

Environmental and Social Disclosures and Firm Risk

(CSR Disclosures and Firm Risk)

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Abstract

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Keywords: environmental and social disclosures; firm risk; voluntary disclosure; corporate social responsibility; stakeholder theory; resource based view; risk management.

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Abstract

We examine the link between a firm's environmental (E) and social (S) disclosures and measures of its risk including total, systematic, and idiosyncratic risk. While we do not find any link between a firm's E and S disclosures and its systematic risk, we find a negative and significant association between these disclosures and a firm's total and idiosyncratic risk. These are novel findings and are consistent with the predictions of the stakeholder theory and the resource based view of the firm suggesting that firms which make extensive and objective E and S disclosures promote corporate transparency that can help them build a positive reputation and trust with its stakeholders, which in turn can help mitigate the firm's idiosyncratic/operational risk. These findings are important for all corporate stakeholders including managers, employees, and suppliers who have a significant economic interest in the survival and success of the firm.

Key words: environmental and social disclosures, financial risk, resource based view, risk management, stakeholder theory, voluntary disclosure, corporate social responsibility.

Abbreviations

CAPM	Capital Asset Pricing Model
CFP	Corporate Financial Performance
CSD	Corporate Social Disclosure
CSP	Corporate Social Performance
CSR	Corporate Social Responsibility
E	Environmental
FTSE	Financial Times Stock Exchange Group
GHG	Green House Gas
GRI	Global Reporting Initiative
ISO	International Organization for Standardization
MTB	Market to Book Ratio
RBV	Resource Based View (of the firm)
ROA	Return on Assets
S	Social
SIC	Standard Industrial Classification
UK	United Kingdom

1. Introduction

In recent years there has been a growing interest in environmental and social issues on the part of a variety of corporate stakeholders including investors, employees, suppliers, customers, government, and the wider society. In line with this trend, a considerable body of academic research has focused on examining the various stakeholder related implications of a firm's actions aimed at addressing its corporate environmental and social responsibility, generally referred to as CSR. Scholars have found investments in CSR to be associated with a number of benefits, including superior economic performance (see Beurden and Gossling, 2008, for a recent literature review) and reduced firm risk (see Orlitzky and Benjamin, 2001, for a meta-analytic review). In the latter context, scholars to date have tended to view a firm's investments in CSR as a risk management strategy that can provide an insurance-like protection for its cash flows, reducing their riskiness vis-à-vis the market (see Godfrey, 2005) and thus impacting the firm's financial/systematic risk (see Hasseldine et al., 2005; Jo and Na, 2012; Oikonomou et al., 2012). There is also, however, a view in the literature that investments in CSR-related activities that help build good relations with a firm's stakeholders are like a real option that a firm can use to reduce its operational costs and/or input prices thus reducing the firm's operational i.e. idiosyncratic risk (Husted, 2005). This theoretical view however has not been explicitly tested in the literature although there is some indirect empirical evidence supporting this view (see Lee and Faff, 2009). Moreover, while the link between corporate social performance and financial risk has been examined to some extent, corresponding studies related to environmental (E) and social (S) disclosures are lacking. Our paper attempts to address both these gaps.

Increasingly public limited companies around the world are making extensive (i.e. covering a wide number of relevant issues, cf. Clarkson et al. 2008) and objective (i.e. 'hard' quantified and hence more reliable, cf. Clarkson et al., 2008; Cormier and Magnan, 2013)

environmental (E) and social (S) disclosures. In line with this trend, academic studies have also been conducted to investigate various capital market implications of such disclosures. While there is an ongoing debate in the literature as to whether extensive E disclosures relate to superior environmental performance (see Al-Tuwaijri et al., 2004; Clarkson et al., 2008; Cho and Patten, 2007; Guidry and Patten, 2012; Patten, 2002), evidence to date suggests that extensive and objective, hence implicitly reliable, E (and S) disclosures reduce the information asymmetry between the firm and its investors (Cormier et al., 2009). Such E disclosures are also found to be associated with lower implied cost of capital (Orens et al., 2010); and with improved informational context of the firm enabling analysts to make better earnings forecasts (Cormier and Magnan, 2013, 2014). Recently, Qiu et al. (2016) find that firms making more extensive and objective E and S disclosures and particularly S disclosures enjoy higher market values. They however find this relation to be driven by the higher expected growth rates in the cash flows of such firms rather than by a reduction in the cost of equity capital for such firms (as prior evidence seems to find, cf. Orens et al., 2010). Thus, a relevant question to ask is whether such disclosures also reduce a firm's risk and if so, which measure of risk is impacted, i.e. systematic and/or idiosyncratic i.e. operational risk. From a stakeholder theory perspective, studying the relation between E and S disclosures and both measures of risk is important. First, systematic risk may *prima facie* matter only (or mostly) for corporate investors, but as socially responsible investment continues to grow around the world, *ceteris paribus*, evidence of lower systematic risk enjoyed by firms making greater E and S disclosures can help direct more funds to firms seen as being socially responsible as well as promote corporate transparency. Moreover, as more firms publicly reveal what they actually do in terms of their CSR, this can promote environmentally and socially responsible business practices and their reporting in companies around the world. Second, if extensive and objective E and S disclosures are associated with lower firm operational/idiosyncratic risk, consistent with RBV theory (Hart,

1995), these would be reflective of reputation and trust building activities on the part of the corporation with its key stakeholders like employees, suppliers, customers, etc. This finding would also provide support for Husted's (2005) assertion that investments in CSR (which we presume would also include investments in CSR-related disclosure) to be a real option that can help a firm reduce its operational risk. Stakeholders, particularly employees, suppliers, and managers with their human and/or financial capital directly tied to the operational success of the firm would benefit from reduced firm operational or idiosyncratic risk. In this paper we directly test the link between a firm's E and S disclosures and both measures of risk.

Employing a panel data set of UK listed firms covering the years 2005-2013, we find a negative and significant association between a firm's E and S disclosures and its idiosyncratic but not with its systematic risk. We find these results to hold even after controlling for the firm's environmental and social performance. These findings are of relevance for all corporate stakeholders, in particular those who have their tangible and intangible assets tied to the fortunes of the firm, such as its employees, suppliers, customers and managers.

The rest of the paper is organized as follows: Section 2 discusses the prior literature and develops the testable hypotheses; Section 3 discusses the sample, variables and models; Section 4 presents the results; and Section 5 concludes the paper.

2. Literature review and hypotheses development

2.1. Environmental and social disclosures and firm systematic risk

A considerable body of academic research has investigated various financial implications of a firm's corporate social performance, CSP, including the link between CSP and measures of corporate financial performance, CFP (e.g. Brammer et al., 2006; Beurden and Gossling, 2008; Dowell et al., 2000), between CSP and a firm's cost of capital (Sharfman and Fernando, 2008), as well as between CSP and a firm's systematic risk (e.g. Jo and Na, 2012; Oikonomou et al., 2012; Salama et al., 2011). Overall this body of research suggests that better CSP tends to be

associated with better financial performance and also lower overall cost of capital. The link with systematic risk however is less than clear – while Salama et al. (2011) and Oikonomou et al. (2012) find a relatively weak negative link between CSP and systematic risk, Jo and Na (2012) find a strong negative link between CSP and systematic risk. It is worth noting though that Jo and Na's study is limited to only the 'controversial' industries, that is, those that are socially undesirable, where CSR may particularly help play a positive role in improving firm image among investors.

In terms of E (and at times S disclosures) while there is still an ongoing debate as to whether extensive E (and S) disclosures reflect superior E (and S) performance (see Al-Tuwaijri et al., 2004; Clarkson et al., 2008; Cho and Patten, 2007; Guidry and Patten, 2012; Patten, 2002), emerging evidence appears to suggest that objective and extensive E and S disclosures are beneficial. For example, Qiu et al. (2016) find a positive link between combined E and S and particularly S disclosures and a firm's market value. Cormier et al. (2009) find such disclosures to reduce the information asymmetry between the firm and its investors, while Cormier and Magnan (2013 and 2014) find such E disclosures to also reduce the information uncertainty faced by financial analysts, allowing them to make better earnings forecasts. Finally, Orens et al. (2010) find web-based non-financial disclosures to be linked with lower implied cost of equity capital.

Few studies to date have directly examined the link between a firm's E and/or S disclosures and its systematic risk. Moreover, the studies which do examine this link tend to treat systematic risk as an independent variable explaining a firm's E and/or S disclosures (cf. Hasseldine et al., 2005; Toms, 2002). The theoretical motivation for this empirical treatment is also not clearly articulated in these studies.

In this study, based on clear theoretical motivation, we examine the impact of a firm's E and S disclosures on its systematic risk. The theoretical argument for examining the link is

developed as follows. First, according to agency theory (Jensen and Meckling, 1976), investors benefit from extensive and objective corporate disclosures. Second, according to proprietary costs theory (Dye, 1985), disclosures are more reliable when there are proprietary costs associated with them (e.g. regulatory costs such as environmental fines in the context of E disclosures or commercial costs e.g. threat to competitiveness due to disclosure of environmental innovation information, sensitive employee health and safety plans and practices, etc.). Third, managers are more likely to make more extensive and objective disclosures if they perceive the potential benefits of such disclosures to exceed their costs (as per voluntary disclosure theory, VDT, Verecchia, 1983 and 2001). Finally, prior theoretical arguments (Hart, 1995) and empirical evidence show that more extensive and objective voluntary corporate disclosures, including E and S disclosures, have been associated with a number of corporate benefits (discussed earlier) including reduced information asymmetry between firm and its investors and analysts (Cormier et al., 2009; Cormier and Magnan, 2013) and lower implied cost of equity capital (cf. Orens et al., 2010). Thus, in the light of this theoretical motivation and the supporting empirical evidence, we hypothesize that (stated in alternative form):

H1: Extensive and objective E (and S) disclosures are negatively related to a firm's systematic risk.

2.2. Environmental and social disclosures and firm idiosyncratic risk

As per agency theory (Jensen and Meckling, 1976) shareholders are assumed to be the only corporate stakeholders to have an incomplete contract with the firm and accordingly are assumed to be the only residual risk bearers of a firm. However, scholars (e.g. Asher et al., 2012) drawing on the property rights theory, the stakeholder theory, and numerous real world examples, have argued that stakeholders other than shareholders (e.g. employees, bank

borrowers in the recent crisis, customers, and suppliers) also have incomplete contracts with a firm and accordingly are also the residual risk bearers of a firm. In fact, employees with their undiversified human and financial capital tied to the firm can be easily argued to be among the biggest losers if a firm collapses. Hence, stakeholders other than shareholders have a significant stake in a firm's continued operational success and hence care about its idiosyncratic or unique business risk. Accordingly, as per agency theory and instrumental stakeholder theory (cf. Jones, 1995), stakeholders would prefer to transact with a firm with higher transparency and lower operational risk. The recent financial crisis and its continued aftermath provide enough evidence to make a compelling case for firms to follow operational strategies that increase corporate transparency and reduce their idiosyncratic risk. Making extensive and objective E and S disclosures can be seen as an integral part of a firm's business risk reduction strategy for a number of reasons discussed below.

First, studies drawing on the resource based view of the firm, i.e. RBV theory, have theoretically argued and empirically found that reliable E disclosures, by influencing perceptions about the firm, contribute to building a positive firm reputation (Hart, 1995; Hasseldine et al., 2005; Toms, 2002). Such positive perceptions can contribute significantly to reducing a firm's reputational risk (Heal, 2005). Second, one can argue that such reporting by promoting corporate transparency and building trust with a firm's economic stakeholders can help reduce the transactional/operating risk arising from potential distributional conflicts with a firm's stakeholders (*ibidem*). For example, objective reporting of product stewardship practices, fair remuneration and training policy and practices, good working conditions/environment for employees, human rights policy, and reporting of corporate equality and diversity policies and practices, etc. can minimize the risks of distributional and hence operational conflicts with a firm's key economic stakeholders. Consistent with such arguments, Qiu et al. (2016) find that firms which make extensive and objective E and S disclosures tend

to enjoy higher expected growth rates of their cash flows. Cheng et al. (2014) also find that firms making higher CSR related disclosures face lower idiosyncratic capital constraints and better access to finance, due to enhanced corporate transparency. Finally, Husted (2005) argues that investments in CSR (which we assume would also include costly investments in CSR-related disclosures), are real options involving strategic and operating decisions by managers that can help reduce business risk of the firm.

Thus based on prior relevant theoretical arguments (Hart, 1995; Heal; 2005; Husted, 2005) and related empirical evidence (Cheng et al., 2014; Qiu et al., 2016), we expect that extensive and objective E and S disclosures should also be associated with reduced firm idiosyncratic risk.¹ Accordingly we hypothesize that (stated in alternative form):

H2: Extensive and objective E (and S) disclosures are negatively related to a firm's idiosyncratic risk.

3. Sample, variables and models

3.1 Sample

Table 1 presents a description of our sample. While the total number of observations available for Bloomberg E and S disclosure scores (used for measuring the disclosures in our study and discussed in detail below) is 1,835 firm-years, matching it with financial variables collected from Datastream leaves a usable sample of 1,755 firm-year observations covering the period 2005-2013. Based on the two-digit Standard Industrial Classification (SIC), the Bloomberg sample represents the following 8 industry sectors (with proportion of total sample presented in brackets): construction industries (3.92), financial sector (18.53), manufacturing (26.95),

¹ While we do not have a specific hypothesis for the link between E and S disclosures and total risk of the firm as measured by stock volatility, for comparability of results with prior relevant studies (e.g. Jo and Na, 2012) we also test this link.

mineral industries (10.95), retail trade (10.90), service industries (14.71), transportation and communications (10.95) and wholesale trade (3.43). Thus our sample covers a wide cross-section of industries (see Table 1, Panel A).

3.2. Variables

The financial variables used in our analyses are obtained from Datastream, including the data used to calculate total, systematic and idiosyncratic risks, the three dependent variables used in our analyses. Environmental and social disclosure scores, the main explanatory variables are collected from Bloomberg. In our robustness test, we also use the Thomson Reuters Asset4 environmental and social performance scores retrieved from Datastream. Appendix A describes the variables, their measurements and sources in detail.

3.2.1. E and S disclosure scores

The primary explanatory variables of interest in this study are the E and S disclosure scores of companies developed by Bloomberg. Bloomberg assigns E and S disclosure scores to companies based on data points collected via multiple sources including annual reports, standalone sustainability reports and company websites etc. The data points used for calculating E and S disclosure scores are based on the GRI framework and capture standardized cross-sector and industry-specific metrics. The weighted score is normalized to range from zero, for companies that do not disclose any E and S data, to 100 for those disclosing every data point collected. Moreover, within each E and S category, the individual company score is expressed as a percentage, so as to make the score comparable across companies. The score is also tailored to be industry relevant, so that each company is evaluated only in terms of the data that is relevant to its industry sector. For example, 'Phones Recycled' is only considered in the score for telecommunications companies and not for other sectors. Similarly, 'Gas Flaring' only goes into computing the disclosure score for oil and gas exploration and production companies while

companies in other sectors are not penalized for not disclosing it. The data points are also weighted (based on a proprietary weighting scheme) in terms of importance within each category, so that ‘Green House Gas emissions’ for example would be weighted more heavily than other data points within the environment category. Hence, the disclosure scores are both relevant as well as weighted in terms of importance to their users (particularly investors). These thus capture the quantity (i.e. number of data points reported by a company) but more importantly the quality (in terms of objective and industry-relevant data points) of E and S disclosures. A number of prior CSR-related studies have used Bloomberg disclosure scores (e.g. Eccles et al., 2012; Ioannou and Serafeim, 2015; Qiu et al., 2016; Utz and Wimmer, 2014). A short description of data points covered in each score is discussed below. The complete list of the data points covered under the E and S categories is given in Appendix B.

The ‘E’ score covers various types of environmental information that could broadly be classified as ‘hard’ items and ‘soft’ items. ‘Hard’ items include quantifiable data like Carbon/GHG emissions, energy/water consumption, waste recycled, investments in sustainability, and ISO certification, among others. ‘Soft’ items include firms’ environmental policies and initiatives such as waste reduction policy, energy efficiency policy and green building policy, among others. Approximately 80% of environmental disclosure items covered are ‘hard’ objective data items, while only 20% are ‘soft’ data points. Thus, these environmental scores largely capture what Clarkson et al. (2008) would call a firm’s ‘hard’ environmental disclosure. As mentioned earlier, Cormier et al. (2009) find such ‘hard’ disclosures to be more strongly associated with reducing the information asymmetry between the firm and its investors; while Cormier and Magnan (2013) find such relevant, objective and reliable disclosures help analysts make better earnings forecasts.

The ‘S’ score developed by Bloomberg mostly covers reporting of issues related to employee relations, such as employee health and welfare, as well as their training and

development including training in CSR. The ‘S’ score also covers disclosure of issues of equality and diversity in employment, community spending and human rights. Based on the type of information covered, about 70% of social score is based on ‘hard’ items while ‘soft’ information makes up about 30% of the score. Such ‘hard’ S disclosures are also likely to enhance a firm's social legitimacy, its social reputation and as Cormier et al. (2009) find, help reduce the information asymmetry between the firm and its investors.

3.2.2. Measures of financial risk

Following prior literature, a firm’s total risk is measured by the standard deviation of the firm’s daily stock’s return (cf. Jo and Na, 2012). Furthermore, we use the CAPM beta as the measure of a firm’s systematic risk (Jo and Na, 2012) and estimate it by regressing the daily stock return on the daily market return of the FTSE-350 over the year:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_i \quad (1)$$

where R_{it} is the return on security i for day t , α_i is the intercept term, β_i is the systematic risk of security i (BETA), R_{mt} is the return on the market m for day t and e_i is an error term.

Finally, we measure a firm’s idiosyncratic i.e. unique business risk as the standard deviation of residuals from CAPM based on daily stock returns (cf. Amit and Wernerfelt, 1990; Lee and Faff, 2009).

3.2.3. Control variables

Following prior related studies, we control for a number of variables that can affect the individual firm’s risk. First, to discern the marginal effect of E and S disclosures on risk, following Qiu et al. (2016), we control for the firm’s E and S performance in the corresponding equations. Consistent with Jo and Na (2012), we expect a negative link between E or S performance and all measures of risk. E and S performance scores are provided by Asset4, a Thomson Reuters database (used by prior literature, e.g. Ioannou and Serafeim, 2015; Shaukat

et al., 2015). In addition, we control for firm size (SIZE) as measured by the natural logarithm of total assets. We expect a negative relationship between size and firm's risk. Prior studies suggest that large firms are less exposed to risk, as they are more able to manage risk especially in times of high volatility (e.g. Jo and Na, 2012). We also control for investment opportunities as measured by market to book ratio (MTB). It is argued that firms with low growth opportunities are characterized by low share prices and low market to book ratios (e.g. Lewellen, 1999). Moreover, analysts consider firms with poor perspectives of growth (low MTB ratio) as being more exposed to market volatility (e.g. Bouslah et al., 2013; Lewellen, 1999). Hence, we expect a negative relationship between risk and MTB. Leverage (LEV) is measured by total debt to total assets ratio. Prior evidence suggests higher leverage to be associated with higher firm risk (Abdelghani, 2005). Thus a positive association is expected between firm's leverage and risk; profitability is measured by return on assets (ROA). Prior research finds more profitable firms to be less risky (e.g. Jo and Na, 2012). Following prior studies we also control for capital expenditure scaled by total assets (CAPEX) and asset growth (ASST_GROW) as measured by total assets in year t minus total assets in year t-1 divided by total assets in year t-1 (cf. Jo and Na, 2012; Salama et al., 2011). We include industry and year fixed effects in all models. Finally, in our robustness checks we employ governance performance score, GOV_PER, provided by Asset4.

3.3. Model specification

Following prior literature (e.g. Jo and Na, 2012), we use the following model to test our hypotheses:

$$\begin{aligned}
Firm\ risk_{it} = & \alpha + \beta_1 \times Disclosure\ score_{it} + \beta_2 \times E\ or\ S\ Performance_{it} + \beta_3 \\
& \times Size_{it} + \beta_4 \times MTB_{it} + \beta_5 \times LEV_{it} + \beta_6 \times ROA_{it} + \beta_7 \times CAPEX_{it} \\
& + \beta_8 \times ASST_GROW_{it} + \sum_j \beta_j \times Industry\ fixed\ effects_j + \sum_l \beta_l \quad (2) \\
& \times Year\ fixed\ effects_l + \varepsilon_{it}
\end{aligned}$$

In Equation 2, Firm risk_{it} is one of the risk measures, namely stock volatility, systematic risk (i.e. beta), or idiosyncratic risk. Disclosure score_{it} represents E or S disclosure score, and the control variables are defined above. All regressions are run as random-effect panel data models.

3.4. Descriptive statistics

Table 1 (Panel B) provides the descriptive statistics for the variables used in this study. It shows that the mean value of stock volatility is 0.350, and the average systematic risk is 0.979 (which is approximately equal to one, the value of the market beta), and the average firm specific risk is 0.019 (which is in line with values in prior studies, e.g. Amit and Wernerfelt, 1990). With respect to E and S disclosure scores, it can be seen that the S disclosure has a mean score of 33% and E disclosure of 22%. This suggests that on average our sample of firms make more extensive S disclosures (as also found by Qiu et al., 2016). With respect to performance however, the average E performance score is almost equal to the average S performance score (about 66.6%). The average MTB ratio is 2.375. Average size measured as natural log of total assets is 14.928 (i.e. about £3,041 million). The average leverage and ROA are 21.2% and 9.7% respectively. Capital expenditure over total assets (CAPEX) and asset growth (ASST_GROW) are 4.5% and 15.0%, respectively.

[Insert Tables 1 and 2 about here]

Table 2 presents the pair-wise Pearson correlations for all variables. It shows a high correlation between total risk (i.e. volatility) and systematic (0.44) and idiosyncratic risk (0.95).

Moreover, the correlation between total and idiosyncratic (but not systematic) risk and E and S disclosure scores are negative and significant. Finally, weak correlations between the control variables indicate that our models are unlikely to suffer from multicollinearity problems.

4. Empirical results

4.1. Multivariate analyses

Table 3 reports results from estimating Equation (2). Models 1-2 report results from regressing stock volatility on E and S disclosures and control variables. We find that the coefficients on E and S disclosures are negative and statistically significant at the 10% and 5% level, respectively. This suggests that extensive and objective E and S disclosures help increase firm transparency, reduce information asymmetry and, by building trust and confidence between the firm and its investors, reduces its stock's volatility. The results are also economically significant: one standard deviation increase in the E and S disclosure scores reduces stock volatility by 0.0077 and 0.0091, respectively (i.e. by 4.81% and 5.66% of the corresponding standard deviation of the volatility variable).

We then run the same regressions by replacing stock volatility with systematic risk (Models 3-4) and idiosyncratic risk measures (Models 5-6). In terms of systematic risk, we find that the coefficient estimates on E and S disclosure scores are statistically insignificant. It appears that E and S disclosures do not affect significantly the firm's systematic risk. On the other hand, in Models 5-6, when the dependent variable is the idiosyncratic risk, it is clear that the coefficients on E and S disclosures are negative and statistically significant at the 10% and 5% level, respectively. It appears that the reduction in stock volatility among high disclosure firms is mainly due to a reduction in the firm's idiosyncratic risk. The results are also economically significant: one standard deviation increase in the E and S disclosure scores reduces idiosyncratic risk by 0.0005 and 0.0006, respectively (i.e. by 5.07% and 6.85% of the corresponding standard deviation in the idiosyncratic risk variable).

One might argue that the relationship between E and S disclosures and measures of risk is found only because the disclosures are a proxy for the companies E and S performance measures. Table 3 shows that it is not the case: the negative effect of E and S disclosures on measures of risk holds after controlling for the respective measures of E and S performance. This confirms that the disclosure about a firm's E and S practices is of value in itself. Furthermore, the negative and significant coefficients on E and S performance scores are consistent with expectations and previous findings (e.g. Benlemlih and Girerd-Potin, 2014; Jo and Na, 2012).

Additionally, we document several significant relationships between our measures of risk and the control variables used in the study. First, our results show that firm's size is positively related to systematic risk and negatively related to total and idiosyncratic risks. Second, firms with high leverage are more risky, possibly because of high leverage being associated with higher default risk. Third, the coefficients on firm's profitability (ROA) load negatively and statistically significantly (at the 1% level) for all the three measures of firm's risk (total, systematic, and specific risks). This result suggests that more profitable firms are less risky. Fourth, companies with higher capital expenditures (as proxied by CAPEX) tend to have lower total and idiosyncratic risk although this effect is not fully robust across model specifications. Finally, other control variables such as MTB and ASST_GROW appear to be less likely to affect firm's risk. Taken together, the results from the control variables are largely in line with previous relevant studies including Jo and Na (2012) and Salama et al. (2011).

[Insert Table 3 about here]

4.2. Additional analyses

In this section, we investigate the robustness of our main findings using instrumental variables approach to address the endogeneity issue and additional controls to rule out potential omitted variable biases that could affect our results.

There is a suggestion in the literature that a firm's CSR-related activities and its risk could be endogenous (Jo and Na, 2012), perhaps being simultaneously determined by some omitted variable such as the firm's management quality or by E and S performance (cf. Al-Tuwaijri et al., 2004; Clarkson et al., 2008 and 2011). Hence, without correcting for potential endogeneity, our results could be biased. To mitigate against such a possibility, we follow the arguments of Cormier and Magnan (2014) who find that E and S disclosures are related to corporate governance performance (as disclosures and good governance could be seen as substitutes). We therefore instrument E and S disclosures with governance performance, GOV_PER (as provided by Asset4, a Thomson Reuters database) and other exogenous variables explaining the risk measures employed. We then re-estimate panel-data regressions reported above employing the aforementioned instrumental variable approach. The corresponding estimates are reported in Table 4 below. While the results obtained here are somewhat weaker than those reported in the main part of the paper, we still find that more extensive and objective S disclosures help firms in reducing their idiosyncratic risk (cf. Model 12). We do not observe the same effect for E disclosures anymore, possibly because S disclosures are likely to be more relevant to key stakeholders (cf. Qiu et al., 2016). The effects of control variables are also weakened. In particular, neither E nor S performance indicators are significant in the amended model specifications.

[Insert Table 4 about here]

We have also considered extending our basic model specifications to include a number of additional control variables shown to be relevant in the current context by some prior studies.² In particular, while modelling firm risk Jo and Na (2012) control also for R&D

² For sake of brevity, the results discussed in this paragraph are not reported in the text, but are available upon request.

expenses and financial slack. Given that data on R&D expenditures is not available for more than 2/3 of our sample, inclusion of the corresponding variables (i.e. R&D scaled either by sales or by total assets) reduces the sample size considerably lowering the power of tests. Instead, we employ an alternative proxy, i.e. the ratio of intangible assets to total assets, and re-estimate all the regressions. While this new variable does not have a consistently significant effect on the risk measures, the main results of the paper are upheld. Similarly, while inclusion of the proxy for financial slack (i.e. the ratio of cash and short-term investments to total assets, cf. Qiu et al., 2016) does not affect the conclusions of the preceding analyses, the variable itself is again insignificant.

5. Discussion and conclusions

In this paper we examine the link between E and S disclosures of UK listed firms and measures of firm risk, namely total, systematic and idiosyncratic risk. First, drawing on the agency theory (Jensen and Meckling, 1976), the proprietary costs theory (Dye, 1985), and the voluntary disclosure theory (VDT, Verrecchia, 1983, 2001) we hypothesize that firms make extensive and objective E and S disclosures which by reducing the information asymmetry between the firm and its stock market participants, also reduce the firm's systematic risk. However, we find no evidence to support this claim. This finding suggests that while extensive and objective (and hence reliable) E and S disclosures may help enhance a firm's market value (as Cormier et al., 2009, and Qiu et al., 2016, find), the effect may not be through a reduction in the firm's systematic risk.

However, our findings are consistent with Hart's (1995) RBV theory based theoretical arguments and findings by Hasseldine et al. (2005) and Toms (2002) that extensive and objective E and S disclosures enhance a firm's reputation. Our findings are also consistent with Qiu et al. (2016)'s RBV and VDT theory based findings that the gains from extensive and objective E and S disclosures (that potentially enhance a firm's reputation among its key

stakeholders), come from real economic benefits like higher expected growth rates of the cash flows of such firms. Our findings complement Qiu et al.'s (2016) evidence, as we find such disclosures to also reduce a firm's idiosyncratic or business risk. These findings are also consistent with Amit and Wernerfelt's (1990) findings that firms operating in uncertain and risky environments, as most global firms do today, care about reducing their business risk. Such disclosures can thus be seen as part of the overall business risk reduction strategy of a firm. These findings further help in reconciling the legitimacy (e.g. Hackston and Milne, 1996; Patten, 1991) and economics based (e.g. Clarkson et al., 2008) arguments in the disclosure literature (cf. Cormier and Magnan, 2013). As long as extensive and objective E and S disclosures help promote corporate transparency and help mitigate the firm's business risk, it probably does not matter whether these reflect (or not) superior E and S performance. Our finding that these disclosures matter for operational risk, even after controlling for a firm's E and S performance further strengthen our assertion that such disclosures are of value in themselves. In this context, future research could examine whether CSP should be considered a contextual factor for CSD, i.e. whether reliable disclosures benefit firms with stronger CSP more (or less).

These findings are relevant for all key corporate stakeholders having tangible and intangible assets tied to the fortunes of the firm, including its employees (having developed firm specific skills and competence and having their pensions tied to the continued success of the firm); key suppliers (having invested in intangible and tangible resources specifically for the firm); as well as managers (having human and financial capital tied to the firm). Our findings suggest that extensive and objective E and S disclosures by promoting corporate transparency can allow both firms and their stakeholders to make more informed economic decisions.

While our study sheds some initial light on the link between E and S disclosures and firm risk, it probably raises more questions than it answers. Future research can fruitfully

explore these. One obvious avenue for future research is to explore more in depth the inter-relationships between E and S performance, disclosures and firm risk using more fine-grained and different measures of each variable. For example, in addition to the risk measures used in this study, future studies can employ alternative measures of risk such as option-based implied volatility measures or variability of accounting performance indicators. Moreover, as there is now a wide range of commercially available CSR indicators (mostly of CSP), future research can employ these in addition to those employed in our study. Importantly, the Bloomberg disclosure measures used here are geared towards a particular group of stakeholders, i.e. investors. If anything, this biases us against finding the result that we report. If other measures of CSP/CSD that better reflect the interests of other stakeholder groups are employed, the impact of CSP/CSD on business risk could be even more potent than reported in this paper. It might also be worth exploring the link between employee-related aspect of CSP, CSD, and firm operating risk, given the wider socio-political and of course the economic importance of this group of stakeholders in UK as in all countries (Gray, Kouhy and Lavers, 1995; Huselid, 1995). The effect of CSD might also be context-specific, e.g. social disclosures could bring more substantial economic benefits in labour-intensive industries.

Examining the inter-links between E and S disclosures, firm risk, and financial performance over the longer run is also important as Orlitzky and Benjamin (2001) raise concern that actions that reduce firm business risk in the short run may promote complacency on the part of firms which may be detrimental to firm health in the long run. Alternatively, such actions may just be a sign of agile business management. Longer run study of these links would shed more light on these possible explanations. Moreover, while this study sheds light on the contemporaneous associations between E and especially S disclosures and firm risk, future research can examine the lead-lag aspects of this link using various market- and accounting-based measures of risk (cf. Orlitzky and Benjamin, 2001). Future research should also explicitly

examine the specific channels through which CSD influences business risk, e.g. higher employee-relevant disclosures could boost employee morale and productivity, and thus boost operating performance and lower operating risk.

Finally, E and S disclosures and their economic implications are also believed to vary by the institutional and regulatory disclosure-related settings. Future research can fruitfully examine the generalisability of these findings by testing these links in a multi-country setting that control for variations in institutional and regulatory disclosure environments.

Appendix A. Variables, definitions and data sources

Variables	Definition	Source
VOL	Stock volatility measured as the standard deviation of daily stock returns in current year (annualized)	Datastream
BETA	Market beta (from CAPM) of individual stocks in current year, based on daily stock returns	Datastream
IDIO	Idiosyncratic risk measured as the standard deviation of residuals from CAPM based on daily stock returns	Datastream
ENV_DISC	Environmental disclosure score	Bloomberg
SOC_DISC	Social disclosure score	Bloomberg
MTB	Market value of assets over book value of assets	Datastream
SIZE	Firm size. It is the natural logarithm of total assets	Datastream
LEV	Book value of total debt divided by total assets	Datastream
ROA	Return on assets	Datastream
CAPEX	Capital expenditures expense divided by total assets	Datastream
ASST_GROW	The evolution of total assets from year t-1 to year t to total assets in year t-1	Datastream
ENV_PER	Environmental performance score	Asset4
SOC_PER	Social performance score	Asset4
GOV_PER	Governance performance score	Asset4

Appendix B. E and S indicators with Bloomberg fields

Environmental

Direct CO2 Emissions	DIRECT_CO2_EMISSIONS
Indirect CO2 Emissions	INDIRECT_CO2_EMISSIONS
Travel Emissions	TRAVEL_EMISSIONS
Total CO2 Emissions	TOTAL_CO2_EMISSIONS
CO2 Intensity (Tonnes)	CO2_INTENSITY
CO2 Intensity per Sales	CO2_INTENSITY_PER_SALES
GHG Scope 1	GHG_SCOPE_1
GHG Scope 2	GHG_SCOPE_2
GHG Scope 3	GHG_SCOPE_3
Total GHG Emissions	TOTAL_GHG_EMISSIONS
NOx Emissions	NOX_EMISSIONS
SO2 Emissions	SO2_EMISSIONS
SOx Emissions	SULPHUR_OXIDE_EMISSIONS
VOC Emissions	VOC_EMISSIONS
CO Emissions	CARBON_MONOXIDE_EMISSIONS
Methane Emissions	METHANE_EMISSIONS
ODS Emissions	ODS_EMISSIONS
Particulate Emissions	PARTICULATE_EMISSIONS
Total Energy Consumption	ENERGY_CONSUMPTION
Electricity Used (MWh)	ELECTRICITY_USED
Renewable Energy Use	RENEW_ENERGY_USE
Water Consumption	WATER_CONSUMPTION
Water/Unit of Prod (in Liters)	WATER_PER_UNIT_OF_PROD
% Water Recycled	PCT_WATER_RECYCLED
Discharges to Water	DISCHARGE_TO_WATER
Waste Water (Thousand Cubic Meters)	WASTE_WATER
Hazardous Waste	HAZARDOUS_WASTE
Total Waste	TOTAL_WASTE
Waste Recycled	WASTE_RECYCLED
Paper Consumption	PAPER_CONSUMPTION
Paper Recycled	PAPER_RECYCLED
Fuel Used (Thousand Liters)	FUEL_USED
Raw Materials Used	RAW_MAT_USED
% Recycled Materials	PCT_RECYCLED_MATERIALS
Gas Flaring	GAS_FLARING
Number of Spills	NUMBER_SPILLS
Amount of Spills (Thousand Tonnes)	AMOUNT_OF_SPILLS

Nuclear % Total Energy	NUCLEAR_%_ENERGY
Solar % Total Energy	SOLAR_%_ENERGY
Phones Recycled	PHONES_RECYCLED
Environmental Fines #	NUM_ENVIRON_FINES
Environmental Fines \$	ENVIRON_FINES_AMT
ISO 14001 Certified Sites	ISO_14001_SITES
Number of Sites	NUMBER_OF_SITES
% Sites Certified	%_SITES_CERTIFIED
Environmental Accounting Cost	ENVIRONMENTAL_ACCTG_COST
Investments in Sustainability	INVESTMENTS_IN_SUSTAINABILITY
Energy Efficiency Policy	ENERGY_EFFIC_POLICY
Emissions Reduction Initiatives	EMISSION_REDUCTION
Environmental Supply Chain Management	ENVIRON_SUPPLY_MGT
Green Building Policy	GREEN_BUILDING
Waste Reduction Policy	WASTE_REDUCTION
Sustainable Packaging	SUSTAIN_PACKAGING
Environmental Quality Management Policy	ENVIRON_QUAL_MGT
Climate Change Policy	CLIMATE_CHG_POLICY
New Products - Climate Change	CLIMATE_CHG_PRODS
Biodiversity Policy	BIODIVERSITY_POLICY
Environmental Awards Received	ENVIRONMENTAL_AWARDS_RECEIVED
Verification Type	VERIFICATION_TYPE

Social

Number of Employees	NUMBER_EMPLOYEES_CSR
Employee Turnover %	EMPLOYEE_TURNOVER_PCT
% Employees Unionized	PCT_EMPLOYEES_UNIONIZED
Employee Average Age	EMPLOYEE_AVERAGE_AGE
% Women in Workforce	PCT_WOMEN_EMPLOYEES
% Women in Mgt	PCT_WOMEN_MGT
% Minorities in Workforce	PCT_MINORITY_EMPLOYEES
% Disabled in Workforce	PCT_DISABLED_IN_WORKFORCE
% Minorities in Mgt	PCT_MINORITY_MGT
Workforce Accidents	WORK_ACCIDENTS_EMPLOYEES
Lost Time from Accidents	LOST_TIME_ACCIDENTS
Lost Time Incident Rate	LOST_TIME_INCIDENT_RATE
Fatalities – Contractors	FATALITIES_CONTRACTORS
Fatalities – Employees	FATALITIES_EMPLOYEES
Fatalities – Total	FATALITIES_TOTAL

Community Spending	COMMUNITY_SPENDING
Employee Training Cost	EMPLOYEE_TRAINING_COST
SRI Assets Under Management	SRI_ASSETS_UNDER_MANAGEMENT
# Awards Received	AWARDS_RECEIVED
Health and Safety Policy	HEALTH_SAFETY_POLICY
Fair Remuneration Policy	FAIR_REMUNERATION_POLICY
Training Policy	TRAINING_POLICY
Employee CSR Training	EMPLOYEE_CSR_TRAINING
Equal Opportunity Policy	EQUAL_OPPORTUNITY_POLICY
Human Rights Policy	HUMAN_RIGHTS_POLICY
UN Global Compact Signatory	UN_GLOBAL_COMPACT_SIGNATORY

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Table 1. Descriptive statistics for the variables of the study

Panel A. Sample breakdown by industry						
Industry	N	%				
Construction industries	72	3.92				
Financial sector	340	18.53				
Manufacturing	488	26.59				
Mineral industries	201	10.95				
Retail trade	200	10.90				
Service industries	270	14.71				
Transportation & communications	201	10.95				
Wholesale trade	63	3.43				
	1,835	100				

Panel B. Descriptive statistics						
Variable	N	Mean	Std. Dev.	Min	Max	Median
VOL	1,835	0.350	0.160	0.133	1.287	0.309
BETA	1,835	0.979	0.291	0.255	2.344	0.977
IDIO	1,835	0.019	0.009	0.007	0.073	0.017
ENV_DISC	1,835	22.319	15.099	1.550	69.422	19.380
SOC_DISC	1,835	33.449	12.986	3.509	84.211	29.822
MTB	1,788	2.375	17.822	-39.46	19.68	2.290
SIZE	1,834	14.928	1.858	11.069	21.596	14.551
LEV	1,835	0.212	0.189	0.000	1.672	0.190
ROA	1,805	0.097	0.100	-0.801	0.714	0.085
CAPEX	1,831	0.045	0.048	0.000	0.353	0.031
ASST_GROW	1,833	0.150	1.816	-0.888	76.843	0.057
ENV_PER	1,755	66.509	24.267	10.040	96.720	73.220
SOC_PER	1,755	66.686	22.645	6.490	98.720	74.900
GOV_PER	1,755	76.147	15.217	2.190	96.720	79.870

This table shows descriptive statistics for the main variables of our study. Panel A presents the sample breakdown by industry. While Panel B provides the number of observations, the mean, the standard deviation, the minimum, the maximum, and the median for all variables. Definitions of all variables are presented in Appendix A.

Table 2. Pearson correlation coefficients between the variables

	VOL	BETA	IDIO	ENV_DISC	SOC_DISC	MTB	SIZE	LEV	ROA	CAPEX	ASST_GROW	ENV_PER	SOC_PER	GOV_PER
VOL	1.000													
BETA	0.439	1.000												
IDIO	0.950	0.271	1.000											
ENV_DISC	-0.113	0.149	-0.213	1.000										
SOC_DISC	-0.092	0.161	-0.185	0.668	1.000									
MTB	-0.055	-0.037	-0.039	0.028	0.012	1.000								
SIZE	-0.057	0.289	-0.202	0.590	0.492	-0.010	1.000							
LEV	-0.021	-0.028	-0.005	0.065	0.075	-0.051	0.054	1.000						
ROA	-0.132	-0.127	-0.126	-0.088	-0.054	0.052	-0.281	-0.032	1.000					
CAPEX	0.085	0.076	0.095	-0.004	0.011	-0.013	-0.088	0.091	0.184	1.000				
ASST_GROW	0.074	0.012	0.051	-0.042	-0.035	0.004	0.023	-0.032	-0.008	-0.011	1.000			
ENV_PER	-0.150	0.089	-0.230	0.591	0.464	0.025	0.468	0.085	-0.159	-0.100	-0.043	1.000		
SOC_PER	-0.191	0.076	-0.272	0.563	0.515	0.003	0.468	0.115	-0.047	-0.096	-0.042	0.697	1.000	
GOV_PER	-0.169	0.064	-0.225	0.376	0.383	0.043	0.294	-0.006	-0.102	-0.070	-0.032	0.475	0.496	1.000

This table presents Pearson pair-wise correlation between all the variables of the study. Correlation coefficients in boldface are significant at less than 5% level.

Definitions of all variables are presented in Appendix A.

Table 3. Environmental and social disclosures and firm financial risk

Dependent variables	Stock Volatility		Systematic Risk (Beta)		Idiosyncratic Risk	
	(1)	(2)	(3)	(4)	(5)	(6)
ENV_DISC	-0.5106* (-1.74)		-0.1013 (-0.14)		-0.0302* (-1.70)	
SOC_DISC		-0.6974** (-2.24)		0.3077 (0.31)		-0.0475** (-2.53)
ENV_PER	-0.3354* (-1.92)		-0.3146 (-0.76)		-0.0300*** (-2.85)	
SOC_PER		-0.6993*** (-4.07)		-0.0197 (-0.05)		-0.0528*** (-5.10)
MTB	0.0275 (0.24)	0.0096 (0.08)	-0.1503 (-0.56)	-0.1597 (-0.59)	0.0049 (0.70)	0.0035 (0.51)
SIZE	-8.4419** (2.38)	-5.9343* (-1.75)	46.1721*** (5.26)	42.0061*** (4.94)	-1.2408*** (-5.72)	-1.0669*** (-5.19)
LEV	45.3143** (2.14)	46.0302** (2.19)	118.2822** (2.31)	115.4392** (2.26)	2.9620** (2.31)	2.9660** (2.43)
ROA	-129.7458*** (-4.54)	-123.5210*** (-4.34)	-236.2568*** (-3.51)	-238.9591*** (-3.54)	-9.7737*** (-5.70)	-9.3191*** (-5.47)
CAPEX	-136.7922 (-1.58)	-162.6625* (-1.89)	58.7855 (0.28)	64.6757 (0.31)	-7.2194 (-1.38)	-9.0534* (-1.75)
ASST_GROW	1.2527 (1.12)	1.2492 (1.13)	-0.8352 (-0.32)	-0.7378 (-0.28)	0.0087 (0.13)	0.0081 (0.12)
INTERCEPT	585.5906*** (10.11)	593.8031*** (10.86)	717.3098*** (5.01)	753.0364*** (5.48)	45.2253*** (12.78)	45.7634*** (13.77)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	1,681	1,681	1,681	1,681	1,681	1,681
No. of firms	295	295	295	295	295	295
R² (%)	64.06	64.69	35.48	35.31	59.89	60.97

This table reports random-effect panel regression estimates for the relation between environmental and social disclosures and financial risk. As measures of financial risk (our dependent variables), we employ the stock volatility (Models 1-2), CAPM beta to measure systematic risk (Models 3-4), and idiosyncratic risk from the CAPM (Models 5-6), respectively. All the models include industry and time fixed effects. Definitions of all variables are presented in Appendix A. All the coefficients reported have been multiplied by 1,000 due to variable scaling issues. The numbers in parentheses are t-values. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Table 4. Environmental and social disclosures and firm financial risk – models controlling for endogeneity of disclosure

Dependent variables	Stock Volatility		Systematic Risk (Beta)		Idiosyncratic Risk	
	(7)	(8)	(9)	(10)	(11)	(12)
ENV_DISC	3.5509 (0.65)		-2.9970 (-0.22)		0.2769 (0.72)	
SOC_DISC		-4.1616 (-1.38)		-5.3807 (-0.39)		-0.3571* (-1.93)
ENV_PER	-0.9502 (-1.31)		0.0082 (0.01)		-0.0594 (-1.49)	
SOC_PER		-0.1375 (-0.21)		0.5278 (0.30)		0.0037 (0.09)
MTB	0.0068 (0.05)	-0.0200 (-0.13)	-0.1109 (-0.39)	-0.1607 (-0.58)	0.0029 (0.37)	0.0039 (0.39)
SIZE	-15.4351 (-0.75)	12.0197* (1.71)	65.0650 (1.29)	64.9430* (1.76)	-1.9446 (-1.37)	0.2692 (0.62)
LEV	27.2299 (1.15)	-18.3821 (-1.02)	69.6765 (1.25)	59.3682 (0.91)	3.1759** (2.06)	0.0095 (0.01)
ROA	-113.5352*** (-3.26)	-85.4047** (-2.33)	-197.8566*** (2.62)	-173.4584** (-2.03)	-8.4842*** (-4.24)	-7.1595*** (-3.17)
CAPEX	16.5728 (0.17)	248.4929*** (3.42)	159.6845 (0.70)	208.4922 (0.79)	-4.8434 (-0.77)	16.2726*** (3.63)
ASST_GROW	2.0112 (1.30)	0.9988 (0.63)	-1.3147 (-0.37)	-1.0181 (-0.36)	0.0636 (0.64)	-0.0156 (-0.16)
INTERCEPT	426.5915 (1.52)	117.6580 (1.45)	11.6532 (0.02)	62.5593 (0.08)	41.1083** (2.21)	16.5987*** (3.32)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	1,681	1,681	1,681	1,681	1,681	1,681
No. of firms	295	295	295	295	295	295
R²	44.47	46.34	17.46	14.92	36.09	39.67

This table reports instrumental-variable random-effect panel regression estimates for the relation between environmental and social disclosures and financial risk. The disclosure scores are instrumented by governance performance indicator and exogenous regressors included in the model specifications. As measures of financial risk (our dependent variables), we employ the stock volatility (Models 1-2), CAPM beta to measure systematic risk (Models 3-4), and idiosyncratic risk from the CAPM (Models 5-6), respectively. All the models include industry and time fixed effects. Definitions of all variables are presented in Appendix A. All the coefficients reported have been multiplied by 1,000 due to variable scaling issues. The numbers in parentheses are t-values. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.