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Mandatory CSR disclosure and analyst forecast properties: Evidence from a quasi-natural experiment in China

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ABSTRACT

Based on a quasi-natural experiment that mandates a subset of listed firms to issue standalone corporate social responsibility (CSR) reports, we examine whether mandatory CSR disclosure improves analysts' information environment. We focus on two properties of analysts' earnings forecasts: forecast error and forecast dispersion. We find that the mandatory issuance of standalone CSR reports is related to less forecast error and less dispersed forecasts, and the effect varies with the firm-level information environment and province-level marketization. Additional tests show that the improvement in forecast properties is mainly driven by CSR reports that i) are of high quality and ii) contain more long-term-oriented information than other CSR reports. Our findings provide evidence that mandatory CSR disclosure plays an important informational role for financial analysts.

1. Introduction

Corporate social responsibility (CSR) generally refers to a firm's responsibilities toward the community and environment in which it operates. CSR typically includes economic, legal, ethical, and philanthropic responsibilities (Carroll, 1991). Despite early opponents to CSR argue that managers' only responsibility is profit

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maximization (Friedman, 1970), investment in CSR activities has shown an increasing trend worldwide because of CSR's strategic implications (McWilliams et al., 2006). Taking the social expenditure dimension as an example, public social spending has comprised approximately 21% of the gross domestic product across Organisation for Economic Co-operation and Development (2016) countries since 2009.

Given widespread CSR practices, the disclosure of CSR activities is of particular interest to various stakeholders. An increasing number of firms are choosing to voluntarily disclose their CSR practices. The literature documents favorable consequences of voluntary CSR disclosure, as it can reduce the cost of equity capital (Dhaliwal et al., 2011), improve the accuracy of analyst forecasts (Dhaliwal et al., 2012), mitigate corporate tax aggressiveness (Lanis and Richardson, 2012), increase the value of cash holdings (Lu et al., 2016), discourage high-profile misconduct (Christensen, 2016), and lower stock price synchronicity (Grewal et al., 2017).

Despite its potential benefits, however, the disclosure of CSR activities is typically self-regulated. Regulators in some capital markets (e.g., Australia, Belgium, China, Denmark, France, Malaysia, Sweden, and the United Kingdom) mandate certain types of firms to disclose their CSR activities, whereas other markets (e.g., Hong Kong) plan to mandate CSR disclosure. Mandatory disclosure differs from voluntary disclosure in several ways. First, it is nonreversible and typically involves nontrivial costs for the disclosing firms (e.g., Dye, 1990; Fishman and Hagerty, 2003). Second, compared with voluntary disclosure, mandatory disclosure is less costly for information users to obtain because it is usually made through prescribed channels and with prescribed timing. Third, although a firm's voluntary disclosure is endogenously determined (Verrecchia, 1983) and can be influenced by mandatory disclosure (Einhorn, 2005; Bischof and Daske, 2013), mandatory disclosure substantially mitigates concerns over endogeneity issues. Because of these differences, it is ex-ante unclear whether and to what extent the previously documented financial and/or informational benefits of voluntary CSR disclosure apply to mandatory CSR disclosures (Chen et al., 2018).[2]

We investigate the informational consequences of mandatory CSR disclosure from the perspective of financial analysts because they represent investors and are sophisticated information users. Analysts play valuable informational roles through their ability to clarify and confirm corporate disclosures. Moreover, they can discover information beyond corporate disclosures (Huang et al., 2018). Analysts' reports usually incorporate a substantial amount of nonfinancial information (Orens and Lybaert, 2007) that can be provided by CSR reports.

We examine whether mandatory CSR disclosure improves the quality of analysts' earnings forecasts based on a quasi-natural experiment in China. We conduct this study in the context of the Chinese market for the following two reasons. First, China has experienced decades of rapid economic growth and is now the second-largest economy in the world. In addition, a series of environmental, social, and governance problems have arisen. It is particularly important for stakeholders to enhance their understanding of the potential consequences of these problems. Financial analysts play a crucial informational role in the fast-growing Chinese capital market because it is dominated by individual retail investors.[3] Analysts' services can add great value by informing ordinary investors and improving market efficiency (Gu et al., 2013).

Second, unlike many developed capital markets, where the disclosure of CSR activities is voluntary, China has required certain types of listed firms to issue standalone CSR reports since 2008. The Shanghai Stock Exchange (SHSE) mandates standalone CSR reports for firms included in the Corporate Governance Index, firms with overseas listed shares, and firms in financial industries. The Shenzhen Stock Exchange (SZSE) mandates standalone CSR reports for firms included in the SZSE 100 Index. The requirement of only a subset of listed firms to issue standalone CSR reports provides a quasi-natural experimental setting in which we can use a difference-in-differences (DID) research design to investigate the consequences of mandatory CSR disclosure. Accordingly, our study can better address the endogeneity issue and establish a causal relation between CSR disclosure and analysts' information environment than previous studies on the consequences of voluntary CSR disclosure (Clarkson et al., 2008).

Using a DID approach, we find that the mandatory issuance of standalone CSR reports reduces both analyst forecast error and analyst forecast dispersion. However, this improvement only occurs in firms that are less transparent and domiciled in more marketized provinces than in other firms. The improvement in ana-

[2] In the scenario of the adoption of International Financial Reporting Standards (IFRS), previous studies (e.g., Daske et al., 2008; Florou and Pope, 2012) show that benefits related to the IFRS adoption do not apply equally to voluntary and mandatory adopters.

[3] Individual investors contributed approximately 85% of the total trading volume in 2017 (SHSE, 2018).

lysts' information environment also varies by CSR report. Further analyses show that this improvement only occurs when the CSR report i) is of high quality and ii) contains more long-term-oriented information than other CSR reports. Our results hold for a battery of robustness tests. Overall, our findings provide evidence that mandatory CSR disclosure plays an important informational role for analysts.

We contribute to the literature in the following three ways. First, our study fits into the literature that investigates the effect of mandatory disclosure. Although mandatory disclosure by its nature differs from voluntary disclosure, the literature examines the effect of mandatory disclosure requirements regarding accounting standards, such as segment reporting (Cho, 2015), risk factor disclosure (Chiu et al., 2018), 8-K expansion (McMullin et al., 2019), and the dissemination of patent information (Saidi and Zaldokas, 2021). These studies tend to support the positive informational consequences of mandatory disclosures. However, Blankespoor et al. (2019) suggest that reporting regulations have limited usefulness because of users' significant processing costs. Leuz and Wysocki (2016), based on an excellent discussion of the economics of financial reporting regulation, suggest that exploring nontraditional forms of disclosure more generally tends to be a fruitful area of accounting research.

Our study echoes Leuz and Wysocki's (2016) suggestions in the context of CSR reporting requirements. Recent research pays attention to the various consequences of mandatory CSR disclosure. One stream of literature examines the real effects of mandatory CSR disclosure, including a decrease in the number of mining-related citations and injuries (Christensen et al., 2017), decreases in both profitability and industrial wastewater and SO_2 emission levels (Chen et al., 2018), improved investment efficiency (Liu and Tian, 2021), and reduced pay gaps (Huang et al., 2022). The other stream investigates the informational effects of CSR disclosure and finds constrained earnings management (Wang et al., 2018), enhanced CSR reporting quality (Hamed et al., 2021), and enhanced stock market liquidity and higher market valuation (Roy et al., 2022). However, Grewal et al. (2019) document an overall negative market reaction to events that increase the likelihood of the European Union's passage of a directive mandating increased nonfinancial disclosures. Our study joins this line of literature and adds to its knowledge of the informational consequences of mandatory CSR disclosure by investigating whether financial analysts, as a group of sophisticated information users, incorporate this type of information into their earnings forecasts. To this end, we contribute to the literature on the effect of a mandatory disclosure policy in China.

Second, a growing stream of the literature examines whether and how investors and creditors use nonfinancial characteristics (i.e., information not directly available from financial statements) in general and CSR information in particular (e.g., Dhaliwal et al., 2011; Dhaliwal et al., 2012; Cao et al., 2015; Griffin et al., 2017; Amel-Zadeh and Serafeim, 2018; Kim et al., 2018). Our study adds to this stream of literature by investigating the usefulness of mandatory CSR disclosure to financial analysts and documenting that high-quality CSR reports and reports with long-term-oriented information improve analysts' information environment.

Third, we contribute to the literature on analysts' role in China. As information intermediaries, analysts play an important role in the capital market. They create value for investors by discovering and interpreting information (Chen et al., 2010; Huang et al., 2018). Analysts' informational role is particularly important in emerging markets such as China because of the prevalence of individual investors in the capital market. Recent studies document that analysts in China deter corporate fraud (Chen et al., 2016), abate bubble intensity by coordinating investors' beliefs (Andrade et al., 2013), and produce information concerning the pricing of initial public offerings (Jia et al., 2018). Our study sheds new light on this line of research by showing that nonfinancial information, such as firms' CSR disclosures, can affect analyst forecast properties.

The remainder of the paper is organized as follows. Section 2 reviews the literature and develops our hypothesis. Section 3 describes our sample and data. Section 4 specifies our empirical model. Section 5 discusses our empirical results, and Section 6 concludes the paper.

2. Literature review and hypothesis development

2.1. Institutional background on mandatory CSR disclosure in China

In recent decades, the world has witnessed exponential growth in the number of firms that quantify and report nonfinancial information from environmental (e.g., carbon emissions, water consumption, and waste

generation), social (e.g., employee, product, and customer-related), and governance (e.g., political lobbying, anti-corruption, and board diversity) perspectives. Whereas<20 firms worldwide disclosed nonfinancial information in the early 1990 s, the number of firms issuing such information, either in the form of a standalone report or integrated reports, increased to nearly 9,000 by 2016 (Amel-Zadeh and Serafeim, 2018). One possible reason for the increase in disclosure is pressure from various stakeholders to disclose information related to the environmental and social impacts of firms' operations. Another possible reason for the increased disclosure is regulatory requirements imposed around the world, such as in China, Denmark, Malaysia, and South Africa.

Concerning China, in December 2008, the SHSE and SZSE stock exchanges issued a Notice Concerning Listed Companies' Preparation for 2008 Annual Reports (hereafter the Notice). The Notice mandates the following types of listed firms to issue standalone CSR reports from fiscal year 2008 onward: i) firms included in the Corporate Governance Index, ii) financial firms, iii) firms cross-listed on overseas stock exchanges, and iv) firms included in the SZSE 100 Index. Accordingly, the SZSE issued Social Responsibility Guidelines to Listed Companies (hereafter the Guidelines). According to the Guidelines, the standalone CSR reports should i) describe whether and how various CSR activities (e.g., labor protection, environmental protection, work safety, welfare plans, and community relationships) are carried out, ii) assess the outcomes of the implementation of the Guidelines and explain the reason for any gaps, and iii) describe the plans and timetables for potential improvements. The mandatory disclosure of standalone CSR reports for only a subset of firms provides us with a quasi-natural experimental setting in which we can compare changes in analysts' information environment between the treatment group (i.e., firms subject to the mandatory CSR disclosure) and the control group (i.e., firms not subject to the mandatory CSR disclosure) after 2008.

Based on this setting, several recent studies examine the impact of mandatory CSR disclosure on the information environment. This stream of literature generally documents that CSR disclosure leads to a favorable change in the information environment. For example, Ioannou and Serafeim (2017) find a significant increase in the disclosure of corporate environmental, social, and governance information in four countries (China, Denmark, Malaysia, and South Africa) that mandate CSR disclosure. Enhanced disclosure is associated with increases in firm valuation. Based on high-frequency trade data, Hung et al. (2015) document a decrease in information asymmetry resulting from China's mandatory CSR disclosure. Wang et al. (2018) examine financial reporting information and find a decrease in earnings management after the institution of the mandatory CSR disclosure regulation. Another stream of literature finds that the mandatory CSR disclosure has real effects in terms of i) decreased numbers of mining-related citations and injuries and reduced labor productivity (Christensen et al., 2017); ii) lower industrial wastewater and SO_2 emission levels (Chen et al., 2018); iii) reduced investment inefficiency, especially overinvestment (Liu and Tian, 2021); and iv) reduced pay gaps, promoting economic growth by improving innovation and productivity (Huang et al., 2022).

However, these positive social externalities are associated with deterioration in financial performance (Chen et al., 2018). Following this line of literature, we can reasonably expect the mandatory disclosure requirement to improve the information environment. In turn, improved transparency changes firm behavior and, subsequently, financial performance. Financial analysts, as an important type of information intermediary, are likely to incorporate information in CSR reports into their earnings forecasts. We thus expect mandatory CSR disclosure to affect analyst forecast properties.

2.2. CSR disclosure and analyst forecasts

China's mandatory CSR disclosure can potentially affect analysts' earnings forecasts through the following two channels. First, standalone CSR reports provide important nonfinancial information to market participants. Although there is no specific requirement for the content or format that a firm should follow in presenting its CSR report, a typical CSR report describes a firm's CSR activities that are of interest to various stakeholders (shareholders, creditors, employees, customers, suppliers, the government, and the community). In this sense, market participants can extract valuable information from CSR reports (Griffin and Sun, 2013). For example, some firms describe their customer care from the perspectives of product quality, customer satisfaction, post-sales services, and innovation activities. CSR reports can also show various examples of how firms care for their employees, such as by providing incentive schemes, training programs, and career

opportunities. The literature supports the informativeness of CSR disclosure in that it affects firm value (Matsumura et al., 2014; Plumlee et al., 2015).

Unlike lagged financial information, these nonfinancial perspectives provide forward-looking information. The literature provides potential explanations for why nonfinancial information can predict future financial performance. For example, employee satisfaction can attract talent and improve operational efficiency (Berns et al., 2009), predict future firm performance (Huang et al., 2015), and enhance firm value (Edmans, 2011). Similarly, customer satisfaction can serve as a leading indicator of customers' future purchase behaviors and help predict accounting performance (Ittner and Larcker, 1998). Financial analysts, as sophisticated information users, are expected to be able to utilize and incorporate the nonfinancial information contained in CSR reports when making their forecasts.

Second, firms that are mandated to issue standalone CSR reports expect that their CSR activities will be disclosed to the public yearly and thus that they will be subject to the scrutiny of capital market participants. This expectation serves a self-disciplining and monitoring role. For example, if a firm explains in its current CSR report that it values customers by committing to high product quality, its managers will then be motivated to improve or at least maintain product quality in future years because they are aware of the capital market's expectations. As sophisticated information intermediaries, financial analysts are likely to understand the self-disciplinary effect of mandatory CSR disclosure on managerial behaviors and firm performance and to take this effect into account when forecasting firms' future earnings. Thus, we hypothesize the following:

Hypothesis: Analyst forecast properties improve significantly after mandatory CSR disclosure.

3. Sample and data

Although the two stock exchanges mandated certain types of listed firms to disclose standalone CSR reports in 2008, most of these firms began complying with the requirement in 2009. Our sample period is from 2005 to 2012, that is, four years before and four years after the effective adoption year of 2009.[4] We use a DID approach to compare the impact of the mandatory CSR disclosure on analyst forecast properties. To do so, we identify all of the firms included in the mandatory adoption list, which comprises our treatment firms. We filter data from the SHSE and SZSE websites to identify the firms covered by the Notice. To ensure the validity of our identification, we confirm the list by checking the official websites of all of the treatment firms. The initial identification procedure results in 252 unique treatment firms.

Next, we apply the following procedures to all of the listed firms to filter the sample. We first delete financial-industry firms and then remove firm-year observations with missing values for the required variables. To ensure that our results are not contaminated by voluntary CSR disclosures, we exclude firms that voluntarily disclosed CSR reports in the pre-adoption period. This leaves us with 13,513 firm-year observations, 1,893 of which are from the treatment group and 11,620 from the control group.

We then construct a matched sample using a propensity score matching (PSM) approach. We regress a logit model on whether an observation is a mandated firm for the period from 2005 to 2008 by including a set of control variables that are likely to affect the probability of inclusion in the mandatory disclosure list. Following Chen et al. (2018), we include market capitalization (*Market_CAP*), stock returns (*Return*), share turnover (*Turnover*), profitability (*ROA*), the percentage of government shareholdings (*Stateshare*), the donations the firm makes (*Donation*), the number of analysts following the firm (*Analyst_N*), whether the firm's chief executive officer or chairperson is politically connected (*PC*), and whether the firm operates in a polluting industry

[4] We use several approaches to mitigate the concern about concurrent events. First, we search the relevant regulations mandating disclosure of CSR-related issues during our sample period. In 2010, the Ministry of Ecology and Environment (MoEE) required heavily polluting firms to disclose their environmental reports. Because this requirement came later than our setting period and the scope of CSR reports is wider than that of environmental reports, we expect that analysts' information set is not significantly affected. In addition, in Section 5.4, we exclude polluting firms to examine the robustness of our results. Second, both the MoEE and the two stock exchanges encouraged the voluntary disclosure of environmental or CSR reports prior to such disclosure becoming mandatory. We therefore exclude voluntarily disclosing firms in the pre-adoption period to mitigate the potential impact of voluntary disclosure. Third, we conduct placebo tests in Section 5.4. We use a similar research design to that found in the literature (Wang et al., 2018; Liu and Tian, 2021; Huang et al., 2022) to examine the impact of mandatory CSR disclosure, and we are thus less concerned that our conclusions could be unduly influenced by concurrent events.

(*Polluting*). We also control for industry and year fixed effects. All of the variables are defined in Appendix A. The results of the logit model for the PSM approach are reported in Panel A of Appendix B.

As shown in Appendix B, the probability of being included in the CSR mandatory disclosure list is positively (negatively) associated with firm size, profitability, government shareholdings, and analyst following (share turnover). We then match each treatment firm to a control firm using nearest-neighbor matching. The PSM procedure leaves us with 3,540 firm-year observations, 1,681 of which are from treatment firms and 1,859 of which are from control firms, corresponding to 249 and 317 unique firms, respectively.[5] Panel B of Appendix B reports the parallel trends test. As shown, the differences in the dependent variables between the treatment and control groups increase significantly from the pre- to the post-adoption period.

Table 1 describes our sample distribution, with Panel A reporting the yearly distribution and Panel B reporting the industry distribution. More than half of the treatment sample belongs to the manufacturing industry, which is consistent with the general distribution of the Chinese A-share market. In addition, the treatment and control groups display similar industry distribution patterns.

4. Model specification

To empirically examine whether the mandatory CSR disclosure has any impact on analyst forecast properties, we estimate the following ordinary least squares (OLS) regression model based on the PSM sample described in Section 3:

$$Forecast\ \ Properties(Y)_{t+1} = a_0 + a_1 Treat + a_2 Post + a_3 Treat{*}Post + Analyst\text{-}specific\ \ Controls_t + Firm\text{-}specific\ Controls_t + fixed\ effects + error\ term \quad (1)$$

where analyst forecast properties are measured in the dimensions of analyst forecast error (*Ferr*) and analyst forecast dispersion (*Disp*). Analyst forecast error captures the amount of information that analysts incorporate into their forecasts, and analyst forecast dispersion captures the degree of uncertainty in their information set (Barron and Stuerke, 1998). We calculate forecast error and forecast dispersion with earnings forecasts for three different forecast horizons. The terms *Ferr(0), Ferr(1),* and *Ferr(2)* are the absolute values of the mean errors for forecasts on a firm's earnings per share (EPS) in years t, $t+1$, and $t+2$, respectively, scaled by the actual EPS; *Disp(0)*, *Disp (1)*, and *Disp(2)* are the standard deviations of forecasts on EPS in years t, $t+1$, and $t+2$, respectively, scaled by the actual EPS; *Treat* is an indicator variable that equals one if the firm is included in the mandatory CSR disclosure list (i.e., a treatment firm), and zero otherwise (i.e., a control firm); and *Post* is an indicator variable that equals one for the post-mandatory period from 2009 to 2012, and zero for the pre-mandatory period from 2005 to 2008 (Chen et al., 2018).[6]

The coefficient of the interaction term, a_3, thus captures the DID effect of whether analyst forecast properties change significantly for the treatment group after the mandatory CSR disclosure requirement compared with the control group. If the standalone CSR reports are informative for analysts making earnings forecasts, we expect both analyst forecast error and analyst forecast dispersion to decrease with the incremental information; in other words, a_3 is expected to be significantly negative.

We include two types of control variables, namely, analyst-specific controls and firm-specific controls, to control for other factors that could affect analyst forecast error and analyst forecast dispersion. Following Cheng et al. (2016), we control for the forecast horizon (*Horizon*) because analyst forecast error and analyst forecast dispersion are likely to increase with the forecast horizon. Brokerage size (*BrokerSize*) and the brokerage age (*BrokerAge*) are controlled for because financial analysts from larger and longer-lived brokerage houses are likely to make more accurate earnings forecasts than financial analysts from other brokerage houses. Analyst experience is further controlled for by the average number of companies covered by analysts forecasting the firm's earnings (*Coverage*). We control for the frequency of new information incorporated by

[5] We allow all of the nearest neighbors to be included in the control group, resulting in an unbalanced number of treatment and control firms.

[6] As a sensitivity check, we calculate the alternative measures of analyst forecast error and analyst forecast dispersion by using the closing stock price at the last fiscal year-end date as the scale and re-estimate all of the regressions with the alternative variables. Although not tabulated, the results show that our inferences are not sensitive to measures of scale.

Table 1
Sample distribution, Panel A: Sample distribution by year, Panel B: Sample distribution by industry.

Year	PSM Sample			
	Treatment Group, # of Unique Firms = 249		Control Group, # of Unique Firms = 317	
	N	%	N	%
2005	156	9.28	160	8.61
2006	188	11.18	200	10.76
2007	210	12.49	231	12.43
2008	217	12.91	246	13.23
2009	238	14.16	279	15.01
2010	231	13.74	267	14.36
2011	225	13.38	247	13.29
2012	216	12.85	229	12.32
Total	**1,681**	**100**	**1,859**	**100**

Industry	Treatment Group		Control Group	
	N	%	N	%
Agriculture, forestry, animal husbandry, & fishery	11	0.65	27	1.45
Mining	86	5.12	81	4.36
Manufacturing	973	57.88	1135	61.06
Electricity, heat, gas, & water supply	110	6.54	67	3.6
Construction	33	1.96	27	1.45
Wholesale & retail	58	3.45	157	8.45
Transportation, warehouse, & postal services	185	11.01	108	5.81
Accommodation & catering	3	0.18	14	0.75
Information technology	59	3.51	41	2.21
Real estate	115	6.84	122	6.56
Business services	16	0.95	19	1.02
Scientific research & technical services	0	0	4	0.22
Water, environmental, & public facilities management	8	0.48	27	1.45
Sports & entertainment	12	0.71	16	0.86
Conglomerate	12	0.71	14	0.75
Total	**1,681**	**100**	**1,859**	**100**

analysts with the variable *Revise*. In addition to the above analyst-specific control variables, we include a set of firm-specific controls that could affect analyst forecast error and analyst forecast dispersion: firm size (*Size*), sales growth (*Growth*), volatility in sales revenue (*SD(sales)*), profitability (*ROE*), leverage (*Lev*), a loss firm indicator (*Loss*), and firm age (*Age*). A firm's corporate governance can also affect its information environment and, thus, analyst forecast error and analyst forecast dispersion. We therefore control for the largest shareholder (*Top1*), institutional ownership (*Inst*), whether the firm is audited by a Big 4 auditor (*Big4*), and whether the firm is a state-owned enterprise (*SOE*). Appendix A provides detailed definitions of all of the variables. All of the continuous variables are winsorized at the first and 99th percentiles.

Table 2 reports the descriptive statistics for our PSM sample. As shown in Panel A, the mean values of *Ferr(0)* and *Disp(0)* are 0.186 and 0.128, respectively. As expected, analyst forecast error and analyst forecast dispersion increase with the length of the forecast horizon. For forecasts made in the concurrent year, analysts make an average of 1.6 revisions, with a 250.7-day difference between the forecast date and the earnings announcement date. The average brokerage house employs 30 analysts and has been in business for approximately 13 years. On average, each analyst in our sample follows 18 firms.[7]

Panel B of Table 2 provides the mean and median values of our two dependent variables for the treatment and control groups for both the pre- and post-mandate periods. For the treatment sample, we observe an

[7] We use the logarithmic transformation of the variables *Revise*, *Horizon*, *BrokerSize*, *BrokerAge*, and *Coverage* in the regression model. Although Table 2 reports the descriptive statistics of these variables after their logarithmic transformation, we describe the means of the raw values of these variables in the text for ease of interpretation.

Table 2
Descriptive statistics, Panel A: Descriptive statistics Panel B: Differences in the mean and median values of the treatment and control groups.

	N	Mean	Std. Dev.	Min.	P25	Median	P75	Max.
Dependent Variables								
Ferr(0)	3,540	0.186	0.225	0.002	0.046	0.111	0.232	1.261
Disp(0)	3,302	0.128	0.138	0.001	0.042	0.081	0.16	0.793
Ferr(1)	3,511	0.306	0.317	0.004	0.095	0.204	0.404	1.766
Disp(1)	3,276	0.177	0.175	0.005	0.068	0.119	0.221	1.048
Ferr(2)	3,313	0.449	0.401	0.009	0.174	0.346	0.588	2.275
Disp(2)	2,973	0.218	0.204	0.004	0.091	0.156	0.264	1.278
Control Variables: Analyst-specific								
Revise(0)	3,540	1.626	0.517	1	1.25	1.556	1.9	5
Horizon(0)	3,540	5.500	0.246	3.935	5.385	5.521	5.655	6.136
BrokerSize(0)	3,540	3.643	0.325	1.099	3.475	3.653	3.854	4.691
BrokerAge(0)	3,540	2.574	0.323	0	2.442	2.611	2.773	3.332
Coverage(0)	3,540	2.789	0.545	0.693	2.436	2.773	3.135	5.421
Revise(1)	3,511	0.949	0.184	0.693	0.811	0.941	1.066	1.792
Horizon(1)	3,511	5.484	0.245	3.935	5.364	5.506	5.634	6.136
BrokerSize(1)	3,511	3.648	0.327	1.099	3.483	3.663	3.862	4.691
BrokerAge(1)	3,511	2.575	0.325	0	2.442	2.615	2.773	3.332
Coverage(1)	3,511	2.763	0.544	0.693	2.404	2.741	3.109	5.421
Revise(2)	3,313	0.928	0.186	0.693	0.78	0.916	1.041	1.792
Horizon(2)	3,313	5.396	0.26	3.784	5.268	5.423	5.549	6.098
BrokerSize(2)	3,313	3.673	0.327	1.099	3.526	3.696	3.88	4.691
BrokerAge(2)	3,313	2.566	0.381	0	2.428	2.629	2.791	3.332
Coverage(2)	3,313	2.783	0.576	0.693	2.404	2.76	3.143	5.421
Control Variables: Firm-specific								
SD(sales)	3,540	0.119	0.122	0.004	0.042	0.081	0.148	0.701
Growth	3,540	0.244	0.415	−0.542	0.049	0.178	0.346	3.231
Loss	3,540	0.030	0.17	0	0	0	0	1
ROE	3,540	0.113	0.095	−0.442	0.065	0.107	0.16	0.364
Size	3,540	22.435	1.201	19.451	21.584	22.314	23.148	25.742
Lev	3,540	0.512	0.179	0.048	0.389	0.526	0.649	0.91
Age	3,540	2.38	0.403	1.099	2.079	2.485	2.708	3.135
Top1	3,540	0.404	0.159	0.091	0.275	0.411	0.522	0.756
Inst	3,540	0.074	0.057	0.001	0.027	0.061	0.109	0.225
Big4	3,540	0.147	0.355	0	0	0	0	1
SOE	3,540	0.740	0.439	0	0	1	1	1

	Treatment Group			Control Group		
	N	Median	Mean	N	Median	Mean
Pre-mandate period: 2005–2008						
Ferr(0)	771	0.097	0.165*	837	0.099	0.185
Disp(0)	725	0.076	0.128	754	0.076	0.117
Ferr(1)	765	0.179	0.276**	818	0.198	0.317
Disp(1)	717	0.121	0.186	740	0.114	0.171
Ferr(2)	721	0.311*	0.422*	743	0.337	0.461
Disp(2)	643	0.161	0.232	638	0.152	0.217
Post-mandate period: 2009–2012						
Ferr(0)	910	0.107***	0.172***	1,022	0.131	0.216
Disp(0)	871	0.085	0.129	952	0.086	0.136
Ferr(1)	908	0.188***	0.275***	1,020	0.244	0.348
Disp(1)	870	0.117	0.168*	949	0.127	0.181
Ferr(2)	877	0.326***	0.408***	972	0.404	0.499
Disp(2)	825	0.152	0.206	867	0.160	0.220

The superscripts *, **, and *** indicate $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively. All of the variables are defined in Appendix A.

overall increasing trend from the pre- to the post-mandate period in the mean and median values of both analyst forecast error and analyst forecast dispersion regardless of the forecast horizon, except for *Disp(1)* and *Disp(2)*. However, the increase in the mean and median values of *Ferr* and *Disp* from the pre- to the

post-mandate period is even higher for the control sample than for the treatment sample. This result is confirmed by the differences in the median values of the two dependent variables between the treatment and control groups. As shown, in the pre-mandate period, the median values of both analyst forecast error and analyst forecast dispersion are not significantly different between the two groups (except for *Ferr(2)*). In comparison, the median values of the forecast error in the treatment group are significantly lower than in the control group in the post-mandate period. However, we do not observe a clear pattern in terms of change with respect to the mean values of the dependent variables. Panel B thus provides preliminary support for the proposition that the treatment group experiences a larger decrease in forecast error from the pre- to the post-mandate period compared with the control group.

The correlation coefficients of all of the variables are presented in Table 3, with the cells below the diagonal reporting the Pearson correlation coefficients and the cells above the diagonal reporting the Spearman correlation coefficients. To be concise, we only report the correlations of *Ferr(0)* and *Disp(0)* with the other variables. As expected, *Ferr* and *Disp* are highly correlated, with a coefficient of 0.662. Concerning the control variables, the highest correlation coefficient is 0.444, between *BrokerAge* and *Coverage*. This is a reasonable finding because older brokerage houses are likely to cover more firms than newer brokerage houses. We are thus relatively unconcerned about multicollinearity issues in our research design.

5. Empirical results

5.1. Regression results for hypothesis

Table 4 reports the results of the OLS regression of the current period's independent variables on the next period's forecast properties. Columns (1) to (4), (5) to (8), and (9) to (12) present the results for analyst forecasts made for the current year, the next year, and the year after, respectively. Columns (1), (3), (5), (7), (9), and (11) include year and firm fixed effects, and the effects of *Treat* and *Post* are therefore subsumed. Columns (2), (4), (6), (8), (10), and (12) include only industry fixed effects. The variable *Treat* captures the difference in forecast properties between the treatment and control groups. The coefficient of *Treat* is significantly positive in columns (4), (8), and (12), providing some evidence that analyst forecast dispersion is greater for the treatment firms than for the control firms. The variable *Post* measures the overall change in forecast properties from the pre- to the post-mandate period for all of the sample firms. As shown, the coefficient of *Post* is significantly positive in columns (6) and (10), providing some evidence of an overall increase in analyst forecast error and analyst forecast dispersion from 2009 to 2012, compared with 2005 to 2008.

Our variable of interest is *Treat*Post*, which captures the DID effect. As shown, the coefficient of *Treat*Post* is significantly negative in all of the columns of Table 4. In column (1), for example, the coefficient of *Treat*Post* is −0.036, with a *t*-value of −2.59. The significantly negative coefficient provides strong evidence that analysts' information environment improves significantly for firms that have been subject to mandatory CSR disclosure since 2009 compared with firms that have not been subject to mandatory CSR disclosure. Because of the improved information environment, analyst forecast error and analyst forecast dispersion decrease significantly regardless of the forecast horizon. The results in Table 4 support the view that financial analysts are likely to incorporate the incremental information contained in standalone CSR reports even though most of those reports are not subject to mandatory audits.

Concerning the control variables, the following findings are noteworthy. First, as expected, analyst forecast error and analyst forecast dispersion increase with the forecast horizon. Second, we find some evidence that brokerage size (*BrokerSize*), brokerage age (*BrokerAge*), and analysts' general experience (*Coverage*) reduce analyst forecast error and analyst forecast dispersion. Third, volatility in sales revenue, sales growth, loss indicator, size, and leverage is positively related to analyst forecast error and analyst forecast dispersion. Fourth, institutional ownership is positively related to analyst forecast error and analyst forecast dispersion, probably because of institutional investors' predatory role (Gu et al., 2013). Fifth, we find some evidence that greater firm age, Big 4 auditors, and state ownership improve analysts' forecast properties.

Table 3
Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1 *Ferr(0)*		***0.516***	**−0.039**	***0.229***	*0.033*	***0.047***	***0.050***	***0.129***	**0.041**	***0.060***	−0.003	***0.066***	***0.187***	***0.062***	***−0.066***	0.026	***−0.075***	−0.024
2 *Disp(0)*	***0.662***		*0.030*	***0.219***	***0.059***	−0.003	***0.075***	***0.176***	***0.049***	***0.055***	0.019	***0.069***	***0.159***	−0.019	*−0.030*	***0.080***	***−0.055***	**−0.035**
3 *Revise(0)*	***−0.054***	−0.023		***−0.254***	***0.146***	***0.127***	***0.127***	0.021	***0.085***	*−0.030*	***0.193***	***0.140***	−0.006	***0.061***	**−0.042**	***0.166***	***0.092***	***−0.077***
4 *Horizon(0)*	***0.262***	***0.199***	***−0.275***		***0.118***	***0.153***	***0.232***	−0.001	**−0.038**	0.007	***−0.072***	***0.069***	0.017	***0.096***	0.004	***−0.086***	***−0.054***	0.021
5 *BrokerSize(0)*	−0.014	0.025	***0.120***	***0.099***		***0.370***	***0.232***	−0.02	***−0.191***	0.002	**−0.037**	***0.278***	***0.057***	***0.262***	*−0.032*	*−0.029*	***0.073***	−0.028
6 *BrokerAge(0)*	**0.039**	0.01	***0.101***	***0.168***	***0.290***		***0.444***	−0.011	***−0.094***	0.016	***−0.063***	***0.170***	0.013	***0.245***	**−0.039**	***−0.093***	0.009	***−0.059***
7 *Coverage(0)*	0.013	0.014	*0.029*	***0.175***	0.001	***0.255***		0.027	*−0.030*	*0.030*	−0.022	***0.120***	−0.003	***0.209***	*−0.033*	**−0.037**	−0.018	***−0.071***
8 *SD(sales)*	***0.091***	***0.109***	0.011	−0.009	**−0.034**	**−0.039**	−0.002		*0.030*	0.028	***0.058***	0	***0.151***	0.023	−0.009	0.017	***−0.061***	**−0.039**
9 *Growth*	***0.063***	***0.085***	**0.043**	**−0.037**	***−0.089***	***−0.064***	−0.028	0.013		*−0.032*	***0.338***	**−0.041**	***0.103***	***−0.115***	0.024	***0.131***	*−0.032*	−0.004
10 *Loss*	***0.062***	***0.047***	−0.006	0.003	−0.005	0.014	***0.044***	0.005	−0.012		***−0.149***	**0.043**	***0.135***	0.007	**−0.037**	***−0.081***	**0.044**	0.02
11 *ROE*	*−0.028*	0.028	***0.119***	***−0.063***	−0.021	***−0.061***	**−0.036**	***0.058***	***0.256***	***−0.206***		***−0.062***	***−0.125***	***−0.048***	*0.029*	***0.275***	0.019	***−0.090***
12 *Size*	**0.037**	**0.042**	***0.183***	***0.048***	***0.271***	***0.146***	0.018	0.019	−0.014	***0.051***	***−0.056***		***0.393***	***0.291***	***0.231***	***−0.259***	***0.359***	***0.237***
13 *Lev*	***0.164***	***0.120***	0.024	0.008	***0.049***	0.006	−0.006	***0.123***	***0.088***	***0.141***	***−0.142***	***0.386***		***0.136***	**−0.036**	***−0.065***	0.016	***0.105***
14 *Age*	*0.030*	−0.015	***0.063***	***0.131***	***0.250***	***0.225***	***0.140***	0.022	***−0.066***	0.009	*−0.031*	***0.257***	***0.124***		***−0.076***	**−0.037**	0.013	***0.117***
15 *Top1*	*−0.029*	−0.009	***−0.048***	−0.008	*−0.029*	**−0.036**	***−0.045***	0.026	***0.058***	***−0.046***	***0.045***	***0.234***	−0.015	***−0.094***		***−0.238***	***0.101***	***0.281***
16 *Inst*	0.015	***0.057***	***0.133***	***−0.105***	**−0.041**	***−0.081***	***−0.069***	−0.003	***0.068***	***−0.079***	***0.232***	***−0.255***	***−0.052***	***−0.058***	***−0.249***		***−0.181***	***−0.107***
17 *Big4*	***−0.062***	**−0.044**	***0.096***	***−0.049***	***0.075***	0.003	**−0.033**	***−0.050***	−0.02	***0.044***	−0.009	***0.390***	0.018	0.02	***0.108***	***−0.164***		***0.066***
18 *SOE*	−0.009	*−0.030*	***−0.077***	*0.029*	−0.017	***−0.052***	***−0.045***	−0.009	−0.024	0.017	***−0.077***	***0.221***	***0.096***	***0.108***	***0.278***	***−0.107***	***0.065***	

The cells below the diagonal report the Pearson correlation coefficients and the cells above the diagonal report the Spearman rank correlation coefficients. Bold italics indicate a significance level of<0.01, bold indicates a significance level of<0.05, and italics indicate a significance level of<0.1.

Table 4
OLS regression results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		$Ferr(0)_{t+1}$		$Disp(0)_{t+1}$	$Ferr(1)_{t+1}$			$Disp(1)_{t+1}$		$Ferr(2)_{t+1}$		$Disp(2)_{t+1}$
Treat		−0.015		0.013*		−0.014		0.023**		0.000		0.027**
		[-1.35]		[1.79]		[-0.91]		[2.52]		[0.01]		[2.39]
Post		0.024*		0.012		0.033*		0.005		0.084***		0.016
		[1.95]		[1.46]		[1.84]		[0.46]		[3.66]		[1.22]
Treat*Post	**−0.036*** **	**−0.032** **	**−0.022** **	**−0.022** **	**−0.037** **	**−0.037***	**−0.029** **	**−0.029** **	**−0.051** **	**−0.050***	**−0.029** **	**−0.029** **
	[-2.59]	**[-2.26]**	**[-2.39]**	**[-2.39]**	**[-2.00]**	**[-1.84]**	**[-2.57]**	**[-2.48]**	**[-2.15]**	**[-1.89]**	**[-2.11]**	**[-2.00]**
Revise(Y)	−0.001	0.003	0.002	0.002	0.060*	0.056*	0.021	0.022	0.056	0.064*	0.014	0.015
	[-0.17]	[0.34]	[0.26]	[0.43]	[1.85]	[1.82]	[1.01]	[1.18]	[1.43]	[1.65]	[0.56]	[0.65]
Horizon(Y)	0.240***	0.234***	0.104***	0.130***	0.303***	0.307***	0.106***	0.144***	0.220***	0.209***	0.075***	0.101***
	[13.49]	[14.83]	[8.15]	[12.05]	[12.63]	[13.60]	[6.72]	[10.27]	[7.90]	[7.44]	[4.04]	[5.81]
BrokerSize(Y)	−0.027*	−0.028**	0.024**	0.017*	−0.018	−0.035**	0.016	0.012	0.010	−0.016	0.011	0.012
	[-1.81]	[-2.21]	[2.07]	[1.94]	[-0.88]	[-2.03]	[1.08]	[1.02]	[0.38]	[-0.70]	[0.61]	[0.85]
BrokerAge(Y)	−0.019	0.006	−0.025**	−0.009	−0.046**	−0.015	−0.026*	−0.012	−0.019	−0.038**	−0.012	−0.016
	[-1.37]	[0.44]	[-2.10]	[-0.84]	[-2.41]	[-0.84]	[-1.78]	[-0.95]	[-0.97]	[-1.96]	[-0.73]	[-1.17]
Coverage(Y)	−0.024***	−0.026***	−0.013**	−0.009*	−0.039***	−0.019	−0.014	−0.004	−0.042***	−0.028*	−0.028***	−0.011
	[-2.65]	[-3.21]	[-1.97]	[-1.65]	[-2.97]	[-1.57]	[-1.62]	[-0.50]	[-2.74]	[-1.89]	[-2.66]	[-1.22]
Sd(sales)	0.080*	0.118***	0.068**	0.101***	0.126**	0.166***	0.113***	0.127***	0.180**	0.197***	0.082*	0.102***
	[1.91]	[3.84]	[2.48]	[5.07]	[2.20]	[3.81]	[3.31]	[5.01]	[2.48]	[3.47]	[1.91]	[3.24]
Growth	0.012	0.036***	0.013**	0.024***	0.024*	0.059***	0.022***	0.039***	0.031*	0.080***	0.028***	0.051***
	[1.33]	[3.93]	[2.19]	[4.11]	[1.92]	[4.65]	[2.94]	[5.28]	[1.93]	[4.83]	[2.84]	[5.31]
Loss	−0.020	0.043**	0.016	0.034**	−0.029	0.036	0.028	0.036**	−0.003	0.062	−0.001	0.016
	[-0.88]	[1.99]	[1.04]	[2.38]	[-0.97]	[1.19]	[1.50]	[1.99]	[-0.08]	[1.53]	[-0.06]	[0.70]
ROE	0.172***	−0.039	0.023	0.005	0.084	−0.215***	−0.011	−0.019	0.121	−0.280***	0.020	−0.044
	[3.34]	[-0.93]	[0.67]	[0.19]	[1.22]	[-3.64]	[-0.26]	[-0.55]	[1.36]	[-3.63]	[0.37]	[-1.02]
Size	0.024*	0.009**	0.021**	0.005*	0.011	−0.011*	0.018*	−0.004	−0.023	−0.034***	0.002	−0.010**
	[1.89]	[2.14]	[2.42]	[1.72]	[0.63]	[-1.74]	[1.67]	[-1.02]	[-1.02]	[-4.21]	[0.16]	[-2.29]
Lev	−0.050	0.191***	−0.060**	0.088***	−0.082	0.299***	−0.057	0.127***	−0.041	0.404***	−0.025	0.158***
	[-1.11]	[7.92]	[-2.00]	[5.57]	[-1.33]	[8.78]	[-1.52]	[6.27]	[-0.52]	[9.00]	[-0.53]	[6.31]
Age	−0.060	0.002	0.019	−0.010	−0.018	−0.034**	0.021	−0.026***	−0.003	−0.074***	0.001	−0.033***
	[-1.26]	[0.20]	[0.60]	[-1.44]	[-0.28]	[-2.36]	[0.55]	[-3.12]	[-0.04]	[-3.96]	[0.01]	[-3.16]
Top1	−0.039	−0.014	0.050	0.008	−0.019	−0.013	0.007	0.001	0.002	−0.044	0.018	−0.020
	[-0.53]	[-0.56]	[1.04]	[0.52]	[-0.19]	[-0.36]	[0.11]	[0.05]	[0.02]	[-0.94]	[0.24]	[-0.78]
Inst	0.416***	0.141**	0.393***	0.195***	0.682***	0.379***	0.488***	0.232***	0.807***	0.622***	0.538***	0.272***
	[4.42]	[1.98]	[6.38]	[4.24]	[5.34]	[3.76]	[6.36]	[3.93]	[4.94]	[4.72]	[5.64]	[3.69]
Big4	−0.003	−0.024**	0.013	−0.012*	−0.006	−0.039**	0.014	−0.014	0.013	−0.043**	0.019	−0.011
	[-0.13]	[-2.10]	[0.83]	[-1.70]	[-0.19]	[-2.48]	[0.69]	[-1.47]	[0.30]	[-2.05]	[0.74]	[-0.99]
SOE	0.023	−0.005	0.004	−0.010*	0.023	−0.019	−0.005	−0.012*	0.034	−0.023	0.002	−0.013
	[1.23]	[-0.54]	[0.32]	[-1.75]	[0.91]	[-1.48]	[-0.36]	[-1.66]	[1.04]	[-1.38]	[0.11]	[-1.45]
Constant	−1.478***	−1.209***	−1.018***	−0.779***	−1.516***	−0.991***	−0.904***	−0.615***	−0.423	0.280	−0.340	−0.142
	[-4.81]	[-9.67]	[-4.88]	[-9.11]	[-3.65]	[-5.55]	[-3.48]	[-5.57]	[-0.80]	[1.24]	[-1.05]	[-1.06]

(*continued on next page*)

Table 4 (*continued*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Year	Yes	–	Yes	–	Yes	–	Yes	–	Yes	–	Yes	–
Firm	Yes	–	Yes	–	Yes	–	Yes	–	Yes	–	Yes	–
Industry	–	Yes	–	Yes	–	Yes	–	Yes	–	Yes	–	Yes
R^2	0.151	0.133	0.136	0.109	0.133	0.140	0.138	0.111	0.089	0.142	0.106	0.098
F-Value	21.719	14.970	17.750	11.047	18.591	15.660	17.888	11.230	11.138	15.025	11.943	8.871
N	3,540	3,540	3,302	3,302	3,511	3,511	3,276	3,276	3,313	3,313	2,973	2,973

This table shows the OLS regression results of $Forecast\ Properties_{t+1} = a_0 + a_1 Treat + a_2 Post + a_3 Treat*Post + Analyst\text{-}specific\ Controls_t + Firm\text{-}specific\ Controls_t + fixed\ effects + error\ term$. The variable *Forecast Properties* is proxied by the forecast error *Ferr* and the forecast dispersion *Disp*. Columns (1)–(4), (5)–(8), and (9)–(12) present the results for analyst forecasts made for the current year, the next year, and the year after, respectively. Columns (1), (3), (5), (7), (9), and (11) include year and firm fixed effects. Columns (2), (4), (6), (8), (10), and (12) include only industry fixed effects. The *t*-statistics are in brackets. The superscripts *, **, and *** indicate $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively. All of the variables are defined in Appendix A.

5.2. Cross-sectional test

5.2.1. Role of the existing information environment

CSR reports' usefulness to financial analysts can vary with the firms' information environment, which affects the demand for the information contained in those reports. For firms with a high level of information asymmetry, CSR reports can serve as an important source of information that supplements other publicly available information (Clarkson et al., 2013). In this case, CSR disclosure is expected to be of greater importance to financial analysts than for firms with a low level of information asymmetry. In contrast, if the firm is relatively transparent, the incremental contribution of the CSR reports is of less importance than for firms with a high level of information asymmetry. Our first cross-sectional test thus examines whether the impact of mandatory CSR disclosure on analyst forecast properties varies with the firm's existing information environment.

Empirically, firms' existing information environment is proxied by stock price synchronicity. Stock price synchronicity measures the level of firm-specific information that is incorporated into a firm's stock prices. A higher value of synchronicity means a lower level of firm-specific information being reflected in stock prices, and thus a higher level of information asymmetry (Jin and Myers, 2006; Hutton et al., 2009; Gul et al., 2010). One can reasonably argue that outsiders, such as analysts, demand more alternative information when the firm has a higher level of information asymmetry than when it is relatively transparent. Thus, we expect standalone CSR reports to provide more incremental information for analysts following opaque firms than for those following transparent firms. We then split the sample into two subsamples based on the sample's median value of synchronicity and then re-estimate Eq. (1) for each subsample.

Panel A of Table 5 presents the results of the cross-sectional test. As shown, the coefficient of *Treat*Post* is significantly negative only in the subsample of firms with high stock price synchronicity. In comparison, the coefficient is insignificant in subsamples with low stock price synchronicity. In other words, standalone CSR reports help analysts improve their forecasts' properties when the firm's information environment is opaque and the CSR report serves as an important alternative information source.

5.2.2. Role of marketization

Arguably, because most CSR reports are unaudited, they can lack credibility. Coram et al. (2009) point out that corporate disclosures are not useful if they are perceived as not credible. In such a situation, financial analysts might not incorporate the disclosed CSR information into their forecasts. We expect credibility-related concerns to be alleviated if firms are domiciled in highly marketized provinces. Such firms typically face more stringent legal enforcement and have more developed financial intermediaries (Fan et al., 2017) and are thus more strictly monitored than firms domiciled in less marketized provinces. In addition, firms in less marketized provinces rely on political connections (Hou et al., 2022) and local protectionism (Hu et al., 2021) rather than capital markets to obtain resources. These firms lack incentives to provide high-quality CSR disclosures despite the mandatory disclosure requirement. We thus conjecture that the CSR reports of firms in highly marketized provinces contain more reliable and relevant information than the CSR reports of firms in less marketized provinces. Therefore, the impact of CSR disclosure requirements on forecast properties is expected to be more pronounced if the firms are domiciled in highly marketized provinces than if they are not. Our second cross-sectional test examines whether the impact of mandatory CSR disclosure on analyst forecast properties is influenced by province-level marketization.

We split the sample into two subsamples based on the Fan Index (Fan et al., 2017) and re-estimate Eq. (1) for each subsample. Specifically, we assign the province-level Fan Index to the firms registered in that province. Eight provinces (Shanghai, Tianjin, Zhejiang, Beijing, Fujian, Guangdong, Jiangsu, and Shandong) are classified as provinces with a high Fan Index, with the rest classified as provinces with a low Fan Index.[8]

The results for the cross-sectional analyses are presented in Panel B of Table 5. Consistent with our expectations, the coefficient of *Treat*Post* remains significantly negative for the subsample of firms located in highly

[8] Because some provinces tend to have more firms than others, we do not use the sample median values of the Fan Index to split the sample. Partitioning by the median value results in unbalanced subsample sizes.

Table 5
Cross-sectional tests Panel A: Role of firms' existing information environment, proxied for by stock price synchronicity Panel B: Role of marketization.

	$Ferr(0)_{t+1}$		$Disp(0)_{t+1}$		$Ferr(1)_{t+1}$		$Disp(1)_{t+1}$		$Ferr(2)_{t+1}$		$Disp(2)_{t+1}$	
	(1) Low	(2) High	(3) Low	(4) High	(5) Low	(6) High	(7) Low	(8) High	(9) Low	(10) High	(11) Low	(12) High
Treat*Post	**−0.018**	**−0.052****	**−0.017**	**−0.027****	**−0.023**	**−0.072*****	**−0.020**	**−0.051*****	**−0.015**	**−0.098*****	**−0.012**	**−0.042****
	[-0.81]	**[-2.53]**	**[-1.20]**	**[-1.98]**	**[-0.75]**	**[-2.69]**	**[-1.08]**	**[-3.24]**	**[-0.38]**	**[-2.93]**	**[-0.52]**	**[-2.08]**
Constant	−2.042***	−1.523***	−1.281***	−0.978***	−2.146***	−1.925***	−1.091***	−1.134***	−0.536	−0.384	−1.092**	−0.687
	[-4.29]	[-3.15]	[-4.00]	[-2.98]	[-3.28]	[-3.05]	[-2.63]	[-2.93]	[-0.64]	[-0.48]	[-2.13]	[-1.39]
Analyst-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.182	0.155	0.159	0.150	0.156	0.157	0.149	0.167	0.078	0.150	0.097	0.157
F-Value	10.968	9.597	8.508	8.523	9.028	9.594	7.771	9.594	3.867	8.414	4.322	7.772
N	1,742	1,791	1,620	1,675	1,733	1,771	1,608	1,661	1,638	1,669	1,471	1,496
	$Ferr(0)_{t+1}$		$Disp(0)_{t+1}$		$Ferr(1)_{t+1}$		$Disp(1)_{t+1}$		$Ferr(2)_{t+1}$		$Disp(2)_{t+1}$	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low	(9) High	(10) Low	(11) High	(12) Low
Treat*Post	**−0.044*****	**−0.022**	**−0.030*****	**−0.007**	**−0.049****	**−0.013**	**−0.041*****	**−0.007**	**−0.059****	**−0.027**	**−0.028**	**−0.017**
	[-2.70]	**[-0.91]**	**[-2.63]**	**[-0.47]**	**[-2.18]**	**[-0.41]**	**[-2.82]**	**[-0.39]**	**[-2.07]**	**[-0.66]**	**[-1.54]**	**[-0.77]**
Constant	−1.095***	−1.879***	−0.882***	−1.216***	−0.730	−2.448***	−0.631*	−1.394***	0.821	−1.913**	0.024	−1.065**
	[-3.07]	[-3.39]	[-3.41]	[-3.40]	[-1.49]	[-3.30]	[-1.91]	[-3.25]	[1.32]	[-2.01]	[0.06]	[-2.01]
Analyst-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.131	0.193	0.129	0.166	0.134	0.163	0.137	0.173	0.095	0.115	0.114	0.124
F-Value	10.399	12.480	9.473	9.572	10.554	10.080	10.061	9.958	6.708	6.239	7.323	6.060
N	2,008	1,532	1,872	1,430	1,990	1,521	1,856	1,420	1,881	1,432	1,686	1,287

This table shows the OLS regression results of $Forecast\ Properties_{t+1} = a_0 + a_1 Treat*Post + Analyst\text{-}specific\ Controls_t + Firm\text{-}specific\ Controls_t + firm\ and\ year\ fixed\ effects + error\ term$. The variable *Forecast* Properties is proxied for by forecast error, *Ferr*, and forecast dispersion, *Disp*. The sample is split into two subsamples and the regression is estimated for each subsample. Panel A partitions the sample based on the sample median of stock price synchronicity. Panel B partitions the sample based on whether the firm is domiciled in provinces with a high Fan Index. Columns (1)–(4), (5)–(8), and (9)–(12) report the results for analyst forecasts made for the current year, the next year, and the year after, respectively. The *t*-statistics are in brackets. The superscripts ** and *** indicate $p < 0.05$ and $p < 0.01$, respectively. All of the variables are defined in Appendix A.

marketized provinces (e.g., −0.044 with a *t*-value of −2.70 in column (1)). In comparison, the coefficient becomes insignificantly different from zero for the subsample of firms located in less marketized provinces (e.g., −0.022 with a *t*-value of −0.91 in column (2)). Therefore, the results in Panel B provide evidence that the impact of mandatory CSR reports on analyst forecast properties is more pronounced for firms domiciled in highly marketized provinces than for firms domiciled in less marketized provinces.

In short, the two cross-sectional tests provide scenarios in which a firm-specific factor (i.e., the information environment) and an external factor (i.e., provincial-level marketization) can affect the relation between mandatory CSR disclosure and analysts' information environment.

5.3. Further analyses

Table 4 provides evidence that mandatory CSR disclosure is informative for analysts in making forecasts. The baseline results assume homogeneity in the usefulness of all CSR reports to financial analysts. However, it is intuitive to argue that the usefulness of CSR reports depends on their quality and the information they contain.

5.3.1. Does CSR report quality matter?

The literature documents improved analyst forecast quality when disclosure quality improves (Brown et al., 1987; Lang and Lundholm, 1996; Healy et al., 1999). In our CSR disclosure setting, despite the Notice and the Guidelines, the standalone CSR reports do not use a prescribed format or types of CSR activities to be disclosed. Therefore, in practice, we observe that the information disclosed in the CSR reports varies greatly across firms. Variations can be found in both the form and content of the CSR reports. These variations unavoidably lead to a lack of comparability, which can impair the CSR reports' usefulness. In addition, the CSR reports are not subject to external audits. Thus, it is reasonable to expect analysts to gain more informational benefits from CSR reports of higher disclosure quality than from CSR reports of lower disclosure quality. Accordingly, we examine whether CSR report quality matters for analyst forecast properties.

To do so, we construct three proxies to measure CSR report quality: *Score*, *Pages*, and *Content*. *Score* is an overall disclosure quality measure provided by the RKS database.[9] This quality measure gauges the following four dimensions of CSR disclosure quality: i) the macrocosm, such as whether CSR is considered a strategic issue and how the firm governs its CSR activities; ii) content, such as how the firm conducts and discloses specific CSR activities related to its employees, the community, customers, and shareholders; iii) technique indicators related to the CSR report, such as comparability with previous CSR reports, along with the reliability and transparency of the report; and iv) industry-specific factors. These four dimensions are then assigned the following weights: 30% to the macrocosm, 45% to content, 15% to technique, and 10% to industry-specific factors. The final score is then calculated based on the weighted scores on a scale of zero to 100. The second quality measure, *Pages*, is the length of the CSR report measured by the natural logarithm of the number of pages plus one. The third quality measure, *Content*, measures the content in the CSR report. It quantifies the number of items disclosed in the CSR report in terms of 10 aspects: shareholder protection, creditor protection, employee protection, supplier protection, customer and consumer protection, the environment and sustainability, public welfare, policy related to CSR activities, workplace safety, and deficiencies in CSR activities. A score of one is given for each of these items that the firm discloses in its CSR report. The variable *Content* is the sum of the scores ranging from zero to 10. All three of these variables are designed so that larger values indicate higher CSR report quality. A value of zero is assigned to the firm-year observations of the control group and the pre-mandate period of the treatment group.

The sample is then split into two subsamples. Given the definition of the three report-level variables, it is infeasible to partition the full sample based on the median values of *Score*, *Pages*, and *Content*. To solve this issue, we first take the median values of those observations with nonzero values for the report-level variables (i.e., the treatment firms during the post-mandate period). We then split the sample according to the

[9] RKS is a leading commercial database that provides CSR rankings for Chinese firms that disclose their CSR reports. More detailed information can be found on its official website at https://www.rksratings.cn.

above-mentioned median values. The control firms and pre-mandate period treatment firms are included in each subsample.[10] Equation (1) is then re-estimated on each subsample.

The results are reported in Panel A of Table 6, with columns (1)–(6) presenting the analyst forecast error results and columns (7)–(12) presenting the analyst forecast dispersion results.[11] As observed, the coefficient of *Treat*Post* remains significantly negative only in the subsamples with high-quality CSR reports (e.g., the coefficient of −0.043 with a *t*-value of −2.58 in column (1)). In comparison, the coefficient of *Treat*Post* is insignificant in the subsamples with low-quality CSR reports. In other words, the improvement in analyst forecast properties after the mandatory CSR disclosure requirement occurs only when the CSR report is of high quality.

5.3.2. What type of CSR information matters?

In this section, we investigate what type of information contained in the CSR report is useful for analysts to make forecasts. As discussed in Section 2.2, the nonfinancial information described in the CSR report differs from traditional lagged financial information by providing forward-looking information. We are thus motivated to examine whether the CSR reports containing more long-term-oriented information, compared with those containing less long-term-oriented information, can provide more information to financial analysts.

Empirically, we count how many times the word "long-term" appears in each CSR report and classify the CSR reports into the following two categories based on the median count: CSR reports with more long-term information and CSR reports with less long-term information. CSR reports that do not mention long-term information are included in the less long-term-oriented information group.[12] Next, all of the control firms and treatment firms in the pre-mandate period are appended to observations with two different types of CSR reports separately to form two subsamples. We then re-estimate Eq. (1) with each subsample.

As shown in Panel B, Table 6, the coefficient of *Treat*Post* is significantly negative only in columns (1) and (3) in the subsample of CSR reports containing more long-term-oriented information (e.g., the coefficient of −0.052 with a *t*-value of −3.22 in column (1)). In comparison, the coefficient of *Treat*Post* becomes insignificantly different from zero in columns (2) and (4), in which the CSR reports contain less long-term-oriented information. In other words, mandatory CSR disclosure affects analyst forecasts only when the CSR reports contain more long-term-oriented information, not when they contain less long-term-oriented information.

Taken together, the results in Table 6 provide evidence of how heterogeneity in the CSR report affects the relation between the mandatory disclosure requirement and analyst forecast properties. We find that analysts' information environment improves only when the CSR report is of high quality and contains more long-term-oriented information.

[Insert Table 6 here].

5.4. Robustness tests

In the main test, we use a DID approach based on a PSM sample to examine the impact of mandatory CSR reports on analyst forecast properties. In this section, we conduct several robustness tests to ensure that our findings are not unduly influenced by other confounding events.

First, as explained in Section 2.1, the Notice mandating particular types of firms to issue standalone CSR reports was issued by the two Chinese stock exchanges in December 2008. Following Chen et al. (2018), we thus define the pre-mandate period as 2005–2008 and the post-mandate period as 2009–2012. However, the transitional year 2008 is arguably noisy because in 2008, i) a firm might have begun releasing CSR-related information through alternative channels or ii) analysts could have begun incorporating CSR-related information into their forecasts with the expectation of CSR disclosure in the near future. To alleviate the concern about the potential noise in 2008, our first robustness check excludes the year 2008 from our sample. By doing so, *Post* is redefined as zero for the sample period from 2005 to 2007 and as one for the sample period from

[10] This research design results in different subsample sizes in Table 6 compared to those in Table 5.

[11] For brevity, Tables 6 and 7 report the results for analyst forecasts made for the current year only (*Ferr(0)* and *Disp(0)*). The results remain statistically similar for analyst forecasts made for the next year and the year after.

[12] Although it is untabulated for brevity, the mean value of "long-term" frequency for the treatment group is 2.236, with a maximum (minimum) value of 13 (0).

Table 6
Further analysis: Information in the CSR report Panel A: Overall CSR report quality, Panel B: CSR reports containing long-term-oriented information.

	DV = *Ferr(0)*$_{t+1}$						DV = *Disp(0)*$_{t+1}$					
	Score		*Content*		*Pages*		*Score*		*Content*		*Pages*	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low	(9) High	(10) Low	(11) High	(12) Low
Treat*Post	**−0.043*****	**−0.025**	**−0.045*****	**−0.029***	**−0.040****	**−0.025**	**−0.030*****	**−0.007**	**−0.025****	**−0.014**	**−0.028*****	**−0.007**
	[-2.58]	**[-1.43]**	**[-2.72]**	**[-1.81]**	**[-2.42]**	**[-1.43]**	**[-2.86]**	**[-0.66]**	**[-2.40]**	**[-1.37]**	**[-2.67]**	**[-0.62]**
Constant	−1.449***	−1.440***	−1.485***	−1.491***	−1.422***	−1.509***	−0.974***	−0.958***	−0.905***	−0.925***	−0.923***	−1.038***
	[-4.25]	[-4.11]	[-4.42]	[-4.46]	[-4.20]	[-4.29]	[-4.38]	[-3.99]	[-4.08]	[-4.08]	[-4.15]	[-4.34]
Analyst-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.157	0.167	0.156	0.165	0.156	0.169	0.153	0.151	0.148	0.153	0.151	0.157
F-Value	18.957	19.614	19.318	20.397	18.967	19.886	16.902	15.907	16.645	17.089	16.720	16.635
N	3,037	2,945	3,098	3,072	3,048	2,943	2,825	2,730	2,878	2,855	2,839	2,725

	DV = *Ferr(0)*$_{t+1}$		DV = *Disp(0)*$_{t+1}$	
	(1) High	(2) Low	(3) High	(4) Low
Treat*Post	**−0.052*****	**−0.024**	**−0.025****	**−0.017**
	[-3.22]	**[-1.45]**	**[-2.44]**	**[-1.60]**
Constant	−0.770***	−0.926***	−0.525***	−0.416**
	[-2.65]	[-3.20]	[-2.78]	[-2.19]
Analyst-specific controls	Yes	Yes	Yes	Yes
Firm-specific controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
R^2	0.172	0.166	0.152	0.145
F-Value	20.949	19.927	16.651	15.529
N	3,108	3,094	2,893	2,872

This table shows the OLS regression results of Forecast Properties$_{t+1}$ = a_0 + a_1Treat*CSR quality + Analyst-specific Controls$_t$ + Firm-specific Controls$_t$ + year and firm fixed effects + error term. The variable Forecast Properties is proxied for by forecast error, Ferr, and forecast dispersion, Disp. The sample is split into two subsamples and the regression is estimated for each subsample. Panel A partitions the sample based on the median values of CSR report quality, which are measured by Score, Pages, and Content, respectively. Panel B partitions the sample based on the median value of frequency of the word long-term contained in the CSR report. The control firms and pre-mandate period treatment firms are included in each subsample. Each panel presents the results for analyst forecasts made for the current year. The t-statistics are in brackets. The superscripts *, **, and *** indicate $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively. All of the variables are defined in Appendix A.

Table 7
Robustness check.

	A: Excluding 2008		B: Placebo Analysis		C: Polluting Industries Deleted	
	(1)	(2)	(3)	(4)	(5)	(6)
	$Ferr(0)_{t+1}$	$Disp(0)_{t+1}$	$Ferr(0)_{t+1}$	$Disp(0)_{t+1}$	$Ferr(0)_{t+1}$	$Disp(0)_{t+1}$
Treat*Post	**−0.043*** [-2.74]**	**−0.020* [-1.90]**			**−0.050*** [-3.16]**	**−0.031*** [-2.99]**
Treat*Placebo			**−0.017 [-0.81]**	**0.029** [2.14]**		
Constant	−1.527***	−1.005***	−1.574**	−0.533	−1.101***	−0.742***
	[-4.63]	[-4.49]	[-2.45]	[-1.32]	[-3.17]	[-3.17]
Analyst-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.159	0.150	0.229	0.250	0.122	0.133
F-Value	20.355	17.419	15.809	15.984	10.862	10.945
N	3,077	2,856	1,608	1,479	2,260	2,092

This table reports the OLS regression results of $Forecast\ Properties_{t+1} = a_0 + a_1 Treat*Post + Analyst\text{-}specific\ Controls_t + Firm\text{-}specific\ Controls_t + firm\ and\ year\ fixed\ effects + error\ term$. The variable *Forecast Properties* is proxied for by forecast error, *Ferr*, and forecast dispersion, *Disp*. Section A reports the results of a reduced sample excluding the transitional year 2008. Section B reports the results of a placebo analysis. We randomly assign a pseudo-mandatory disclosure year, 2007, and restrict the sample period to 2005–2008. Then we define a new variable, *Placebo*, to be equal to one for the period from 2007 to 2008 and zero for the period from 2005 to 2006. Section C reports the results of a reduced sample excluding firms in polluting industries. In each section, the results for analyst forecasts made for the current year are reported. The *t*-statistics are in brackets. The superscripts *, **, and *** indicate $p < 0.1$, $p < 0.05$, and $p < 0.01$, respectively. All of the variables are defined in Appendix A.

2009 to 2012. Equation (1) is then re-estimated for the reduced sample, and the results are reported in columns (1) and (2) of Table 7. As shown, the coefficient of *Treat*Post* remains significantly negative, suggesting that the impact of the mandatory CSR disclosure on forecast properties is not unduly influenced by the transitional period.

Second, to mitigate the potential impact of any confounding events, we conduct a placebo analysis. Instead of defining 2009 as the mandatory disclosure year, we randomly assign a pseudo-mandatory disclosure year, 2007, and restrict the sample period to 2005–2008. We then replace *Post* with a new variable, *Placebo*, in Eq. (1). *Placebo* equals one for the period from 2007 to 2008 and zero for the period from 2005 to 2006. If the redefined coefficient of *Treat*Placebo* remains significantly negative, then our findings are likely driven by other confounding events that might not be related to the mandatory CSR disclosure requirement. The results of the placebo analysis are reported in columns (3) and (4) of Table 7. We find that the coefficient of *Treat*Placebo* becomes insignificant (significantly positive) when the dependent variable is *Ferr(0)* (*Disp(0)*). The placebo analysis supports our conclusion that the decreases in analyst forecast error and analyst forecast dispersion are attributed to the mandatory CSR disclosure, rather than to concurrent events.

Third, China's MoEE required firms in polluting industries to disclose environmentally related information even before the 2008 mandate. Accordingly, there could be a concern that our results are contaminated by polluting firms. To address this concern, we exclude polluting firms from the sample and re-estimate Eq. (1) based on this reduced sample. The results are reported in columns (5) and (6) of Table 7. As shown, the coefficient of *Treat*Post* remains significantly negative. Therefore, our main conclusions are not unduly influenced by polluting firms.

6. Conclusions and implications

Based on a quasi-natural experiment that mandates certain listed firms to issue standalone CSR reports, we construct a PSM sample to examine whether the CSR reports provide incremental information. We focus on financial analysts, a group of sophisticated information users, and examine whether the standalone CSR reports improve their earnings forecasts. Consistent with our expectations, we document a significant decrease

in both analyst forecast error and analyst forecast dispersion for the treatment firms after the CSR disclosure requirement was implemented compared with the analyst forecast error and analyst forecast dispersion of the control firms. Analysts incorporate the incremental information contained in the CSR reports when making their forecasts. Our findings are not unduly influenced by potential confounding factors, as evidenced by alternative sampling and a placebo analysis.

More interestingly, we document that the informativeness of the CSR reports varies with firms' existing information environment and external monitoring. The evidence in our study supports the view that the improvement in analyst forecast properties by the mandatory CSR disclosure is more pronounced if the firms are opaque and domiciled in highly marketized provinces than if they are transparent and domiciled in less marketized provinces. We also highlight the importance of the CSR report by showing that analysts' information environment is improved only when the CSR report is of high quality and contains more long-term-oriented information than when it is of low quality and contains less long-term-oriented information.

Our study provides important implications for financial analysts, along with investors, indicating the need to pay attention to the incremental information in CSR reports. Given the global trend of mandating CSR disclosure, our study also provides useful insights for countries in which policymakers plan to mandate or enhance disclosure requirements for nonfinancial information in general and CSR-related information in particular.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A:. Variable definitions

Variables	Definitions
Dependent variable	
Ferr(Y); (Y = 0, 1, or *2)*	Analyst forecast error. The variables *Ferr(0)*, *Ferr(1)*, and *Ferr(2)* represent the forecast errors for forecasts made in year t for the EPS of the years t, $t + 1$, and $t + 2$, respectively. The forecast error of each firm is calculated as the absolute value of the difference between the mean value of the most updated forecasts and the actual EPS, scaled by the absolute value of the actual EPS.
Disp(Y); (Y = 0, 1, or *2)*	Analyst forecast dispersion. The variables *Disp(0)*, *Disp(1)*, and *Disp(2)* represent the forecast dispersions for forecasts made in year t for the EPS of the years t, $t + 1$, and $t + 2$, respectively. The forecast dispersion of each firm is calculated as the standard deviation of the most updated forecasts scaled by the absolute value of the actual EPS.
Variable of interest	
Post	A dummy variable that equals one for the period from 2009 to 2012 and zero for the period from 2005 to 2008.

(*continued on next page*)

(*continued*)

Variables	Definitions
Treat	A dummy variable that equals one for the treatment group and zero for the control group. A firm is included in the treatment group if it is mandated by the SHSE and SZSE to issue standalone CSR reports and it issued CSR reports between 2009 and 2012. The control group is constructed based on the PSM procedure. The PSM procedure is described in Appendix B.
Control variables: Analyst-specific	
Revise(Y); (Y = 0, 1, or *2)*	Average number of forecast revisions. The variables *Revise(0)*, *Revise(1)*, and *Revise(2)* represent the logarithmic transformations of the average number of revisions made on a firm's EPS for the years t, $t + 1$, and $t + 2$, respectively.
Horizon(Y); (Y = 0, 1, or *2)*	Average forecast horizon. The variables *Horizon(0)*, *Horizon(1)*, and *Horizon (2)* represent the logarithmic transformations of the average number of days between the issuance date of a firm's earnings forecasts for the years t, $t + 1$, and $t + 2$, respectively, and the corresponding earnings announcement date.
BrokerSize(Y); (Y = 0, 1, or *2)*	Brokerage size. The variables *BrokerSize(0)*, *BrokerSize(1)*, and *BrokerSize(2)* represent the logarithmic transformations of the average number of active analysts in the brokerage houses whose analysts forecast a firm's earnings for the years t, $t + 1$, and $t + 2$, respectively.
BrokerAge(Y); (Y = 0, 1, or *2)*	Brokerage age. The variables *BrokerAge(0)*, *BrokerAge(1)*, and *BrokerAge(2)* represent the logarithmic transformations of the average age of the brokerage houses whose analysts forecast a firm's earnings for the years t, $t + 1$, and $t + 2$, respectively.
Coverage(Y); (Y = 0, 1, or *2)*	Number of firms covered by analysts. The variables *Coverage(0)*, *Coverage(1)*, and *Coverage(2)* represent the logarithmic transformations of the average number of firms covered by analysts forecasting firm earnings for the years t, $t + 1$, and $t + 2$, respectively.
Control variables: Firm-specific	
SD(sales)	The standard deviation of sales revenue divided by total assets in the past three years.
Growth	Revenue growth, calculated as the increase in revenue divided by the revenue in the previous year.
Loss	A dummy variable equal to one if the net income is negative in the previous year and zero otherwise.
ROE	Return on equity, calculated as net income divided by net assets.
Size	Firm size, calculated as the logarithmic transformation of total assets.
Lev	Leverage, calculated as total liabilities divided by total assets.
Age	Firm age, calculated as the logarithmic transformation of the number of years since the firm was first listed.
Top1	Percentage of shareholdings held by the largest shareholder.
Inst	Percentage of shareholdings held by institutional investors.
Big4	A dummy variable equal to one if the firm is audited by one of the Big 4 auditors and zero otherwise.
SOE	A dummy variable equal to one if the firm is ultimately controlled by the government and zero otherwise.
Variables in cross-sectional tests	
Synchronicity	Stock price synchronicity, calculated as $\log(R^2/(1 - R^2))$, where R^2 is obtained from the market model by regressing the firm's weekly return on the weekly market return.

(*continued*)

Variables	Definitions
Marketization	The marketization development index compiled by Fan et al. (2017) of the province in which the firm is domiciled. The following eight provinces are classified as having high marketization: Shanghai, Tianjin, Zhejiang, Beijing, Fujian, Guangdong, Jiangsu, and Shandong. The remaining provinces are classified as having low marketization.
Score	Social responsibility disclosure ranking from RKS, including the macrocosm score, content score, technique score, and industry score. The variable *Score* is calculated as 30%*macrocosm score + 45%*content score + 15%*technique score + 10%*industry score, with a scale from zero to 100.
Content	Content of the CSR report, counted as the number of disclosed items in the CSR report in 10 aspects: shareholder protection, creditor protection, employee protection, supplier protection, customer and consumer protection, the environment and sustainability, public welfare, policy related to CSR activities, workplace safety, and deficiency in CSR activities. A score of one is assigned for each item the firm discloses in the CSR report. The variable *Content* is the sum of the scores, with a scale from zero to 10.
Pages	Length of the CSR report, calculated as the natural logarithm of the number of pages plus one.
Long-term-oriented information	Long-term-oriented information contained in the CSR report, measured by the frequency of the word "long-term" in the report.
Variables in the PSM	
Market_CAP	Logarithmic transformation of the total market value of the firm.
Return	Yearly return of the firm's stock price.
Turnover	Turnover of the firm's shares during the year.
ROA	Return on assets, calculated as net income divided by total assets.
Stateshare	Percentage of shares held by the government.
Donation	Total donations made during the year, scaled by revenue.
Analyst_N	Number of analysts following the firm.
PC	A dummy variable that equals one if the firm is politically connected and zero otherwise.
Polluting	A dummy variable that equals one if the firm operates in a polluting industry and zero otherwise.

Appendix B:. Construction of the PSM samples

Panel A: Logit regression results

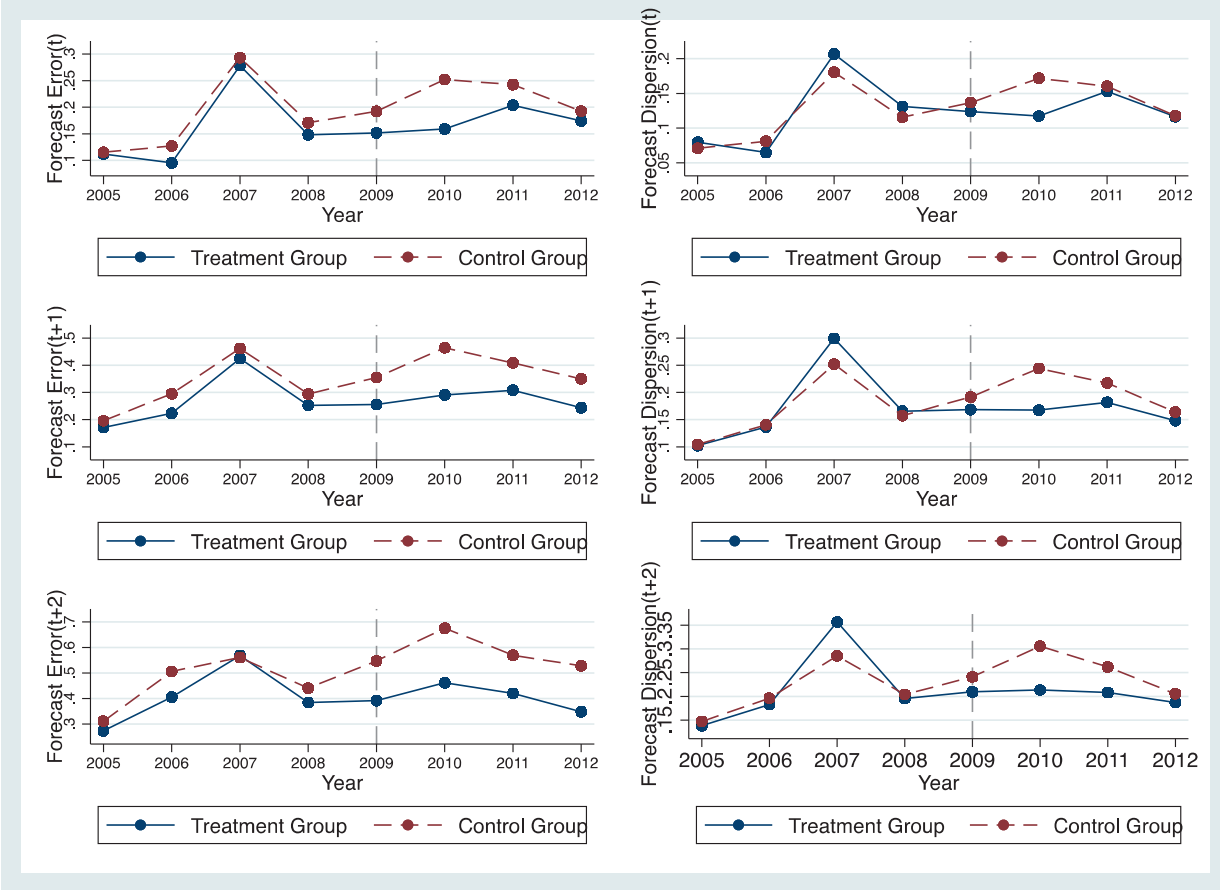
	Coefficient	*z*-Value	$p > z$
Market_CAP	0.726***	12.410	0.000
Return	−0.068	−1.360	0.175
Turnover	−0.001***	−4.290	0.000
ROA	1.892**	1.980	0.048
Stateshare	0.915***	4.640	0.000
Donation	−1.546**	−2.190	0.029
Analyst_N	0.422***	6.860	0.000

(*continued on next page*)

(*continued*)

	Coefficient	*z*-Value	$p > z$
PC	0.065	0.650	0.518
Polluting	0.020	0.210	0.835
Constant	−12.562***	−15.120	0.000
Industry and Year	Yes		
N	3,207		
Pseudo-R^2	0.195		

Panel B: Parallel trends test



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