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# CSR DISCLOSURE AND INFORMATION ASYMMETRY: THE ROLE OF FINANCIAL REPORTING QUALITY

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## **Abstract:**

Based on firm-level data from 39 countries, over a nine-year period, this study analyzes whether financial reporting quality and CSR disclosure are related to each other in improving the quality of corporate information. The findings show that firms disclosing a greater amount of CSR information have a lower degree of information asymmetry (bid-ask spread). This relationship is less pronounced in firms with high financial reporting quality. It suggests a substitution association between financial reporting and CSR disclosure in reducing information asymmetry. Financial transparency is therefore an important factor to explain the informativeness of CSRD. With a high financial transparency, CSRD provides less incremental information content to the investors. However, the robustness tests show that CSRD decreases the quality of financial analysts' forecasts. This seemingly contradictory result might be explained by firms engaging in differentiated information disclosure to cope with contradictory social and institutional pressures (investors versus financial analysts).

*Keywords:* CSR disclosure, financial reporting quality, information asymmetry

The past decades have witnessed a dramatic increase in firms from all over the world disclosing their Corporate Social Responsibility (CSR) activities. KPMG (2017) reports that 75 % of 4900 large firms worldwide prepare CSR reports, including 93 % of the largest 250 firms. Beyond company practices, CSR information disclosure (CSRD) is also subject to intense regulatory interest. For instance, the European Union (EU) adopted a Directive requiring large companies listed on EU-regulated markets to make disclosures relating to environmental, employee, human rights, corruption, and diversity matters. However, following Dhaliwal et al. (2012, p. 724), “there is little academic evidence regarding the value of the reporting to stakeholders in general and shareholders in particular”. In effect, there is an ongoing theoretical and empirical debate (Dhaliwal et al., 2012; Milne and Gray, 2013; Cho et al., 2015) to know whether CSRD is actually useful to their shareholders.

There is little academic evidence regarding whether financial reporting quality determines the level of CSR issues and how they are related to each other in improving the quality of corporate information. The answers can reveal the benefit of CSR disclosure on information transparency as well as the specific setting by which managers can make decisions on disclosing CSR information or/and the level of CSR reporting. We first study the sign of the impact of CSRD on information asymmetry. Then we study the influence of FRQ (Financial Reporting Quality) on the level of CSR disclosure. Finally, we analyze the moderating role of FRQ on the relationship between CSRD and information asymmetry in order to understand if FRQ and CSRD are complement or substitutes. Financial and non-financial disclosures are complements (substitutes) when the benefits of one kind of information disclosure increase (decrease) with the use of other kind of information disclosure.

We use a worldwide sample of 2,591 listed companies that disclose Environmental, Social and Governance data. Following Isidro et al. (2016), the use of an international sample does not aim to isolate the effect of individual country attributes, it is rather to insure the robustness of the relationship in spite of the various country-level institutions and features. Compared with similar research as Dhaliwal et al. (2012, 2014), we formulate a more detailed assessment for CSRD. The CSRD measure is not limited to a dummy variable representing the issuance of stand-alone CSR reports. We consider the content of the CSR disclosure.

The paper proposes three main contributions with, first, a theoretical and empirical analysis of the links between CSR disclosure and financial information quality in order to reduce information asymmetry, second, a method that cope with endogeneity problems by using the Heckman two steps procedure and introducing two very important control variables (CSR performance and governance quality), third, an empirical study on a worldwide sample.

The study is organized as follows: section 1 presents the theoretical background of the hypothesis. Section 2 provides a review of the sample, variables and methods. Sections 3 and 4 present results and robustness tests.

## 1. Prior research and hypothesis development

In this section, we summarize the literature on the effect of CSR disclosure on information asymmetry, and then propose the potential association between CSR and financial disclosure in reducing the dissymmetry of information.

### *1.1 CSR disclosure and information asymmetry*

Before investigating if the impact of CSRD on information asymmetry is affected by the financial reporting quality of the company, we first check if such an impact exists and is significant. This preliminary analysis seems all the more important because there is a

theoretical debate on the usefulness of CSR information for investors and the results of empirical studies are divergent.

Two major competing theories are used to explain the impact of CSR disclosure on information asymmetry: signaling theory (Connelly et al., 2011) and legitimacy theory (Cho et al., 2012a). From the signaling perspective, because companies provide potentially valuable information on non-financial aspects of the firm such as internal governance, human resource aspects, involvement in community activities and environmental protection, etc., they can reduce the information asymmetry between the firm and its shareholders. CSR and business as usual activities are complementary and have a positive impact on company value. Consequently, companies that are better in implementing those activities benefit from disclosing CSR information to the market. These CSR engagements affect the firm's value positively through their impact on the firm's risk profile like supply chain, legitimation, product and technology risk.

According to the survey conducted by Deloitte, CSR Europe, and EuroNext in 2003, on the basis of 400 mainstream fund managers and financial analysts in nine European countries, approximately 80 percent of the respondents agree that CSR adoption is positively associated with firm's market value in long run, and approximately 50 percent of them declare that they use CSR information in the forecasting process. Empirical studies provide evidence that CSR disclosure not only reduces information asymmetry and estimation risk but also increases the investor's preference effect stemming from their willingness to accept a lower rate of return on CSR-supporting investments. It can thereby increase the accuracy of analysts' earnings forecasts (i.e., Nichols and Wieland, 2009; Dhaliwal et al., 2012) and lower the cost of equity capital (i.e., Dhaliwal et al., 2014).

Under legitimacy theory and impression management (Merkl-Davies and Brennan, 2011; Cho et al., 2012b), company management makes strategic use of disclosure to sustain company legitimacy within society (Merkl-Davies and Brennan, 2011). Consequently, companies may deliberately obfuscate potentially controversial actions with selective, incomplete, and biased disclosures (Arena et al., 2018). Following Cowan and Deegan (2011) the volume of voluntary environmental disclosure is associated with firms that have poor environmental performance. Incongruence between a company's information disclosure and its activities will erode the credibility of its disclosures, and thus result in a significant loss of the trust of financial market participants and other stakeholders (Merkl-Davies and Brennan, 2011). CSRD are often used to enhance the corporation's reputation, not to provide incremental information to market participants (Cho et al., 2010). It may also help management to divert attention away from other areas. CSR disclosure does not signal good performance but covers up poor performance (Chung and Cho, 2018).

Supporting this view, Cohen et al. (2011) find that retail investors do not place great value on CSR information compared with economic and governance information. In the same vein, Cheng et al. (2015) show that investors value CSR only when its measurement pertains closely to the firm's core strategy. Trotman and Trotman (2015) show that there is little evidence of internal efforts by companies to ensure high-quality CSR disclosures. CSRD is limited in scope and giving a false appearance (Aras and Crowther, 2008).

In short, in line with signaling theory, companies are supposed to disclose reliable CSR information on activities that have a positive impact on value. Consequently, CSRD should reduce information asymmetry. In line with legitimacy and impression management theories, companies do not disclose very reliable information. Therefore, CSR disclosure should have no impact, or even a negative impact, on the information used by investors to take their decisions. Therefore, we posit that:

*Hypothesis 1a:* Ceteris paribus, CSR disclosure is negatively associated with information asymmetry.

*Hypothesis 1b:* Ceteris paribus, CSR disclosure is positively associated with information asymmetry.

### *1.2 The association between CSR disclosure and financial reporting quality in affecting information asymmetry*

Beyond the direct impact of CSR disclosure on information asymmetry, it is interesting to examine how financial reporting quality influences the association between CSR reporting and information asymmetry.

Information asymmetry between firms and outsiders increases demand from shareholders and firm incentives to provide voluntary disclosure because the value of such additional information (presenting distinct aspects toward different target audiences) is greater in these settings, for example (Grossman and Hart, 1980; Verrecchia, 1983). We therefore suspect that firms with poor (good) financial reporting quality will issue more (less) extensive disclosure. However, a second stream of research suggests that when the information quality of a firm's financial system increases, managers tend to select a higher level of voluntary disclosure because the good information quality induces investors to treat such voluntary disclosure as more credible (Verrecchia, 1990; Penno, 1997; Francis et al., 2008; Chi et al., 2013). High financial reporting quality is a signal of the high commitment of the company to provide relevant and reliable information which further brings positive externality to a firm's nonfinancial disclosures and finally influences the firm's decision to issue CSR reports (Francis et al., 2008; Chen et al., 2016). Moreover, firms which have high ethical commitments tend to avoid unethical actions such as abusing authority to manipulate or smooth earnings in their own interests so that they can maintain corporate transparency in the long term. This idea has been supported by several scholars who provide evidence for a positive correlation between a firm's commitment on business ethics and earning quality (Choi and Pae, 2011; Kim et al., 2012; Gao and Zhang, 2015). We therefore suspect that firms with higher financial reporting quality select a higher level of CSR disclosure.

Basing on such predictions, while a few empirical studies have examined the association between CSR and financial reporting quality to date there are no consensus findings. We therefore propose:

*Hypothesis 2a:* Ceteris paribus, CSR disclosure is negatively related to financial reporting quality.

*Hypothesis 2b:* Ceteris paribus, CSR disclosure is positively related to financial reporting quality.

Both CSR and financial reporting are significant related to the information problem, while they interact with each other in reducing asymmetric information. In other words, the relationship between CSR and information asymmetry will be contingent on the quality of financial reporting. The magnitude of the impact of information disclosure on information asymmetry depends on two main characteristics: the richness and diversity of information disclosed for investor decision and the reliability of those information.

With regard to the richness of the information set, the substitution effect seems the most relevant. According to Dhaliwal et al. (2014, p. 332), "financial information and the nonfinancial information contained in CSR disclosures are substitutes for each other". With a high financial reporting quality, CSR should provide less incremental information content to the investors. In other words, we can expect a positive impact of CSR and FRQ

(Financial Reporting Quality) interaction on information asymmetry. The association between CSRD and information asymmetry should be less pronounced in firms that are more financially transparent.

In contrast, the complementary role of financial and non-financial information disclosure can be better explained by the quality dimension. An increase in financial information quality will have a direct effect in reducing information asymmetry. If the correlation between financial and non-financial information quality is positive, the quality of non-financial information will also increase and will therefore reduce information asymmetry. Two main arguments could explain a positive correlation between financial and non-financial information. First, CSRD and FRQ have common determinants: managerial ability and the firm's corporate governance quality. Indeed, the role of managerial ability in enhancing financial reporting quality (Demerjian et al., 2012; Baik et al., 2018) may also concern non-financial disclosure. Moreover, for companies with strong governance, good FRQ may be a signal of high non-financial reporting quality that is hardly observable. Second, a positive relationship between financial and non-financial disclosure quality can be explained by a spillover effect (Verrecchia, 1990; Francis et al., 2008; Gao et al., 2016) on the credibility of one form of firms' disclosures to another. Companies with a reputation of having high FRQ will not take the risk to lose their reputation by disclosing low quality CSR information. In such a situation, we expect a negative impact of CSRD and FRQ interaction on information asymmetry. In contrast, if the board effectiveness in monitoring management in the financial reporting process is weak (i.e., Park and Shin, 2004; Zhao and Chen, 2008), low FRQ will be associated with low CSRD quality leading to a positive impact the interaction between FRQ and CSRD on asymmetry. In summary, higher FRQ can reduce the impact of CSRD on information asymmetry via the information richness channel or increase it through the quality channel. As we do not know a priori the relative strength of the two channels, we hypothesize that:

*Hypothesis 3a:* Ceteris paribus, the association between CSR disclosure and information asymmetry is less pronounced in firms that are more financial transparency (substitutive).

*Hypothesis 3b:* Ceteris paribus, the association between CSR disclosure and information asymmetry is more pronounced in firms that are more financial transparency (complementary).

## 2. Data and model specification

In this section we provide the description of the data and sample selection, the definition of the main variables in this study. We also introduce the research model.

### 2.1 Sample and variables

Our starting sample includes 2,988 international listed companies for the period between 2007 and 2015, obtained from 58 countries<sup>1</sup>. All firms have ESG data on Bloomberg<sup>2</sup> during this period. After removing financial groups and firms with missing data, our unbalanced sample contains 2,591 companies from 39 countries<sup>3</sup>.

*Information asymmetry.* The “bid-ask spread” is our proxy to measure the information asymmetry. Bid-ask spread (Spread) is the difference between the selling price and the buying price. Spread is high due to information asymmetry costs. A larger spread indicates a higher degree of information asymmetry or lower information transparency.

$$\text{Spread}_{i,t} = \left[ \left( \frac{|\text{bid}_{i,t} - \text{ask}_{i,t}|}{(\text{bid}_{i,t} + \text{ask}_{i,t})/2} \right) * 100 \right] / n$$

Spread<sub>i,t</sub> = Absolute value of the average difference between the highest purchase price (bid) and the lowest selling price (ask) based on the daily price of firm i for one year divided by the number of trading days during the year (n).

*Corporate social responsibility disclosure (CSR).* Bloomberg’s ESG database is based on “triple bottom line on business approach” including Environmental, Social and Governance aspects to measure the sustainability and ethical impacts of an investment within a company. To the extent that the concept of CSR and the definition of ESG data on Bloomberg are overlapped, we employ the ESG disclosure score obtained from Bloomberg to address the degree of CSR reporting. The ESG disclosure score is an overall measure of a firm’s reporting on 120 indicators of CSR program. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point.

*Financial reporting quality (FRQ).* To assess financial reporting quality (FRQ), we focus on accounting-based measures. Because the accrual-based measures are among the most commonly used measures of earnings management, we use the following two models. The first (called Accruals Quality: AQ) is the mapping of accounting accruals into past, current, and future operating cash flow, or the quality of accruals. We use the model in Dechow and Dichev (2002) modified by McNichols (2002) and Francis et al. (2005). The second (called Earning Management: EM) is the degree of earning manipulation using accruals or the managerial discretion over accruals based on the Jones (1991) approach modified by Kothari et al. (2005). Beside the accrual-based measures, we also assess conditional conservatism which concerns the timelier recognition of economic losses into accounting earnings than economic gains. Our conservatism measure (Cscore) is developed by Khan and Watts (2009) relying on the Basu (1997) model of asymmetric timeliness. Finally, we construct a composite variable of the three above conventional measures of financial reporting quality, FRQM. It is equal to the average of EM, AQ, Cscore for each firm-year. We expect that proxies of financial reporting quality will increase if the financial transparency increases.

## 2.2 Model specification

We firstly examine the effect of CSR disclosure on the degree of information asymmetry (hypothesis 1) by using regressions with country, industry and year fixed effects:

$$\begin{aligned} \text{Asymmetry}_{i,t} = & \delta_0 + \delta_1 \text{ESGscore}_{i,t} + \delta_2 \text{SIZE}_{i,t} + \delta_3 \text{Age}_{i,t} + \delta_4 \text{LEV}_{i,t} + \delta_5 \text{CI}_{i,t} \\ & + \eta_j + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where the subscripts *i* and *t* denote firm *i* and year *t*, respectively;  $\eta_j$  denotes the country, industry, and year fixed effect. The information asymmetry is measured with the bid-spread. In this model, CSR is a continuous variable: ESGscore. The control variables are: SIZE (natural logarithm of firm’s net assets), AGE (natural logarithm of the number of years in business), LEV (debt ratio) and CI (capital intensity). The definitions of all variables are presented in Appendix.

Hypothesis 1 is considered through the coefficients of CSRD ( $\delta_1$ ). The negative (positive) coefficients will support hypothesis 1a (1b) indicating that CSR reporting increases (decreases) the information environment of a firm.

A potential self-selection bias in the choice of reporting CSR information can be due to the link between CSR performance and CSRD. In a recent paper, García-Sánchez et al. (2020) demonstrate that a gap could exist between CSRD and CSR performance. Moreover, this gap could have a negative effect on the quality of information (measured by the analysts' forecast errors). To solve this problem, we use the Heckman (1977) two-stage approach to examine Hypotheses 2 and 3. In the first stage, we examine the determinants of CSR reporting with financial reporting quality as one of main contingent variables, allowing us to infer the nature of the relation between CSRD and FRQ. In the second stage, we examine the moderation effect of financial reporting quality on the link between CSRD and information asymmetry by regressing information asymmetry on CSRD with financial reporting quality, control variables and the inverse Mills ratio derived from the first-stage regression. The inverse Mills ratio is presumed to proxy for the effect of self-selection bias. In doing so, the second-stage regression can examine the association between CSRD and information asymmetry without the presence of endogeneity resulting from self-selection. We run regression for both models with country, industry, and year fixed effect. In doing so, we define CSRD variable as an indicator equal to 1 if the concerned firm's ESG disclosure score is in the 4th (medium-high) and 5th (high) quintiles of the ESG disclosure score sample, and 0 otherwise. Accordingly, we can estimate the likelihood that firms disclose a high level of CSR information and vice versa.

In the first stage, we develop our model as follows:

$$\text{Prob}(\text{CSR}_{i,t}=1) = \Phi(\beta_0 + \beta_1\text{FRQ}_{i,t-1} + \beta_2\text{CGQ}_{i,t-1} + \beta_3\text{ANALYST}_{i,t-1} + \beta_4\text{CSP}_{i,t-1} + \beta_5\text{ROA}_{i,t-1} + \beta_6\text{SIZE}_{i,t-1} + \beta_7\text{LEV}_{i,t-1} + \beta_8\text{RISK}_{i,t-1} + \beta_9\text{GROWTH}_{i,t-1} + \beta_{10}\text{RD}_{i,t-1} + \beta_{11}\text{CI}_{i,t-1} + \beta_{12}\text{AGE}_{i,t-1} + \beta_{13}\text{MKTS}_{i,t-1} + \eta_i) + \varepsilon_{i,t} \quad (2)$$

where:  $\Phi$  is the cumulative distribution function of the standard normal distribution. FRQ measures the financial reporting quality. The other variables are: CGQ (corporate governance quality), ANALYST (analyst coverage), CSP (CSR performance), ROA (return on assets ratio), SIZE (natural logarithm of firm's net assets), LEV (debt ratio), RISK (standard deviation of the monthly stock return), GROWTH (percentage of revenue change), RD (R&D expenditure), CI (capital intensity), AGE (natural logarithm of the number of years in business) and MKTS (leading position in industry). The definitions of all variables are presented in Appendix.

In the second stage, we develop a model which examines the relationship between CSRD in year t and asymmetric information in year t+1 as follows:

$$\text{Asymmetry}_{i,t+1} = \alpha_0 + \alpha_1\text{CSR}_{i,t} + \alpha_2\text{FRQ}_{i,t} + \alpha_3(\text{FRQ}_{i,t} \times \text{CSR}_{i,t}) + \alpha_4\text{SIZE}_{i,t} + \alpha_5\text{AGE}_{i,t} + \alpha_6\text{LEV}_{i,t} + \alpha_7\text{CI}_{i,t} + \alpha_8\text{MILLS}_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

where: the information asymmetry is measured with the bid-spread. CSR is a dummy variable measuring the CSR disclosure. FRQ assesses the financial reporting quality<sup>4</sup>. The control variables are: SIZE (natural logarithm of firm's net assets), AGE (natural logarithm of the number of years in business), LEV (debt ratio), and CI (capital intensity). MILLS is the inverse Mills ratio derived from the first-stage regression. The definitions of all the variables are presented in Appendix. All data come from Bloomberg data source.

Hypothesis 2 is considered through the coefficients of FRQ ( $\beta_1$ ) in equation 2. The negative coefficients will support the substitution hypothesis (2a) that FRQ restricts a high



degree of reporting CSR information. The positive coefficient will support the synergy hypothesis (2b) that firms with higher FRQ will disclose a high degree of CSR information. Hypothesis 3 is represented by the coefficient of interaction terms  $FRQ \times CSR$  ( $\alpha_3$ ) in equation 3.

### 3. Results

#### 3.1 Summary statistics

Table 1 provides descriptive statistics of the main variables. It shows a non-negligible level of information asymmetry (mean value of 0.57) and CSR disclosure (mean value of 26.08). With the correlations matrix (untabulated), we notice that CSR (ESG score) is negatively significantly correlated at the 1% level with spread suggesting a negative impact of CSR disclosure on the degree of information asymmetry. CSR disclosure is also significantly and positively correlated with financial reporting quality at the 1% level. It suggests a positive association between financial transparency and CSR disclosure.

Table 1. Descriptive statistics of main variables

Variable	Mean	S.D.	Min	Max
Spread	0.57	1.24	0	9.01
ESGscore	26.08	14.46	0.83	86.78
EM	-0.07	0.09	-0.6	-0.001
AQ	-0.03	0.04	-0.22	-0.001
Cscore	0.14	0.09	-0.09	0.36
FRQM	0.02	0.05	-0.35	0.36

Spread is the bid-ask spread to measure the information asymmetry. ESGscore assesses the level of reporting CSR information. EM, AQ, Cscore and FRQM are proxies for financial reporting quality. All variables are presented in Appendix.

#### 3.2 Main regression results

Table 2 presents the empirical results of the tests of hypothesis 1<sup>5</sup>. The coefficient of ESGscore (measure of CSR) is significantly negative, suggesting a negative relationship between CSR and corporate information asymmetry. Reporting CSR information reduces the information asymmetry and thus improves the firm's information transparency, as predicted in hypothesis 1a. This result supports the information asymmetry perspective rather than the legitimacy theory explanation.

Table 2. The effect of CSR on information asymmetry

	Spread
ESGscore	-0.0015** (0.05)
SIZE	-0.112*** (0.00)
AGE	-0.0002 (0.53)
LEV	0.291*** (0.00)
CI	-0.218*** (0.00)

Constant	2.793*** (0.00)
Country, industry, time FE	Yes
Observations	21,899
Adjusted R <sup>2</sup>	0.18

Table 2 presents the FEM regression results for the impact of CSR disclosure (ESGscore) on information asymmetry (Spread: bid-ask spread). The control variables are: SIZE (natural logarithm of firm's net assets), AGE (natural logarithm of the number of years in business), LEV (debt ratio) and CI (capital intensity). All variables are presented in Appendix. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Table 3 presents the results for the first-stage regression designed to estimate the likelihood of a firm reporting a high level of CSR information. Columns (1), (2), (3) show the results of regressions using individual proxies for FRQ as the main independent variables, while column (4) presents the results of tests using a composite measure of FRQ (FRQM). The coefficients on financial reporting quality are significantly positive for almost all the proxies or the aggregate measure of FRQ (EM, Cscore, and FRQM). These results suggest that a firm with greater financial transparency (FRQ) would report a greater amount of CSR information, as predicted in hypothesis 2b. In addition, most of the other variables have the expected signs and are statistically significant at conventional levels.

Table 3. The likelihood of a firm reporting a high level of CSR information

CSRD	(1)	(2)	(3)	(4)
EM	0.51*** (0.01)			
AQ		-0.021 (0.96)		
Cscore			0.374** (0.01)	
FRQM				1.098*** (0.00)
CGQ	0.02*** (0.00)	0.023*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
ANALYST	0.013*** (0.00)	0.013*** (0.00)	0.013*** (0.00)	0.013*** (0.00)
CSP	0.551*** (0.00)	0.544*** (0.00)	0.549*** (0.00)	0.549*** (0.00)
ROA	-0.245 (0.27)	-0.357 (0.15)	-0.261 (0.24)	-0.269 (0.23)
SIZE	0.32*** (0.00)	0.317*** (0.00)	0.323*** (0.00)	0.322*** (0.00)
LEV	-0.275*** (0.00)	-0.233** (0.02)	-0.283*** (0.00)	-0.272*** (0.00)
RISK	-0.203 (0.26)	-1.786*** (0.00)	-0.229 (0.21)	-0.184 (0.31)
GROWTH	-0.503*** (0.00)	-0.456*** (0.00)	-0.508*** (0.00)	-0.5*** (0.00)
RD	2.278***	2.127***	2.242***	2.286***

	(0.00)	(0.00)	(0.00)	(0.00)
CI	0.772***	0.842***	0.781***	0.775***
	(0.00)	(0.00)	(0.00)	(0.00)
AGE	0.006***	0.006***	0.007***	0.006***
	(0.00)	(0.00)	(0.00)	(0.00)
MKTS	0.013	0.006	0.012	0.012
	(0.61)	(0.83)	(0.62)	(0.63)
Constant	-4.475***	-4.318***	-4.547***	-4.55***
	(0.00)	(0.00)	(0.00)	(0.00)
Country, industry, time FE	Yes	Yes	Yes	Yes
Observations	16,213	12,673	16,134	16,227
Pseudo R	0.436	0.421	0.436	0.436

Table 3 summarizes the probit model results (the first-stage) which examine the determinants of CSR disclosure (proxy by the category variable CSRD). EM, AQ, Cscore and FRQM are proxies for financial reporting quality. The control variables are: CGQ (corporate governance quality), ANALYST (analyst coverage), CSP (CSR performance), ROA (return on assets ratio), SIZE (natural logarithm of firm's net assets), LEV (debt ratio), RISK (standard deviation of the monthly stock return), GROWTH (percentage of revenue change), RD (R&D expenditure), CI (capital intensity), AGE (natural logarithm of the number of years in business) and MKTS (leading position in industry). All variables are presented in Appendix. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

The table 4 presents the results for the second-stage regression. There are three remarkable findings. First, the coefficients on CSRD are significantly negative in many cases, suggesting that issuing a high amount of CSR information reduces information asymmetry even after controlling for the quality of the financial information system. This result increases the support for the information asymmetry perspective. Second, we observe the same pattern in the relationship between FRQ and information asymmetry as the coefficients on FRQ measures are significantly negative. Third, the coefficients on FRQ×CSRD are positive. Combined with the significantly negative coefficients on CSRD, these results suggest that the negative relationship between CSRD and information asymmetry is less acute in firms that have better financial transparency, suggesting a substitutive association between these two forms of disclosure as predicted in hypothesis 3a. This finding is consistent with previous studies that found a substitution effect between financial reporting and CSR disclosure in reducing the cost of equity or increasing the analyst's forecast accuracy (Dhaliwal et al., 2012, 2014).

Table 4. Financial reporting quality, CSR disclosure and information asymmetry

Spread	(1)	(2)	(3)	(4)
CSRD	-0.012	0.001	-0.103***	-0.068***
	(0.64)	(0.98)	(0.00)	(0.00)
EM	-0.028**			
	(0.02)			
EM×CSRD	0.618**			
	(0.02)			
AQ		-0.026*		
		(0.08)		
AQ×CSRD		0.608		
		(0.33)		
Cscore			-0.022*	
			(0.06)	

Cscore×CSR			0.468**	
			(0.01)	
FRQM				-0.042***
				(0.00)
FRQM×CSR				1.186***
				(0.00)
SIZE	-0.004	0.039***	-0.002	-0.003
	(0.7)	(0.00)	(0.82)	(0.78)
AGE	0.0002	0.0004	0.0003	0.0003
	(0.5)	(0.32)	(0.47)	(0.46)
LEV	0.28***	0.293***	0.288***	0.276***
	(0.00)	(0.00)	(0.00)	(0.00)
CI	0.025	0.052	0.022	0.028
	(0.65)	(0.46)	(0.69)	(0.61)
MILLS	0.219***	0.369***	0.23***	0.223***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	1.426***	1.145***	1.393***	1.401***
	(0.00)	(0.00)	(0.00)	(0.00)
Country, industry, time FE	Yes	Yes	Yes	Yes
Observations	15,903	10,475	15,832	15,917
Adjusted R <sup>2</sup>	0.161	0.176	0.161	0.161

Table 4 presents the second-stage regression results of the two-stage least square regression. The dependent variable Spread is the bid-ask spread. CSR is a dummy variable measuring the CSR disclosure. EM, AQ, Cscore and FRQM are proxies for financial reporting quality. The control variables are: SIZE (natural logarithm of firm's net assets), AGE (natural logarithm of the number of years in business), LEV (debt ratio), and CI (capital intensity). MILLS is the inverse Mills ratio derived from the first-stage regression. All variables are presented in Appendix. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

The empirical analysis results support hypothesis 1a which states that there is a negative association between CSR disclosure and information asymmetry. Furthermore, financial reporting quality positively determines the amount of CSR information. This means that corporate financial transparency is a factor that encourages firms to enrich the content of their CSR reports. Finally, the reduction of information asymmetry is less pronounced in firms that have better financial transparency, suggesting that CSR and financial reporting are substitutive to each other in reducing information asymmetry. In other words, the negative link between CSR and information asymmetry is moderated by financial reporting quality. With a high financial transparency, CSR provides less incremental information content to the investors. This result supports the information asymmetry perspective rather than the legitimacy theory explanation.

#### 4. Robustness test<sup>6</sup>

The results can be affected by the variable selection, especially the variables of interest such as information asymmetry. A test using other proxies of information asymmetry is therefore essential. The analysts' earnings forecast-based measures such as the accuracy and the dispersion of analysts' forecasts are also often used in literature (i.e., Lang and Lundholm, 1996; Dhaliwal et al., 2012). Higher accuracy or a smaller dispersion of analysts' forecasts indicates greater availability of information or less information asymmetry. The forecast error (FERROR) is constructed to proxy for the analysts' forecasts accuracy, which is calculated as the absolute value of actual earnings per share (EPS) minus the mean of one-year ahead

forecasted earnings per share (FEPS), scaled by the absolute value of actual earnings per share. The second measure is the standard deviation (SD) of analysts' forecasts (Dispersion)<sup>7</sup>:

$$\text{FERROR}_{i,t} = \frac{|\text{EPS}_{i,t} - \text{FEPS}_{i,t}|}{|\text{EPS}_{i,t}|}$$

$$\text{Dispersion}_{i,t} = \frac{\text{SD}_{i,t}}{|\text{EPS}_{i,t}|}$$

The results in table 5 show that firms with a high level of CSR disclosure have a lower analysts' forecast error (the impact of ESGscore is negative and significant). Nevertheless, the impact on dispersion is not significant. These results are in line with the asymmetry of information perspective in the sense that disclosing CSR information helps to decrease the level of information asymmetry between managers and financial analysts.

Table 5. The effect of CSRD on information asymmetry

	FERROR	Dispersion
ESGscore	-0.004*** (0.00)	-0.001 (0.27)
SIZE	-0.164*** (0.00)	-0.1*** (0.00)
AGE	-0.002*** (0.00)	-0.002*** (0.00)
LEV	1.235*** (0.00)	0.891*** (0.00)
CI	0.354*** (0.00)	0.435*** (0.00)
Constant	-1.652*** (0.00)	-2.273*** (0.00)
Country, industry, time FE	Yes	Yes
Observations	18,359	17,644
Adjusted R <sup>2</sup>	0.195	0.329

Table 5 presents the FEM regression results for the tests which examine the impact of CSRD (ESGscore) on information asymmetry, using FERROR (accuracy of analysts' forecasts) and Dispersion of analysts' forecasts to proxy for information asymmetry. The control variables are: SIZE (natural logarithm of firm's net assets), AGE (natural logarithm of the number of years in business), LEV (debt ratio) and CI (capital intensity). All variables are presented in Appendix. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

In short, the second-stage regression results (untabulated) testing the association between CSRD and information asymmetry regarding the effect of financial reporting quality show that firms with higher financial reporting quality have a lower analysts' forecasts error and dispersion, consistent with the results in table 4. One difference with the previous results is that most of coefficients on CSRD are positive (even though few are significant), suggesting a negative direct impact of CSRD on information asymmetry. These results do not confirm our finding that CSR disclosure reduces information asymmetry. They are not in line with what is generally observed in previous papers as presented by Hinze and Sump (2019) in their literature review on this topic. They rather support the legitimacy theory approach: CSR disclosure does not target financial analysts but rather other stakeholders of the companies.

The significant and positive coefficients on the interaction between proxies of FRQ and CSRD also suggest that CSRD is not primarily designed for financial investors (represented here by financial analysts). Zhou et al. (2017) explain that, due to cognitive limitation, financial analysts have difficulties to process complex information. Adding non-financial information into their decision-making processes could exacerbate the adverse effects on analyst earnings forecast error and dispersion. This is especially the case when the link between non-financial information and financial information is not well articulated. Moreover, it seems that financial analysts make use of CSR disclosures rarely and attribute little importance to such information (Krasodomska and Cho, 2017). If the company primary's goal were to improve financial analysts' forecasts, companies would probably dedicate more attention to a better integration between financial and non-financial disclosures. In our study, it does not seem to be the case.

In contrast with Dhaliwal et al. (2012), our tests do not show that CSRD and financial disclosures act as substitutes for financial analysts. While Dhaliwal et al. (2012, 2014) proxy CSRD with the issuance of stand-alone CSR reports, we have a more in-depth assessment of this variable. Our measure is based on the firm's reporting on 120 indicators of CSR program. This difference may explain our different findings.

## Conclusion

This paper extends the literature on the consequences of CSR disclosure by examining the association between CSR disclosure and information asymmetry regarding the influence of financial reporting quality in an international setting. As a source of firm information, CSR disclosure can provide firm information on CSR activities that may reduce the imbalance of information between the firm and its shareholders. We therefore examine the impact of CSR disclosure on the quality of corporate information by using the degree of information asymmetry as a variable of interest. Following the asymmetry of information view, CSR disclosure provides valuable information related to firm prospects in the long-term. It can substitute financial reporting to reduce the dissymmetry of information caused by the lower quality of financial information. CSR information is nevertheless distinct from financial information, so CSRD can be an additional source of firm information besides financial reporting. The effect of CSR and financial information on information asymmetry should therefore be magnified when they are performed simultaneously.

Our empirical results provide evidence that CSR disclosure reduces information asymmetry when measured by the bid-ask spread. This finding supports the information asymmetry perspective. Second, financial reporting quality positively determines the high amount of CSR information in the company's CSR reports. It is an important factor that motivates the issuance of CSR reports with rich content. Finally, we find that the negative relationship between issuing high level of CSR information and information asymmetry is less pronounced in firms that have high financial transparency, suggesting a substitution association between financial reporting and CSR disclosure in reducing information asymmetry. With a high financial transparency, CSRD provides less incremental information content to the investors. Its informativeness decreases.

Our seemingly contradictory finding that CSRD decreases the quality of financial analysts' forecasts is consistent with both legitimacy and signaling (voluntary disclosure) theory. In line with the legitimacy theory which explains that, in order to cope with contradictory social and institutional pressures, companies engage in differentiated information disclosure. Indeed, investors are more heterogeneous than financial analysts explaining why CSR information could reduce information asymmetry between the members

of the first group and not for the more homogeneous second group. Moreover, with the dramatic increase of Socially Responsible Investing (SRI), a growing fraction of investors is interested by the disclosure of CSR information. From the voluntary disclosure theory perspective, following Rossignoli et al. (2022), since financial analysts rely not only on firm-provided disclosures but also on private information from unstructured sources, the relationship between disclosure policies and the dispersion of their forecasts is not predictable. In consequence, an increase in the informativeness of firm-provided disclosures associated with an increase in forecast dispersion is attributable either to the fact that analysts rely on different sets of private information or to their use of different forecast models.

The results of our paper have interesting managerial implications. Managers face a tradeoff between the gains associated with better corporate information disclosure and the cost associated to the production, formatting and disclosure of that information (Healy and Palepu, 2001). It is therefore important to know which combination of financial and CSR information has the most positive effect on investors. This choice depends on the direct impact of financial and CSR information but also on the degree of substitutability between the two.

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## Appendix. Variable definition

<i>Variables</i>	<i>Definition</i>
	<i>Dependent variables</i>
<i>Spread</i>	The absolute value of the average difference between the highest purchase price to the lowest selling price based on the daily price of firm <i>i</i> for one year.
<i>FERROR</i>	The logarithm value of the absolute value of actual earnings per share minus the mean of one-year ahead forecasted earnings per share, scaled by the absolute value of actual earnings per share.
<i>Dispersion</i>	The logarithm value of the standard deviation of analysts' forecasts, scaled by the absolute value of actual earnings per share.
	<i>CSR information disclosure</i>
<i>ESGscore</i>	ESG disclosure score indicating the level of reporting CSR information provided by Bloomberg, ranging from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point on 120 indicators in three dimensions of CSR: environment, social and governance.
<i>CSRD</i>	An indicator variable equal to 1 for firms with an ESG disclosure score in the 4 <sup>th</sup> (medium-high) and 5 <sup>th</sup> (high) quintiles of ESG disclosure score sample, and 0 otherwise.
	<i>Financial reporting quality (FRQ)</i>
<i>Accrual quality (AQ)</i>	The absolute values of residuals got from the Dechow and Dichev's (2002) model modified by McNichols (2002) and Francis et al. (2005) are a proxy for accruals quality. A higher value of residuals represents a lower accruals quality, then lower FRQM. We multiply it by -1 to get a positive indicator of FRQM.
<i>Earning management (EM)</i>	The abnormal accruals got from the Jones (1991)'s approach modified by Kothari et al. (2005) are a second proxy for earning management. We multiply its absolute value by -1 to get a positive indicator of FRQM.
<i>Accounting conservatism (Cscore)</i>	C-score developed by Khan and Watts (2009) reflects the increasing timeliness of bad news over good news. It is measured basing on the Basu (1997)'s model of asymmetric timeliness. A high C-score reflects a high degree of conservatism, so it is a positive indicator of FRQM.
<i>FRQM</i>	A composite measure of firm-level financial reporting quality equals to a firm-year mean of three proxies of firm-level financial transparency: EM, AQ, Cscore. A high FRQM corresponds to a high quality of financial reporting at firm level.
	<i>Control variables</i>
<i>CGQ</i>	An aggregate measure of corporate governance quality computed on the basic of 40 firm-specific provisions on both internal and external governance. Following Brown and Caylor (2006)'s, we used the ISS Corporate Governance: Best Practices User Guide and Glossary (2003) to code each of 40 factors either 1 or 0 depending on whether ISS considers the firm's governance to be minimally acceptable, and then sum all binary variables to create a firm-specific summary measure. It is reported on a percentile basis ranging from 0 to 100 per cent.
<i>SIZE</i>	Firm size: the natural logarithm of firm's net assets.
<i>LEV</i>	Leverage: the ratio of total debt to total assets.
<i>RD</i>	Research and development expenditure: the ratio of R&D expenses to net sales.
<i>CI</i>	Capital intensity: the ratio of property, plant, and equipment to total assets.
<i>ROA</i>	Return on assets.
<i>GROWTH</i>	Growth opportunity: the percentage of revenue changes from prior year.
<i>RISK</i>	A measure of firm risk: the standard deviation of the monthly stock return for the five preceding years, annualized.
<i>AGE</i>	Firm age: the natural logarithm of the number of years in business.
<i>CSP</i>	An indicator of a firm's CSR performance that takes a value of 1 if the firm is comprised in the Dow Jones Sustainability World Index (DJSWI) in any year over the sample period, and 0 otherwise.

<i>ANALYST</i>	Analyst coverage: the natural logarithm of the average number of analysts following the firm.
<i>MKTS</i>	A measure of leading position in industry: the ratio of the firm's sales in a year to the total sales of all companies in the same industry in the same year. Industries are classified on the basis of two-digits SIC code.
<i>Country effect</i>	Dummy variables for each country.
<i>Industry effect</i>	Dummy variables according to SIC two-digit classification.
<i>Year effect</i>	Dummy variables for each year.

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<sup>1</sup> The use of an international sample does not aim to isolate the effect of individual country attributes, it is rather to insure the robustness of the relationship in spite of the various country-level institutions and features. However, even if we introduce country fixed effects, the results may be impacted by countries' heterogeneity.

<sup>2</sup> The authors are aware that the choice of a single provider of ESG data might give a biased view since correlation between providers is low.

<sup>3</sup> We winsorize extreme (1st and 99th) percentiles of dependent variable and continuous control variables to prevent the effect of outliers.

<sup>4</sup> In model 3, the measures of FRQ variables need to be centered to get a revised sample mean of zero so that we can eliminate the multicollinearity effect occurred by using the interaction terms.

<sup>5</sup> According to the Breusch and Pagan Lagrangian test and the Hausman test, fixed effects method seems to be the more appropriate.

<sup>6</sup> We also conduct a robustness check by using a sample of companies in "dirty" industries. The specific characteristics of polluting industries regarding CSR activities does not modify the conclusions obtained from the global sample.

<sup>7</sup> The two measures (FERROR and Dispersion) are transformed into logarithm to induce the symmetry and normality in such data.