Spillover Effects in ESG Disclosure

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Abstract

This study examines the effect of mandatory ESG disclosure by peer firms on the voluntary ESG disclosure of non-mandatory firms. Using China's pilot IPO reform as a quasi-experiment, we find significant spillover effects in firms' disclosure within industries: nonregulated firms enhance their ESG disclosure after the first regulated firm in their industry goes public under the registration-based IPO system. Our findings indicate that market-oriented IPOs intensify industry competition, motivating existing firms to improve ESG disclosure to attract stakeholder attention. Furthermore, the adoption of higher accuracy and transparency standards increases information demands from institutional investors, which drives firms to address such needs. This study provides valuable insights into peer disclosure dynamics in different exchanges and the implications of varying disclosure standards within the same industry.

Keywords: ESG Disclosure, Registration-based IPO system, Governance, Spillover effects, Competition **JEL Codes:** M41; G38

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1 Introduction

With the surge in interest in sustainable investments, demand has steadily increased for information on corporate social responsibility (CSR) and companies' environmental, social, and governance (ESG) activities¹ to support informed, sustainable decision-making. The sustainability information available considered falls short of meeting current needs (Friedman and Ormazabal 2024). To facilitate such needs, a growing number of governments have recently introduced mandatory ESG reporting legislation as well as numerous organizations provided reporting standards to promote sustainable reporting practices. Meanwhile, regulators have been calling for incorporating ESG considerations into the preparation and auditing of financial statements under IFRS and US GAAP². However, much of the ESG information supply is still considered voluntary.

A growing body of literature has explored the factors motivating firms to increase CSR disclosure, such as signalling future performance(Lys et al. 2015), reducing information asymmetry(Dhaliwal et al. 2011, 2012, Tan et al. 2020), gaining reputation insurance (Bartov et al. 2021, Lins et al. 2017), and enhancing customer satisfaction and loyalty(Sen and Bhattacharya 2001, Servaes and Tamayo 2013). However, whether peer effects exist in CSR disclosure remains a topic of debate. While some studies suggest that increased competition encourages CSR engagement (Fernández-Kranz and Santaló 2010, Flammer 2015), others argue that it discourages disclosure due to concerns about proprietary costs(Christensen et al., 2021; Darrough & Stoughton, 1990; X. Li, 2010; Ryou et al., 2022), that sensitive information in disclosure may cause competitive threats. Similar results are found in financial disclosure, where private firms often limit public disclosure when they perceive competitive risks (Bernard et al. 2016, Dedman and Lennox 2009). Additionally, unregulated firms may reduce voluntary disclosures in the presence of mandatory disclosure requirements for regulated firms (Breuer et al. 2022). As a result, firms' decisions regarding voluntary nonfinancial disclosures in competitive markets remain far from clear.

² See for instance, the IFRS Foundation press release and materials linked at https:

//www.ifrs.org/news-and-events/news/2020/11/educational-material-on-the-effects-ofclimate-relatedmatters/ and the FASB Staff Educational Paper at https://fasb.org/page/

¹ Consistent with most studies, e.g., Gillan et al.(2021)and Tsang et al. (2023), Krueger et al. (2024), we treat CRS and ESG as they are mostly interchangeable, and in this paper generally use ESG as it refers to boarder context by including corporate governance.

ShowPdf?path=FASB_Staff_ESG_Educational_Paper_FINAL.pdf&title=FASB%20Staff% 20Educational%20Paper-Intersection%20of%20Environmental.

To address this gap, this paper investigates whether the entry of new firms with mandatory ESG disclosures leads to a spillover effect on the voluntary ESG disclosures of existing firms. To draw causal inferences, we employ the unique transition in the Chinese capital market to draw causal inferences around plausibly exogenous peer disclosures. The Chinese stock market has undergone a series of reforms aimed at promoting market openness and increasing the autonomy of companies and investors. One significant change is the transition from the approval-based initial public offerings (IPO) system to the registration-based IPO system, which was first piloted on the Shanghai Stock Exchange's STAR Market in June 2019. This shift seeks to provide companies with greater access to capital and make it easier for investors to assess stock values. Compared to the approval-based IPO system, the registration-based IPO system contributes to devolving authority from the China Securities Regulatory Commission (CSRC) to the stock exchange, leading to more stock market independence (Huang & Tang, 2016), increased investor attention and information demand towards listed stocks(Wu et al., 2022), and a higher degree of pricing efficiency(Lai et al., 2022).

Under the registration-based IPO system, listed companies are incentivized to disclose high-quality information to attract investors and enhance their market reputation. This reform places particular emphasis on the quality of information disclosure at the time of IPO, especially in relation to ESG topics. In this setting, we hypothesize that mandatory ESG disclosures from new IPO companies may influence the voluntary ESG disclosure of existing firms within the same industry, but the results remain nuanced. On one hand, increased information demand (Chi et al. 2020, Naughton et al. 2019) may raise the pressure on other firms to improve their ESG disclosures as investors become more attentive to disclosure quality. On the other hand, proprietary costs related to disclosures or may lead them to view mandatory disclosures as substitutes, reducing their own ESG disclosures. Furthermore, when it comes to free-rider problem, firms with highly correlated value may choose to disclose no information in response (Admati and Pfleiderer 2000, Baginski and Hinson 2016, Capkun et al. 2023).

To empirically examine this research question, we match the initial batch of 25 companies listed under the pilot registration-based IPO system³ with their respective industry peers. Given the variation

³ The pilot registration-based IPO regime on the Shanghai Stock Exchange STAR Market was launched in June 2019 with its first batch of 25 new issues. More details can be found: http://www.csrc.gov.cn/csrc/c100028/c1001082/content.shtml

in IPO timing, we apply a staggered difference-in-difference design. It is observed that an increase in mandatory ESG disclosure by regulated firms is associated with a rise in voluntary ESG disclosure by unregulated firms. Specifically, our results show that when the first company in an industry goes public under the registration-based IPO system, firms in the same specific industry code (e.g., "A01") increase ESG disclosures by an average of 20% in the following year. Similarly, firms in the same broader category (e.g., "A") but in different subcategories (e.g., "A02") experience a 16% rise, while firms across the entire broader category see a 19.5% increase. These findings suggest that the IPO reform not only improves ESG reporting for newly listed firms but also generates a positive spillover effect, particularly for firms in closely related sectors⁴.

To uncover the drivers behind these spillover effects, we further investigate the underlying mechanisms influencing focal firms' ESG disclosure decisions, categorizing them primarily as competition threats and information demand induced supervision. For competition threats, we find that spillover effects are more pronounced in industries with lower levels of competition, where firms face reduced proprietary costs and become more inclined to disclose as market competition intensifies⁵. For information demand, we find that firms with a higher presence of institutional investors and internet search exposure display a more substantial increase in ESG disclosure, driven by the heightened demand for information spurred by the reform.

Having documented evidence on positive spillovers in focal firms' ESG disclosure, we further conduct cross-sectional analysis to understand the characteristics among firms. First, we expect to find greater peer effects among firms that initially have higher market awareness, as the extent to which peer firm disclosure spurs firms to keep or enhance reputation in response to their existing visibility and reputation in the market. Using the number of average posts and comments on leading Chinese financial news organizations⁶, we find consistent results with our expectation. Second, we find that focal firms

⁴ According to CSRC Industry Classification 2012: A one-digit code represents a broader industry category(sector), represented by one Lation letter (e.g., agriculture or manufacturing), while a two-digit code, indicated by two Arabic numeral provides a more detailed classification within that broader category (e.g., specific sub-sectors like Coal mining and dressing industry under mining category).

⁵ In line with the findings of Ryou et al. (2022), which show that competition intensity hinders firms' incentives to report their sensitive CSR activities, our results suggest that firms operating in less competitive industries are more willing to respond positively to peer disclosure.

⁶ Data are obtained from East Money(https://guba.eastmoney.com/) and Sina(https://sina.eastmoney.com/) stock forums.

are more likely to respond to peer firm disclosure when they exhibit lower accounting quality ex-ante. As this reform places particular emphasis on firms' information, firms with weaker accounting quality are more exposed to signal their quality through disclosure. Furthermore, we find that firms with more uncertainty in their cash flow response less to this shock. As the potential barrier response to peers' ESG initiative require less risk in their operation, firms with higher levels of cash flow volatility appear to be more vulnerable to adapting to this change. Lastly, state ownership enterprises⁷ respond less due to their unique role in China's economic mandates, as they already have relatively high ESG performance or are generally well-aligned with ESG goals.

Our paper makes several contributions. Firstly, we contribute to the literature on the competition dynamics among firms, in particular, the ongoing debate over whether peer disclosures lead to increased or decreased disclosures by focal firms. Previous work focuses on the peer effects in financial disclosure and find mixed results. For instance, a recent study by Seo (2021) finds a complementary relation that peer firm disclosure shapes a firm's information environment by inducing the individual firm to disclose. In contrast, Baginski and Hinson (2016) document a negative relationship between free riders and contributors in firms' management forecasts. Breuer et al. (2022) find similar evidence that regulated firms' disclosure crowds out other unregulated firms' voluntary disclosures. For non-financial disclosure, Capkun et al.(2023) indicate that firms are less likely to disclose their own trial results when many closely related trials are disclosed by peer firms. Furthermore, for CSR disclosure, Cao et al. (2019) find a positive relationship among firms operating in the same competitive market, while Ryou et al. (2022) present contrasting results, indicating that product market competition fosters a negative relationship. Our paper contributes to the existing literature by providing new insights on how mandating peer firms' ESG disclosure will shape unregulated firms' ESG engagement within the same industry. Particularly, our results contribute to understanding the types of equilibrium that emerge when firms on different exchanges, with distinct disclosure standards, experience disclosure spillover effects from one another.

Second, we contribute to the literature by examining the conditions and factors that determine peer firms' disclosure decisions. Shroff et al. (2017) suggest that a firm's cost of capital is negatively

⁷ As a significant driver of Chinese economic development, state-owned enterprises have undertaken mandated public policy projects, such as infrastructure initiatives and social welfare programs, which are not driven by profit maximization but are instead aligned with social responsibility.

associated with the peer information environment when firm-specific public information is scarce, and this negative relationship diminishes as firm-specific information becomes more available. Cao et al., (2019) show that technological peer pressure leads to a decrease in product disclosure but does not affect management earnings forecasts. Ryou et al. (2022) identify proprietary cost concerns, finding that greater product market concentration discourages firms from disclosing competition-sensitive information. We add to the literature by indicating investors' information demand and competition threat are the determinants of focal firms' voluntary ESG disclosure.

Lastly, we provide additional insights into the externalities of ESG disclosure regulation. A longstanding debate surrounds whether corporations should voluntarily disclose ESG information or if regulators should mandate certain disclosures. Early theoretical work by Admati and Pfleiderer (2000) suggests that due to the free-rider problem, Nash equilibrium disclosure policies are often socially inefficient. They also highlight that potential equilibria may emerge when firms can select among different exchanges. Moreover, when it comes to "what gets measured gets managed" (Karpoff et al. 2022), disclosure mandates could simply lead firms to focus on the metrics that are required. Similarly, Christensen et al. (2021) indicate that while mandating disclosure may provide new information, it could also incur proprietary costs and expose firms to greater scrutiny by stakeholders. In addition, a more recent analysis by Frankel et al. (2024) remains positive and discusses disclosure regulation may be beneficial under certain circumstances. In this context, our paper addresses the need to sufficiently justify such mandates by contributing to the determination of whether mandated ESG reporting generates positive spillovers.

The rest of the paper proceeds as follows. Section 2 introduces the institutional background and Section 3 provides the literature review and hypothesis development. The empirical methodology is discussed in Section 4, while Section 5 presents the main results and several robustness checks. Section 6 concludes.

2 The Registration-based IPO System Reform

2.1 Implementation of The Registration-based IPO System

Before the registration-based IPO system, the China Securities Regulatory Commission (CSRC) and the two major stock exchanges, namely the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE), employed the approval-based IPO system for selecting eligible companies to be listed in either Shanghai or Shenzhen. Under this system, companies are required to meet strict financial criteria to obtain approval for their initial public offerings (IPOs). However, this system has faced criticism for being inefficient and unfair. Consequently, reputable companies in need of capital often resort to purchasing "Shell companies" that meet the standards or even opt to list outside of China.

The introduction of the new registration-based IPO system marks a significant shift by eliminating the regulatory authorities' decision-making power regarding IPO outcomes. Under this system, if IPO candidates fulfil the necessary formalities and standards, they can obtain a listing without requiring approval from securities regulators. The most notable improvement brought about by this system is the enhanced efficiency in allocating capital.

In June 2019, the pilot registration-based IPO system was initially launched on the Sci and Tech Innovation Board of the SSE, with an initial batch of 25 companies successfully completing their IPOs and subsequently becoming listed. Following this success, in August 2020, the ChiNext board, which specifically supports innovative and entrepreneurial companies, began piloting the registration-based IPO system. In February 2023, the registration-based IPO system was officially implemented across all boards and exchanges⁸.

Figure 1: Timeline of the Registration-based IPO Reform in China



The pilot registration-based IPO system was initially launched.

It was only implemented on the Sci and Tech Innovation Boards of Shanghai Stock Exchange. August-2020

The pilot registration-based IPO system was implemented to the ChiNext board of the Shenzhen Stock Exchange. February-2023

The registration-based IPO system was officially implemented on all stock exchanges in China.

2.2 The Differences Between Two Systems

Compared to the approval-based IPO system, the registration-based system introduces a crucial feature centred around the truthful, accurate, and comprehensive disclosure of company information as its primary IPO requirement. Below, we outline the main differences between the approval-based IPO system and the registration-based system and summarize in Appendix A.

⁸ To ensure the feasibility of our DID framework, we limit the sample period to 2021, when the pilot registration program affected only a subset of firms within industries, which allows for a clear distinction between treated and control groups.

The registration-based system aims to improve the efficiency of capital allocation by streamlining the IPO process⁹. Under the original approval-based system, companies are subject to a rigorous evaluation process by regulators who determine whether or not to grant approval for the IPO. In contrast, the registration-based system dispenses with the need for regulatory approval, focusing instead on fulfilling disclosure requirements. Specifically, it removes discretionary power, relying on compliance with disclosure regulations as the primary determinant for IPO success. Instead of placing on meeting financial standards and other criteria defined by regulators before, the registration-based system prioritizes the truthful, accurate, and complete disclosure of company information, ensuring transparency for investors¹⁰.

Most importantly, it is worth noting that the regulatory framework for the pilot registration-based system explicitly requires companies to proactively incorporate sustainable development principles, strengthening environmental disclosure requirements during the IPO application process¹¹. Therefore, by streamlining the IPO process, the new system shifts investors' focus to information disclosure, stimulating demand for the necessary information to conduct independent evaluation and assessment. This, in turn, incentivizes companies to provide more comprehensive and transparent information to the public.

3 Hypothesis Development

As a common form of behavior across various business domains, imitation has been widely studied in the context of business strategies (e.g., Klemperer, 1992; Chen & MacMillan, 1992; Chen, Smith, & Grimm, 1992). Rivalry-based theories suggest that imitation is often a strategic response to competitive pressures. Firms imitate their peers not only to maintain their relative market position but also to neutralize the competitive advantage gained by rivals' aggressive actions (Lieberman and Asaba, 2006).

⁹ Researchers in China have found that the reform this reform can mitigate stock price synchronizatio(Wu et al. 2022). Also, it can catalyze innovation among firms, as companies within the same industry may emulate the innovative behavior exhibited by those on the STAR market(Liu and Li 2022).

¹⁰ Yu et al. (2022) find that the registration-based system enhances the degree of prospectus disclosure, such as sentence length and textual comprehensibility.

¹¹ The STAR Market listing rules include a dedicated section on corporate social responsibility, mandating that the initial batch of STAR Market pilot companies disclose their social responsibility practices. Details can be found:

http://www.sse.com.cn/lawandrules/sserules/tib/listing/a/20190430/844150315985755e3f3b254e8c78 ad25.doc

With the implementation of the Registration-based IPO system, firms encounter lower entry barriers to the public market, which leads to increased industrial competitiveness in sectors they enter. Meanwhile, new entrants are mandated to provide additional ESG disclosures, which reshapes market's attention toward such information. In this context, when firms are mandated to disclose ESG information, the regulatory intervention not only requires compliance from mandated firms but also pressures the unregulated peers within the industry to adapt to the increasing importance of ESG transparency and evolving market information demands in this area. Unregulated firms, in turn, may actively observe the outcomes of ESG disclosures by mandated peers—such as improved access to capital (Cheng et al. 2014) or enhanced firm value (Baron 2008, Bénabou and Tirole 2010, Fatemi et al. 2015, 2018)—and adopt similar practices to maintain their competitiveness(Cao et al. 2019). Meanwhile, ESG disclosures provides firms with a means to enhance competitiveness by strongly aligning with investor priorities(Krueger 2015). Higher market competition may also prompt firms to bolster their commitment to ESG (e.g., Kemper et al., 2013) and mimic their peers' practices (e.g., Cao et al., 2019).

However, this regulatory shock may also fail to produce industry-wide spillovers due to the freerider problem in peer disclosures (Admati and Pfleiderer 2000, Baginski and Hinson 2016, Capkun et al. 2023) and concerns about proprietary costs (Christensen et al. 2021, Darrough and Stoughton 1990, Li 2010, Ryou et al. 2022). Free-riding may occur if unregulated firms benefit indirectly from the mandated disclosures of their peers without incurring the associated costs. This dynamic can diminish the potential benefits for mandated firms or even impose higher costs on them(Breuer 2021). Similarly, focal firms may withhold ESG disclosures to avoid revealing competitively sensitive information or increasing proprietary risks, particularly in highly competitive sectors. Consequently, we propose our primary hypothesis as follows:

Hypothesis: IPO entrants under the registration-based system generate spillovers of ESG disclosure within their respective industries.

4 Methodology

4.1 Research Design

To investigate the spillover effect of ESG disclosure, this paper aims to find how firms going public through the new registration-based IPO system affect other existing firms(*focal firms*) within the same industry. To be specific, we consider a focal firm as the one potentially impacted by the reform if it enters the stock market through the old approval-based IPO system while their industry has a new incomer going public through the new registration-based IPO system. To allow us to measure the extent of the spillover effect, we follow the Industry Classification Guidelines for listed companies published by CSRC in 2012^{12} and conduct our analysis using different tiers of classification. By doing so, we classify firms based on how closely their business is related to new comers. In Table *1*, we summarize industries where there are first-time IPO through the registration system in 2019 and 2020^{13} .

First, we focus on the direct spillover effect. A firm is identified as directly affected by the reform if it operates within an industry where there exists the first firm listed through the registration-based system. We match the two-digit industry classification (e.g., "A01") to locate these focal firms and count them as the direct treatment group. Second, we examine the indirect spillover effect. Following Elenev et al. (2021), we define the indirect treatment group to include firms under the same sector (e.g., "A") as the first company(e.g., "A01") listed through the registration-based system but belonging to different sub-industries (e.g., "A02"). These firms are presumably closely related and have business overlaps, thereby they are counted as indirectly affected. Lastly, we analyze the overall spillover effect, where we aggregate the direct and indirect treatment groups together. It is critical to note that the control group remains consistent all the time in our analysis, consisting of firms within industries where no firm has gone public through the registration-based system during our sample time range. Figure 2 below illustrates the relationship between the three categories.

¹² http://www.csrc.gov.cn/csrc_en/c102030/c1370858/content.shtml

¹³ It should be noted that the definition of initial registration listing events below takes into account listings on the two boards, the Sci and Tech Innovation Board and the ChiNext board (After August 2020). To feasibly conduct this research, we only consider the spillovers effects of the registration-based IPO pilot program. As start from February 17, 2023, China officially implemented the registration-based IPO system for all boards of its capital markets on.



Treated_{direct}: Companies which operate within an industry where the inaugural firm has been listed through the registration-based system, using the **two-digit** industry classification.

*Treated*_{indirect}: Companies within the same industry where the first company has gone public through the registration-based system, using the **one-digit** industry classification, excluding the directly affected companies.

 $Treated_{all} = Treated_{direct} + Treated_{indirect}$

Figure 2

4.2 Data Source

In this study, our primary variable ESG is derived from Bloomberg, which generally measures ESG disclosure quality to assess a firm's ESG/CSR disclosure attributes. Bloomberg's ESG ratings are primarily based on ESG reports disclosed by firms and are designed to help investors evaluate a company's transparency and commitment to ESG practices by measuring the extent of publicly disclosed ESG performance information¹⁴. Thus, using ESG data from the Bloomberg database enables us to capture our focus on the level of firms' engagement in ESG disclosure more precisely.

We also use ESG ratings from the Sino-Securities Index Information Service (Shanghai) to crosscheck the validity of our results. Regarding the financial reports of listed firms, we obtain data from CSMAR database which covers a sample period spanning from 2015 to 2021. As the pilot program is launched in the STAR Market and the ChiNext board, our focal firms are from the Main-board Market. Firms are excluded if they are 1) labelled as ST or PT; 2) going public after 2015¹⁵; 3) in the financial service industry; 4) in ChiNext and Sci-Tech Innovation Board. Overall, our sample consists of 980 listed firms. Among them, 165 firms belong to the control group, as no firm in their industry went public

¹⁴ Bloomberg's ESG score as a proxy for firms' ESG disclosure is widely adopted by researchers (Buchanan et al., 2018; Gillan et al., 2021). More details of Bloomberg ESG Metrics can be found: https://www.esg-advising.com/insights/bloombergs-esg-disclosure-score

¹⁵ We restrict our focal firms to have at least three years' financial data before this IPO shock.

through the registration-based IPO system during the sample period. The remaining firms are affected by the reform, with 641 directly influenced and 174 indirectly influenced. All continuous variables are winsorized at 1% level. The summary statistics are presented in Table 2.

4.3 Model Specification

Due to the varying timing of each IPO passed by the registration-based system, we employ a timevarying difference-in-differences (DID) model to identify causal effects. The DID model is presented as follow:

$$ESG_{i,t} = \beta_0 + \beta_1 DID_{i,j,t-1} + \gamma X_{i,t-1} + \varphi_{j,t} + \delta_i + \varepsilon_{i,j,t}$$
(1)

where $ESG_{i,t}$ is the ESG ratings of firm *i* in year *t*, $DID_{i,j,t-1}$ is the dummy variable indicating whether firm *i*'s industry j^{16} there has been a firm going public through the registration-based IPO system firstly in year *t*-1. $X_{i,t-1}$ is the vector consisting of all control variables of company *i* in year *t*-1.

The control variables are determined according to three aspects: 1) Operation: including total assets, return on assets (ROA), debt to assets ratio(leverage), Tobin-Q, liquidity ratio and R&D expenditure; 2) Governance: shareholding ratio of the top five shareholders, the duality of COB and CEO; 3) Stock market performance: annual stock return and the volatility, the number of related reports. The details of the control variables are in Appendix B. $\varphi_{j,t}$ is the industry×year fixed effect, and δ_i is the company fixed effect. *Treated_i* and *Post*_{*i*,*t*-1} are dropped because of the multicollinearity.

5 Results

5.1 **Baseline results**

Table 3 presents the baseline regression results¹⁷. The variable Two-digit Ind×Year FE represents the industry×year fixed effect, with the industry classified at the two-digit level. The variable $DID_{difference}$ is calculated as the product of DID_{all} and a dummy variable *Group*, which equals 1 if the firm is in the direct treatment group and 0 if it belongs to the indirect treatment group. This test aims to examine whether the improvement in ESG disclosure differs between two groups of firms, which are categorized based on their business similarity to the focal firms.

The results suggest that the coefficients of our variables of interest are all significantly positive.

¹⁶ We run this baseline model for different tiers of industrial classification as discussed in 4.1.

¹⁷ In Table 10, we rerun the same tests using the alternative dependent variables, which are E, S or G metrics, separately.

Specifically, when the first firm within an industry goes public through the registration-based IPO system, firms operating in the same industry (the same two-digit industry) experience an average increase in ESG disclosure of approximately 20% compared to the average in the following year. Similarly, firms in the same one-digit industry but a different two-digit industry observe an average ESG disclosure improvement of around 16% compared to the mean. Overall, firms within the same category, regardless of whether they are in the same two-digit industry, experience an average ESG disclosure increase of approximately 19.5%. The marginal differences among the three results reinforce the robustness of our findings. As it is consistent with our intuition, firms with closer business to new IPO firms are more exposed to this shock. In column 4, we include a group dummy to demonstrate that the direct and indirect effects differ significantly, with the direct effect being more substantial.

To ensure that the difference between the treatment group and the control group is solely attributed to the shock, we conduct a parallel trend test to validate our DID assumption. We examine whether both groups follow a similar trend in ESG disclosure before the shock by interacting the year dummy with the treatment dummy for four years before the shock (*pre1*, *pre2*, *pre3*, *pre4*), the shock year (*current*), and one year after the shock (*post1*). In the regression, pre1 is excluded due to collinearity.

Results are presented in Table 4 with each column indicating the results for the direct, indirect, and aggregated treatment groups, respectively. All findings reveal that the coefficients before the shock (*exante*) are not statistically significant. However, the coefficients after the shock (*ex-post*) are significant and exhibit a positive and increasing trend over the years. Consistent with our conjecture, these results document that the impact of the registration-based IPO system is progressively growing with each passing year.

5.2 Mechanisms

5.2.1 Competition Threats

Prior research has shown that increased competition can foster more information disclosure from industry peers (Seo 2021). To enhance their competitiveness, firms may adopt social responsibility as a strategic approach (e.g., Fernández-Kranz & Santaló, 2010)¹⁸. By streamlining the IPO process, the implementation of the registration-based IPO system has enabled more small firms to enter the capital

¹⁸ Given the scarcity of investor attention (Barber and Odean 2008, Cohen and Frazzini 2008, Simon 1956), firms are incentivized to increase their information disclosure in response to their peers' disclosures to retain their reputation (Leary and Roberts 2014) and attract investors (Amel-Zadeh & Serafeim, 2018; Lou, 2014; Cao et al., 2019).

market, which intensifies competition within industries. As shown in our baseline results, this increased competition incentivizes companies to enhance their ESG disclosure as signaling mechanisms. However, considering proprietary costs, the extent to which focal firms respond to this shock may vary depending on the intensity of competition within their industry (Ryou et al., 2022). In this context, we adopt two measures to assess the underlying mechanism of industrial competitiveness. We generate our first proxy of market revenue concentration (RC) as the aggregate percentage of main revenue from the top five companies within the industry¹⁹. A higher value of RC indicates a higher concentration degree, implying a less competitive industry environment. Our second proxy of market competition is the Herfindahl-Hirschman Index(*HHI*)(Rhoades 1993). A higher *HHI* value indicates greater market concentration and, consequently, less competition.

5.2.2 Information Demand-induced Supervision

The registration-based IPO system places a greater emphasis on companies' information disclosure, imposing higher quality standards. Companies that go public through this system are required to provide more comprehensive and accurate information. Existing literature highlights the role of nongovernmental and independent organizations in monitoring corporate behavior in socially responsible ways (e.g., Campbell, 2007). Among these, institutional investors have been shown to be particularly sensitive to companies' information disclosure practices (García-Sánchez et al. 2021), act as key external monitors (Aggarwal et al., 2011; Brav et al., 2008; Gillan & Starks, 2000; McCahery et al., 2016), and contributes to the transparency of firms' information (Boone and White 2015). They typically exercise their governance power to influence firms that they cover or hold to enhance certain practices (Cao et al. 2019). Moreover, a recent study by Gibbons (2024) finds that institutional investors' willingness to hold securities increases with the availability of environmental and social information. Consequently, institutional investors are likely to respond actively to changes in the information disclosure environment, pressuring firms to comply with new requirements and adapt their practices accordingly. In this context, we use the proportion of institutional investors (*InsProp*) as a measure of institutional supervision. To explore the role of information demand in the spillover effect, we use the

¹⁹ Following Economic Census approach, we also check the results employing *RC* indicators constructed from the main revenue of top 4, 8, 10, and 20 companies in the same industry, the results remain consistent as using the top 5 companies.

Web Search Volume Index (*Search Index*) to measure the external information demand received by listed firms following Vlastakis & Markellos(2012).

Finally, we test the following model to examine the underlying mechanisms:

$$ESG_{i,t} = \beta_0 + \beta_1 DID_{i,j,t-1} \times Z_{i,j,t} + \beta_2 DID_{i,j,t-1} + \beta_3 Z_{i,j,t-1} + \gamma X_{i,t-1} + \varphi_{j,t} + \delta_i + \varepsilon_{i,j,t}$$
(2)

where $Z_{i,j,t-1}$ represents *HHI*, *CR*, *InsProp* or *Search Index*. β_1 is our variable of interest.

Table 5 indicates significant and positive results from the interaction between the *DID* estimator and the competition indicators, as presented in both column 1 and column 2. This shows that the shock that arises from the registration-based IPO system exhibits a greater impact on industries with lower levels of competition. Column 3 of Table 5 indicates that the interaction between *DID* and *InsProp*(the proportion of institutional investors' ownership) is significantly positive. This suggests that companies with higher proportions of institutional investors experience a greater improvement in their ESG disclosure when rival companies go public through the registration-based IPO system. Similarly, in column 4, the interaction between *DID* and *Search Index*(level of web search volume) also shows a positive significance. This implies that companies with higher web search volume exhibit a more substantial improvement in their ESG disclosure when subjected to a shock aimed at enhancing the information disclosure. All these findings align with the hypothesis posited in the study.

5.3 Heterogeneity Analysis

To gain further insights into the underlying mechanisms, we conduct heterogeneity analyses to examine the potential influence of different firm-level characteristics on ESG disclosure. ESG practices can serve as a means of signalling the market and enhancing a company's reputation (Borghesi et al. 2014, Lins et al. 2017). Firms may enhance their information disclosure efforts to prevent investors from shifting their attention to competitors with more comprehensive or superior disclosure practices(Coller and Yohn 1997). In light of this, we hypothesize that firms with lower investor attention may be more inclined to engage in ESG disclosure following the shock of the registration-based IPO system. To test this hypothesis, we divide the sample into three subgroups based on the number of average posts and comments on East Money and Sina stock forums related to the companies' stocks in 2018. Subsequently, we re-estimate the baseline regression separately for the highest and lowest attention groups. By doing so, we aim to discern any potential variations in the impact of the shock on ESG disclosure. The findings from Table 6 show significant positive coefficients for both the low post and high posts groups. In addition, the coefficient for the high posts group is notably larger compared to those of the low posts group and the baseline regression. Within the high comments group, the coefficient is significantly positive, whereas the low comments group shows no significant effect. These outcomes align with those observed in Table *6*, which suggests that under the registration-based IPO system, investors prioritize information availability and actively seek it themselves. Thus, companies receiving more attention experience a more pronounced enhancement in their ESG disclosure.

Furthermore, we categorize firms into subgroups based on the extent of their accounting information quality. First, following Ball and Shivakumar (2006), we use the ACF model to estimate the quality of accounting information. Second, we use the delay in annual report disclosure as a proxy for firms' accounting information quality, defined as the time interval between the fiscal year-end and the actual disclosure date of the annual report²⁰. We hypothesize that firms with lower accounting quality are more sensitive to changes in information disclosure requirements in the market. As a result, firms with poorer ex-ante information disclosure quality are likely to exhibit stronger responses in their ESG disclosure.

Table 7 shows that the coefficients for each group are consistently and significantly positive. The coefficient observed for the low accounting information quality (AQ) group is higher than that of the high accounting information quality. This suggests that companies with poorer accounting information quality experience a greater enhancement in their ESG disclosure.

Additionally, the coefficient for the short lag group is lower than that of the long lag group, implying that companies with longer intervals between the end date of the last fiscal year and the actual disclosure date of the annual report exhibit a more pronounced improvement in their ESG disclosure. Both of these findings align with the objective of this IPO reform that its impacts are expected to be achieved by promoting faster, more accurate disclosure.

Firms experiencing higher cash flow volatility tend to reduce their discretionary investment (Minton and Schrand 1999) and are subject to higher uncertainty(Favara et al. 2021), which may lead to a lack of focus on ESG. To further investigate this conjecture, we divide firms into subgroups based on their cash volatility in 2018, one year prior to the IPO system reform. Cash volatility is calculated

²⁰ Taking into accounting for holidays during the announcement period.

by dividing the standard deviation of quarterly cash flows by the absolute value of the mean of quarterly cash flows. The results presented in Table 8 indicate that the coefficient for *DID* is significantly positive in the low volatility (*Low VCF*) group but not in the high volatility group (*High VCF*). This finding suggests that firms with lower cash flow volatility possess greater financial resources and face less risk exposure, enabling them to engage more in ESG practices. As a result, these firms exhibit a significant improvement in their ESG disclosure.

Furthermore, we classify firms based on their ownership structure. As shown in Table 8, the coefficient for *DID* is significantly positive for non-state-owned enterprises (non-SOEs). One of the interpretations is that non-SOEs often face higher financial constraints compared to SOEs (Poncet et al. 2010). With the implementation of the registration-based IPO system, non-SOEs are motivated to enhance their competitiveness and attract investors to lower their cost of capital²¹, thereby leading them to put more effort in improving their ESG disclosure. On the other hand, given the special role of SOEs in China's economic agenda, non-SOEs may have a lower level of social responsibility compared to SOEs ex-ante, making them more exposed to this shock.

Lastly, we have categorized our sample according to industries classified by pollution levels as this may potentially alter their willingness to adopt ESG disclosure. The classification standard is according to the List of Industry Classification for Environmental Protection Inspection of Listed Companies22, officially issued by the Ministry of Environmental Protection in 2008. As presented in Table *9*, firms operating within industries characterized by lower pollution levels exhibit a more substantial enhancement in their overall ESG disclosure when compared to their counterparts in industries marked by high pollution levels. Specifically, we find these results are driven by their disclosure in environmental dimension, which firms operating in low-pollution industries place greater emphasis the environmental dimension within their ESG policy disclosures as stated in column 3 and 4.

5.4 Robustness Tests

To assess the robustness of the spillover effect in ESG disclosure, we first replace the dependent variable from the overall ESG score to its sub-scores, which are measured across three dimensions:

²¹ Both theorical and empirical work has documented ESG/CSR attributes lead to lower cost of capital (e.g., Chava, 2014; El Ghoul et al., 2011; Heinkel et al., 2001; Hong & Kacperczyk, 2009; Pedersen et al., 2021).

²² Details can be found: https://www.gov.cn/gzdt/2008-07/07/content_1038083.htm

environmental (E), social (S), and governance (G). We conduct our baseline regression analysis using the sub-scores separately and the results are presented in Table 10. For all three categories, the direct and overall spillover effects are significantly positive, demonstrating the robustness of the results.

Furthermore, we validate our results by checking the text contents from firms' annual reports. The Management Discussion and Analysis (MD&A) section of listed firms' annual reports serve as a crucial guide for the company's future development and relevant investment decisions. It also provides valuable insights into the presence of ESG-related information. To further assess the robustness of the results, this study employs a textual index developed by Li et al. (2024) to measure the proportion of environment-related sentences (*ES*) and words (*EW*) in the total MD&A. These alternative proxies serve as indicators of firms' ESG emphasis in their mandatory disclosures.

Table 11 presents the findings, which show a significantly positive increase in both the number of environmental sentences and the usage of environment-related words in the *MD&A* sections for firms in the direct treatment and overall treatment groups. Although the indirect influence is found to be statistically insignificant, it could be explained by the fact that these firms place more emphasis on the governance aspect as the results shown in Table 10. This increased inclusion of environment-related content in their *MD&A* further supports the conclusion that this shock resulting from the registration-based IPO system has positive spillovers on enhancing peer firms' ESG disclosure.

Also, we use alternative ESG data from Sino-Securities Index Information Service (Shanghai Co.Ltd) as explanatory variables in our baseline regression. Here, we adjust ESG values from 1 to 9, corresponding to ESG scores ranging from "C" to "AAA", respectively. One thing to note here is that Sino-Securities' ESG Index not only includes firms' ESG disclosures but also reflects their ESG performance. The results remain consistent with our baseline findings. In Table *12*, it shows that DID_{direct} and DID_{all} are significantly positively correlated with ESG performance. Overall, the spillover effects remain valid and consistent at the two-digit industry level.

Additionally, as firms may also be affected by spillover effects from other firms within the same regions (Dasgupta et al., 2023; Li & Wang, 2022; Matray, 2021), the overall spillover effects we examine based on their industry classification may also include the regional spillover effect. To address this concern, we introduce province-fixed effects in our previous model. The results are presented in the first column of Table 13, where the coefficient of DID_{all} is significant at 1% level. In Column 2, we include a city dummy variable $City_{i,t}$, which equals 1 if a focal firm *i* is in a city where at least one

firm has been listed through the registration-based IPO system at time t, and 0 otherwise. The result shown in column 2 indicates that the existence of a registration-based IPO within the same city does not affect the spillover effect. This implies that city effects could not serve as an alternative explanation in this study.

To further mitigate concerns that events other than the registration-based IPO reform may lead to confounding results, we conduct a placebo test to assess whether firms that fail to go public through the registration-based IPO system also have an influence on firms within the same industry. To achieve this, we manually collect data on firms failing to go public through the Registration-based IPO system, identifying the application years and industries to which they belong. Given the limited number of failed IPOs, we avoid using overly strict controls and instead apply one-digit industry-year fixed effect. The key variables *DID_failed_indirect* and *DID_failed_direct* are measured by matching focal firms with the failure IPOs using one-digit and two-digit industry classification respectively, which are dummy variables equal to 1 if there is a failed IPO in the sector or industry of the firm after the time t-1.

The result presented in Table 14 shows that the firms within both one-digit and two-digit industry classifications are not affected by those failed IPO firms. Therefore, this result verifies the causal relationship between the registration-based IPO and the observed positive effects on firms' ESG disclosure.

6 Conclusion

Over recent years, the demand for ESG information has increased significantly. In this paper, we contribute to the discussion by examining the positive spillovers of peer firms' ESG disclosures. Establishing causality between ESG disclosure and firms' interactions with peers is challenging as they are arguably endogenous. Typically, quasi-natural experiments based on policy changes are difficult to implement to analyze peer firms as such changes often apply to entire industries. However, the unique transition in the IPO system in China provides a setting where an exogenous shock affects only a subset of peers within an industry, which allows us to draw causal inferences by capturing variations in focal firms' ESG disclosure.

In particular, we employ a time-varying difference-in-differences (DID) model to examine the spillover effect on firms operating in industries that experience new entrants following the implementation of the registration-based IPO system. Our findings document a significant enhancement in focal firms' ESG disclosure subsequent to the first registration-based IPO within their respective industries, providing evidence of peer effects in ESG disclosure decisions. Especially, these results maintain statistically significant and exhibit greater magnitude under the two-digit industry classification, of which firms are directly affected. Furthermore, we identify two underlying mechanisms–competition threats and information demand-induced supervision as potential channels through which the spillover effects are effectively transmitted. In the cross-sectional analysis, we find that these spillover effects are more pronounced when a focal firm's ex-ante market awareness and accounting quality are low, as such firms have a greater need to attract investors and are under more urgent pressure to improve the accuracy of their information disclosure. In contrast, firms with high cash flow volatility experience weaker spillover effects, likely due to the greater uncertainty they face in making smooth adjustments to ESG practices. These findings provide additional support for the mechanisms driving peer effects in ESG disclosure.

Our findings provide valuable insights for disclosure regulation, particularly on how to influence firm' voluntary participation in ESG disclosure. We document positive spillovers from regulated firms to unregulated firms listed on different exchanges. Incorporating these results into further theoretical research may enhance understanding of the underlying social equilibria in disclosure decisions and support firms in strengthening their long-term commitment to social goals.

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Table

Year	Sector	Two-digit Industry
		Classification
2019	C: Manufacturing Industry	C14,C26,C27,C29,C30,C32,C3
		4,C35,C37,C38,C39,C40,C42
	I: Industry of Information Transmission, Software	I65
	and Information Technology Services	
	M: Scientific Research and Technical Service	M73
	Industry	
2020	C: Manufacturing Industry	C13,C17,C22,C28,C33,C36,C4
		1
	F: Wholesale and Retail Industry	F52
	G: Transport, Storage and Postal Service Industry	G59
	I: Industry of Information Transmission, Software	I64
	and Information Technology Services	
	K: Real Estate Industry	K70
	M: Scientific Research and Technical Service	M74
	Industry	
	N: Water Conservancy, Environment and Public	N77
	Facility Management Industry	
	R: Industry of Culture, Sports and Entertainment	R87
	1	51055/ · · · 1 · 1

Table 1 Lists of the First Registration-based IPO entrant in Different Industries

For more details: http://www.csrc.gov.cn/csrc_en/c102034/c1371375/content.shtml

Table 2 Summary Statistics

This table reports summary statistics of main variables. The sample of focal firms includes all firms that are listed in the Chinese Stock Market, excluding those in the financial industries. The sample period spans 2015-2021. All continuous variables are winsorized at the 1st and 99th percentiles.

Variable	Ν	mean	sd	min	medium	max
ESG	6191	30.417	7.273	16.849	28.750	55. 276
DID _{direct}	5088	0.191	0.393	0.000	0.000	1.000
DID _{indirect}	2184	0.109	0.311	0.000	0.000	1.000
DID _{all}	6191	0.209	0.406	0.000	0.000	1.000
Report Attention	4979	2.805	1.166	0.693	2.890	4.860
Liquidity Ratio	6191	1.810	1.507	0.248	1.403	11.141
R&D Spend	5323	0.020	0.020	0.000	0.016	0.094
Stock Return Volatility	6178	0.124	0.063	0.039	0.111	0.395
Manager	6053	0.204	0.403	0.000	0.000	1.000
Size	6191	23.343	1.232	19.714	23.250	26.592
Stock Returm	6168	0.146	0.505	-0.585	0.025	2.240
ROA	6191	0.039	0.065	-0.386	0.035	0.195
Top 5 Shareholders	6191	0.542	0.153	0.199	0.542	0.879
Leverage	6191	0.484	0.196	0.070	0.491	0.956
Tobin's Q	6082	1.993	1.520	0.822	1.488	10.944
CR	5983	0.577	0.193	0.262	0.580	0.669
HHI	6180	0.103	0.103	0.016	0.070	0.669
InsProp	6191	0.542	0.209	0.008	0.570	0.908
Search Index	6186	13.030	0.720	11.268	12.993	14.938

Table 3 The Spillover Effects of ESG Disclosure

This table shows whether there is a spillover effect in industrial peers' ESG disclosure following the implementation of IPO system. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The base regression is gradually saturated by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

		ES	G	
	(1)	(2)	(3)	(4)
	5.972***			
DID _{all}	(29.18)			
סוס		5.892***		
DID _{direct}		(26.90)		
סוס			4.850***	
DID _{indirect}			(2.76)	
מומ				13.66***
DID _{difference}				(4.32)
Firm FE	YES	YES	YES	YES
Ind×Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Cluster	Firm	Firm	Firm	Firm
Ν	3540	2970	1121	2989
R-Squared	0.856	0.849	0.884	0.855

t statistics in parentheses

Table 4 Parallel Tests

This table presents the effect of the registration-based IPOs on industrial peer firms' ESG disclosure around the years of the implementation of the registration-based IPO system. The results show the coefficient estimates on time dummies starting four years before the system's implementation and ending 1 year after due to data limitation. The regressions are performed on samples with varying levels of impact, constructed by matching firms based on the similarity of their business. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

		ESG	
	Direct	Indirect	All
	(1)	(2)	(3)
	-0.469	-1.261	-0.410
pre4	(-1.02)	(-0.82)	(-0.90)
2	0.387	2.155	0.471
pre3	(1.09)	(0.93)	(1.34)
2	0.517	0.128	0.231
pre2	(1.60)	(0.34)	(1.08)
	5.992***	4.879***	5.979***
current	(29.00)	(2.76)	(29.80)
.1	9.721***	6.413***	7.957***
post1	(10.59)	(2.74)	(17.60)
Firm FE	YES	YES	YES
Ind×Year FE	YES	YES	YES
Controls	YES	YES	YES
Cluster	Firm	Firm	Firm
Ν	3498	1130	3582
R-Squared	0.856	0.883	0.856

t statistics in parentheses

Table 5 Competition and Supervision Effects

This table explores the underlying mechanisms through which the spillover effects are transmitted following the implementation of the registration-based IPO system. Where *HHI* and *CR* are proxies of market concentration degree which are measured by the Herfindahl Index and the percentage of main revenue of the top eight companies in the industry, respectively. *InsProp* and *Search Index* measure the level of institutional investors' ownership and attention from internet. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	ESG					
	(1)	(2)	(3)	(4)		
	13.26***					
$DID_{all} \times CR$	(3.07)					
		12.85***				
DID _{all} × HHI		(3.70)				
			2.952**			
$DID_{all} \times InsProp$			(2.31)			
DID y Cogush Indon				0.780**		
$DID_{all} \times Search Index$				(2.15)		
Firm FE	YES	YES	YES	YES		
Ind×Year FE	YES	YES	YES	YES		
Controls	YES	YES	YES	YES		
Cluster	Firm	Firm	Firm	Firm		
Ν	3478	3580	3582	3577		
R-Squared	0.854	0.856	0.857	0.856		

t statistics in parentheses

Table 6 Investor Attention

This table explores how spillover effects vary across groups with different investor attention. The companies are divided into three levels according to the number of average posts and comments of the companies on East Money and Sina stock forums about the companies' stocks in 2018. For comparison, the table focuses on the results from the top third and the bottom third groups. Dependent variables are indicated at the top of each column and measured by companies ESG scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Difference	P-value	= 0.0853	P-value=0.0002		
		Η	ESG		
	Low Post	High Post	Low Comments	High Comments	
	(1)	(2)	(3)	(4)	
חות	4.394**	5.939***	-0.232	4.980***	
DID _{all}	(2.36)	(10.69)	(-0.26)	(3.38)	
Firm FE	YES	YES	YES	YES	
Ind×Year FE	YES	YES	YES	YES	
Controls	YES	YES	YES	YES	
Cluster	Firm	Firm	Firm	Firm	
Ν	1147	782	665	1372	
R-Squared	0.887	0.921	0.931	0.874	

t statistics in parentheses

Table 7 Accounting Information Quality

This table explores how spillover effects vary across groups with different accounting information quality. The companies are divided into three levels according to accounting information quality and timeliness in 2018. For comparison, the table focuses on the results from the top third and the bottom third groups. AQ measures firms' accounting information robustness. Lag is the time interval between the end date of the last fiscal year and the actual disclosure date of the annual report (including holidays during the announcement period). The table shows the highest-level and the lowest-level group results. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Difference	P-value	e=0.0199	P-value=	=0.0000
		E	SG	
	Low AQ	High AQ	Short Lag	Long Lag
	(1)	(2)	(3)	(4)
	6.081***	5.838***	2.777***	6.197***
DID _{all}	(25.00)	(11.01)	(5.96)	(12.58)
Firm FE	YES	YES	YES	YES
Ind×Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Cluster	Firm	Firm	Firm	Firm
Ν	2504	974	1345	1030
R-Squared	0.843	0.886	0.896	0.863

t statistics in parentheses

Table 8 Volatility of Cash Flow and Ownership

This table explores how spillover effects vary across different groups of cash flow volatility and ownership structure. The companies are divided into three groups based on the volatility of cash flow in 2018 and their ownership structure. For comparison, the table focuses on the results from the top third (High VCF) and the bottom third (Low VCF) groups. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Difference	P-value=	=0.0000	P-value=0.0034						
		ESG							
	Low VCF	High VCF	State-owned	Non-state-owned					
	(1)	(2)	(3)	(4)					
	5.636***	2.465	1.734	5.887***					
DID _{all}	(17.26)	(1.40)	(1.59)	(17.86)					
Firm FE	YES	YES	YES	YES					
Ind×Year FE	YES	YES	YES	YES					
Controls	YES	YES	YES	YES					
Cluster	Firm	Firm	Firm	Firm					
Ν	1483	1054	1890	1422					
R-Squared	0.881	0.865	0.875	0.850					

t statistics in parentheses

Table 9 Pollution level and ESG Disclosure

This table explores how spillover effects vary across different groups of pollution status. The companies are divided into groups whether they are in the high-pollution industries or low-pollution industries. Dependent variables are indicated at the top of each column and measured by companies' ESG scores and the sub-scores, which are E, S, and G respectively. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	ES	G	I	E	S		G	
	Hpollu	Lpollu	Hpollu	Lpollu	Hpollu	Lpollu	Hpollu	Lpollu
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
מומ	4.678***	5.790***	6.872***	13.94***	1.201	0.845***	5.357**	2.602***
DID _{all}	(3.23)	(24.29)	(2.47)	(28.72)	(1.02)	(3.44)	(3.4)	(9.12)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Ind×Yea r FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Ν	1168	2414	1167	2403	1167	2412	1167	2414
R- Squared	0.860	0.851	0.823	0.784	0.836	0.817	0.809	0.800

t statistics in parentheses

Table 10 ESG Disclosure into Sub-scores

This table explores the robustness of the spillover effects. The alternative dependent variables are indicated at the top of each column and measured by ESG disclosure sub-scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

		ESG		En	vironmental(H	E)		Social(S)		C	Governance(G)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	5.972***			14.25***			0.966***			2.503***		
DID _{direct}	(29.18)			(31.64)			(4.51)			(9.67)		
		5 892***			6 885			0.737			7 014***	
$DID_{indirect}$		(26.90)			(0.99)			(0.89			(2.73)	
		(20.90)			(0.99))			(2.15)	
תות			4.850***			14.37***			1.017***			2.559***
DID _{all}			(2.76)			(35.57)			(4.89)			(10.55)
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Ind×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Ν	3540	2970	1121	3000	1123	3570	3005	1128	3579	3006	1130	3581
R-Squared	0.856	0.849	0.884	0.796	0.837	0.804	0.819	0.852	0.824	0.795	0.818	0.802

t statistics in parentheses

Table 11 Environmental Information Disclosure

This table further assesses the robustness of the spillover effect by conducting text analysis to explore the presence of environmental content in firms' management discussion and analysis sections(MD&A). The alternative dependent variables are indicated at the top of each column and measured by the proportion of environmental sentences(ES) and words(EW) in MD&A. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

		ES			EW	
	(1)	(2)	(3)	(4)	(5)	(6)
מות	0.00638***			0.0261***		
DID _{direct}	(5.15)			(14.54)		
מזמ		-0.00626			-0.00607	
DID _{indirect}		(-1.12)			(-0.40)	
מומ			0.00615***			0.0255***
DID _{all}			(5.57)			(15.79)
Firm FE	YES	YES	YES	YES	YES	YES
Ind×Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Ν	5887	1858	6821	5887	1858	6821
R-Squared	0.940	0.970	0.943	0.932	0.964	0.934

t statistics in parentheses

Table 12 Alternative ESG Measure

This table explores the robustness of the spillover effects by using alternative ESG measure. The alternative variables are indicated at the top of each column and measured by the ESG scores from Sino-Securities Index Information Service(Shanghai) Co.Ltd. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

		ESG_Sino	
	(1)	(2)	(3)
מזמ	2.028***		
DID _{direct}	(63.95)		
סזס		-0.0788	
DID _{indirect}		(-0.12)	
מות			2.041***
DID _{all}			(70.77)
Firm FE	YES	YES	YES
Ind×Year FE	YES	YES	YES
Controls	YES	YES	YES
Cluster	Firm	Firm	Firm
Ν	5914	1871	6857
R-Squared	0.735	0.788	0.742

t statistics in parentheses

Table 13 Regional Spillover Effects

This table addresses the potential explanation that spillover effects may transmit through the same regions which firms operate. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The first-column regression includes city-fixed effect additionally. The second-column regression includes the interaction term of *DID* and the city dummy variable, which is equal to 1 if the firm is in the city where there is a first registration-based IPO firm. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	ESG	
	(1)	(2)
DID _{all}	5.970***	5.696***
	(29.76)	(8.79)
$DID_{all} \times City$		0.284
		(0.45)
Firm FE	YES	YES
Ind×Year FE	YES	YES
City FE	YES	No
Controls	YES	YES
Cluster	Firm	Firm
Ν	3576	3582
R-Squared	0.855	0.856

t statistics in parentheses

This table explores whether firms that fail to go public through the Registration-based IPO system will impact other companies in the same industry. Dependent variables are indicated at the top of each column and measured by companies' ESG scores. The results remain robust by adding additional controls. All models include constant, firm fixed effects, industry-year fixed effects and controls, but the coefficients are not tabulated. T-statistics are presented in parentheses. Standard errors are corrected for heteroscedasticity and clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	ESG	
	(1)	(2)
DID failed direct	-0.332	
DID_J uneu_uneci	(-0.14)	
DID_failed_indirect		2.759
		(1.63)
Firm FE	YES	YES
Ind×Year FE	YES	YES
Controls	YES	YES
Cluster	Firm	Firm
Ν	555	555
R-Squared	0.836	0.836

t statistics in parentheses

Appendix

Appendix A

Differences between Approval-based IPO system and Registration-based IPO system

	Approval-based IPO	Registration-based IPO
Institutional Backgrounds	The retail investors dominate the trading.	With more institutional investors participated in.
IPO Approval	High. The applicant has to (i) provide	Low The applicant has to provide
Listing	(ii)meet strict criteria regarding revenue	public and accurate information
standards	and profitability	public and accurate information.
standards		Securities hashers on investment
IPO Approval Process: Pre- listing examination	(i)Securities regulator;(ii) Securities brokers or investment banks.	banks. Note that securities regulators only focus on the formalities of the application materials.
Post-listing financial supervision	Weak.	Strong. The system focuses on the enforcement of post-listing information disclosure requirements.
Marketisation level	Low.	High.
IPO efficiency	Low. Applicants need 560 days on average to get listed on the main board.	High. Applicants need 271 days or305 days on average to get listed on the STAR or SZSE growth enterprises market.
Penalties for financial fraud and other illegal activities	5% of the total funds raised as the fine.	100% of the total funds raised as the fine.
Information	True, accurate and complete, with no	Based on the original, add the
disclosure	false records, misleading statements or	requirement of conciseness and
requirement	material omissions.	clarity, understandability.

Appendix B

Variable Definitions

Variable	Data Construction and Source	
ESG	Companies' ESG Score. Source: Bloomberg database.	
E	Companies' environmental(E) Score. Source: Bloomberg database.	
S	Companies' social(S) Score. Source: Bloomberg database.	
G	Companies' governance(G) Score. Source: Bloomberg database.	
DID _{direct}	A dummy variable equals 1 if there is a first registration-based IPO in the industry of the company at the time t-1. The industry is classified as the two-digit industry. Source: CSMAR database.	
DID _{indirect}	A dummy variable equals 1 if there is a first registration-based IPO in the one-digit classified but not two-digit classified industry of the company at the time t-1. Source: CSMAR database.	
DID _{all}	A dummy variable equals 1 if there is an IPO in the industry of the company at the time t-1. The industry is classified as the one-digit industry. Source: CSMAR database.	
DID _{diff} erence	A dummy variable equals $DID_{all} \times Group$, where <i>Group</i> is a dummy that equals 1 if the firm is in the direct group. Source: CSMAR database.	
DID _{failed_direct}	A dummy variable equals 1 if there is a first registration-based IPO but finally failed in the industry of the company at the time t-1. The industry is classified as the two-digit industry. Source: CSMAR database.	
DID _{failed_indirect}	A dummy variable equals 1 if there is a first registration-based IPO but finally failed in the one-digit classified but not two-digit classified industry of the company at the time t-1. The industry is classified as the two-digit industry. Source: CSMAR database	
City	A dummy variable equals 1 if the firm is located at the city where there is a first registration-based IPO. Source: CSMAR database.	
Report Attention	The logarithm of the number of related reports. Winsorized at the 1% and 99% levels. Source: CSMAR.	
Liquidity Ratio	A firm's liquid assets divided by its total liability at the end of the year. Winsorized at the 1% and 99% levels. Source: CSMAR database.	
R&D Spend	A firm's total R&D Spending divided by its total assets. Winsorized at the 1% and 99% levels. Source: CSMAR database.	
Stock Return Volatiliy	Standard deviation of firm's stock return over one year. Winsorized at the 1% and 99% levels. Source: CSMAR database.	

Manager	A dummy variable equals 1 if the CEO and COB are the same person. Source: CSMAR database.
Size	The logarithm of total assets. Winsorized at the 1% and 99% levels. Source: CSMAR database.
Stock Return	A firm's stock return over one year. Winsorized at the 1% and 99% levels. Source: CSMAR database.
ROA	A firm's total assets divided by its total assets at the end of the year. Winsorized at the 1% and 99% levels. Source: CSMAR database.
Top 5 Share Holders	The proportion of shares of the top 5 shareholders. Winsorized at the 1% and 99% levels. Source: CSMAR database.
Leverage	A firm's total liabilities divided by its total assets at the end of the year. Winsorized at the 1% and 99% levels. Source: CSMAR database.
Tobin's Q	A firm's total market value divided by its total assets. Winsorized at the 1% and 99% levels. Source: CSMAR database.
ННІ	The summation of the square of the ratio of the revenue of each company in the industry to the total revenue of the industry, calculated as Rhoades(1993). Winsorized at the 1% and 99% levels. Source: CSMAR database.
CR	The percentage of main revenue of the top five companies in the industry. Winsorized at the 1% and 99% levels. Source: CSMAR database.
InsProp	The proportion of institutional investor of a firm. Winsorized at the 1% and 99% levels. Source: CSMAR database.
Search Index	The logarithm of Web Search Volume Index(WSVI) of a firm. WSVI is constructed based on the Baidu platform, and measures the total volume of public searches using stock codes and company names (including abbreviations and full names) as keywords. Winsorized at the 1% and 99% levels. Source: CNRDS database.
pre*	A dummy variable equals 1 if the company is treated and it is *years before the reform, where *represents 1-4. Source: CSMAR database.
Posts	The average number of posts by users who posted on East Money and Sina stock forums related to the companies' stock. Source: CSMAR database.
Comments	The average number of comments on each posts on East Money and Sina stock forums related to the companies' stock. Source: CSMAR database.
AQ	A dummy variable equals 1 if the accounting information of a firms

	is robust. Following the ACF model of Ball and Shivakumar(2006): $ACC_{i,t} = \alpha_0 + \alpha_1 DR_{i,t} + \alpha_2 CFO_{i,t} + \alpha_3 DR_{i,t} \times CFO_{i,t} + \varepsilon_{i,t}$ $ACC_{i,t}$ is total accruals, equal to net profit plus finance costs minus net cash flow from operating activities. $CFO_{i,t}$ is the net cash flow from operating activities. $DR_{i,t}$ is the dummy variable that $DR_{i,t}$ $= 1$ if $CFO_{i,t} < 0$ and $DR_{i,t} = 0$ if $CFO_{i,t} > 0$. α_3 reflects the incremental sensitivity of total accruals to negative operating cash flows over sensitivity to positive operating cash flows. After the regression for each year and each industry(according to the one- digit classification), if $\alpha_3 > 0$, meaning total accruals is more sensitive to the negative operating cash flows, demonstrating the robustness of accounting information. $AQ=1$ if $\alpha_3 > 0$ and $AQ=0$ if $\alpha_3 < 0$. Source: CSMAR database.
Lag	Time interval between the end date of the last fiscal year and the actual disclosure date of the annual report (including the holidays during the announcement period). Source: CSMAR database.
VCF	Cash flow volatility, the standard deviation of quarterly cash flows divided by the absolute value of the mean of quarterly cash flows of a firm. Source: CSMAR database.
SOE	A dummy variable equals 1 if a firm is state-owned. Source: CSMAR database.
ES	Proportion of environment-related sentences in an annual report of a firm (Li et al., 2024). Winsorized at the 1% and 99% levels.
EW	Proportion of environment-related words in an annual report of a firm (Li et al., 2024). Winsorized at the 1% and 99% levels.
Hpollu(Lpollu)	A dummy variable equals 1 if a firm is in the high pollution industry, classified according to the <i>List of Industry Classification for Environmental Protection Inspection of Listed Companies</i> .
ESG_Sino	ESG data from Sino-Securities Index Information Service (Shanghai) Co. Ltd. Scaled to 0-100. Winsorized at the 1% and 99% levels. Source: Wind database.