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Abstract

A key aspect of the governance process inside organizations and markets is the measurement and disclosure of important metrics and information. In this chapter, we examine the effect of sustainability disclosure regulations on firms' disclosure practices and valuations. Specifically, we explore the implications of regulations mandating the disclosure of environmental, social, and governance (ESG) information in China, Denmark, Malaysia, and South Africa using differences-in-differences estimation with propensity score matched samples. We find that relative to propensity score matched control firms, treated firms significantly increased disclosure following the regulations. We also find increased likelihood by treated firms of voluntarily receiving assurance to enhance disclosure credibility and increased likelihood of voluntarily adopting reporting guidelines that enhance disclosure comparability. These results suggest that even in the absence of a regulation that mandates the adoption of assurance or specific guidelines, firms seek the qualitative properties of comparability and credibility. Instrumental variables analysis suggests that increases in sustainability disclosure driven by the regulation are associated with increases in firm valuations, as reflected in Tobin's Q. Collectively, the evidence suggest that current efforts to increase transparency around organizations' impact on society are effective at improving disclosure quantity and quality as well as corporate value.

Keywords: *disclosure regulation, sustainability reporting, mandatory disclosure, corporate sustainability, corporate social responsibility*

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1. Introduction

The number of companies that have developed governance processes to measure, analyze, drive and communicate sustainability efforts has dramatically increased in the last few years. [1]The percentage of S&P 500 companies that have board-level sustainability committees has increased from 5% to 24% just in the last five years while in the same time period the percentage of companies releasing a sustainability report has grown from 20% to 80%. However, this phenomenon is not limited to US companies but it manifests globally. While these trends partly manifest because of voluntary actions by individual companies, in many cases they could be the result of regulations. Around the world, there has been a proliferation of reporting regulations aiming to incentivize companies to improve their environmental, social and governance (ESG) performance. In this chapter, we examine the effect of such disclosure regulations on firms' disclosure strategies and subsequent valuations, provided that disclosure is a key part of the governance process by promoting the measurement of key metrics and broader transparency in markets that could facilitate value creation.

Ex ante, it is not clear how such disclosure regulations might affect companies. On the one hand, increased transparency, to the extent that it is achieved through mandatory reporting laws and regulations, could discipline companies and motivate them to do better along socio-environmental dimensions of performance. On the other hand, mandatory sustainability disclosure regulations could also generate negative externalities in that firms with superior sustainability disclosure will have to exert greater efforts and possibly incur higher costs to distinguish themselves from the rest of the firms in the period following the regulation. In other words, such laws and regulations could result in a costly pooling rather than a separating equilibrium with respect to the value of sustainability disclosures, and can thus eventually destroy shareholder value.

[1] The terms "sustainability", "environmental, social and governance" (ESG), "non-financial" or "corporate social responsibility" (CSR) reporting are all been used interchangeably, to describe reports with different degrees of focus on environmental, social or corporate governance issues.

To address key aspects of this important debate, we first investigate whether and the extent to which mandatory sustainability disclosure regulations have an impact on corporate disclosure practices (i.e. on the level of transparency). Second, we also explore whether these laws and regulations influence organizational practices and firms' valuations. We note that the effectiveness of sustainability disclosure regulations in terms of increasing the level of corporate sustainability disclosure is not *a priori* obvious: this type of regulations typically include a "comply or explain" clause and hence, they provide firms with the option of *not* increasing ESG disclosure but instead, to opt for briefly explaining why they are not releasing ESG data.[2] In addition, for sustainability reporting, the potential sanctions resulting from non-disclosure are not usually clearly postulated and little guidance, if any, guidance exists regarding the metrics and disclosures that a firm needs to quantify and release. Finally, some firms that had already been disclosing some ESG information prior to the regulation may continue at the same level of disclosure given that the disclosure regulations do not typically prevent them from claiming that pre-existing disclosure patterns are sufficient to satisfy the regulatory disclosure requirements. For all these reasons therefore, the impacts of mandatory sustainability disclosure regulations remain unclear and therefore, it is important to empirically explore such implications both from a firm's as well as from a policy point of view.

To rigorously investigate these questions, we collect data for four countries, China, Denmark, Malaysia, and South Africa that mandated sustainability disclosures prior to 2011, allowing us to gather information for both the period prior as well as the period after the enforcement of the focal disclosure regulation. Hence, we can conduct a differences-in-differences analysis to estimate the impact of the regulation on treated firms, using two alternative control groups consisting of (a) firms from the rest of the world (termed, Worldwide control group), and (b) firms from the U.S. only. In contrast to previous studies that have examined the effect of disclosure regulations on stock market measures (e.g. Daske, Hail, Leuz and Verdi 2008) – whereby these stock market measures are merely assumed to be reflective of changes in

[2] We read firms explanations for non-disclosure and in most cases we found that firms that choose to "explain" claim that sustainability disclosures are not relevant to their business model, that they are costly given their size and complexity, or that they are not ready to make appropriate disclosures but they would disclose in the future.

the underlying level and quality of disclosure – in this chapter, we model directly actual changes in the level of disclosure following the respective regulations. In so doing, we are able to estimate the first-order and direct effect of the sustainability disclosure regulations. We subsequently employ instrumental variables regressions to estimate the effect of disclosure on firms' valuation, using the regulatory shock as an instrument for changes in sustainability disclosure (our first-stage regressions).

As with all regulatory shocks that aim to affect certain organizational processes of firms that are covered, the main challenge for researchers is to empirically disentangle the effect of the regulation itself from other confounding effects. To do so, we implement propensity score matching procedures to construct control groups for the treated firms. To be more specific, in the year immediately prior to the enforcement of the regulation in each country in our sample, we match on firm size, profitability, Tobin's Q, pre-existing environmental, social, and governance (ESG) disclosure, financial leverage, and industry membership, to construct a comparable group of control firms. Performing this type of matching is particularly important for our setting given that sustainability disclosure globally has significantly increased in the past ten years (Ioannou and Serafeim 2012). Therefore, observing increased disclosure by treated firms over time does not *prima facie* constitute evidence of an impact of the disclosure regulation. We propensity score match the set of treated firms with controls from a worldwide set of firms as well as a set of U.S. firms to yield two distinct control samples that we use in separate analysis throughout the paper. Both of these control groups are sufficiently similar to our treatment group along multiple important dimensions. In additional analysis we derive propensity scored matched control firms for each treated country only from countries with similar competitiveness rankings or only from countries of the same legal origin; we find very similar results to our main analysis.

Controlling for firm and year fixed effects as well as other time-varying firm characteristics, we find that treated firms significantly increase ESG disclosure following the regulation relative to the worldwide control group as well as the U.S. control group. We also conduct subsample analysis and find that firms that did and those that did not disclose ESG information prior to the regulation, increase ESG disclosure once the regulation is adopted. This finding confirms that disclosure regulation may increase the

transparency of firms with prior high *and* low disclosure levels, thus generating a "race to the top" in the sustainability setting. Nevertheless, we provide further evidence that the nature of such disclosure increases are different across the two groups. Moreover, our analysis shows that firms, on average, are significantly more likely to seek assurance on their ESG disclosures and also, they are significantly more likely to adopt the Global Reporting Initiative (GRI) reporting guidelines (which represent the most widely and globally adopted set of reporting guidelines for non-financial information). Accordingly, we infer that treated firms in China, Denmark, Malaysia, and South Africa do not only increase their sustainability disclosure levels following the regulatory change but also, they seek to improve the credibility and comparability of these disclosures. Through a number of robustness checks, we confirm that our findings are not sensitive to the choice of matching procedure; alternative matching procedures yield no significant changes to our main findings. We also conduct tests to detect disclosure increases in our treatment countries in pseudo-years and we fail to detect any such changes, thus confirming that it is the disclosure regulations that are more likely to cause the increases in the level of disclosure rather than any other events.

Moreover, we estimate instrumental variable models, exploring the financial implications of the increase in ESG disclosure for firms. In the first stage, we estimate the direct effect of the regulation on ESG disclosure and, in the second stage we examine the effect of the predicted (i.e. instrumented) ESG disclosure on Tobin's Q. In addition to firm and year fixed effects and other time-varying firm characteristics, in these specifications we also control for inter-temporal differences in Tobin's Q at the country level, consistent with prior literature (Daske et al. 2008). Critics of sustainability disclosure regulations argue that companies that are "forced" to increase disclosure will bear significant costs either because of the disclosure *per se* or because of the changes in managerial practices that they will be forced to make, thus destroying shareholder value. In contrast, supporters argue that firms that increase disclosure will benefit in terms of enhanced corporate reputation and superior brand value, recruitment and retention of employee talent, uncovering of opportunities to improve process efficiency and management of hidden risks, better access to finance, among multiple other reasons.

Our results provide evidence for a positive and significant relation between Tobin's Q and the predicted component of the ESG disclosure, implying that the net effect of mandating sustainability reporting is, on average, value-enhancing rather than value-destroying for the treated firms in our sample. Importantly, we confirm that these results are not driven solely by increases in governance disclosure and/or any other related improvements in corporate governance. In fact, when we control in the first as well as the second stage of our regression models for governance disclosure, we find that both the instrumented environmental as well as the instrumented social disclosure scores are significantly and positively associated with Tobin's Q.

The remainder of this chapter is organized as follows. Section 2 briefly reviews the history of sustainability reporting to date and provides background information regarding the regulations adopted in the four countries in our sample – China, Denmark, Malaysia and South Africa. Section 3 develops the hypotheses and section 4 presents our data collection efforts and sources. Section 5 discusses the research design. Section 6 presents our findings and section 7 concludes.

2. Historical Background and Disclosure Regulations

During the 1960s and 1970s, both in the U.S. as well as in Europe, what may now be identified as a form of *voluntary* sustainability reporting was driven by a renewed awareness of responsibility towards society and the environment, which remained unfulfilled by governmental institutions, and some that were directly attributable to business organizations. Early attempts with voluntary social reporting, primarily in the Netherlands and France, paved the way for the introduction of environmental reports in countries such as Germany, Austria, and Switzerland. During the 1980s, ethical investment funds in the UK and the U.S. started implementing an investment approach – broadly known as "negative screening" – excluding firms from their investment universe based on the firms' social and ethical performance.[3] Towards the end of the

[3] Originally based on religious principles, investment decisions by such funds excluded firms operating in "sin" industries, such as alcohol and tobacco.

1980s and following the 1989 Exxon Valdez disaster, the U.S.-based Coalition for Environmentally Responsible Economies (CERES) developed the "CERES/Valdez Principles" on behalf of the Social Investment Forum (SIF), and subsequently introduced a set of environmental reporting guidelines. In 1997, CERES and the United Nations Environment Program (UNEP) launched the Global Reporting Initiative (GRI) with the goals of developing and establishing reporting guidelines for the "triple bottom line": accounting for economic, as well as environmental and social performance by corporations. The main objective was to gradually establish sustainability reporting at par with financial reporting in terms of rigor, credibility and comparability. Later on, in the 1990s, the increased societal pressures, demands and expectations on companies for more transparency and accountability, led to a significant growth in the issuance of voluntary corporate sustainability reports.

In more recent years, growing social (e.g., poverty, deteriorating social equality, and corruption) and environmental (e.g., climate change, water usage, and waste) challenges have generated renewed pressures on companies by investors, shareholders and a range of non-shareholding stakeholders to adopt a more systematic approach towards risk management and sustainability reporting. In fact, companies were increasingly expected to disclose how they are utilizing, developing (or depleting) and, more generally, affecting human capital, natural resources and society at large. Moreover, as a result of several high-profile corporate scandals and the recent global financial crisis (which caused the Great Recession of 2007-09), a general feeling of distrust has developed around companies' ability to self-regulate and a concern that current company disclosures primarily provide information about past performance rather than future prospects (e.g. Kaplan and Norton, 1992). Meanwhile, investors and information intermediaries in capital markets (e.g. sell-side analysts) began to integrate ESG data in their valuation models, creating additional demand for sustainability reporting (Ioannou and Serafeim, 2015). As a direct consequent of such demands, not only by the investment community but also numerous non-shareholding stakeholders, an increasing number of countries around the world began to *mandate* the disclosure of ESG information, either through laws and regulations or through stock exchange listing requirements.

In addition to the four countries that we focus on in this chapter (i.e. Denmark, South Africa, China and Malaysia), Brazil, Hong Kong, and India have also mandated sustainability reporting starting from 2012 and later.[4] However, the key reason why we specifically focus on treated firms in these four countries is because they adopted regulations or listing requirements at a point in time in the past that allows us sufficient time to collect data for at least two years prior to, and two years after the regulation (although they did not all adopt such regulations in the same year).[5] In what follows, we provide additional historical and background information about sustainability reporting for these four countries.

Both Denmark and South Africa are countries in which sustainability reporting has been relatively widespread prior to the regulation, at least among the larger firms in the economy.[6] In Denmark, the Minister for Economic and Business Affairs introduced an Act that amended the Danish Financial Statements Act, in October 2008. Large companies, meaning businesses that satisfy two out of the three criteria of either a) total assets more than DKK 143 million, or b) net revenues of DKK 286 million, or c) an average number of full-time employees of 250, were required to supplement their annual management's review with a report on social responsibility. Corporate social responsibility was defined in the legislation as *"voluntarily include considerations for human rights, societal, environmental and climate conditions as well as combatting corruption in their business strategy and corporate activities."* It was not therefore mandated that companies adopt or implement such policies *per se*. Nevertheless, if companies did not have any such policies, they were required to disclose this fact in their management's review. The amendment entered into force and applied for the financial years commencing on the 1st of January 2009 or later.

[4] In addition, Finland, and Sweden mandated sustainability reporting but only for state-owned corporations.

[5] As we explain in more detail in the empirical section, given that we apply a differences-in-differences estimation approach, it is important that we ensure a good enough matching between treated and control firms in the period *prior* to the regulation.

[6] For example, in Denmark the Center for Quality in Business Regulation estimated that approximately 1,030 out of the 1,100 companies affected by the regulation were already engaged with social responsibility issues and initiatives.

In South Africa, the Johannesburg Stock Exchange (JSE) mandated the disclosure of sustainability information starting in the 2010 financial year while subsequently, through the issuance of the King III Report on Corporate Governance (in 2009), it mandated the disclosure of integrated reporting starting in financial year 2011. King III was preceded by the issuance of the King I Report on Corporate Governance in 1994, and by the King II Report on Corporate Governance in 2002. While the two earlier King reports did not specify mandatory disclosure requirements for companies, their guidelines were selectively or holistically adopted by the JSE as listing requirements (Eccles, Serafeim, and Armbrester 2012). Importantly, although both King I and King II discussed sustainability issues as part of corporate management, King III emphasized the ideas of leadership, sustainability, and corporate citizenship, to a much greater extent.

In contrast to Denmark's Act – that required disclosure of ESG issues in a supplementary and non-integrated way – King III stated that reporting on sustainability issues was to be interwoven with financial reporting (Eccles, Serafeim, and Armbrester 2012). Therefore, the integrated report would describe the value creation process, critically putting the company's economic performance into a broader context. In so doing, companies would have to discuss the environment in which they operated as well as their impact on stakeholders, and the strategies for mitigating any negative impacts on society. The JSE made integrated reporting mandatory for all listed companies on an "apply or explain" basis, thus allowing those companies that did not issue an integrated report to explain why this was the case. Similar to a company in Denmark therefore, a company in South Africa could either disclose on ESG issues or alternatively, explain why it would not make any ESG disclosures. While in both countries companies were mandated to disclose the policies that they had in relation to a series of ESG issues, as well as to report on the actions that they had taken to achieve the objectives of their policies, no specific guidelines were provided or standards were set, to require disclosure along a specific group of metrics.

Companies in China as well as companies in Malaysia had very low levels of ESG reporting prior to their respective regulations. Thus, in China, the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) mandated certain listed firms to disclose ESG information starting in financial year

end December 2008. Specifically, SHSE mandated sustainability reporting for firms included in the SHSE Corporate Governance Index, firms with overseas listed shares, and firms in the financial industry. SZSE mandated sustainability reporting for firms included in the Shenzhen 100 Index. In fact, in 2006 the Chinese government revised Article 5 of the Company Law requiring companies to *"undertake social responsibility"* in the course of business. In January of 2008, the State-Owned Assets Supervision and Administration Commission of the State Council released the Guide Opinion on the Social Responsibility Implementation for the State-Owned Enterprises controlled by the government. Both the reporting regulations and the prior government actions emphasized the economic benefits of Corporate Social Responsibility (CSR), how CSR could be a driver for a "harmonious society" and growth, and how it could help enhance organizational creativity, reputation, and employee engagement.

In Malaysia, the stock exchange Bursa Malaysia made sustainability disclosure a listing requirement for all listed firms starting on 31st of December 2007. This followed the Malaysian Prime Minister's speech announcing the requirement for listed companies to report on their CSR initiatives. Specifically, according to this requirement, there is an obligation for firms to disclose a description of their CSR activities or, if they have none, to issue a statement publicly acknowledging the absence of such activities. Importantly, similar to the regulation adopted for Danish and South African companies, no specific guidelines were provided to require disclosure on specific metrics in either China or Malaysia.

3. Hypotheses Development

Arguably, one of the main objectives of disclosure regulations is to increase the availability of information and to (potentially) influence organizational practices. In the sustainability setting, the specific type of information that such regulations focus on comes in the form of ESG data. Firms might increase disclosure as a response to the regulation and/or the fear of being found not complying or because they might perceive benefits generated through compliance. For example, signaling theory suggests that firms would try to signal their type through disclosure (Verrecchia 2001). In other words, firms whose goal is to signal that they are "good corporate citizens" will further increase disclosure given that competitors will also be forced

to increase their own disclosure by the regulation. Similarly, if disclosure regulations raise the perceived importance of ESG issues in society, firms could increase data availability to signal their commitment to transparency, their willingness to be responsible and accountable, and to conform to societal norms and expectations. In fact, past studies document that firms with higher ESG disclosure enjoy benefits in terms of brand and reputation or access to finance (e.g. Bhattacharya and Luo 2006; Cheng, Ioannou and Serafeim 2014).

However, while the disclosure regulations aim to increase the availability of information, there are valid reasons to expect that at least *some* firms will *not* disclose more information after a regulation goes into effect. First, the sustainability disclosure regulations contain a "comply or explain" provision under which firms might choose not to increase ESG disclosure but instead, to simply disclose why they are not releasing ESG data. Second, in contrast to financial reporting, it is not clear what the potential sanctions resulting from non-disclosure would be in the case of sustainability reporting and it is also unclear what the enforcement and monitoring systems would be that could incentivize firms to actually increase ESG disclosure. Even in cases where sustainability disclosure regulations have been linked to listing requirements, no firm to date has been delisted because of a failure to comply with such regulations. Third, a rich literature on reporting incentives shows that firms respond to disclosure regulations according to their pre-existing reporting incentives and argues that it is these incentives rather than the disclosure regulations *per se* that will affect the response of a firm to a regulation (Leuz 2010). As a result, if firms consider disclosure to be too costly because of proprietary, preparation, or political costs, then they might choose not to disclose. Fourth, because in the sustainability domain there is no clear guidance on the metrics and disclosures that a firm needs to quantify and disclose, and because a number of firms have already been disclosing some ESG information (at least in some countries), such firms might simply claim that pre-existing disclosure patterns are sufficient and hence, they may not change their actual level of disclosure. Summarizing the above discussion therefore, we can formulate the following hypothesis:

H1: Sustainability disclosure regulations are likely to increase the level of ESG disclosure.

A long literature in accounting documents that credibility and comparability are two important qualitative characteristics of disclosed corporate information. Past studies for example, provide evidence that more credible and comparable information is more decision useful. In terms of enhanced credibility, accounting information that is assured is considered to be more credible because of lower noise and/or lower bias (Simnett, Vanstraelen and Chua, 2009). Moreover, assurance can decrease both the probability of unintentional errors in calculations (by double-checking the numbers and underlying assumptions) and the likelihood of intentional misreporting because of managerial incentives (e.g. agency costs or fraud). Therefore, firms that receive assurance tend to receive financing on better terms (Minnis 2011) and have higher quality accounting numbers (Serafeim 2011). In terms of comparability, prior work finds that it lowers the cost of acquiring information, and enhances the overall quantity and quality of information available to investment analysts about the firm (De Franco, Kothari, and Verdi 2011).

While in a financial reporting context firms have little ability to deviate from the default option of gaining assurance and reporting according to some Generally Accepted Accounting Principles, the sustainability context allows us to test whether firms proactively seek out these properties in an unregulated setting. Given the stated benefits of disclosure credibility and comparability in a financial reporting context, we argue that these benefits will be at least as significant, and likely to be *even more* significant in a sustainability setting. This is because firms that decide to incur the additional cost of gaining assurance and achieving comparability in an unregulated context would be more effective in signaling to stakeholders their commitment to sustainability and therefore, in distinguishing themselves from other firms that may be, for example, "green-washing". The fact that, as argued, a mandatory sustainability reporting regulation makes it likely that peers and competitors will increase disclosure, raising the overall level of ESG disclosure, suggests that the need for signaling is more pronounced and therefore, on average, firms will be more likely to seek assurance and comparability of their ESG disclosures. Hence, we posit that following the regulation, firms will seek assurance on their disclosures and they will adopt reporting guidelines. Hence, our second hypothesis is:

H2: Sustainability disclosure regulations are likely to increase the probability of receiving assurance on ESG information or adopting ESG reporting guidelines.

In the context of financial reporting, past literature finds that disclosure regulations have an overall positive effect on firm value. For example, when potential private benefits of control exist, insiders might be reluctant to provide disclosure in order to preserve those benefits. Under such a regime, mandatory disclosure regulation may increase firm value by improving management of corporate assets (Shleifer and Vishny 1997; La Porta et al. 2000). However, other studies document negative effects on firm value due to compliance costs and other unintended consequences. Indicatively, Chow (1983) finds that the Securities Exchange Act of 1933 negatively impacted some firms by tightening existing covenants and negatively affecting investment and financing opportunities. Bushee and Leuz (2005) find that the SEC disclosure requirements imposed on firms listed on the OTC Bulletin Board in 1999 forced over 2,600 firms into the less regulated "pink sheet" market, consistent with the idea that disclosure regulations may generate significant costs for certain firms.

Similarly, the implications of disclosure regulations on firm value are not *ex ante* obvious in the context of sustainability reporting and these implications are further complicated by the fact that shareholders are not the only audience of the ESG disclosures. On the one hand, higher ESG disclosure might incentivize companies to change managerial practices and adopt more productive and efficient configurations. Indeed, prior work documents that increases in information availability leads to more efficient operations and better environmental performance (Konar and Cohen, 1997; Scorse and Schlenker, 2012), improved food and water safety (Bennear and Olmstead, 2008; Jin and Leslie, 2003), and improved surgical outcomes (Cutler, Huckman, and Landrum, 2004; Hannan et al., 1994; Peterson et al., 1998). Thus, the disclosure regulation may be forcing firms to implement initiatives that reduce their carbon emissions, increase employee engagement and reduce turnover, change suppliers, invest in product quality and safety procedures. This effect may obtain due to two main reasons: because of the regulation *per se* or because the regulation may serve as a strong signal of the commitment of the government and regulators towards sustainability, thus elevating the importance of ESG issues within society. This type of expressed

governmental and regulatory commitment also provides a strong institutional justification for undertaking the often substantive and transformational change required to integrate sustainability issues into corporate business models (Eccles, Ioannou and Serafeim, 2014). Consequently, we note here that our empirical models are capturing financial effects both from the increased level of disclosure *per se* as well as any internal changes that the management is making.[7]

On the other hand, sustainability disclosure regulations might decrease firm value by imposing significant preparation costs (e.g. environmental management systems for gathering environmental information) on firms and/or forcing them to disclose proprietary or competitively sensitive information. Similarly, forcing firms to increase ESG disclosure through regulation opens the door for non-shareholding stakeholders to target such firms in terms of increasing demands and potentially driving a transfer of wealth from shareholders to other non-shareholding stakeholders. For example, civil society organizations might put pressure on some firms to further improve working conditions, purchase more expensive but cleaner sources of energy, or increase compensation for supply chain partners. More generally, we suggest that if the ESG disclosure regulation forces firms to adopt organizational processes that generate a net cost for the company, then the disclosure regulation would negatively affect the valuation of a firm (Eccles, Ioannou and Serafeim 2014). Our third hypothesis is:

H3: Sustainability disclosure regulations are likely to affect firm valuation.

4. Data and Sample

We collect data on ESG reporting practices from Bloomberg. Bloomberg is by a large margin the most widely used data provider for stock market, financial, and other corporate data. ESG data originate from company-sourced fillings including sustainability or CSR reports, annual reports, company websites, and a proprietary Bloomberg survey that requests information directly from the companies. In contrast to other

[7] We also note that if some companies implement internal changes in response to the regulation but do not increase disclosure then our results might be biased. However, it seems unlikely that a *disclosure* regulation would force firms to change management practices and at the same time leave *disclosure* practices unaffected.

data providers, Bloomberg does not estimate or derive from mathematical models any of the ESG data. Rather, all data points are transparent and can be traced back to their original source in a company document. Importantly for our study, Bloomberg has the widest coverage of all ESG datasets, assessing the ESG disclosure of more than 10,000 companies around the world. By comparison, MSCI covers less than 6,000 companies and Thomson Reuters fewer than 4,000. Due to their rather limited overall coverage, these other datasets have a much smaller number of companies covered in the four countries of interest, and they are therefore not appropriate for exploring our research question.

We begin our data collection process by downloading the members of the Bloomberg product index, which includes 10,472 companies from around the world. This is a set of companies for which Bloomberg analysts have collected ESG data since 2005; therefore our data span the period 2005-2012. For all these companies, we also collect accounting and stock market data from Bloomberg. All data are measured in U.S. dollars. Bloomberg calculates an ESG Disclosure score and its three sub-scores (Environmental (E), Social (S) and Governance (G)) to quantify a company's transparency in reporting ESG information. Environmental data typically include information on emissions, water, waste, energy and operational policies around environmental impact. Examples include the level of scope 1, 2 and 3 carbon emissions, the amount of waste discarded, percentage of water usage from recycled sources, the amount of electricity used, environmental fines, and the total amount of materials recycled. Social data relate primarily to employees, products and impact on communities. Examples include employee turnover, percentage of women in workforce, lost time incident rate, community spending, number of customer complaints, and number of suppliers audited based on social and environmental criteria. Governance data relate to board structure and function, firm's political involvement, and executive compensation.

The data are collected from any available form of corporate disclosure such as annual reports, sustainability reports, and other public corporate presentations. This score is based on 100 out of 219 raw data points that Bloomberg collects, and is weighted to emphasize the most commonly disclosed data fields. The weighted disclosure score is normalized to range from zero (for companies that do not disclose any ESG data) to 100 for those companies that disclose every data point collected. Bloomberg accounts for

industry-specific disclosures by normalizing the final score based only on a selected set of fields applicable to the industry type. For example, "Total Power Generated" is counted into the disclosure score of utility companies only. We use these disclosure scores as our main dependent variables of interest. Past research has shown that these disclosure scores, among all ESG related data fields, are the ones that attract the most attention by investors (Eccles, Krzus and Serafeim 2011).

We identify the treated firms in each of the four countries by applying the criteria that each respective regulation stated and required for a company to be covered. Within the group of firms with available ESG data in Bloomberg, we thus identify 144 Chinese, 29 Danish, 43 Malaysian, and 101 South African treated firms. By construction, these firms are among the largest firms in each of their respective economies and collectively cover most of the market capitalization in the stock exchanges in which they are listed. Indicatively, we note that as of the end of 2012, the aggregate market capitalization of the *treated* Chinese firms was $1,880 billion (90% of total market capitalization of all treated Chinese firms). The respective numbers for treated Danish, Malaysian and South African firms was $220 (90% of total market capitalization of Danish stock exchange), $260 (65% of total market capitalization of Bursa Malaysia), and $460 billion (70% of total market capitalization of JSE). In other words, our sample is economically meaningful and significant given that it includes firms that represent an overwhelming portion of the local stock exchanges.

5. Research Design

To identify the effect of the disclosure regulation on firms' reporting practices, we use a differences-in-differences approach whereby we track a reporting practice before and after the regulation, both for the treated and the control firms. Moreover, we use propensity score matching to ensure that the treated and the control groups are as comparable as possible on a number of observable characteristics. Specifically, we match in the year prior the regulation on firm size (natural logarithm of total sales), profitability (return-on-assets), leverage (total liabilities over total assets), market expectations about growth opportunities

(Tobin's Q), the level of the ESG disclosure, and industry membership (financial vs. non-financial sectors).[8] We select for each firm the closest neighbor based on the following model:

$$\text{Treatment}_i = \alpha + \beta_1 \text{Size}_i + \beta_2 \text{ROA}_i + \beta_3 \text{Leverage}_i + \beta_4 \text{Tobin's Q}_i + \beta_5 \text{ESG}_i + \mu_j \quad (1)$$

Treatment takes the value of 1 if firm *i* is covered by the regulation or otherwise it takes the value of zero. μ_j is an indicator variable that takes the value of one for industry *j*. Each logit regression is estimated separately and sequentially for pairs of treated (i.e. China, Denmark, Malaysia and South Africa) and control countries (i.e. Worldwide and U.S.-only). As discussed, disclosure of ESG data has been increasing over time across the world thus generating an empirical challenge for identifying the incremental effect of mandatory sustainability reporting regulations on the level of ESG disclosure. Firms in different countries might also have been affected by various voluntary disclosure initiatives, major environmental or social crises that put pressure on firms to disclosure more, or disclosure regulations specifically around climate change issues. We use two different samples to control for other inter-temporal changes in ESG disclosure. First, we use a global set of control firms from which we draw our control firms – we term this the Worldwide control group. Second, we use U.S. firms only to draw control firms since compared to other countries, in the U.S. relatively fewer ESG-related disclosure regulations have been adopted between 2005 and 2012. Therefore, within the set of control countries probably the "cleanest" control group is U.S. firms, which for the years included in our sample have not been subject to mandated disclosure of any ESG metrics. In contrast, disclosures of firms in the UK for example, might have been affected by the 2006 Companies Act broad requirements to identify and disclose environmental and social factors that could affect the business in the director's report; firms in Japan have increased disclosure of carbon emissions and other environmental information due to the 2005 Mandatory greenhouse gases (GHG) accounting system; the largest firms in India were mandated in 2011 to start producing sustainability reports the following year.

[8] Using market capitalization or total assets as measures of firm size does not change any of our results. Similarly, matching on ROE instead of ROA leaves all results unchanged.

Table 1 presents summary statistics pertaining to the matching algorithm. Specifically, we present the average level of each covariate of interest for the treated firms in the year of matching (i.e. the year prior to the first year of regulation enforcement) and moreover, we tabulate the average difference in means between treated and a) unmatched (Δ No Match) and b) matched control (Δ Match) group as well as the corresponding t-statistic. We match treated with control firms in the year prior to regulation as follows: 2009 for South Africa, 2008 for Denmark, 2007 for China and 2006 for Malaysia. Because all Malaysian firms have zero ESG disclosure prior to the regulation, we do not use this variable in the corresponding logit model. Instead, we restrict all candidate control firms to be drawn from a pool of firms that also have zero ESG disclosure in 2006. Chinese firms have low ESG disclosure in the year of matching while both South African and Danish firms have considerably higher levels of disclosure. Indicatively, we note that among all firms in the Bloomberg sample, the disclosure levels of the treated South African and Danish firms rank at the top quartile in their respective year of matching, given that the 75th percentile of all companies has an ESG score of approximately 21. We implement the propensity score matching sequentially using the first letter of the country name to guide the sequence of matching. After each matching iteration, the matched control firms are excluded from the set of possible control firms for the next iteration (i.e. the next country, in alphabetical order). We do not pool all firms in the same propensity score matching algorithm since different countries need to be matched at different years. To ensure that our results are not affected by the sequence of matching, in robustness tests we also inverse the sequence of matching (i.e. we first match firms from South Africa and last, we match firms from China) and observe no changes to our main findings.

The statistics of Table 1 suggest that the matching procedure works reasonably well with mean differences for many covariates being significant across the treated and unmatched control group but insignificant between the treated and the matched control group. In the few exceptions where matched and treated groups are still significantly different, the differences are smaller than the differences between treated and unmatched controls suggesting that the matching process increases the similarity on the observable characteristics between the two groups that are included in the empirical analysis. To identify

the effect of the disclosure regulation on ESG reporting we estimate the following model through ordinary least squares (OLS):

$$ESG_{it} = \alpha_i + \mu_t + \gamma_{jt} + \beta_1 \text{Treatment}_i \text{ x Mandate}_t + \beta_2 \text{ Size}_{it} + \beta_3 \text{Leverage}_i \quad (2)$$

ESG_{it} is the ESG disclosure score or other reporting practice for firm *i* in year *t*. In particular, we explore the impact of regulation on a) a composite index of ESG disclosure as well as individual indices for b) environmental, c) social and d) governance disclosure. $Mandate_t$ is an indicator variable capturing whether in year *t* the regulation mandates disclosure of ESG information and zero otherwise. From equation (1), $Treatment_i$ takes the value of one if firm *i* is covered by the regulation and zero otherwise. To mitigate the concern of correlated omitted variables, we include firm fixed effects (α_i), year fixed effects (μ_t) and year-industry paired fixed effects (γ_{jt}, where we categorize all industries in our sample into two groups: financial and non-financial industries). The average treatment effect is the estimated β_1 on the interaction term $Treatment_i*Mandate_t$, which captures the change in disclosure for treated firms after the regulation relative to the change for the control firms. A positive coefficient on β_1 is therefore consistent with an increase in disclosure following the regulation. We control for key time-varying firm characteristics that are likely to be correlated with disclosure levels: firm size and leverage.[9] Finally, we use robust standard errors clustered at the firm level throughout our analysis to mitigate serial correlation within a firm across years.

We also estimate instrumental variable (IV) specifications to trace the financial value implications from increased disclosure and any associated changes in the underlying managerial practices. Model (2) is the first stage of the IV and in the second stage we instrument for ESG disclosure using as an instrument the interaction term *Treatment x Mandate*. We then report results for the impact of increased ESG disclosure on Tobin's Q, the dependent variable of interest and our measure of firm valuation (Tobin's Q has been used as a measure of firm valuation by numerous prior studies such as La-Porta, López-de- Silanes, Shleifer, and Vishny 2000; Daske, Hail, Leuz and Verdi 2008; Ahern and Dittmar 2012, among others. We also control for the yearly mean of Tobin's Q in each country to isolate macro-economic changes that might

[9] We also included other time-varying firm characteristics such as profitability, ownership concentration, and stock return volatility but none of these variables obtained significance. All main results reported here remain unchanged.

drive systematic changes in Tobin's Q across countries (Daske, Hail, Leuz and Verdi 2008). In addition, we control for key time-varying firm characteristics such as size, leverage and ROA that have been shown to be determinants of Tobin's Q.[10] We report results from models both with and without these firm characteristics since they may bias our results to the extent that they could be affected by the changes in ESG disclosures due to the regulation. Therefore, the second stage of the IV is:

$$\text{Tobin's } Q_{it} = \alpha_i + \mu_t + \gamma_{jt} + \beta_1 \text{Predicted } (ESG_{it}) + \beta_2 \text{ Size}_{it} + \beta_3 \text{Leverage}_i + \beta_4 \text{ROA}_i + \beta_5 \text{Market Benchmark Tobin's } Q_{jt} \quad (3)$$

6. Results

6.1. Effects on Corporate Reporting and Value

Figures I and II present the average ESG disclosure score for the treatment and control groups starting two years before the enforcement of the regulation and two years after. Figure I uses the worldwide control group while Figure II uses a control group comprising U.S. firms only. Both figures reveal a similar pattern. Before year 0, the first year of the regulation, both the treatment and the control group have identical ESG disclosure scores. This is reflective of the matching procedure and consistent with Table 1. However, not only the ESG disclosure scores are identical in year -1, the year of the matching, but also in year -2. Importantly, in year 0, the ESG disclosure score of the treatment group jumps compared to the score of the control group. The difference in ESG disclosures scores between treatment and control that is created in year 0 is maintained in years +1 and +2. Both figures suggest that the regulation had an effect on the level of disclosure of the treated firms. That effect appears concentrated on the first year of the regulation. Certainly, these univariate results do not control for other time-varying characteristics. Table 2 presents in a multivariate framework the estimated coefficient β_1 and its statistical significance based on the regression analysis. Specifically, each column of Table 2 estimates equation (2) for the two alternative control groups

[10] In unreported results we also include controls for R&D expenses, capital expenditures, dividend yield, and earnings volatility but the coefficients on the instrumented variables remain very similar.

(i.e. worldwide control and U.S. control). We report results for four distinct measures of disclosure as the dependent variables: the composite ESG disclosure score and its three components E, S, and G.

The findings imply that the regulation has a highly significant positive effect on the level of ESG disclosure of treated firms. The coefficient on *Treatment x Mandate* is positive and significant across all specifications. We also note that the effect is highly significant for all of our disclosure measures. However, the magnitude of the effect on social disclosures seems to be larger than the respective effect on environmental or governance disclosures. The magnitude of the overall effect is large, raising significantly the level of ESG disclosure relative to pre-regulation levels (that can be seen in Table 1). On average, relative to the period prior to the regulation, treatment firms experience an increase of between 30-50% in ESG disclosure compared to the control group. While this estimate is large, it needs to be interpreted with caution provided that the level of disclosure prior to the regulation is quite low.

Table 3 explores whether in addition to having an impact on disclosure practices, the regulation also has an impact on firms' propensity to seek to improve the credibility and comparability of their ESG disclosures. Specifically, in the models of Table 3 we replace the dependent variables on ESG disclosure with two new variables capturing whether firms receive assurance on their ESG data and whether they adopt the reporting guidelines of the GRI, which represents the most widely adopted set of reporting guidelines for nonfinancial information. We estimate linear probability models because of the large number of fixed effects and we find that treated firms are significantly more likely to receive assurance or adopt the GRI guidelines compared to both control groups of firms. These results suggest that treated firms not only increase disclosure but also, they seek to increase its credibility and comparability. In fact, these linear probability models show that the frequency of treated firms with assurance on ESG disclosures after the regulation relative to control firms increases by 4 or 7% depending on the control group. The frequency of treated firms reporting according to GRI guidelines after the regulation relative to control firms increases by 12 or 15% depending on the control group.

Table 4 Panel A presents the results of the IV analysis and tabulates the second stage across the two different control groups.[11] We find significant results suggesting an increase in Tobin's Q for firms that increased disclosure relative to the control group following the regulation. Thus, our findings imply that by increasing disclosure for treated firms and potentially affecting underlying ESG management practices, the sustainability disclosure regulation generated, on average, long-run benefits for companies that responded by increasing disclosure.[12] While past literature argues that voluntarily adopting practices to improve ESG performance can have a positive impact on firm value by attracting and retaining higher quality employees (Turban and Greening, 1997), increasing demand for products and services and/or reducing consumer price sensitivity (Sen and Bhattacharya, 2001), and contributing towards gaining social legitimacy thereby mitigating the likelihood of negative regulatory, legislative or fiscal action (Berman et al., 1999; Hillman and Keim, 2001), our results suggest that ESG disclosure regulations could also generate some of those effects, thus contributing to long-term value creation.

Table 4 Panel A also presents results from IV regressions where the first stage is based on each sub-component of the overall ESG disclosure index. We estimate these models to understand which of these subcomponents may be driving the overall effect on Tobin's Q. To do so, we run separate instrumental variable models for each of them and find that all three instrumented subcomponents load with a significant and positive coefficient. The economic effect from a one standard deviation increase in predicted disclosures is also significant and approximately equal to a 10% increase in Tobin's Q. The coefficients on the control variables load with the expected signs: the coefficients on market benchmark, ROA and leverage are positive while the coefficient on size is negative and significant.

[11] The first stage includes all the variables that are included in the second stage plus the *treatment x mandate* interaction term. It is identical to Table 2 with the addition of ROA and market benchmark Tobin's Q. None of the two additional variables are significant in the first stage.

[12] We note here, and later discuss in the limitations section, that it is beyond the scope of this chapter to empirically disentangle the impact of transparency vs. the impact of changes in ESG practices on firm valuations. All we are claiming here is that the disclosure regulation appears to have had long-term benefits for firms. Exploring the mechanisms through which these benefits materialize is, we believe, a fruitful avenue for future research.

Table 4 Panel B presents the same analysis but omits the time-varying firm characteristics to assess the robustness of our results to the possibility of including "bad controls," in the sense of Angrist and Pischke (2009) and as implemented in Ahern and Dittmar (2012), where the control variable is itself an outcome of the disclosure regulation. The estimated coefficients on the instrumented disclosure variables are all positive and significant consistent with the results in Panel A.

6.2. Conditioning on the level of disclosure before the disclosure regulation

As discussed, the firms' ESG disclosure prior to the regulations varied widely across firms. In this section, we explore how firms that provided relatively high versus low levels of ESG disclosure *before* the regulation differ in their responses *after* the regulation. On the one hand, one could expect a larger increase in disclosure among firms that disclosed little information before the regulation. This is because such firms start from a lower level of overall ESG disclosure and therefore, they potentially have more opportunities to increase disclosure. Moreover, to the extent that the marginal net benefit from an additional unit of disclosure is concave after some level of disclosure, firms will resist additional disclosures. If firms that provide relatively high levels of disclosure have already reached that level at which the marginal cost of an additional unit of disclosure exceeds the marginal benefit of doing so, then firms that provide low levels of disclosure will increase disclosure by more after the regulation. On the other hand, firms that already provide high levels of disclosure prior to the regulation might further increase disclosure to sustain a separating equilibrium and the ability to signal their "high-quality" type.

Table 5, Panel A is similar to Table 2 in that it presents the estimated coefficient β_1 based on estimations of equation (2) while the key difference is that we distinguish between treated firms with high versus low pre-regulation disclosure scores (i.e. above and below the median level) in the year of matching. Accordingly, the models are estimated based on a subsample of high disclosure treated firms and their corresponding control group, and a subsample of low disclosure firms and their control firms. Because the results using U.S. control firms are similar, we present results only using the Worldwide sample of control firms.

The estimates suggest that disclosure increases for both subsamples. Moreover, the estimates reveal significant differences between high and low disclosure firms with regards to the way they respond to the regulation. Firms that had relatively high levels of environmental disclosure increased their environmental disclosure by more compared to firms with low levels of environmental disclosure. In contrast, firms that had higher levels of governance disclosure increased their governance disclosure by less. This asymmetry is consistent with the idea that the disclosure regulation may be generating differential responses across different types of information, even within the sustainability (non-financial) information category. Firms that were laggards in terms of governance disclosure increased their disclosure by significantly more and, after the regulation, reached levels of governance disclosure similar to the leaders. In contrast, the leaders in environmental disclosure further widened the gap after the disclosure regulation. Leaders in terms of social disclosure maintained the gap with respect to laggards. This is consistent with governance disclosures being less costly to obtain and make available compared to environmental or social information. For example, while board or compensation level information is more readily available, information around environmental impacts, or employee metrics are more difficult to obtain, aggregate and release.

Panel B shows the effect on firm valuation for firms with high versus low disclosure before the regulation. We find that the instrumented overall ESG disclosure score has a positive and significant effect on firm value. However, the subcomponents have a positive and insignificant relation with Tobin's Q. For firms with already high levels of ESG disclosure, increases in disclosure are weakly associated with increases in firm value. In contrast, the association with firm value for firms with low levels of ESG disclosure is much stronger. Both the instrumented ESG disclosure score as well as all subcomponents are strongly associated with firm value. This result is consistent with the idea that the marginal net benefit from an additional unit of ESG disclosure is decreasing as firms increase disclosure. However, given the levels of disclosure prior to the regulation, our results suggest that, on average, firms disclose below the level at which the marginal benefit of disclosure is equal to or exceeds the marginal cost of disclosure.

Panel C conditions on the level of ESG disclosure and provides evidence about which types of firms are more likely to seek assurance and adopt reporting guidelines. We expect that firms with already

high levels of ESG disclosure will be more likely to receive assurance and adopt reporting guidelines following the regulation for at least two reasons. First, these actions are commitments to transparency that can help these firms differentiate themselves from other companies after the regulation, when all companies are forced to disclose (in other words, they seek to strengthen the signal and maintain a separating equilibrium). Second, these firms have already had experience with ESG disclosure and as a result, receiving assurance and systematizing disclosure through the adoption of reporting guidelines is relatively less costly. The results in Panel C are consistent with our expectations. We find that the frequency of assurance and GRI guidelines increases for treatment firms relative to controls for both groups. However, the increase is much larger for firms with higher levels of ESG disclosure before the regulation.

6.3. Robustness Tests

Alternative Matching Procedures

We perform a number of robustness checks to ensure the accuracy and reliability of our main findings. First, to ensure that our results are not affected by the sequence in which we match treated firms from affected countries to controls firms worldwide or U.S. firms, in unreported results we reverse the sequence of matching (i.e. we match treated firms from countries in reverse alphabetical order: South Africa, Malaysia, Denmark and China), and follow the same procedure: after each iteration of matching, the matched control firms are excluded from the set of possible control firms for the next iteration. Our main findings regarding the impact of regulation on disclosure, organizational practices (i.e. credibility and comparability) and firm value remain virtually the same, indicating that our estimates are not sensitive to the sequence of matching. Second, we match each treated firm to two control firms following the same algorithm and sequence of matching as the main specifications of our study, to ensure the robustness of our estimates in the choice of control firms. In unreported results, we find very similar estimated coefficients for all the variables of interest, thus increasing the confidence in the reliability of our reported main findings.

Alternative Control Samples

In our tests we have used controls firms from around the world or only from the U.S. to match with treated firms. To the extent that country-level institutions affect the changes in ESG disclosure around the adoption of the sustainability disclosure regulations, our results might be affected by the heterogeneity across such institutions. We address this concern by restricting the pool of control firms in the matching process according to (a) the World Competitiveness Index ranking of each country (from the World Economic Forum) and (b) legal origin. The rationale is that the World Competitiveness Index ranking represents an aggregate index of the country institutions that promote economic development along with social progress. Legal origin has been shown to influence a range of political, economic and social outcomes and as a result, it represents an alternative way to identify countries with comparable institutions. According to the World Competitiveness Index ranking criterion we restrict the pool of control firms for each treated firm country to firms from countries that rank between 10 places above and 10 places below the focal country. For the analysis based on legal origins, we classify countries according to whether they have British, French, German or Scandinavian legal origin. Both methods yield results that are very similar to the results reported in the primary analysis and therefore in the interest of space we omit tabulating all of them. Table 6 shows the results using control firms and the same covariates as matching variables but restricting the pool of potential control firms to countries of the same legal origin. We find that treated firms increase disclosure, receive assurance and seek guidelines. Increases in disclosure around the regulation are positively associated with Tobin's Q.

Governance Disclosure as a Control Variable

Previous studies suggest that corporate governance could have an effect on firm value (Adams, Hermalin and Weisbach 2010). If firms' increase in governance disclosure are associated with improvements in corporate governance and increases in governance disclosure are also associated with increases in environmental and social disclosure, then the results suggesting an association between increases in ESG disclosure and firm value could be the result of improvements in corporate governance. To understand whether this is indeed the case we estimate our two-stage model by including as a control variable both in the first and second stage, the level of governance disclosure and use as dependent variables the level of

environmental or social disclosure in the first stage. Table 7 shows that the results remain unchanged and the instrumented environmental and social disclosures are positively and significantly associated with Tobin's Q. This suggests that increases in governance disclosure and any associated governance changes because of changes in governance disclosure do not solely account for the increases in firm valuation. Interestingly, the level of governance disclosure in the second stage is negatively associated with Tobin's Q. This stands in contrast to the sign of the instrumented governance disclosure in Table 4 and highlights the importance of having an instrument and a shock to the level of disclosure. This is in order to address the endogeneity problem between governance disclosure and firm valuation, where firms with lower Tobin's Q might have higher level of governance disclosure. While firms with lower Tobin's Q have higher levels of governance disclosure *ceteris paribus*, an exogenous increase in the level of governance disclosure has a positive effect on Tobin's Q.

Pseudo-events

Finally, we conduct tests of changes in disclosure over time for both the treatment and the control group for pseudo-events. Specifically, we analyze changes in disclosure for years -2 and +2 relative to the year of the regulation for both treatment and control groups. In both cases we do not find any differences between the treatment and the control group in terms of changes in ESG disclosure. This is consistent with Figures I and II that show no differential movement in disclosure in years other than the first year of mandatory disclosure.

7. Auxiliary Analysis

In our main empirical analysis we pool together the data from the four countries that adopted mandatory sustainability reporting regulations. However, concerns may be raised with regards to this approach and about whether we are sufficiently controlling for the heterogeneity of institutional contexts across the treated countries by using either firms from the U.S. or worldwide to form the control groups. To alleviate such concerns, but also to develop a deeper understanding of the drivers of our main findings, we performed extensive analysis at the country level for each of the four treated countries in our sample. For brevity of

space, these results are available from the authors upon request. Specifically, rather using the U.S. or the worldwide group as the only two control groups, in the auxiliary analysis we instead use firms from the U.S., Japan, India, Australia, and the UK as controls and we separately estimate the baseline models pairwise for each pair of a treated country and a control country from this set of countries. Additionally, to control for institutional heterogeneity we estimate our models for each treated country using "local" firms as a control group.[13] Thus, for China we have a large pool of Chinese control firms. For Denmark, we define as a local control group firms from the other Scandinavian countries (i.e. Norway, Finland and Sweden). For Malaysia, we use companies from Singapore, Thailand and Indonesia as controls. And for South Africa we use UK companies as local controls because of the tight business connections between the two countries and the similarities in corporate governance regimes.

The country-level estimates show that the regulation has a highly significant positive effect on treated firms in South Africa suggesting that these firms increased their level of ESG disclosure following the regulation compared to the control group. In China, we also find a highly significant increase in disclosure by treated firms compared to control firms from any of the other countries except China itself. In this setting, it appears as if when a competitor issues a sustainability report, other companies follow, irrespective of whether they are directly affected by the regulation. The empirical findings are consistent with such spillover effects. In fact, the Chinese control firms in our sample increased ESG disclosure significantly after the regulation: we propensity score match these Chinese control firms with U.S., Japanese, Indian, Australian, and UK firms and we find that the Chinese control firms do increase disclosure significantly relative to the control groups after the regulation.

We also note that while the effect is highly significant for all disclosure measures in South Africa, for China the most consistently significant effect is on social disclosures (although environmental and

[13] However, we note that the local control group has some drawbacks especially in the case of China where control firms are domiciled in the same country as the treated firms. Past research has shown that corporate social responsibility practices, such as reporting on those practices, are implemented because of institutional pressures and peer effects, where competitors mimic what other companies are doing (Misani 2010).

governance disclosure obtain significance in several of the specifications as well) which may be related to the emphasis traditionally placed by the Chinese government on the establishment of a "harmonious society." The results also suggest that regulation in Denmark and Malaysia did not significantly affect disclosures by treated firms relative to any control group. However, these findings do not necessarily indicate that the regulation had no impact at all. In fact, in further analysis, we find some evidence that Malaysian firms are more likely to adopt GRI guidelines after the regulation and Danish firms signed on the United Nations Global Compact and concentrated on supply chain management following the regulation.

Furthermore, we find that treated firms in South Africa are significantly more likely to receive assurance or adopt the GRI guidelines compared to control groups of firms from any other country. And we find that treated Chinese firms are significantly more likely to adopt the reporting guidelines of the GRI following the regulation. These results therefore, suggest that in South Africa and China, firms did not only increase disclosure but also sought to increase its reliability and comparability. On the other hand, and perhaps consistent with the finding of no changes in disclosure, we find no evidence that firms in Denmark were more likely to seek assurance or adopt the GRI following the regulation.

Finally, with regards to the impact of the regulation on firm valuations across countries, we find significant results for China and South Africa indicating an increase in Tobin's Q for firms that increased disclosure relative to the control group following the regulation. In other words, as discussed in the main findings section, the results of this additional analysis suggest that by increasing disclosure for treated firms and potentially affecting ESG management practices, the disclosure regulation generated long-run benefits for companies across these countries. We note though that we find no such effect for firms in Denmark or Malaysia.

8. Conclusion

To the best of our knowledge, this is the first attempt to investigate the effect of disclosure regulations that mandate sustainability reporting on firms' disclosure practices, other organizational processes and firm

valuation. We find that treated firms significantly increased disclosure compared to control firms. Moreover, they supplemented the increased disclosure with efforts to increase the comparability and credibility of the disclosed information. The economic effect of the disclosure regulations appears to be positive. Instrumenting the increases in disclosure because of the regulation reveals a positive correlation between instrumented disclosure and Tobin's Q. The results are robust across a plethora of specifications and robustness checks. While the regulation might have imposed costs on some firms, our estimates suggest that on average, the effect of the regulation on companies has been value-enhancing rather than value-destroying.

With these findings, we contribute to broader the literature that explores the economic implications of information disclosure regulations. Prior work provides evidence that government disclosure programs have pushed corporations to improve their environmental performance (Konar and Cohen, 1997; Scorse and Schlenker, 2012), food and water safety (Bennear and Olmstead, 2008; Jin and Leslie, 2003), and even surgical outcomes (Cutler, Huckman, and Landrum, 2004; Hannan *et al.*, 1994; Peterson *et al.*, 1998). More generally, the results of this study extend the literature on the effects of disclosure regulation (Bushee and Leuz 2005; Armstrong et al. 2008; Daske et al. 2008; Joos and Leung 2013) as well as the literature that evaluates the effectiveness of information disclosure programs (e.g., Fung et al., 2007; Jin and Leslie, 2009; Toffel and Short 2011; Doshi, Dowell and Toffel 2013).

Although the majority of previous studies examine the effect of financial disclosure regulation, in this chapter we focus on a substantively different reporting framework and a distinct type of information disclosure. A key distinguishing characteristic of the sustainability reporting setting is that the target audience for these mandated disclosures is not strictly confined to a firm's investor base, as is typically the case with financial reporting. Rather, by issuing a sustainability report, firms aim to inform a wider and more diverse set of non-shareholding stakeholders (in addition to their shareholders) about a range of environmental, social and governance (i.e. typically nonfinancial) objectives, issues and metrics.

Our work also contributes to an emerging stream of literature that seeks to understand the characteristics and consequences of nonfinancial disclosure (e.g. Simnett, Vanstraelen, and Chua 2009; Dhaliwal et al.

2011; Cheng, Ioannou and Serafeim 2014) as well as work that explores heterogeneous firm responses to institutional pressures (e.g. Delmas and Toffel 2008; Oliver 1991). Importantly, our findings should be of interest to regulators and policy makers, who have already mandated or are considering mandating sustainability reporting in their respective contexts.

Provided though that neither assurance nor adoption of reporting guidelines is in fact mandated in the broader sustainability disclosure space, the evidence we provide in this chapter – revealing that firms will enhance the credibility and comparability of their sustainability disclosures – contributes to the broader literature that seeks to establish the value of these qualitative attributes of information (Minnis 2011; De Franco, Kothari and Verdi 2011). Importantly, our findings contribute to the literature that examines corporate reporting practices in unregulated settings such as, for example, the period prior to the introduction of the SEC (Barton and Waymire 2004), small private firms (Allee and Yohn 2008), or more recently, for large publicly listed firms in specific sectors (Serafeim 2011).

Finally, it is important to acknowledge a number of caveats. First, to the extent that our disclosure variable does not include certain disclosure items it may be a noisy indicator of the level and change in disclosure practices. While we are not sure how this could bias our results given that Bloomberg's customers are investors, our findings are less likely to apply to disclosures that are geared towards non-shareholding stakeholders. Moreover, our study examines disclosure regulations in four countries. It could be the case that sustainability disclosure regulations affect firms differently in other countries where institutions vary in terms of the extent to which organizations already make ESG disclosures and in terms of how they compete on the basis of their ESG performance. Finally, although we find a positive relation between instrumented disclosure and Tobin's Q, our research design is not suitable for identifying the underlying mechanisms through which this positive impact materializes: two possible mechanisms that future research may seek to disentangle are (a) the impact of transparency itself on firm value, and (b) the impact of changes in underlying ESG practices that are linked to the disclosure regulation.

Several more opportunities exist for future research. First, an increasing number of countries are adopting disclosure regulations similar to the ones considered here. Future research may explore the extent

to which our results generalize to these different and diverse settings. Second, more research is needed to understand how companies change resource allocations and investment decisions as a response to changes in disclosure regulations. Finally, a fruitful avenue for future research is to investigate the changes in the demand for ESG information over time. While the disclosure regulations in some cases increase the supply of such non-financial metrics, we still know little about how they affect the demand across different stakeholders.

References

Ahern, K., and A. Dittmar. 2012. The changing of the boards: the impact on firm valuation of mandated female board representation. *Quarterly Journal of Economics* 127: 137-197.

Allee, K.D. and Yohn, T.L., 2009. The demand for financial statements in an unregulated environment: An examination of the production and use of financial statements by privately held small businesses. *The Accounting Review*, 84(1): 1-25.

Angrist, J., and J. Pischke. 2009. Mostly Harmless Econometrics: An Empiricist's Companion. Princeton University Press.

Armstrong, C., M. Barth, A. Jagolinzer, and E. Riedl. 2010. Market Reaction to the Adoption of IFRS in Europe. *The Accounting Review*, 85 (1): 31-61.

Barth, M. E., M.F. McNichols and G. P. Wilson. 1997. Factors influencing firms' disclosures about environmental liabilities. *Review of Accounting Studies* 2: 35-64.

Barton, J. and Waymire, G., 2004. Investor protection under unregulated financial reporting. *Journal of Accounting and Economics*, 38: 65-116.

Bennear L.S., and Olmstead S.M. 2008. The impacts of the 'right to know': information disclosure and the violation of drinking water standards. *Journal of Environmental Economics and Management* 56 (2): 117 - 130.

Berman, S. L., Wicks, A.C., Kotha, S., and Jones, T. M., 1999. Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *The Academy of Management Journal*, 42(5): 488-506.

Bhattacharya, CB., and L. Xueming. 2006. Corporate social responsibility, customer satisfaction and market value. *Journal of Marketing* 70 (4): 1–18.

Bushee, B. J. and Leuz, C. 2005. Economic Consequences of SEC Disclosure Regulation: Evidence from the OTC Bulletin Board. *Journal of Accounting and Economics*, Vol. 39, No. 2.

Chatterji A.K., Toffel M.W. 2010. How firms respond to being rated. *Strategic Management Journal* 31 (9): 917 – 945.

Cheng, B., I. Ioannou, and G. Serafeim. Corporate Social Responsibility and Access to Finance. *Strategic Management Journal* 35, no. 1 (2014): 1–23.

Cutler D.M., Huckman R.S., Landrum M.B. 2004. The role of information in medical markets: an analysis of publicly reported outcomes in cardiac surgery. *American Economic Review* 94 (2): 342–346.

Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS reporting around the world: early evidence on the economic consequences. *Journal of Accounting Research* 46, 1085– 1142.

DeFranco, G., S.P. Kothari and R. Verdi. 2011. The Benefits of Financial Statement Comparability. *Journal of Accounting Research* 49 (4): 895-931.

Delmas M.A., Toffel M.W., 2008. Organizational responses to environmental demands: opening the black box. *Strategic Management Journal* 29 (10): 1027–1055.

Dhaliwal, D., O. Li, A. Tsang, and Y. Yang. 2011. Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *The Accounting Review* 86 (1): 59–100.

Doshi, A. R., Dowell, G. W., and Toffel, M. W. (2013). How firms respond to mandatory information disclosure. *Strategic Management Journal* 34 (10): 1209-1231.

Eccles, R., I. Ioannou, and G. Serafeim. The Impact of Corporate Sustainability on Organizational Processes and Performance." *Management Science* 60 (11): 2835 - 2857.

Eccles, R., G. Serafeim, and P. Armbrester. 2012. Integrated Reporting in South Africa. Harvard Business School Case 413-038.

Eccles, R., G. Serafeim, and P. Andrews. 2011. Mandatory Environmental, Social, and Governance Disclosure in the European Union. Harvard Business School Case 111-120.

Eccles, R., M. Krzus, and G. Serafeim. 2011. Market Interest in Nonfinancial Information. *Journal of Applied Corporate Finance* 23, no. 4: 113-127.

Eccles, R., M. Krzus, J. Rogers, and G. Serafeim. 2012. The Need for Sector Specific Materiality and Sustainability Reporting Standards. *Journal of Applied Corporate Finance,* 24 (2): 65-71.

Fung A., Graham M., Weil D. 2007. *Full Disclosure: The Perils and Promise of Transparency*. Cambridge University Press: New York.

Greenstone M., Oyer P., Vissing-Jorgensen A., 2006. Mandated disclosure, stock returns, and the 1964 Securities Acts Amendments. *Quarterly Journal of Economics* 121 (2): 399–460.

Hannan E.L., Kilburn H. Jr., Racz M., Shields E., Chassin M.R. 1994. Improving the outcomes of coronary artery bypass surgery in New York State. *Journal of the American Medical Association* 271 (10): 761–766.

Hillman, A.J. and Keim, G.D., 2001. Shareholder value, stakeholder management, and social issues: what's the bottom line?. *Strategic Management Journal* 22 (2): 125-139.

Hung, M. and Y. Wang. 2014. Mandatory CSR disclosure and shareholder value: evidence from China. HKUST working paper.

Ioannou, I., and G. Serafeim. The Impact of Corporate Social Responsibility on Investment Recommendations: Analysts' Perceptions and Shifting Institutional Logics. *Strategic Management Journal,* July 2015, 36(7): 1053-1081

Jin G.Z., and Leslie P. 2003. The effect of information on product quality: evidence from restaurant hygiene grade cards. *Quarterly Journal of Economics* 118 (2): 409 – 451.

Jin G.Z., and Leslie P. 2009. Reputational incentives for restaurant hygiene. *American Economic Journal: Microeconomics* 1 (1): 237–267.

Joos, P., and E. Leung. 2013. Investor Perceptions of Potential IFRS Adoption in the United States. *The Accounting Review*: March 2013, Vol. 88, No. 2, pp. 577-609.

Kaplan, R., and Norton, D. 1992. The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review* (January–February): 71–79.

Konar S., and Cohen M.A., 1997. Information as regulation: the effect of community right to know laws on toxic emissions. *Journal of Environmental Economics and Management* 32 (1): 109–124.

La-Porta R., F. López-de- Silanes, A. Shleifer, and R. Vishny. 2000. Investor Protection and Corporate Governance. *Journal of Financial Economics*, 58 (1-2): 3-27.

Leuz, C., D. Nanda and P. Wysocki. 2003. Earnings Management and Investor Protection: An International Comparison. *Journal of Financial Economics*, 69 (3): 505-527.

Leuz, C. 2010. Different Approaches to Corporate Reporting Regulation: How Jurisdictions Differ and Why. *Accounting and Business Research*, 40: 229–256.

Minnis, M. 2011. The Value of Financial Statement Verification in Debt Financing: Evidence from Private U.S. Firms. *Journal of Accounting Research*, 49: 457-506.

Misani, N. 2010. The Convergence of Corporate Social Responsibility Practices. *Management Research Review*, Vol. 33, No. 7, pp. 734-748.

Oliver C. 1991. Strategic responses to institutional processes. *Academy of Management Review* 16 (1): 145 – 179.

Peterson E.D., DeLong E.R., Jollis J.G., Muhlbaier L.H., Mark D.B. 1998. The effects of New York's bypass surgery provider profiling on access to care and patient outcomes in the elderly. *Journal of the American College of Cardiology* 32 (4): 993–999.

Reid, E. M. and Toffel, M. W. 2009. Responding to public and private politics: corporate disclosure of climate change strategies. *Strategic Management Journal*, 30: 1157–1178.

Scorse J, Schlenker, W. 2012. Does being a 'top 10' worst polluter affect facility environmental releases? Evidence from the U.S. Toxic Release Inventory. *Working paper*, Monterey Institute of International Studies, Monterey, CA.

Sen, S., and Bhattacharya, C. B., 2001. Does doing good always lead to doing better? Consumer reactions to corporate social responsibility**.** *Journal of Marketing Research*, 38 (2): 225-243.

Serafeim, G. 2011. Consequences and Institutional Determinants of Unregulated Corporate Financial Statements: Evidence from Embedded Value Reporting. *Journal of Accounting Research*, 49 (2): 529-571.

Serafeim, G. 2014. The Role of the Corporation in Society: An Alternative View and Opportunities for Future Research. *Harvard Business School Working Paper, No. 14-110*.

Shleifer, A. and Vishny, R. W. 1997. A Survey of Corporate Governance. *The Journal of Finance*, 52: 737–783.

Simnett, R., A. Vanstraelen, and W.F. Chua. 2009. Assurance on Sustainability Reports: An International Comparison, *Accounting Review*, 84 (3): 937-967.

Toffel M., and Short J. 2011. Coming clean and cleaning up: does voluntary self-reporting indicate effective self-policing? *Journal of Law and Economics* 54 (4): 609 – 649.

Turban, D. B., and Greening, D. W., 1997. Corporate social performance and organizational attractiveness to prospective employees. *The Academy of Management Journal*, 40(3): 658-672.

UNICEF. 2009. Corporate Social Responsibility Practices in Malaysia.

Verrecchia, R. 2001. Essays on Disclosure. *Journal of Accounting and Economics* 32: 97-180.

Weil D., Fung A., Graham M., Fagotto E., 2006. The effectiveness of regulatory disclosure. *Journal of Policy Analysis and Management* 26 (1): 155–181.

Figure I

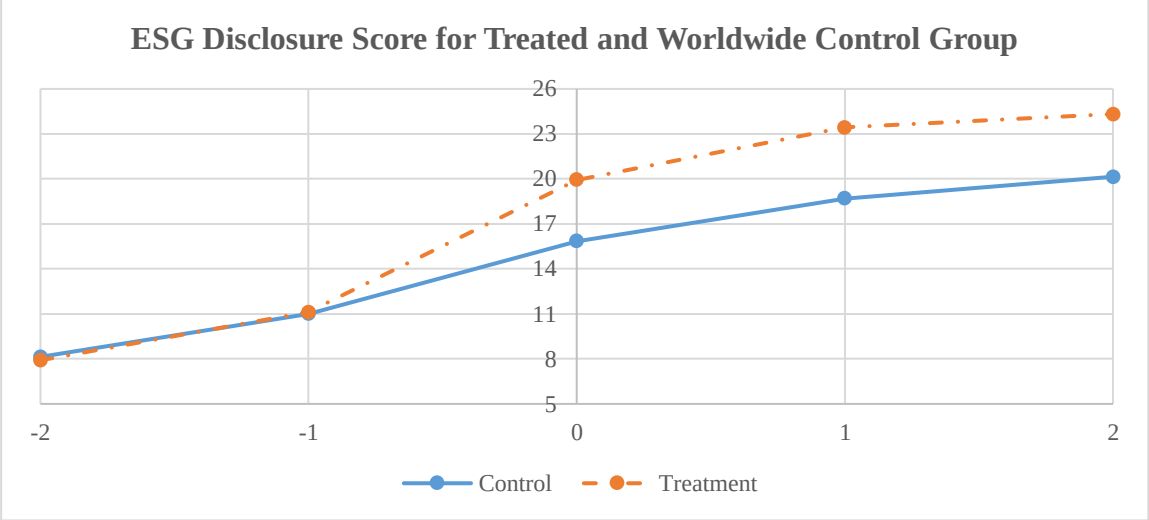
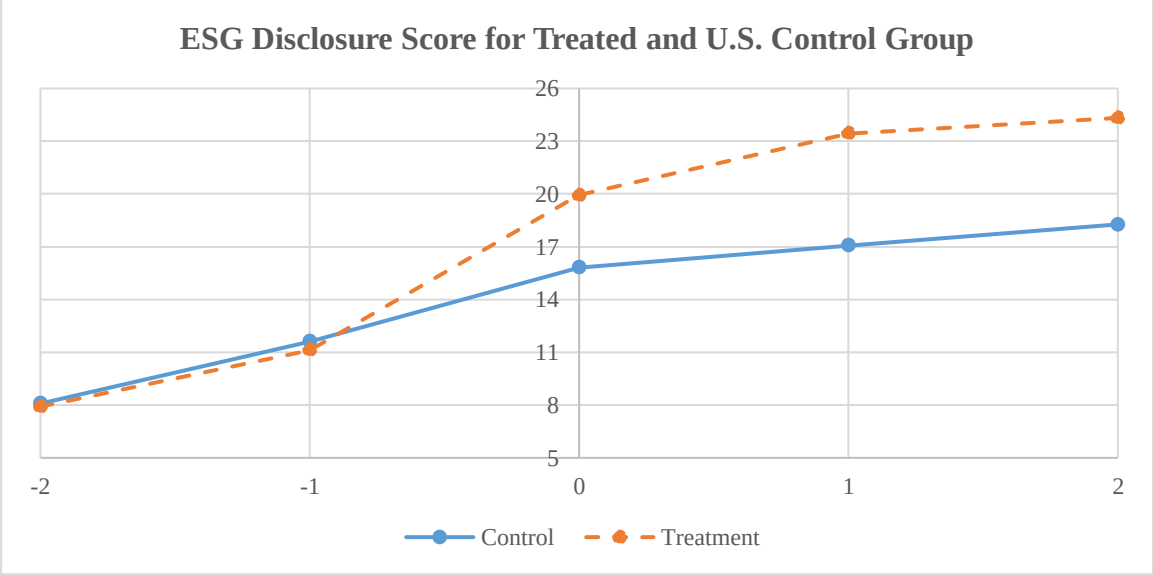


Figure II



Year 0 in the x-axis is the first year of mandatory sustainability disclosure. The y-axis measures the average ESG disclosure score from Bloomberg. The Figures shows the evolution of the ESG disclosure score from two years before the first year of the regulation until two years after for both the treated firms and the matched control firms from the Worldwide and the US control groups.

Table 1: Propensity-score matched samples

Treatment Country	Matching Variable	Control: World			Control: U.S.	
		Mean for Treatment	Δ No Match *t-stat*	Δ Match *t-stat*	Δ No Match *t-stat*	Δ Match *t-stat*
China	ESG	4.19	5.019	-0.467	2.687	0.341
			4.396	-0.596	3.051	0.421
	Sales	6.92	-0.299	-0.026	-0.288	0.370
			-1.702	-0.117	-1.645	1.824
	Leverage	0.57	-0.014	0.014	-0.018	0.014
			-0.709	0.511	-0.874	0.496
	ROA	8.73	-3.952	-0.455	-5.162	-0.054
			-4.441	-0.279	-4.806	-0.045
	Tobin's Q	1.34	-0.546	0.009	-0.446	-0.009
			-15.443	0.140	-11.762	-0.145
Denmark	ESG	22.25	-7.914	0.971	-12.441	1.263
			-2.946	0.252	-5.866	0.300
	Sales	7.54	-0.796	0.475	-0.817	0.592
			-2.091	1.152	-2.171	1.230
	Leverage	0.61	-0.040	0.018	-0.035	-0.018
			-0.914	0.290	-0.742	-0.298
	ROA	4.78	-1.963	-1.618	-4.415	1.604
			-0.885	-0.530	-1.567	0.505
	Tobin's Q	0.70	-0.094	-0.037	-0.034	0.098
			-1.380	-0.406	-0.473	1.001
Malaysia	ESG	0.00	3.324	0.000	1.996	0.000
			2.228	0.000	1.739	0.000
	Sales	6.62	-0.179	0.597	-0.133	0.598
			-0.546	2.069	-0.410	1.801
	Leverage	0.57	-0.008	-0.006	-0.018	0.007
			-0.223	-0.143	-0.458	0.150
	ROA	6.82	-2.088	-0.400	-2.973	-1.910
			-1.233	-0.269	-1.430	-1.166
	Tobin's Q	0.72	0.106	0.043	0.210	-0.030
			1.701	0.592	3.359	-0.437
South Africa	ESG	22.55	-6.439	0.024	-11.988	2.595
			-4.261	0.009	-9.274	0.908
	Sales	7.12	-0.423	-0.259	-0.485	-0.099
			-2.083	-1.005	-2.431	-0.374
	Leverage	0.59	-0.028	-0.067	-0.030	0.025
			-1.159	-2.115	-1.151	0.798
	ROA	7.83	-6.298	1.021	-7.631	-1.277
			-5.688	0.703	-5.686	-0.905

	Tobin's Q	0.70	-0.081	-0.032	0.060	0.027
			-2.159	-0.644	1.583	0.551

This table shows the average level of each variable for the treated group that is included in a logit model as described by equation (1) in the text. The logit is estimated separately for each treated-control country pair in the year before the first year of the regulation. Δ No Match is the difference in the means between the treated group and the potential control group while Δ Match is the difference in the means between the treated group and the propensity-score matched control group based on propensities estimated from the logit model. ESG is the ESG disclosure score from Bloomberg. Sales is the natural logarithm of firm sales. Leverage is total liabilities over total assets. ROA is net income plus net interest expense over total assets. Tobin's Q is the market value of a firm's assets over total book value of assets. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 2: The impact of mandatory corporate sustainability reporting on ESG disclosure

	Control Group: World				Control Group: U.S.			
	ESG Disclosure	Environmental Disclosure	Social Disclosure	Governance Disclosure	ESG Disclosure	Environmental Disclosure	Social Disclosure	Governance Disclosure
Treatment x Mandate	4.644***	2.525***	8.160***	5.709***	6.360***	4.988***	10.95***	4.676***
	(0.722)	(0.757)	(1.006)	(1.051)	(0.650)	(0.684)	(0.903)	(1.063)
Size	-0.848	-1.149*	-0.432	-0.502	-1.390***	-1.652***	-1.323**	-0.765
	(0.608)	(0.608)	(0.769)	(0.742)	(0.467)	(0.456)	(0.611)	(0.776)
Leverage	-3.101*	-2.685	-3.239	-3.842	-0.134	-0.156	-1.580	1.493
	(1.720)	(1.795)	(2.503)	(2.761)	(1.616)	(1.573)	(2.208)	(2.688)
Constant	-1.399	4.592	-4.483	-12.68*	8.150**	9.693**	4.443	7.227
	(5.492)	(5.536)	(6.909)	(6.744)	(4.064)	(3.918)	(5.267)	(7.051)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072	5,072	5,072	5,072	5,072
R-squared	0.768	0.718	0.713	0.750	0.785	0.734	0.735	0.737

This table shows the estimated coefficient on the interaction term between an indicator variable that takes the value of one for treated firms and an indicator variable that takes the value of one for years after the regulation. The dependent variable is the ESG disclosure score or its subcomponents. Equation (2) in the text describes the full model which includes firm fixed effects, year fixed effects, time-varying sector indicators, a firm size control, and a firm leverage control. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 3: The impact of mandatory corporate sustainability reporting on assurance and propensity to adopt the GRI reporting guidelines

	Control Group: World		Control Group: U.S.	
	Credibility	Comparability	Credibility	Comparability
Treatment x Mandate	0.0393**	0.116***	0.0678***	0.150***
	(0.0157)	(0.0238)	(0.0144)	(0.0230)
Size	0.00219	-0.0262*	-0.00734	-0.0321**
	(0.00912)	(0.0156)	(0.00803)	(0.0157)
Leverage	-0.0326	-0.00540	-0.0209	-0.00997
	(0.0305)	(0.0583)	(0.0258)	(0.0514)
Constant	-0.0380	0.122	0.0422	0.159
	(0.0830)	(0.143)	(0.0695)	(0.140)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072
R-squared	0.470	0.592	0.462	0.587

This table shows the estimated coefficient on the interaction term between an indicator variable that takes the value of one for treated firms and an indicator variable that takes the value of one for years after the regulation. The dependent variable is Assurance, an indicator variables that takes the value of one if the firm has received assurance on its ESG disclosures, or GRI, which is an indicator variable that takes the value of one if the firm follows the Global Reporting Initiative guidelines. Equation (2) in the text describes the full model which includes firm fixed effects, year fixed effects, time-varying sector indicators, a firm size control, and a firm leverage control. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 4: Instrumental variables analysis – the impact on Tobin's Q in the second-stage

Panel A: With firm time-varying characteristics

	Control Group: World				Control Group: U.S.			
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Instrumented ESG Disclosure	0.0210***				0.0130***			
	(0.00495)				(0.00303)			
Instrumented Environmental Disclosure		0.0390***				0.0166***		
		(0.0134)				(0.00420)		
Instrumented Social Disclosure			0.0120***				0.00754***	
			(0.00254)				(0.00170)	
Instrumented Governance Disclosure				0.0170***				0.0176***
				(0.00429)				(0.00516)
Return on assets	0.00878***	0.00983***	0.00866***	0.00801***	0.00557***	0.00579***	0.00554***	0.00508***
	(0.00123)	(0.00155)	(0.00116)	(0.00137)	(0.00115)	(0.00117)	(0.00115)	(0.00124)
Size	-0.0763***	-0.0511	-0.0888***	-0.0844***	-0.0752***	-0.0662***	-0.0833***	-0.0791***
	(0.0248)	(0.0323)	(0.0228)	(0.0253)	(0.0212)	(0.0211)	(0.0213)	(0.0247)
Leverage	0.478***	0.536***	0.450***	0.464***	0.408***	0.413***	0.418***	0.371***
	(0.0763)	(0.103)	(0.0718)	(0.0848)	(0.0777)	(0.0802)	(0.0780)	(0.0834)
Market Benchmark Tobin's Q	0.312***	0.333***	0.317***	0.287***	0.320***	0.327***	0.318***	0.309***
	(0.0180)	(0.0238)	(0.0166)	(0.0215)	(0.0177)	(0.0185)	(0.0169)	(0.0228)
Constant	1.191***	0.956***	1.212***	1.407***	0.514***	0.447***	0.589***	0.511**
	(0.237)	(0.293)	(0.212)	(0.261)	(0.167)	(0.166)	(0.167)	(0.203)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072	5,072	5,072	5,072	5,072

Panel B: Without time-varying firm characteristics

	Control Group: World				Control Group: U.S.			
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
ESG Disclosure	0.0156***				0.00753**			
	(0.00468)				(0.00295)			
Environmental Disclosure		0.0310**				0.00998***		
		(0.0127)				(0.00251)		
Social Disclosure			0.00861***				0.00422***	
			(0.00241)				(0.00162)	
Governance Disclosure				0.0124***				0.0101**
				(0.00385)				(0.00439)
Year-country average Tobin's Q	0.319***	0.336***	0.322***	0.300***	0.320***	0.325***	0.318***	0.313***
	(0.0173)	(0.0222)	(0.0165)	(0.0194)	(0.0171)	(0.132)	(0.0167)	(0.0190)
Constant	0.782***	0.821***	0.698***	0.870***	0.206***	0.214***	0.214***	0.168***
	(0.0571)	(0.0939)	(0.0328)	(0.0868)	(0.0336)	(0.0405)	(0.0343)	(0.0358)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072	5,072	5,072	5,072	5,072

This table shows the estimated coefficient on the instrumented ESG disclosure score or its subcomponents in the second stage of an instrumental variables regression. The dependent variable is Tobin's Q calculated as the sum of the market value of equity and the book value of the liabilities over the total book value of assets. Equation (1) in the text describes the first stage. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 5: The impact of mandatory sustainability reporting on ESG disclosure, conditional on levels of disclosure in the year prior to the regulation

Panel A: Effect on Disclosure

Control group: World	High Disclosure prior to regulation				Low Disclosure prior to regulation			
	ESG Disclosure	Environmental Disclosure	Social Disclosure	Governance Disclosure	ESG Disclosure	Environmental Disclosure	Social Disclosure	Governance Disclosure
Treatment x Mandate	4.144***	5.908***	9.858***	0.236	5.421***	1.991**	8.430***	10.22***
	(1.230)	(1.667)	(1.954)	(1.345)	(0.907)	(0.844)	(1.235)	(1.355)
Size	-2.123**	-1.434	-0.226	-2.017*	0.183	-0.254	0.474	0.292
	(0.975)	(1.698)	(1.790)	(1.121)	(0.710)	(0.617)	(0.849)	(0.928)
Leverage	-3.833	-1.569	-0.580	-6.918	-2.663	-1.608	-2.583	-3.777
	(4.129)	(5.823)	(7.264)	(4.773)	(1.774)	(1.633)	(2.408)	(3.281)
Constant	-1.340	12.15	-13.39**	1.228	-8.788	-1.781	-10.31	-16.52**
	(3.037)	(24.29)	(5.968)	(3.502)	(6.386)	(5.582)	(7.662)	(8.358)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,872	1,264	1,360	1,840	3,200	3,808	3,712	3,232
R-squared	0.791	0.768	0.751	0.778	0.739	0.646	0.661	0.748

This table shows the estimated coefficient on the interaction term between an indicator variable that takes the value of one for treated firms and an indicator variable that takes the value of one for years after the regulation. The dependent variable is the ESG disclosure score or its subcomponents. Equation (2) in the text describes the full model which includes firm fixed effects, year fixed effects, time-varying sector indicators, a firm size control, and a firm leverage control. A firm is identified as High Disclosure if it discloses more than the median firm in the year before the first year of the regulation. A firm is identified as Low Disclosure if it discloses equal to or less the median firm in the year before the first year of the regulation.*,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Panel B: Effect on Firm Value

Control group: World	High ESG Disclosure prior to regulation				Low ESG Disclosure prior to regulation			
	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Instrumented ESG Disclosure	0.0158*				0.0210***			
	(0.00825)				(0.00534)			
Instrumented Environmental Disclosure		0.00376				0.0605**		
		(0.00514)				(0.0269)		
Instrumented Social Disclosure			0.00377				0.0140***	
			(0.00277)				(0.00325)	
Instrumented Governance Disclosure				N/A				0.0109***
								(0.00253)
Return on assets	0.00847***	0.00849***	0.00862***		0.00918***	0.00977***	0.00835***	0.00862***
	(0.00212)	(0.00213)	(0.00187)		(0.00148)	(0.00194)	(0.00138)	(0.00149)
Size	-0.0386	-0.139***	-0.150***		-0.111***	-0.0718	-0.0858***	-0.108***
	(0.0451)	(0.0399)	(0.0396)		(0.0264)	(0.0457)	(0.0282)	(0.0229)
Leverage	0.467***	0.434***	0.510***		0.484***	0.529***	0.425***	0.459***
	(0.134)	(0.128)	(0.122)		(0.0871)	(0.137)	(0.0814)	(0.0867)
Market Benchmark Tobin's Q	0.237***	0.228***	0.181***		0.346***	0.313***	0.333***	0.364***
	(0.0275)	(0.0418)	(0.0322)		(0.0208)	(0.0258)	(0.0180)	(0.0198)
Constant	0.180	0.853***	0.927***		1.424***	1.190***	1.176***	1.394***
	(0.274)	(0.240)	(0.240)		(0.262)	(0.454)	(0.262)	(0.229)
Firm Fixed Effects	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Observations	1,872	1,264	1,360		3,200	3,808	3,712	3,232

This table shows the estimated coefficient on the instrumented ESG disclosure score (Panel A) or its subcomponents (Panel B) in the second stage of an instrumental variables regression. The dependent variable is Tobin's Q calculated as the sum of the market value of equity and the book value of the liabilities over the total book value of assets. Equation (1) in the text describes the first stage. N/A means that the instrument in the first stage is not relevant. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Panel C: Effect on Credibility and Comparability of Information

Dependent Variable:	Control Group: World				Control Group: US			
	Credibility		Comparability		Credibility		Comparability	
	High ESG Disclosure	Low ESG Disclosure	High ESG Disclosure	Low ESG Disclosure	High ESG Disclosure	Low ESG Disclosure	High ESG Disclosure	Low ESG Disclosure
Treatment x Mandate	0.0980***	0.00111	0.174***	0.0853***	0.132***	0.0228**	0.172***	0.130***
	(0.0326)	(0.0137)	(0.0419)	(0.0286)	(0.0309)	(0.0111)	(0.0427)	(0.0267)
Size	-0.000995	0.0110	-0.0285	-0.0121	-0.0112	0.00426	-0.0388	-0.0116
	(0.0193)	(0.00911)	(0.0292)	(0.0178)	(0.0161)	(0.00792)	(0.0298)	(0.0186)
Leverage	0.0513	-0.0476*	-0.0395	0.0328	-0.0127	-0.0134	-0.138	0.0725
	(0.0869)	(0.0255)	(0.131)	(0.0629)	(0.0645)	(0.0218)	(0.109)	(0.0566)
Constant	-0.0810	-0.101	-0.0928	0.00799	0.0228	0.200**	0.148	0.598**
	(0.0690)	(0.0777)	(0.0957)	(0.162)	(0.160)	(0.0979)	(0.287)	(0.253)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,872	3,200	1,872	3,200	1,872	3,200	1,872	3,200
R-squared	0.507	0.383	0.637	0.528	0.514	0.320	0.638	0.490

This table shows the estimated coefficient on the interaction term between an indicator variable that takes the value of one for treated firms and an indicator variable that takes the value of one for years after the regulation. The dependent variable is Assurance, an indicator variables that takes the value of one if the firm has received assurance on its ESG disclosures, or Comparability, which is an indicator variable that takes the value of one if the firm follows the Global Reporting Initiative guidelines. Equation (2) in the text describes the full model which includes firm fixed effects, year fixed effects, time-varying sector indicators, a firm size control, and a firm leverage control. A firm is identified as High Disclosure if it discloses more than the median firm in the year before the first year of the regulation. A firm is identified as Low Disclosure if it discloses equal to or less the median firm in the year before the first year of the regulation.*,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 6: Control firms from countries of same legal origin

Panel A: Effect on Disclosure, Credibility and Comparability

Dependent Variables	ESG Disclosure	Environmental Disclosure	Social Disclosure	Governance Disclosure	Credibility	Comparability
Treatment x Mandate	4.893***	2.123***	8.835***	7.065***	0.0407**	0.118***
	(0.681)	(0.730)	(0.936)	(1.015)	(0.0163)	(0.0241)
Size	-1.370***	-1.868***	-1.240*	-0.252	-0.00271	-0.0348**
	(0.486)	(0.492)	(0.641)	(0.796)	(0.0102)	(0.0176)
Leverage	-0.550	0.606	-0.253	-3.263	-0.0109	0.0979
	(2.033)	(2.001)	(2.750)	(3.142)	(0.0397)	(0.0670)
Constant	14.20**	13.20**	17.92**	9.245	-0.00470	0.139
	(5.566)	(5.595)	(7.190)	(9.373)	(0.114)	(0.205)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072	5,072	5,072
R-squared	0.784	0.732	0.738	0.753	0.477	0.595

This table shows the estimated coefficient on the interaction term between an indicator variable that takes the value of one for treated firms and an indicator variable that takes the value of one for years after the regulation. The dependent variable is the ESG disclosure score, its subcomponents or Assurance, an indicator variables that takes the value of one if the firm has received assurance on its ESG disclosures, or Comparability, which is an indicator variable that takes the value of one if the firm follows the Global Reporting Initiative guidelines. Equation (2) in the text describes the full model which includes firm fixed effects, year fixed effects, time-varying sector indicators, a firm size control, and a firm leverage control. Treatment firms are matched with control firms from countries of the same legal origin. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Panel B: Effect on Firm Value

Dependent Variable	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Instrumented ESG Disclosure	0.0209***			
	(0.00438)			
Instrumented Environmental Disclosure		0.0485***		
		(0.0179)		
Instrumented Social Disclosure			0.0116***	
			(0.00220)	
Instrumented Governance Disclosure				0.0144***
				(0.00298)
Return on assets	0.00747***	0.00954***	0.00756***	0.00597***
	(0.00139)	(0.00195)	(0.00134)	(0.00141)
Size	-0.0526**	0.00652	-0.0670***	-0.0755***
	(0.0222)	(0.0396)	(0.0210)	(0.0230)
Leverage	0.445***	0.442***	0.438***	0.453***
	(0.0876)	(0.125)	(0.0834)	(0.0854)
Market Benchmark Tobin's Q	0.318***	0.363***	0.319***	0.288***
	(0.0176)	(0.0339)	(0.0164)	(0.0193)
Constant	0.584**	0.186	0.672***	0.785***
	(0.234)	(0.376)	(0.218)	(0.242)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry-year Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072

This table shows the estimated coefficient on the instrumented ESG disclosure score (Panel A) or its subcomponents (Panel B) in the second stage of an instrumental variables regression. The dependent variable is Tobin's Q calculated as the sum of the market value of equity and the book value of the liabilities over the total book value of assets. Equation (1) in the text describes the first stage. Treatment firms are matched with control firms from countries of the same legal origin. *,**,*** indicate significance at 10%, 5%, and 1% levels (two-tailed), respectively.

Table 7: Instrumental variables analysis – the impact on Tobin's Q in the second-stage controlling for governance disclosure

	Control Group: World		Control Group: US	
Dependent Variable:	Tobin's Q	Tobin's Q	Tobin's Q	Tobin's Q
Instrumented Environmental Disclosure	0.0736*		0.0197***	
	(0.0400)		(0.00510)	
Instrumented Social Disclosure		0.0163***		0.00872***
		(0.00362)		(0.00193)
Governance Disclosure	-0.0151*	-0.00622***	-0.00329***	-0.00274***
	(0.00819)	(0.00133)	(0.000816)	(0.000574)
Return on assets	0.0115***	0.00890***	0.00593***	0.00561***
	(0.00269)	(0.00119)	(0.00120)	(0.00116)
Size	-0.0215	-0.0904***	-0.0638***	-0.0839***
	(0.0530)	(0.0228)	(0.0213)	(0.0213)
Leverage	0.600***	0.444***	0.421***	0.425***
	(0.179)	(0.0746)	(0.0824)	(0.0792)
Market Benchmark Tobin's Q	0.374***	0.328***	0.331***	0.319***
	(0.0496)	(0.0173)	(0.0189)	(0.0168)
Constant	0.555	1.141***	0.435***	0.601***
	(0.466)	(0.208)	(0.168)	(0.166)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,072	5,072	5,072	5,072