.052***	0.075***	0.021***	0.009***
	(0.001)	(0.010)	(0.001)	(0.000)
Mandatory disclosure$_{c,t-1}$	0.108***	0.034***	0.354***	0.090***
	(0.029)	(0.009)	(0.069)	(0.030)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
# Obs.	259,518	176,373	19,325	27,683
Pseudo R^2	0.505	0.489	0.389	0.468

Panel B: Compliance with GRI Guidelines				
	(1)	(2)	(3)	(4)
	Probit	Probit	Probit	Probit
Dependent variable:	*GRI compl*$_{i,c,t}$	*GRI compl*$_{i,c,t}$	*GRI compl*$_{i,c,t}$	*GRI compl*$_{i,c,t}$
Firm fundamental:	*Size*	*Institutional ownership*	*Sustainalytics ESG score*	*Asset4 ESG score*
Mandatory disclosure$_{c,t-1}$ *x Firm fundamental*$_{i,c,t-1}$	0.043***	0.295***	-0.004***	-0.002***
	(0.005)	(0.053)	(0.001)	(0.001)
Firm fundamental$_{i,c,t-1}$	0.040***	-0.128***	0.020***	0.007***
	(0.003)	(0.039)	(0.001)	(0.000)
Mandatory disclosure$_{c,t-1}$	-0.951***	-0.049	0.268***	0.161***
	(0.112)	(0.032)	(0.064)	(0.040)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes
# Obs.	22,223	20,387	11,685	14,785
Pseudo R^2	0.127	0.127	0.225	0.167

Table 5: Effect of Mandatory Disclosure on Analyst Behavior

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on financial analysts' behavior. We use three variables to measure analyst behavior. *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one). *Analyst accuracy* is calculated as -100*|Estimated EPS-Actual EPS|/(Stock Price). *Analyst dispersion* is calculated as 100*(Standard Deviation of Estimated EPS)/(Stock Price). Definitions of variables are in Data Appendix A. Standard errors, reported in parentheses, are clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
	OLS	OLS	OLS
Dependent variable:	*Log(# Analysts)*$_{i,c,t}$	*Analyst accuracy*$_{i,c,t}$	*Analyst dispersion*$_{i,c,t}$
Mandatory disclosure$_{c,t}$	0.029	0.250*	-0.082***
	(0.033)	(0.134)	(0.030)
Negative skew$_{i,c,t,}$	0.037***	-0.145***	-0.006*
	(0.003)	(0.023)	(0.003)
Δ*Turnover*$_{i,c,t}$	0.030	1.938***	-0.440***
	(0.029)	(0.274)	(0.068)
Equity return$_{i,c,t}$	20.892***	90.346	111.950***
	(6.059)	(138.173)	(39.617)
Equity volatility$_{i,c,t}$	1.778***	-50.437***	17.145***
	(0.551)	(6.397)	(1.823)
Size$_{i,c,t-1}$	0.350***	0.184***	0.012***
	(0.004)	(0.017)	(0.004)
ROA$_{i,c,t-1}$	0.330***	4.760***	-1.308***
	(0.058)	(0.364)	(0.067)
Leverage$_{i,c,t-1}$	-0.519***	-2.765***	0.531***
	(0.018)	(0.138)	(0.027)
MtoB$_{i,c,t-1}$	0.022***	0.096***	-0.021***
	(0.001)	(0.009)	(0.002)
Opaqueness$_{i,c,t-1}$	0.317***	0.013	0.214***
	(0.015)	(0.118)	(0.027)
% Insider shares$_{i,c,t-1}$	-0.261***	-0.223**	0.084***
	(0.020)	(0.094)	(0.023)
% Int'l sales$_{i,c,t-1}$	0.208***	-0.106	-0.000
	(0.019)	(0.065)	(0.013)
Index volatility$_{c,t}$	-0.097	-2.361**	0.434**
	(0.103)	(1.044)	(0.214)
Index return$_{c,t}$	0.054	1.227***	-0.096**
	(0.034)	(0.300)	(0.045)
Capital to GDP$_{c,t}$	-0.011*	0.001	-0.001
	(0.006)	(0.034)	(0.006)
GDP growth$_{c,t}$	-0.015	6.687**	-1.212**
	(0.336)	(2.788)	(0.567)
Intercept	-6.013***	-3.971***	-0.127
	(0.102)	(0.386)	(0.095)
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
# Obs.	256,944	122,549	99,840
Adjusted R^2	0.574	0.174	0.305

Table 6: Effect of Mandatory Disclosure on ESG Incidents

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on ESG incidents. We use three variables to measure ESG incidents. *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk. *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk. *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. Definitions of variables are in Data Appendix A. Standard errors, reported in parentheses, are clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
	OLS	OLS	OLS
Dependent variable:	*Log(# ESG incidents)*$_{i,c,t}$	*Log(# Novel ESG incidents)*$_{i,c,t}$	*Log(ESG incidents influence)*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.048**	-0.036*	-0.061**
	(0.023)	(0.020)	(0.028)
Negative skew$_{i,c,t,}$	-0.001	-0.003	0.000
	(0.004)	(0.003)	(0.005)
Δ*Turnover*$_{i,c,t}$	-0.056*	-0.043	-0.075**
	(0.031)	(0.026)	(0.037)
Equity return$_{i,c,t}$	-51.741***	-48.600***	-60.036***
	(8.781)	(7.674)	(10.342)
Equity volatility$_{i,c,t}$	-1.336**	-1.474***	-1.293*
	(0.569)	(0.495)	(0.677)
Size$_{i,c,t-1}$	0.210***	0.182***	0.258***
	(0.009)	(0.007)	(0.010)
ROA$_{i,c,t-1}$	-0.215***	-0.199***	-0.253***
	(0.028)	(0.025)	(0.036)
Leverage$_{i,c,t-1}$	-0.317***	-0.276***	-0.385***
	(0.029)	(0.026)	(0.036)
MtoB$_{i,c,t-1}$	0.005***	0.005***	0.007***
	(0.001)	(0.001)	(0.001)
Opaqueness$_{i,c,t-1}$	0.091***	0.076***	0.116***
	(0.015)	(0.013)	(0.019)
% Insider shares$_{i,c,t-1}$	-0.166***	-0.145***	-0.193***
	(0.014)	(0.012)	(0.017)
% Int'l sales$_{i,c,t-1}$	0.154***	0.136***	0.180***
	(0.011)	(0.010)	(0.014)
Index volatility$_{c,t}$	-0.078	-0.049	-0.100
	(0.096)	(0.080)	(0.114)
Index return$_{c,t}$	0.052*	0.038*	0.069**
	(0.027)	(0.023)	(0.032)
Capital to GDP$_{c,t}$	0.002	0.002	0.002
	(0.004)	(0.004)	(0.005)
GDP growth$_{c,t}$	0.523	0.421	0.483
	(0.411)	(0.350)	(0.483)
Intercept	-3.968***	-3.437***	-4.872***
	(0.183)	(0.151)	(0.212)
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
# Obs.	64,946	64,946	64,946
Adjusted R^2	0.330	0.322	0.323

Table 7: Effect of Mandatory ESG Disclosure on Stock Price Crash Risk

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on stock price crash risk. We use three measures of stock price crash risk. *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power. *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks). *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise. A crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year. Definitions of variables are in Data Appendix A. We report marginal effects of the probit estimate in Column (3). Standard errors, reported in parentheses, are clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
	OLS	OLS	Probit
Dependent variable:	*Negative skew*$_{i,c,t}$	*Down-to-up vol*$_{i,c,t}$	*Crash*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.101**	-0.065*	-0.028*
	(0.049)	(0.033)	(0.015)
Dependent Variable$_{i,c,t-1,}$	0.076***	0.089***	0.066***
	(0.004)	(0.004)	(0.003)
Δ*Turnover*$_{i,c,t-1}$	0.017	0.004	0.027***
	(0.031)	(0.023)	(0.008)
Equity return$_{i,c,t-1}$	-65.695***	-59.202***	-14.733***
	(5.993)	(4.795)	(1.969)
Equity volatility$_{i,c,t-1}$	-3.344***	-3.000***	-1.426***
	(0.513)	(0.377)	(0.157)
Size$_{i,c,t-1}$	0.004	-0.002	-0.013***
	(0.003)	(0.002)	(0.001)
ROA$_{i,c,t-1}$	0.037*	-0.011	0.021***
	(0.020)	(0.014)	(0.008)
Leverage$_{i,c,t-1}$	-0.001	0.013	0.020***
	(0.015)	(0.011)	(0.005)
MtoB$_{i,c,t-1}$	0.003***	0.002***	0.000
	(0.001)	(0.000)	(0.000)
Opaqueness$_{i,c,t-1}$	0.042***	0.016**	0.006*
	(0.010)	(0.007)	(0.004)
% Insider shares$_{i,c,t-1}$	-0.082***	-0.051***	-0.005
	(0.012)	(0.009)	(0.004)
% Int'l sales$_{i,c,t-1}$	0.016*	0.013**	0.007*
	(0.009)	(0.006)	(0.004)
Index volatility$_{c,t}$	-0.777***	-0.636***	-0.064*
	(0.139)	(0.110)	(0.036)
Index return$_{c,t}$	0.053	0.056**	0.012
	(0.037)	(0.027)	(0.011)
Capital to GDP$_{c,t}$	-0.016***	-0.012***	-0.003***
	(0.003)	(0.003)	(0.001)
GDP growth$_{c,t}$	0.395	0.169	0.140
	(0.422)	(0.326)	(0.126)
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
# Obs.	259,539	259,539	259,539
Adjusted/ Pseudo R^2	0.036	0.050	0.028

Table 8: Effects of Mandatory ESG Disclosure: All-at-Once versus Gradual E, S, and G Disclosure

This table reports regressions at the firm-year level to compare the impact of all-at-once mandatory ESG disclosure versus gradual introduction of E, S, and G disclosure on ESG reports (Panel A), analyst behavior (Panel B), ESG incidents (Panel C), and stock price crash risk (Panel D). In Panel A, *ESG report* is an indicator that equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise; and *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. In Panel B, *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one); *Analyst accuracy* is -100*|Estimated EPS-Actual EPS|/(Stock Price); and *Analyst dispersion* is 100*(Standard Deviation of Estimated EPS)/(Stock Price). In Panel C, *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk; *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk; and *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. In Panel D, *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power; *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks); and *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise (a crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year). Definitions of variables are in Data Appendix A. We report marginal effects of the Logit or Probit estimates. Standard errors are reported in parentheses and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: ESG Reporting		
	(A1)	(A2)
	Probit	Probit
Dependent variable:	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
All-at-Once ESG disclosure$_{c,t-1}$	0.063***	-0.001
	(0.017)	(0.029)
Other ESG disclosure$_{c,t-1}$	0.020***	-0.002
	(0.007)	(0.030)
Controls	Yes	Yes
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
# Obs.	259,518	22,223
Pseudo R^2	0.506	0.123

Table 8 (continued)

Panel B: Analyst Behavior			
	(B1) OLS	(B2) OLS	(B3) OLS
Dependent variables:	*Log(# analysts)*$_{i,c,t}$	*Analyst accuracy*$_{i,c,t}$	*Analyst dispersion*$_{i,c,t}$
All-at-Once ESG disclosure$_{c,t-1}$	0.078	0.272	-0.035
	(0.054)	(0.224)	(0.048)
Other ESG disclosure$_{c,t-1}$	0.008	0.241**	-0.099***
	(0.031)	(0.123)	(0.028)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	256,944	122,549	99,840
Adjusted R^2	0.574	0.174	0.305

Panel C: ESG Incidents			
	(C1) OLS	(C2) OLS	(C3) OLS
Dependent variable:	*Log(# ESG incidents)*$_{i,c,t}$	*Log(# Novel ESG incidents)*$_{i,c,t}$	*Log(ESG incidents influence)*$_{i,c,t}$
All-at-Once ESG disclosure$_{c,t-1}$	-0.162***	-0.133***	-0.192***
	(0.037)	(0.031)	(0.044)
Other ESG disclosure$_{c,t-1}$	-0.028	-0.020	-0.038
	(0.025)	(0.022)	(0.030)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	64,946	64,946	64,946
Adjusted R^2	0.331	0.322	0.323

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Panel D: Stock Price Crash Risk			
	(D1) OLS	(D2) OLS	(D3) Probit
Dependent variable:	*Negative skew*$_{i,c,t}$	*Down-to-up vol*$_{i,c,t}$	*Crash*$_{i,c,t}$
All-at-Once ESG disclosure$_{c,t-1}$	-0.170**	-0.099*	-0.050**
	(0.080)	(0.054)	(0.025)
Other ESG disclosure$_{c,t-1}$	-0.053	-0.041	-0.011
	(0.035)	(0.026)	(0.010)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	259,539	259,539	259,539
Pseudo/Adjusted R^2	0.037	0.051	0.024

Table 9: Effects of Mandatory ESG Disclosure: Role of Disclosure Authority

This table reports regressions at the firm-year level to investigate the role of the disclosure authority (in case disclosure is introduced all at once) for the impact of mandatory ESG disclosure on ESG reports (Panel A), analyst behavior (Panel B), ESG incidents (Panel C), and stock price crash risk (Panel D). In this table, we do *not* consider comply-or-explain ESG disclosure regulation as mandatory disclosure. In Panel A, *ESG report* is an indicator that equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise; and *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. In Panel B, *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one); *Analyst accuracy* is -100*|Estimated EPS-Actual EPS|/(Stock Price); and *Analyst dispersion* is 100*(Standard Deviation of Estimated EPS)/(Stock Price). In Panel C, *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk; *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk; and *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. In Panel D, *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power; *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks); and *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise (a crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year). Definitions of variables are in Data Appendix A. We report marginal effects of the Logit or Probit estimates. Standard errors are reported in parentheses and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: ESG Reporting		
	(A1)	(A2)
	Probit	Probit
Dependent variable:	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
Government-All-at-Once$_{c,t-1}$	0.020**	0.017
	(0.009)	(0.060)
Non-Government-All-at-Once$_{c,t-1}$	0.098***	-0.007
	(0.026)	(0.029)
Other ESG disclosure$_{c,t-1}$	0.017**	-0.002
	(0.007)	(0.030)
Controls	Yes	Yes
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
# Obs.	259,518	22,223
Pseudo R^2	0.505	0.123

Table 9 (continued)

Panel B: Analyst Behavior			
	(B1) OLS	(B2) OLS	(B3) OLS
Dependent variables:	*Log(# analysts)$_{i,c,t}$*	*Analyst accuracy$_{i,c,t}$*	*Analyst dispersion$_{i,c,t}$*
Government-All-at-Once$_{c,t-1}$	0.130*	0.547**	-0.090
	(0.069)	(0.273)	(0.071)
Non-Government-All-at-Once$_{c,t-1}$	-0.021	-0.058	0.022
	(0.026)	(0.242)	(0.041)
Other ESG disclosure$_{c,t-1}$	0.010	0.261**	-0.104***
	(0.032)	(0.123)	(0.029)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	256,944	122,549	99,840
Adjusted R^2	0.574	0.174	0.305

Panel C: ESG Incidents			
	(C1) OLS	(C2) OLS	(C3) OLS
Dependent variable:	*Log(# ESG incidents)$_{i,c,t}$*	*Log(# Novel ESG incidents)$_{i,c,t}$*	*Log(ESG incidents influence)$_{i,c,t}$*
Government-All-at-Once$_{c,t-1}$	-0.204***	-0.169***	-0.242***
	(0.036)	(0.030)	(0.043)
Non-Government-All-at-Once$_{c,t-1}$	-0.054	-0.041	-0.067
	(0.055)	(0.051)	(0.071)
Other ESG disclosure$_{c,t-1}$	-0.035	-0.025	-0.046
	(0.025)	(0.022)	(0.030)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	64,946	64,946	64,946
Adjusted R^2	0.331	0.323	0.323

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Panel D: Stock Price Crash Risk			
	(D1) OLS	(D2) OLS	(D3) Probit
Dependent variable:	*Negative skew$_{i,c,t}$*	*Down-to-up vol$_{i,c,t}$*	*Crash$_{i,c,t}$*
Government-All-at-Once$_{c,t-1}$	-0.231**	-0.142*	-0.064*
	(0.109)	(0.074)	(0.035)
Non-Government-All-at-Once$_{c,t-1}$	-0.039	-0.009	-0.021**
	(0.038)	(0.028)	(0.010)
Other ESG disclosure$_{c,t-1}$	-0.053	-0.041	-0.011
	(0.035)	(0.026)	(0.010)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	259,539	259,539	259,539
Pseudo/Adjusted R^2	0.037	0.051	0.025

Internet Appendix

for

The Effects of Mandatory ESG Disclosure around the World

Internet Appendix Table 1: Distribution of Observations by Country

This table reports the distribution of observations by country in our sample. We also report the year in which the mandatory ESG disclosure policy was published and the distribution of ESG reports by country.

Country	# Obs. Sample	Perc. Obs. Sample	Mandatory ESG Disclosure	# ESG Reports in Sample	Perc. ESG Reports
Argentina	539	0.21%	2008	53	0.24%
Australia	11,107	4.28%	2003	949	4.27%
Austria	772	0.30%	2016	163	0.73%
Bahrain	141	0.05%		1	0.00%
Belgium	1,319	0.51%		188	0.85%
Bermuda	256	0.10%		15	0.07%
Brazil	2,152	0.83%		661	2.97%
Canada	11,063	4.26%	2004	816	3.67%
Chile	1,650	0.64%	2015	176	0.79%
China	22,226	8.56%	2008	1809	8.14%
Colombia	272	0.10%		111	0.50%
Egypt	1,122	0.43%		13	0.06%
France	6,642	2.56%	2003	1028	4.63%
Germany	6,902	2.66%	2016	747	3.36%
Greece	1,447	0.56%	2006	142	0.64%
Hong Kong	10,954	4.22%	2016	631	2.84%
Hungary	303	0.12%	2016	40	0.18%
India	14,081	5.43%	2015	779	3.51%
Indonesia	4,135	1.59%	2012	319	1.44%
Ireland	567	0.22%	2016	102	0.46%
Israel	3,200	1.23%		95	0.43%
Italy	2,169	0.84%	2016	269	1.21%
Japan	37,892	14.60%		3741	16.83%
Jordan	1,487	0.57%		12	0.05%
South Korea	14,864	5.73%		636	2.86%
Malaysia	9,236	3.56%	2007	347	1.56%
Mexico	1,233	0.48%		276	1.24%
Morocco	267	0.10%		19	0.09%
Netherlands	1,768	0.68%	2016	413	1.86%
New Zealand	1,014	0.39%		82	0.37%
Nigeria	218	0.08%		17	0.08%
Norway	1,655	0.64%	2013	228	1.03%
Oman	538	0.21%		10	0.04%
Pakistan	1,634	0.63%	2009	32	0.14%
Peru	712	0.27%	2016	102	0.46%
Philippines	2,301	0.89%	2011	159	0.72%
Poland	3,045	1.17%	2016	161	0.72%
Portugal	571	0.22%	2010	132	0.59%
Qatar	158	0.06%		17	0.08%
Russian Federation	950	0.37%		184	0.83%
Singapore	5,691	2.19%	2016	255	1.15%
Slovenia	254	0.10%	2015	22	0.10%
South Africa	2,756	1.06%	2010	1084	4.88%
Spain	1,023	0.39%	2012	379	1.71%
Sri Lanka	1,281	0.49%		84	0.38%
Switzerland	2,937	1.13%		582	2.62%
Thailand	5,643	2.17%		340	1.53%
Tunisia	346	0.13%		0	0.00%
Turkey	2,471	0.95%	2014	227	1.02%
United Arab Emirates	548	0.21%		39	0.18%
United Kingdom	5,100	1.97%	2013	446	2.01%
United States	45,281	17.45%		3032	13.64%
Vietnam	3,625	1.40%		58	0.26%
Total	259,518	100.00%		22,223	100.00%

Internet Appendix Table 2: Mandatory ESG Disclosure Policies

Country	Year	Disclosure Venue	Regulation	Authority	Comply or Explain?	All-at-Once Disclosure?
Argentina	2008	Sustainability reports	Ley N 2594 de balance de responsabilidad social y ambiental	Buenos Aires City Council	No	Yes
Australia	2003	Annual Report	Listing Rule 4.10.3, Australian Stock Exchange	Australian Stock Exchange	No	No
Austria	2016	Management report; non-financial report	Transposition of EU NFR Directive: Sustainability and Diversity Improvement Act 257/ME	Ministry of Justice	No	No
Canada	2004	data disclosure	The TSX Timely Disclosure Policy	Stock Exchange	No	Yes
Chile	2015	Annual report	Norma de Caracter General N 385/386	Superintendencia de valores y seguros	Yes	No
China	2008	Annual Social Responsibility Report	Guidelines on Listed Companies' Environmental Information Disclosure	Shanghai Stock Exchange (SSE)	No	Yes
France	2001	Annual Report	New Economic Regulations Act (NRE)	Parliament	No	Yes
Germany	2016	Annual Report	Transposition of EU NFR Directive: CSR Directive Implementation Act	Governments	Yes	Yes
Greece	2006	Annual Report	Law 3487, 2006		No	Yes
Hong Kong	2015	Directors' Report, ESG Report	HKEX Listing Rules Disclosure of Financial Information	Hong Kong Stock Exchange	Yes	No
Hungary	2016	Annual Report	Transposition of EU NFR Directive: Amendments to Accounting Act C of 2000	Governments	Yes	Yes
India	2015	Sustainability reports	Circular No. CIR/CFD/CMD/10/2015 Format for Business Responsibility Report	Securities and Exchange Board of India (SEBI)	No	No
Indonesia	2012	Annual Report	Rule No.KEP-431/BL/2012 concerning the obligation to submit annual reports for issuers of public companies	Capital Market and Financial Institutions Supervisory Agency (Bapepam-LK)	No	No
Ireland	2016	Non-financial Statement, director report	Transposition of EU NFR Directive (1)	Governments	Yes	Yes
Italy	2016	Management report	Transposition of EU NFR Directive: legislative Decree 30 December 2016, n.254	Ministry of Economic Affairs	Yes	Yes
Malaysia	2007	Annual Report	Main Markets listing requirements CSR description	Bursa Malaysia Securities Berhad	Yes	No
The Netherlands	2016	Annual Management Report	Transposition of EU NFR Directive	Ministry of Security and Justice	Yes	No
Norway	2013	Annual and Sustainability reports	Act amending the Norwegian Accounting Act	Norwegian Parliament	No	No
Pakistan	2009	Directors' Report	Companies (Corporate Social Responsibility) general order	Securities and exchange commission of Pakistan	No	Yes
Peru	2016	Sustainability reports	Resolucion SMV No 033-2015-SMV/01	Peruvian Capital Markets Superintendency	No	Yes

Philippines	2011	Annual Report	Corporate Social Responsibility Act, 2011	Committee on trae and commerce	No	Yes
Poland	2016	Annual Report	Transposition of EU NFR Directive: Amendments to the Accounting Act	Governments	No	Yes
Portugal	2010	Annual Report	The Financial Reporting Accounting Standard n 26	Commission for Accounting Normalization	No	No
Singapore	2016	Sustainability reports	SGX0ST Listing Rules Practice Note 7.6 Amendments to sustainability reporting guide	Singapore Stock Exchange (SGX)	Yes	No
Slovenia	2015	Annual reports	Transposition of EU NFR Directive: Amendment to act No. 431/2002 Coll. on Accounting	Governments	Yes	Yes
South Africa	2010	Integrated / sustainability report	Johannesburg Stock Exchange Listing Requirement 2010	Johannesburg Stock Exchange (JSE)	Yes	Yes
Spain	2012	Annual Report /Sustainability Report	Spanish Sustainable Economy Law (revision of 2011)	The National Securities Market (CNVM)	Yes	No
Turkey	2014	GHG report /Annual Report	GHG Monitoring Regulation/Communique on corporate governance principles	Capital Markets Board of Turkey	No	No
United Kingdom	2013	strategic report; director's report	The companies Act 2006 Regulations 2013	Secretary of State	No	No

Internet Appendix Table 3: Distribution of ESG Reports and GRI Compliance across Years

This table reports in Panel A the distribution of ESG reports filed in the GRI or Asset4 database over time, and in Panel B the distribution of the ESG reports' compliance with any of the GRI guidelines over time.

Panel A: Distribution of ESG Reports by Year

	GRI		Asset4		GRI or Asset4	
Year	# Reports	Perc. Reports	# Reports	Perc. Reports	# Reports	Perc. Reports
2002	35	0.27%	29	0.18%	60	0.27%
2003	52	0.40%	57	0.35%	104	0.47%
2004	87	0.68%	124	0.76%	191	0.86%
2005	118	0.92%	215	1.32%	292	1.31%
2006	203	1.58%	254	1.55%	397	1.79%
2007	279	2.17%	668	4.09%	793	3.57%
2008	387	3.00%	826	5.05%	988	4.45%
2009	493	3.83%	946	5.79%	1,141	5.13%
2010	655	5.08%	1,265	7.74%	1,499	6.75%
2011	989	7.68%	1,399	8.56%	1,813	8.16%
2012	1,175	9.12%	1,526	9.34%	1,989	8.95%
2013	1,377	10.69%	1,599	9.78%	2,171	9.77%
2014	1,618	12.56%	1,653	10.11%	2,361	10.62%
2015	1,657	12.86%	1,693	10.36%	2,401	10.80%
2016	1,884	14.62%	1,864	11.40%	2,768	12.46%
2017	1,876	14.56%	2,228	13.63%	3,255	14.65%
Total	12,885	100%	16,346	100%	22,223	100%

Panel B: Distribution of GRI Compliance by Year

	GRI		Asset4		GRI or Asset4	
Year	# GRI Compliance	Perc. Compliance	# GRI Compliance	Perc. Compliance	# GRI Compliance	Perc. Compliance
2002	32	91.43%	16	55.17%	42	70.00%
2003	47	90.38%	39	68.42%	76	73.08%
2004	74	85.06%	75	60.48%	128	67.02%
2005	101	85.59%	112	52.09%	181	61.99%
2006	152	74.88%	144	56.69%	248	62.47%
2007	213	76.34%	336	50.30%	446	56.24%
2008	316	81.65%	500	60.53%	631	63.87%
2009	417	84.58%	617	65.22%	790	69.24%
2010	557	85.04%	809	63.95%	1,004	66.98%
2011	763	77.15%	931	66.55%	1,221	67.35%
2012	885	75.32%	1,041	68.22%	1,369	68.83%
2013	1,060	76.98%	1,096	68.54%	1,521	70.06%
2014	1,186	73.30%	1,142	69.09%	1,625	68.83%
2015	1,185	71.51%	1,168	68.99%	1,647	68.60%
2016	1,150	61.04%	1,271	68.19%	1,714	61.92%
2017	900	47.97%	1,497	67.19%	1,864	57.27%
Total	9,038		10,794		14,507	

Internet Appendix Table 4: Distribution of the Adherence Level to the GRI Guidelines

This table reports the adherence level of ESG reports to the GRI guidelines. This information is only available for reports filed in the GRI database.

GRI Guidelines	# Reports	Perc. Reports
Non-GRI	3,847	29.86%
Citing-GRI	2,131	16.54%
GRI-G1	34	0.26%
GRI-G2	349	2.71%
GRI-G3&G3.1	2,535	19.67%
GRI-G4	1,568	12.17%
GRI-Standards	2,405	18.67%
Total	12,885	100

Internet Appendix Table 5: Effect of Mandatory Disclosure with Firm-Fixed Effects

This table reports regressions at the firm-year level with firm-fixed effects to investigate the impact of mandatory ESG disclosure on ESG reports (Panel A), analyst behavior (Panel B), ESG incidents (Panel C), and stock price crash risk (Panel D). In Panel A, *ESG report* is an indicator that equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise; and *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. In Panel B, *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one); *Analyst accuracy* is -100*|Estimated EPS-Actual EPS|/(Stock Price); and *Analyst dispersion* is 100*(Standard Deviation of Estimated EPS)/(Stock Price). In Panel C, *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk; *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk; and *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. In Panel D, *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power; *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks); and *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise (a crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year). Definitions of variables are in Data Appendix A. In the table, we use OLS estimates also for binary variables due to the large number of fixed effects. Standard errors are reported in parentheses and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: ESG Reporting		
	(A1)	(A2)
	OLS	OLS
Dependent variable:	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.013	0.015
	(0.011)	(0.016)
Controls	Yes	Yes
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
# Obs.	255,455	11,876
Adjusted R^2	0.640	0.774

Panel B: Analyst Behavior			
	(B1)	(B2)	(B3)
	OLS	OLS	OLS
Dependent variables:	*Log(# analysts)*$_{i,c,t}$	*Analyst accuracy*$_{i,c,t}$	*Analyst dispersion*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.034	0.098	-0.065**
	(0.027)	(0.117)	(0.027)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	252,855	118,653	96,814
Adjusted R^2	0.882	0.424	0.579

Internet Appendix Table 5 (continued)

Panel C: ESG Incidents			
	(C1)	(C2)	(C3)
	OLS	OLS	OLS
Dependent variable:	*Log(# ESG incidents)*$_{i,c,t}$	*Log(# Novel ESG incidents)*$_{i,c,t}$	*Log(ESG incidents influence)*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.049**	-0.037*	-0.063**
	(0.024)	(0.022)	(0.029)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	64,389	64,389	64,389
Adjusted R^2	0.699	0.677	0.669

Panel D: Stock Price Crash Risk			
	(D1)	(D2)	(D3)
	OLS	OLS	OLS
Dependent variable:	*Negative skew*$_{i,c,t}$	*Down-to-up vol*$_{i,c,t}$	*Crash*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.143**	-0.098**	-0.038**
	(0.058)	(0.040)	(0.019)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	255,473	255,473	255,473
Adjusted R^2	0.215	0.230	0.202

Internet Appendix Table 6: Effect of Mandatory Disclosure after Accounting for Attrition

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on ESG reports (Panel A), analyst behavior (Panel B), ESG incidents (Panel C), and stock price crash risk (Panel D). We remove firms with observations only before or only after mandatory ESG disclosure to alleviate the impact of attrition effects. In Panel A, *ESG report* is an indicator that equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise; and *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. In Panel B, *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one); *Analyst accuracy* is -100*|Estimated EPS-Actual EPS|/(Stock Price); and *Analyst dispersion* is 100*(Standard Deviation of Estimated EPS)/(Stock Price). In Panel C, *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk; *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk; and *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. In Panel D, *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power; *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks); and *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise (a crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year). Definitions of variables are in Data Appendix A. We report marginal effects of the Logit or Probit estimates. Standard errors are reported in parentheses and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: ESG Reporting		
	(A1)	(A2)
	Probit	Probit
Dependent variable:	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.028***	-0.007
	(0.008)	(0.028)
Controls	Yes	Yes
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
Country Fixed Effect	Yes	Yes
# Obs.	213,616	19,522
Pseudo R^2	0.512	0.112

Panel B: Analyst Behavior			
	(B1)	(B2)	(B3)
	OLS	OLS	OLS
Dependent variables:	*Log(# analysts)*$_{i,c,t}$	*Analyst accuracy*$_{i,c,t}$	*Analyst dispersion*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.007	0.166	-0.077***
	(0.030)	(0.121)	(0.025)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	211,307	101,729	83,762
Adjusted R^2	0.591	0.174	0.318

Internet Appendix Table 6 (continued)

Panel C: ESG Incidents			
	(C1)	(C2)	(C3)
	OLS	OLS	OLS
Dependent variables:	*Log(# ESG incidents)*$_{i,c,t}$	*Log(# Novel ESG incidents)*$_{i,c,t}$	*Log(ESG incidents influence)*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.054**	-0.040**	-0.069**
	(0.023)	(0.020)	(0.028)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
# Obs.	56,163	56,163	56,163
Adjusted R^2	0.347	0.339	0.340

Panel D: Stock Price Crash Risk			
	(D1)	(D2)	(D3)
	OLS	OLS	Probit
Dependent variable:	*Negative skew*$_{i,c,t}$	*Down-to-up vol*$_{i,c,t}$	*Crash*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.119**	-0.075**	-0.029*
	(0.051)	(0.034)	(0.016)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
# Obs.	213,638	213,638	213,638
Pseudo/Adjusted R^2	0.035	0.044	0.024

Internet Appendix Table 7: Effect of Mandatory Disclosure without Comply-or-Explain Regulation

This table reports regressions at the firm-year level to investigate the impact of mandatory ESG disclosure on ESG reports (Panel A), analyst behavior (Panel B), ESG incidents (Panel C), and stock price crash risk (Panel D). In this table, we do *not* consider comply-or-explain ESG disclosure regulation as mandatory disclosure. In Panel A, *ESG report* is an indicator that equals one if a firm has an ESG reports uploaded in the GRI or Asset4 database in a firm-year, and zero otherwise; and *GRI compliance* equals one if a firm's ESG report complies with any of the GRI standards in a firm-year, and zero otherwise. In Panel B, *# Analysts* is the total number of analysts that follow a firm in a firm-year (plus one); *Analyst accuracy* is -100*|Estimated EPS-Actual EPS|/(Stock Price); and *Analyst dispersion* is 100*(Standard Deviation of Estimated EPS)/(Stock Price). In Panel C, *# ESG incidents* is the number of ESG incidents in a firm-year (plus one) as reported by RepRisk; *# Novel ESG incidents* is the number of novel ESG incidents in a firm-year (plus one) as reported by RepRisk; and *ESG incidents influence* is the influence of all ESG incidents in a firm-year according to a reach score rating by RepRisk. The reach score is based on the influence or readership of the source in which a risk incident was published. A higher number indicates that news about ESG incidents are more influential. In Panel D, *Negative skew* is the negative coefficient of skewness calculated by taking the negative of the third moment of firm-specific weekly returns for each sample year divided by the standard deviation of firm-specific weekly returns raised to the third power; *Down-to-up vol* is the natural logarithm of the standard deviation of weekly-stock returns during the weeks in which they are lower than their annual mean (down weeks) over the standard deviation of weekly-stock returns during the weeks in which they are higher than their annual mean (up weeks); and *Crash* equals one if a firm experienced one or more crash weeks in a firm-year, and zero otherwise (a crash week is a week in which a firm-specific weekly return fell 3.2 standard deviations below the mean of the firm-specific weekly returns over a fiscal year). Definitions of variables are in Data Appendix A. We report marginal effects of the Logit or Probit estimates. Standard errors are reported in parentheses and clustered at the country-year level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Panel A: ESG Reporting		
	(A1)	(A2)
	Probit	Probit
Dependent variable:	*ESG report*$_{i,c,t}$	*GRI compliance*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.004	-0.040
	(0.010)	(0.046)
Controls	Yes	Yes
Year Fixed Effect	Yes	Yes
Firm Fixed Effect	Yes	Yes
# Obs.	259,518	22,223
Pseudo R^2	0.504	0.122

Panel B: Analyst Behavior			
	(B1)	(B2)	(B3)
	OLS	OLS	OLS
Dependent variables:	*Log(# analysts)*$_{i,c,t}$	*Analyst accuracy*$_{i,c,t}$	*Analyst dispersion*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	0.088**	0.183	-0.064*
	(0.036)	(0.166)	(0.036)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	256,944	122,549	99,840
Adjusted R^2	0.574	0.174	0.305

Internet Appendix Table 7 (continued)

Panel C: ESG Incidents			
	(C1) OLS	(C2) OLS	(C3) OLS
Dependent variable:	*Log(# ESG incidents)*$_{i,c,t}$	*Log(# Novel ESG incidents)*$_{i,c,t}$	*Log(ESG incidents influence)*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.070***	-0.054***	-0.087***
	(0.021)	(0.019)	(0.027)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	64,946	64,946	64,946
Adjusted R^2	0.330	0.322	0.323

Panel D: Stock Price Crash Risk			
	(D1) OLS	(D2) OLS	(D3) Probit
Dependent variable:	*Negative skew*$_{i,c,t}$	*Down-to-up vol*$_{i,c,t}$	*Crash*$_{i,c,t}$
Mandatory disclosure$_{c,t-1}$	-0.095	-0.051	-0.029
	(0.066)	(0.044)	(0.021)
Controls	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
# Obs.	259,539	259,539	259,539
Pseudo/Adjusted R^2	0.036	0.051	0.024