Inter-Relations among Corporate Environmental Performance, Environmental Disclosures, Financial Performance, and Risk

Amama Shaukat

Brunel Business School

Brunel University London

Kingston Lane

Uxbridge Middlesex, UB8 3PH

UK

Tel: +44 1895 268899

E-mail: amama.shaukat@brunel.ac.uk

Grzegorz Trojanowski

University of Exeter Business School

Xfi Building

Rennes Drive

Exeter EX4 4ST

UK

Tel: +44 1392 723441

E-mail: g.trojanowski@ex.ac.uk

Abstract

We propose a holistic approach to modelling of the links among various environmental and financial outcomes of a firm, taking into account the endogeneity of these relations. In particular, we explicitly incorporate financial risk in the environmental-financial accountability analysis. We find corporate environmental performance and disclosures, corporate financial performance, and financial risk to be endogenously determined. First, we find that higher and more objective environmental disclosures help improve a firm's operating performance while mitigating its operating risk. This finding suggests that environmental disclosures are largely a means of engaging with and building a positive reputation among the firm's key operational stakeholders including customers. Second, we find corporate environmental performance to improve a firm's market value while reducing its market risk: for investors, environmental actions seem to speak louder than words. Third, consistent with the voluntary disclosure theory, we find a positive link between environmental performance and environmental disclosures. Finally, we find many of the links between the endogenous variables to be bi-directional. Overall these results have important conceptual and methodological implications for future research as well as for policy and practice related to the wider role of business in society.

Keywords: corporate social responsibility; environmental performance; environmental disclosures; financial performance; financial risk; endogeneity

Inter-Relations among Corporate Environmental Performance, Environmental Disclosures, Financial Performance, and Risk

Abstract

We propose a holistic approach to modelling of the links among various environmental and financial outcomes of a firm, taking into account the endogeneity of these relations. In particular, we explicitly incorporate financial risk in the environmental-financial accountability analysis. We find corporate environmental performance and disclosures, corporate financial performance, and financial risk to be endogenously determined. First, we find that higher and more objective environmental disclosures help improve a firm's operating performance while mitigating its operating risk. This finding suggests that environmental disclosures are largely a means of engaging with and building a positive reputation among the firm's key operational stakeholders including customers. Second, we find corporate environmental performance to improve a firm's market value while reducing its market risk: for investors, environmental actions seem to speak louder than words. Third, consistent with the voluntary disclosure theory, we find a positive link between environmental performance and environmental disclosures. Finally, we find many of the links between the endogenous variables to be bi-directional. Overall these results have important conceptual and methodological implications for future research as well as for policy and practice related to the wider role of business in society.

Keywords: corporate social responsibility; environmental performance; environmental disclosures; financial performance; financial risk; endogeneity

---

1. Introduction

As the issues of climate change and natural resource degradation and depletion gain importance, corporate environmental accountability is also gaining momentum around the world. Accordingly all interested parties including policy makers, academics, corporate managers, and investors are striving to understand the inter-relations between corporate environmental performance (CEP) and corporate environmental disclosures (CED) as well as the link of both these variables with corporate financial performance (CFP). While scholars have investigated the link between CEP and CED from different theoretical standpoints obtaining mixed empirical results (e.g. Cho & Patten, 2007; Clarkson, Li, Richardson, & Vasvari, 2008; Patten, 2002), the bulk of the research in this area has focussed on studying the link between CEP and CFP also known broadly as the study of the 'business case' for corporate social (and environmental) responsibility (for good reviews see Beurden & Gossling, 2008, Margolis & Walsh, 2003; and Orlitzky, Schmidt & Rynes, 2003). There are very few studies, however, that examine the link among the three variables simultaneously, taking into account the endogeneity of these links (a notable exception being the study by Al-Tuwaijri, Christensen, & Hughes, 2004). Moreover, to the best of our knowledge, no prior work incorporates firm financial risk in such an analysis. The omission of risk from the environmental-financial accountability type analysis is quite problematic as Orlitzky and Benjamin (2001; p. 369) aptly remark that "[t]*rue economic performance (…) manifests itself in both high financial return and low financial risk."* Hence the so-called business case for environmental accountability (which is so important for channelling corporate resources to environmental protection) would be incomplete without consideration of its impact on financial risk alongside financial return.

In this paper we aim to develop a more holistic understanding of the links between the key environmental and financial outcomes of a firm taking into account the endogeneity of these links. The specific contributions we make to the related literature are as follows. On the conceptual level, we incorporate financial risk in the environmental-financial accountability analysis. Reduction of risk is central to the discussion of the strategic role of responsible environmental management by a firm (Godfrey 2005; Husted, 2005; Sharfman & Fernando, 2008). Yet, barring some studies (e.g. Chen & Metcalf, 1980; McGuire, Simdgren, & Schneeweis, 1988; Oikonomou, Brooks, & Pavelin, 2012; Salama, Anderson, & Toms 2011; Spicer, 1978) it has largely been neglected in the CEP-CFP-type analyses (Orlitzky & Benjamin, 2001). Moreover, barring a very few studies that incorporate direct measures of firm risk (e.g. Benlemlih, Shaukat, Qiu, & Trojanowski, 2016; Cormier & Magnan, 1999), it has also been ignored in the literature on environmental disclosures. We not only incorporate risk explicitly in this analysis, i.e. examine the simultaneous links between CEP, CED, CFP, and corporate financial risk (CFR), but also study these links separately for the firm's financial operating and market outcomes. As noted earlier, omission of any of the aforementioned variables not only presents an incomplete picture, but potentially leads to the danger of producing biased and inconsistent results with ensuing problematic managerial, other corporate stakeholder-related, and consequentially environmental implications.

We also improve on the empirical level over prior related analysis by Al-Tuwaijri et al. (2004) and Clarkson, Li, Richardson, and Vasvari (2008 and 2011). First, we use an extensive longitudinal data set covering a wide cross-section of industries over the period 2005-2013 for the UK-listed firms – prior related studies are largely cross-sectional and/or limited to the most environmentally-sensitive industries. Second, we improve on the measurement of relevant variables. While both Al-Tuwaijri et al. (2004) and Clarkson et al. (2011) measure CEP in terms of only limited environmental performance indicators, for

example Al-Tuwaijri et al. (2004) use the proportion of hazardous waste recycled, we employ the now widely-used comprehensive environmental performance measures, namely Asset4 environmental performance scores. These scores capture a wide array of indicators of environmental performance for a firm relative to its industry peers as well as wider industry sectors (Ioannou & Serafeim, 2015; Shaukat, Qiu, & Trojanowski, 2016). Similarly, we measure environmental disclosures using the Bloomberg disclosure scores, used recently in a number of studies (e.g. Benlemlih et al., 2016; Ioannou & Serafeim, 2015; Qiu, Shaukat, & Tharyan, 2016; Utz & Wimmer, 2014). These disclosure scores also cover a wide array of industry-relevant items of environmental information that can be provided by a firm.

As expected, we find CEP, CED, CFP, and CFR, to be endogenously determined. Specifically, while both CEP and CED are linked to CFP (both operating and market performance) as well as CFR (both operating and market risk), the effects of CEP and CED differ. While CED improves a firm's operating performance and reduces the variability of this performance, CEP improves the firm's market performance and reduces the market risk. These findings suggest that firms make instrumental use of their CED to engage with their key economic stakeholders including customers in order to improve corporate perception, reputation and thus encourage their co-operation and loyalty resulting in operational success for the firm (cf. Aerts & Cormier, 2009; Hasseldine, Salama, & Toms, 2005; Jones, 1995; Servaes & Tamayo, 2013; Toms, 2002). For corporate investors, however, environmental actions speak louder than words. Prior evidence suggests that investors consider a firm's social and environmental disclosures to be '*self-congratulatory PR puff*' (Milne & Chan, 1999; p. 452) or 'perfunctionary' (Campbell & Slack, 2011). Our findings suggest that this investor perception, at least in the UK, has not changed. This assertion is further supported by the fact that we find CED to have a strong negative link with a firm's current market performance and a weak positive link with market risk. CEP on the other hand, has a strong

negative link with a firm's current operating performance and a positive link with the variability of this performance. The latter finding in conjunction with CEP market-related results suggest that while investments in environmental actions (which are usually innovative and risky) are contemporaneously costly for a firm (thus negatively impacting its financial bottom line) and increasing its contemporaneous operating risk, they are still valued by investors as they are potentially seen as investments that would deliver future environmental pay offs. These findings also suggest that CEP and CED are two distinct, complementary, and apparently balancing activities of a firm: firms engage in corporate environmental reporting to build better relations with stakeholders vital for a firm's operational success, while CEP, although costly, is undertaken as it matters to the firm's investors. Overall, our findings shed new light on the distinct economic relevance of CEP and CED, as well as highlight the importance of including CFR alongside CFP in such analyses: both CEP and CED seem to have true economic relevance for a firm and its stakeholders.

In terms of other results, we find evidence of reverse causality going from higher market risk to higher CEP for all types of firms (and not just for the firms in controversial industries as found by Jo and Na, 2012). We also document the positive bi-directional nature of the link between CED and operating performance, suggesting that not only CED improves profitability, but it also pays for profitable firms to communicate more about its environmental responsibilities with its key stakeholders. Finally, consistent with the resource-based view (RBV) theory and voluntary disclosure theory we show a positive link between CEP and CED. Across the industrial sectors, firms are now making environmental disclosures that are reflective of their actual environmental performance.

2. Literature review and hypotheses development

2.1. Corporate environmental performance, environmental disclosures, operating performance, and operating risk

The CEP-CFP link has been widely studied in the literature, largely from the management perspective. Drawing on the RBV theory (Hart, 1995) scholars have argued and found evidence that being environmentally responsible can be a source of competitive advantage that can bring economic benefits to a firm, including superior operating profits. While this claim has not been unequivocally established, there is some evidence to suggest that this may at times be the case (Beurden & Gossling, 2008; Margolis & Walsh, 2003; Russo & Fouts, 1997; Waddock & Graves, 1997). There is also an alternative view, again from the RBV perspective, and some evidence to suggest that it is important for a firm to be profitable first and to have excess resources in order to lead green initiatives (which are often costly with long horizon benefits; Clarkson et al. 2011). In short, evidence suggests that in the case of CEP and corporate profitability, causality could run in either or both directions, and, as Al-Tuwaijri et al. (2004) and Clarkson et al. (2011) suggest, both may be determined jointly by some other unobservable variable like superior firm management quality.

As with CEP, recent evidence suggests that it is also the firms having sufficient financial resources (i.e. financial slack and higher operating returns) that are able to make costly extensive and objective environmental disclosures (CED). Moreover, firms making such environmental (and social) disclosures are also found to enjoy higher expected growth rates of their cash flows (Qiu et al., 2016). Hence, as with CEP, the link between CED and profitability may also be endogenous with bi-directional causality. In today's world of rapid corporate information dissemination and the similarly instant access to information, it is likely that not only more profitable firms would have requisite resources and credibility (due to proprietary and opportunity costs associated with making extensive environmental

disclosures, see Brammer & Pavelin, 2008; Cormier & Magnan, 1999), but also that the benefits of such credible environmental disclosures would translate quickly into higher cash flows/profits (by creating a positive firm reputation among its various stakeholders including customers; Lev, Petrovits, & Radhakrishnan, 2010; Qiu et al., 2016). The recent disclosure of poor environmental performance of VW cars (although by a third party) provides a good example of how powerful and instantaneous the effect of environmental information can be for both the firm bottom line and stock price.

Importantly, the discussion of risk, including operating profitability risk, has largely been absent within the CEP and/or CED and profitability analysis. This omission is quite surprising given that, on a theoretical level, mitigation of operating risk has often been argued to be a key strategic purpose of undertaking effective corporate social including corporate environmental programmes. Husted (2005) theoretically argues that investments in corporate social responsibility-related activities are real options involving strategic and operating decisions by managers that can help reduce the operating risk of the firm. He however does not elaborate on which aspects of corporate social (including environmental) responsibility-related activities would matter for a firm's operating risk. In this regard, Hart (1995) and Servaes and Tamayo (2013) clearly highlight that it is important not just to undertake effective environmental actions, but also to make effective disclosure of this performance – in order to build a positive firm reputation among key corporate stakeholders. For example, it is not enough to produce 'greener' cars, but also to communicate effectively (to all relevant stakeholders) about the operational initiatives that the firm is undertaking in order to become 'green' itself, including 'greening' of its suppliers, employees and customers. Such communications can help the firm enlist the support and loyalty of various corporate stakeholders including environmental activists (who may give free valuable publicity to the firm), proud employees (who are likely to be happy/proud to be associated with such an

environmentally responsible company), suppliers (whose practices the company may help in making more environmentally responsible and thus also economically long-run sustainable), and loyal customers who are willing to even pay more in order to do their bit for the environment. Increasingly B2C companies now appeal to 'green'-oriented consumers by making use of certification from organizations working for promoting environmental sustainability. For example, Unilever-owned PG tips tea company in the UK actively promotes its position as being the first major UK tea brand to sell fully Rainforest Alliance Certified™ black and green teas. They are also engaging their customers by calling on them to recycle or compost their tea waste. The website of Tesco (one of the sample firms) goes to considerable length to explain how the company is engaging with its suppliers, customers, government, and other agencies (like Sustainable Seafood Coalition) to ensure that it responsibly and sustainably sources and supplies fish to its customers. Recognizing the importance of such communication with its customers, Tesco's website states "[w]*e're also working with other agencies, Government, UK retailers and brand owners through the Sustainable Seafood Coalition to ensure transparency and consistency when it comes to how we communicate sustainability to our customers."*

All such actions (i.e. environmental performance) and their reporting (i.e. related disclosures) should promote better stakeholder relations (including customer relations) thus helping reduce operating risk. However, the empirical evidence examining the links among CEP, CED and CFR (operating) is quite limited. While a number of prior studies have examined the link between CEP and market risk (which we discuss in the next section), none to the best of our knowledge examines the link between CEP and operating risk. Moreover, only one recent study examines the link between CED and operating risk (Benlemlih et al., 2016). Given the lack of relevant evidence, we consider the existence of the link between CEP and operating risk an open empirical question, allowing for the link to be bi-directional.

However, following Benlemlih et al. (2016), we hypothesize the link to run from CED to operating risk. Furthermore, we simultaneously study the links among these four variables (i.e. CEP, CED, as well as operating measures of CFP and CFR), which to the best of our knowledge have not been studied as such before. Pointing to this notable omission in the literature, Orlitzky and Benjamin (2001; p. 370) comment that "*reviews of the social-financial performance literature usually do not correct for any potentially confounding CSP-risk effects. Instead, many of those previous reviews and studies relating CSP to corporate financial outcomes have focused almost exclusively on performance level instead of performance variability*."

Given the mixed and inconsistent prior results on any pair-wise relations between CEP, CED, operating profits, and their variability, we refrain from making any specific predictions about the nature (positive v. negative) of these links.

2.2. Corporate environmental performance, environmental disclosures, market performance, and market risk

Over the years, scholars have also been interested in examining various capital market implications of CEP and CED. In this context, many studies have examined the link between various measures of a firm's CEP and measures of its market performance. As with operating performance, scholars have been divided on whether better CEP should lead to superior market performance or vice versa. Proponents of the former view, drawing on the RBV theory, have generally argued, that superior CEP of a firm should signal to the market its superior management quality (Ullman, 1985) and/or superior corporate strategy (Hart, 1995), which in turn should increase the market value of the firm. Alternatively, consistent with Friedman's (1970) argument, there is also a view in the literature that shareholders should frown upon social responsibility including environmental responsibility-related expenditures

seeing them as a wasteful cost that could reduce the financial competitiveness of a firm and thus would discount the value of the firms undertaking such actions (e.g. Barnea & Rubin, 2010). Consistent with these divergent theoretical stances, prior evidence on the link between CEP and market performance tends to be mixed, with some studies finding a positive link between measures of CEP and measures of market performance such as Tobin's Q (e.g. Al-Tuwaijri et al., 2004; Clarkson et al., 2011; Dowell, Hart, & Young, 2000), and others finding a negative link (e.g. Barth & McNichols, 1994; Brammer, Brooks, & Pavelin, 2006; Hughes, 2000).

As is the case with CEP, the research examining the link between CED and measures of market performance also yield mixed empirical results. While many earlier studies using limited (mostly negative news-related) environmental disclosures find a negative link between measures of CED and market performance (e.g. Freedman & Patten, 2004; Lorraine, Collinson, & Power, 2004; Shane & Spicer, 1983), more recent work (e.g. Clarkson et al., 2011) using a more comprehensive and objective measure of CED, find a positive link between CED and the market value of a firm. Additionally, consistent with the arguments and empirical results of Al-Tuwaijri et al. (2004), Clarkson et al. (2011) find the links among CEP, CED, and measures of market performance to be endogenous – assumed to be determined simultaneously by the superior firm management quality.

Again, while Al-Tuwaijri et al. (2004) and Clarkson et al. (2011) consider CEP, CED, and market performance to be endogenous, they surprisingly omit the consideration of firm market risk from their analysis. There is a long-standing argument and evidence to support the notion that good environmental performance can be an effective risk-management strategy that can lower the firm's market risk (e.g. Chen & Metcalf, 1980, McGuire et al., 1988; Spicer, 1978). Recent studies, presenting different theoretical arguments, including good CEP leading to reduction in implicit stakeholder claims (Salama et al., 2011) or good

CEP providing insurance-like protection to a firm's assets against downside risk (Oikonomou et al., 2012), find a negative link between measures of CEP and market risk. There is, however, an alternative argument, also supported by empirical evidence, that firms in 'controversial' industries which are likely to have higher market risk, may be more inclined to undertake higher CSP (including CEP) as a reputation building exercise (Jo & Na, 2012; Toms, 2002). Hence, one can conclude that the link between CEP and market risk could also be endogenous, due to reverse causality and/or simultaneity.

Contrary to the relatively frequently studied link between CEP and measures of market risk, the link between CED and market risk, to the best of our knowledge, is rather under-studied. A recent study by Benlemlih et al. (2016) finds a negative link running from CED to market risk. The authors postulate that reliable and relevant environmental disclosures can reduce the information asymmetry between the firm and its investors and thus, by reducing the market participants' perception of riskiness of a firm can help reduce its market risk. Thus, in the light of the prior results relating to the links among CEP, CED, market performance, and market risk, we treat these as endogenous in our analysis. Again, given prior inconsistent results, we refrain from making any predictions about the specific nature (positive/negative) of the relations.

2.3. The link between corporate environmental performance and environmental disclosures

Finally, the discussion of CEP, CED, and firm financial outcomes would be incomplete without a commentary on the link between CEP and CED themselves. In this regard, scholars have again been divided on both the theoretical as well as the empirical front. While some scholars drawing on socio-political and legitimacy theory-based arguments contend and find support for the notion that such disclosures are primarily an environmental reputation/legitimacy building exercise and therefore poor environmental performers are

likely to make higher environmental disclosures (e.g. Cho, Guidry, Hageman, & Patten, 2012; Cho & Patten, 2007; Patten, 2002); other scholars drawing on RBV and voluntary disclosure theory (VDT) argue and find support for the notion that superior environmental performers are likely to make higher environmental disclosures in order to convey their 'type' (see Al-Tuwaijri et al., 2004; Clarkson et al., 2008; Qiu et al., 2016). Regardless of the specific nature of the link, scholars tend to agree that CEP and CED are inter-related and thus not only should both be included in an environmental-financial accountability type analysis, but their endogeneity should also be controlled for. Hence, we include both and treat them as endogenous.

3. Data and methodology

3.1 Sample

Our sample covers UK firms that are FTSE350 index constituents over the period, 2005-2013. The initial sample comprises 1,835 firm-years for which Bloomberg environmental disclosure scores (used for measuring the disclosures in our study and discussed in detail below) are available. We then match these with data on financial variables collected from Worldscope (via Thomson One) and Thomson Reuters Asset4 environmental performance scores (discussed below and retrieved from Datastream). Finally, to be consistent with prior studies, we drop observations corresponding to firms belonging to financial sector (Industry 11 in Fama & French, 1997, 12-industry classification) leaving us with a usable sample of 961 firm-year observations covering a wide cross-section of industries.

3.2. Endogenous variables

The environmental performance score (CEP) as defined by Asset4 (a Thomson Reuters database) *"measures a company's impact on living and non-living natural systems, including*

the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities". It covers 'hard' performance indicators (as classified by Clarkson et al., 2008) such as information on energy used, CO_2 emissions, water and waste recycled, and spills and pollution controversies. Hence, the aggregate environmental performance score can be considered to provide a largely objective measure of a firm's overall environmental performance and it has been used by prior related literature (e.g. Ioannou & Serafeim, 2015; Shaukat et al., 2016).

The environmental disclosure score (CED) is developed by Bloomberg. Bloomberg assigns the 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 the 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 environmental data, to 100 for those disclosing every data point collected. Moreover, 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 pertinent to its industry sector. For example, 'Phones Recycled' is only considered in the score for telecommunications companies and not for other sectors. The data points are also weighted (based on a proprietary weighting scheme) in terms of relevance. For example 'Green House Gas emissions' would be weighted more heavily than other data points in computing the E disclosure score. Hence, the E disclosure score captures both the quantity (i.e. number of E items reported by a company) as well as the quality (in terms of objective and industry-relevant data) of environmental disclosures. Approximately 80% of environmental disclosure items covered are objective data items, while only 20% are 'soft'

i.e. subjective data points. Thus, these environmental scores largely capture what Clarkson et al. (2008) would call a firm's 'hard' environmental disclosure.

In alternative model specifications, we employ two different measures of firm financial performance (CFP), i.e. an accounting-based profitability measure (return on assets, ROA) and stock-based performance measure (Tobin's_Q), both used in prior related literature (e.g. Dowell et al., 2000; Waddock & Graves, 1997). Depending on the financial performance measure employed in the model, we employ corresponding measures of firm risk (CFR). Hence in the models including profitability, consistent with prior related literature (e.g. McGuire et al., 1988) we use standard deviation of ROA over three-year period (SD_ROA) as the corresponding operating risk measure. In the models employing stock-based measure of financial performance, we employ stock Volatility a measured by the annual standard deviation of the firm's daily stock's return as the measure of firm risk (cf. Jo & Na, 2012; McGuire et al., 1988).

As discussed above, we expect to find the following endogenous links (depicted in Figure 1). First, we expect a unidirectional contemporaneous link running from CEP to CED. Second, we expect a bi-directional link of both CEP and CED with both measures of firm financial performance i.e. operating and market. Third, we expect a bi-directional link between CEP and both measures of firm risk. Finally, we postulate that CED affects both measures of risk.

[Insert Figure 1 about here]

3.3. Exogenous regressors and control variables

The decisions to include/exclude particular variables are driven by theoretical considerations and the identification requirements for the system of equations. In particular, we control for firm size (Size) as measured by the natural logarithm of total assets in all the regressions.

Larger firms face greater public scrutiny as well as stakeholder responsibility pressures and thus are more likely to engage in broader social responsibility, including environmental activities (Brammer & Pavelin, 2008; Cho & Patten, 2007; Qiu et al., 2016). We also expect a negative relationship between size and firm's risk: prior studies suggest that larger firms are less exposed to risk, as they are more able to manage risk especially in times of high volatility (e.g. Jo & Na, 2012).

Leverage is measured by the ratio of total debt to total assets. Prior evidence suggests higher leverage to be associated with higher firm risk (Jo & Na, 2012). Thus a positive association is expected between firm's leverage and risk. Higher leverage is also expected to boost firm financial performance.

Following prior studies, we control for capital expenditure scaled by total assets (CapEx) while modelling firm environmental performance (Shaukat et al., 2016). We also control for asset growth (Asst_Grwth), as measured by total assets in year t minus total assets in year t-1 divided by total assets in year t-1, in the equations explaining environmental disclosures and firm risk (cf. Jo & Na, 2012; Qiu et al., 2016).

Clarkson et al. (2011) argue and find empirical support for the claim that firms pursuing a proactive environmental strategy are the ones with greater financial resources. We therefore control for financial slack (Fin_Slack, measured as the ratio of the sum of cash and short-term investments and total receivables to the book value of total assets, cf. Qiu et al., 2016; Shaukat et al., 2016) while modeling environmental disclosures.

There is a theoretical argument (Johnson & Greening 1999) that large block holders, due to their narrow short term share performance targets and illiquidity of holdings, may tend to focus on short term returns, whereas investments in CSR require longer time horizons. Accordingly we expect a negative relation between block holdings (Blck_Hold, measured as

block holdings of 5% or more) and measures of environmental performance and disclosure (cf. Qiu et al., 2016).

Finally, asset intangibility as a proxy for firm's investments in R&D (Asst_Intngblty, measured as the ratio of intangible assets to total assets) is likely to relate to both firm financial performance and risk (cf. Jo & Na, 2012).

3.4. Model specification

The discussion above leads us to formulate the following system of equations (with expected links between the endogenous variables visualised by Figure 1 above):

$$CFP_{it} = \alpha_0 + \alpha_1 * CEP_{it} + \alpha_2 * CED_{it} + \alpha_3 * Size_{it} + \alpha_4 * Leverage_{it} + \alpha_5 * \underline{Asst\_Intngblty}_{it} + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon_1 \quad (1)$$

$$CFR_{it} = \beta_0 + \beta_1 * CEP_{it} + \beta_2 * CED_{it} + \beta_3 * CFP_{it} + \beta_4 * Size_{it} + \beta_5 * Leverage_{it} + \beta_6 * Asst\_Grwth_{it} + \beta_7 * \underline{Asst\_Intngblty}_{it} + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon_2 \quad (2)$$

$$CEP_{it} = \gamma_0 + \gamma_1 * CFP_{it} + \gamma_2 * Size_{it} + \gamma_3 * CFR_{it} + \gamma_4 * CapEx_{it} + \gamma_5 * Blck\_Hold_{it} + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon_3 \quad (3)$$

$$CED_{it} = \delta_0 + \delta_1 * CEP_{it} + \delta_2 * CFP_{it} + \delta_3 * Size_{it} + \delta_4 * Asst\_Grwth_{it} + \delta_5 * Fin\_Slack_{it} + \delta_6 * Blck\_Hold_{it} + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon_4 \quad (4)$$

As mentioned earlier, the models employing ROA as a measure of financial performance (CFP_{it}) employ SD_ROA as the measure of risk (CFR_{it}), while models employing Tobin's Q as a performance indicator include Volatility as a risk measure. We include industry and year fixed effects in all the equations to account for the panel structure of the dataset. Industry fixed effects are based on 12-industry classification by Fama and French (1997). The models are estimated via 3SLS.

[Insert Table 1 about here]

3.5. Descriptive statistics

Table 1 provides descriptive statistics for the variables used in this study. The average scores for environmental performance and disclosures are 66.65 and 21.99 (out of 100), respectively. The average firm has ROA of 0.11 and Tobin's Q of 1.49. The average firm size measured as natural log of total assets is 14.62, which correspond to £2.24bn. The average firm is moderately leveraged (at 22%), spends about 5% of total assets on capital expenditures, and has the annual asset growth of 11%. On average 18.42% of equity outstanding is controlled by large block holders. Finally, intangible assets represent on average about a quarter of the total asset base. For most variables, the median and mean values are pretty close to each other indicating lack of skewness in the corresponding distributions.

Table 1 also presents the pair-wise Pearson correlations for all variables. It shows a high correlation between environmental performance and disclosure (0.57). Moreover, the correlations between these two CSR-related measures and firm size are strongly positive (at 0.52 and 0.62, respectively). The absolute values of all the remaining correlation coefficients do not exceed 0.41, indicating that our models are unlikely to suffer from multicollinearity problems.

4. Results

Tables 2 and 3 present the main results of the analyses. While Table 2 reports parameter estimates for the model employing accounting-based measures (i.e. ROA and SD_ROA as proxies for financial performance and risk, respectively), Table 3 presents results for the model employing market-based indicators (i.e. Tobin's Q and Volatility, respectively).

[Insert Tables 2 and 3 about here]

First, both models, i.e. Tables 2 and 3, strongly support the predictions of the RBV and VDT theories: in other words, our evidence suggests that across the industrial sectors, better environmental performers make more extensive and objective environmental disclosures: one-standard-deviation increase in CEP translates almost exactly into one-standard-deviation increase in the CED score. Second, we find that both CEP and CED significantly affect firm financial performance although their effects differ. According to Table 2, CEP negatively impacts firm profitability (possibly due to costs associated with implementing greener technologies), while CED disclosure benefits it. Together, these results are consistent with Hart's (1995) RBV-based assertions that while environmental actions may be costly to pursue, their effective communication can create the benefits of positive firm reputation among firm's key stakeholders that in turn can lead to competitive advantages, including higher profits. The latter finding is also consistent with the socio-political and environmental legitimacy-based arguments for the aims of such disclosures – firms that convey their environmental responsibility better are more likely to obtain a licence to operate from the various corporate stakeholders (Cho et al., 2012; Gray, Kouhy, & Lavers, 1995; Patten, 1991; Walden & Schwartz, 1997). Furthermore, as Table 3 suggests, it seems that for stock market investors actions do speak louder than words: investors take a positive view of firm environmental actions (CEP), while being sceptical of its environmental disclosures (CED) – hence a positive link running from CEP to Tobin's Q, and a negative link from CED to Tobin's Q. The investor scepticism towards CED could be due to the ambiguous relation between CEP and CED found in the prior literature (Cho et al., 2012; Clarkson et al., 2008).

Third, the findings of Tables 2 and 3 suggest that the link between CED and CFP is bi-directional. Firms which enjoy higher market values and which are more profitable are able and willing to incur the costs of making higher environmental disclosures. However,

while higher environmental disclosures result in higher profitability, firms making higher disclosures have lower market values. We also find the link between CEP and profitability (but not market value) to be bi-directional: on the one hand, CEP is likely to involve costs that could reduce current profitability (see above), on the other - more profitable firms seem to care less about CEP (perhaps because they consider economic legitimacy gained through superior profitability to be sufficient in itself).

Fourth, both CEP and CED also appear to significantly influence firm risk although their effects vary depending on the environmental and risk measures considered. CED is likely to help firms mitigate their operating risk (see Table 2), while CEP is negatively and highly significant in mitigating market risk (see Table 3). Moreover, as argued above, investments in CEP (which usually involve innovations with uncertain outcomes) seem to increase contemporaneous operating risk; while riskier firms also seem to be inclined to undertake more CEP (as risk mitigation strategy) – hence a positive link running from CEP to operating risk and vice versa. Table 3 suggests that higher CED leads to increased stock return volatility. Again, this could be driven by investors' ambiguity about the less than consistent relation found between CEP and CED in the prior literature (Cho et al., 2012; Clarkson et al., 2008), and thus about the signal higher CED sends to the market. The resulting divergence of opinions among investors is likely to result in the increased stock volatility (consistent with general predictions about effects of CSR on stock market participants; Orlitzky, 2013).

Fifth, we find a link between CFP and risk: while higher profitability is associated with higher operating risk, higher Tobin's Q is associated with lower volatility. The former result is as expected, as companies that earn higher profits can choose to undertake riskier projects. The latter result is consistent with the risk-return trade-off documented in finance

literature: higher Tobin's Q corresponds to higher firm value and lower expected returns and lower stock risk.

Finally, Tables 2 and 3 also document significant effects that a number of control variables have on the endogenous variables. First, financial performance of smaller firms is stronger while other control variables do not reach conventional significance levels in the corresponding equations. Second, the effects of control variables on firm risk measures are not consistent across the two model specifications. Third, as expected, larger (and thus more visible and heavily scrutinised firms) tend to deliver significantly stronger CEP, and so do firms with smaller proportion of equity controlled by block holders. Fourth, Table 3 suggests a trade-off between firm capital expenditures and commitment to 'greening up' their act: firms that invest more heavily in property, plant, and equipment tend to score lower on their environmental performance (CEP). Fifth, larger firm size facilitates significantly better environmental disclosures. Possibly, better-performing and larger firms can afford to devote resources to engage with their stakeholders by means of extensive environmental disclosures. Finally, the results indicate that while block holders may not necessarily be too keen on firms focusing on environmental performance initiatives (as discussed above), corporate transparency in this regard is appreciated by large investors: larger block holdings are associated with higher environmental disclosure scores. This discrepancy between the effects of block holdings on environmental performance and disclosure scores once again underscores the importance of empirically distinguishing between the two.

5. Discussion and conclusions

We propose a holistic approach to modelling of the links between key environmental and financial outcomes of a firm, taking into account the endogeneity of these relations. Moreover, we build on prior related literature (Al-Tuwaijri et al., 2004; Clarkson et al., 2011)

by explicitly incorporating financial risk in the environmental-financial accountability analysis. We find corporate environmental performance and disclosures, corporate financial performance, and financial risk to be endogenously determined, with many of the links among these variables being bi-directional.

First, consistent with the RBV and VDT theories, we find a highly significant and positive relation between CEP and CED – across industries, stronger environmental performers appear to make higher and more objective environmental disclosures. Moreover, we find such CED to be associated with stronger operating performance and reduced operating risk. This finding is consistent with both the VDT (Clarkson et al., 2008, 2011) as well as the legitimacy theory-based (Cho et al. 2012; Cho & Patten, 2007; Patten, 2002; Walden & Schwartz, 1997) arguments for why firms make higher environmental disclosures. CED appears to be both, a means of signalling the firm 'type' to its relevant stakeholders (cf. Al-Tuwaijri et al. 2004; Clarkson et al. 2008); as well as a means of building positive perception and reputation, thus helping gain co-operation of key operationally relevant stakeholders including customers, suppliers, and others (Cho et al. 2012). Thus, consistent with the instrumental stakeholder theory (Jones, 1995), it appears that firms make instrumental use of such disclosures to help them earn higher operating returns while simultaneously minimizing its operating risk. The latter finding is also consistent with theoretical assertions of Hart (1995) and Husted (2005), that investments in CSR, which we presume would include environmental disclosures, are part of the firm's operational strategy aimed at reducing its operational risk.

Second, we find that for the stock market participants environmental actions speak louder than words. Firms with higher CEP enjoy both higher market values as well as lower market risk despite the fact that CEP reduces firm profitability contemporaneously. This finding is consistent with the theoretical arguments of Godfrey (2005) and empirical findings

of Oikonomou et al. (2012) that investors view a firm's responsible environmental performance as a form of insurance against market uncertainty and are therefore willing to pay an upfront premium. Together these results also underscore the importance of making a clear distinction between the two corporate actions, i.e. CEP and CED. Each appears to be targeted at distinct corporate stakeholders.

Third, while prior empirical evidence (Al-Tuwaijri et al., 2004; Clarkson et al., 2011; Jo & Na, 2012) illustrates that firms from more polluting or controversial industries are likely to engage more in CEP, we document that the same is the case for riskier firms (for both measures of risk) across industry sectors. Fourth, less profitable firms tend to be stronger environmental performers at least concurrently. This finding contrasts sharply with the results of Clarkson et al. (2011) who find that more profitable firms in environmentally-sensitive sectors engage more in CEP. Our findings suggest that this positive relation may not hold across the industrial sectors.

Overall, our findings have important practice and research implications. For managers, our findings bring good news: both CED and CEP are balancing activities that are worth pursuing as they can bring different benefits for a firm and its different stakeholders. Our results also have implications for the interpretation of findings of prior related studies that neglect endogeneity concerns and posit causal unidirectional links among only some of the variables of interest examined here, as reviews by Beurden and Gossling (2008), Margolis and Walsh (2003), and Orlitzky and Benjamin (2001) clearly highlight. At least some of these findings are likely plagued by biases resulting from omitted variables, simultaneity, and reverse causality. Our paper provides a conceptual framework that could be used by future research in different institutional contexts to re-examine issues of environmental and broader social and financial accountability.

References

Aerts, W., Cormier, D. (2008). Media legitimacy and corporate environmental communication. *Accounting, Organizations and Society*, 34(1), 1-27.

Al-Tuwaijri, S. A., Christensen, T. E., Hughes, K. E. (2004). The relations among environmental disclosure, environmental performance, and economic performance: a simultaneous equations approach. *Accounting, Organizations and Society*, 29(5-6), 447-471.

Barnea, A., Rubin, A. (2010). Corporate Social Responsibility as a Conflict between Shareholders. *Journal of Business Ethics*, 97(1), 71-86.

Barth, M.E., McNichols, M.F. (1994). Estimation and market valuation of environmental liabilities relating to superfund sites. *Journal of Accounting Research*, 32(Supplement), 177-209.

Benlemlih, M., Shaukat, A., Qiu, Y., Trojanowski, G. (2016). Environmental and social disclosures and firm risk. Forthcoming in *Journal of Business Ethics*, Online First, available at: http://link.springer.com/article/10.1007/s10551-016-3285-5.

Beurden, P., Gossling, T. (2008). The worth of values: A literature review on the relation between corporate social and financial performance. *Journal of Business Ethics*, 82(2), 407-424.

Brammer, S., Brooks, C., Pavelin, S. (2006). Corporate social performance and stock returns: UK evidence from disaggregate measures. *Financial Management*, 35(3), 97-116.

Brammer, S., Pavelin, S. (2008). Factors influencing the quality of corporate environmental disclosure. *Business Strategy and the Environment*, 17(2), 120-136.

Campbell, D., Slack, R. (2011). Environmental disclosure and environmental risk: Sceptical attitudes of UK sell-side bank analysts. *British Accounting Review*, 43(1), 54-64.

Chen, K. H., Metcalf, R. W. (1980). The relationship between pollution control record and financial indicators revisited. *Accounting Review*, 55(1), 168-177.

Cho, C. H., Guidry, R. P., Hageman, A. M., Patten, D. M. (2012). Do actions speak louder than words? An empirical investigation of corporate environmental reputation. *Accounting, Organizations and Society*, 37(1), 14-25.

Cho, C. H., Patten, D. M. (2007). The role of environmental disclosures as tools of legitimacy: a research note. *Accounting, Organizations and Society*, 32(7-8), 639-647.

Clarkson, P. M., Li, Y., Richardson, G. D., Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. *Accounting, Organizations and Society*, 33(4), 303-327.

Clarkson, P. M., Li, Y., Richardson, G. D., Vasvari, F. P. (2011). Does it really pay to be green? Determinants and consequences of proactive environmental strategies. *Journal of Accounting and Public Policy*, 30(2), 122-144.

Cormier, D., Magnan, M. (1999). Corporate environmental disclosure strategies: determinants, costs and benefits. Journal of Accounting, *Auditing and Finance*, 14(3), 429-451.

Dowell, G., Hart, S., Yeung, B. (2000). Do corporate global environmental standards create or destroy market value? *Management Science*, 46(8), 1059-1074.

Fama, E. F., French, K. (1997). Industry costs of equity. *Journal of Financial Economics*, 43(2), 153-193.

Freedman, M., Patten, D. M. (2004). Evidence on the pernicious effect of financial report environmental disclosure. *Accounting Forum*, 28(1), 27-41.

Friedman, M. (1970). The social responsibility of business is to increase its profits. *New York Times Magazine*, 32, 122-126.

Godfrey, P. C. (2005). The relationship between corporate philanthropy and shareholder wealth: A risk management perspective. *Academy of Management Review*, 30(4), 777-798.

Gray, R., Kouhy, R., Lavers, S. (1995). Corporate social and environmental reporting: A review of the literature and a longitudinal study of UK disclosure. *Accounting, Auditing & Accountability Journal*, 8(2), 47-77.

Hart, S. L. (1995). A natural resource based view of the firm. Academy of Management Review, 20(4), 986-1014.

Hasseldine J., Salama A. I., Toms J. S. (2005). Quantity versus quality: The impact of environmental disclosures on the reputations of UK Plcs. *British Accounting Review*, 37(2), 231-248.

Hughes, K. (2000). The value relevance of nonfinancial measures of air pollution in the electric utility industry. *Accounting Review*, 75(2), 209-228.

Husted, B. W. (2005). Risk management, real options, and corporate social responsibility. *Journal of Business Ethics*, 60(2), 175-183.

Ioannou, I., Serafeim, G. (2015). The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal*, 36(7), 1053-1081.

Jo, H., Na, H. (2012). Does CSR reduce firm risk? Evidence from controversial industry sectors. *Journal of Business Ethics*, 110(4), 441-457.

Johnson, R. A., Greening, D. W. (1999). The effects of corporate governance and institutional ownership types on corporate social performance. *Academy of Management Journal*, 42(5), 564-576.

Jones, T. M. (1995). Instrumental Stakeholder Theory: A Synthesis of Ethics and Economics. *Academy of Management Review*, 20(2), 404-437.

Lev, B., Petrovits, C., Radhakrishnan, S. (2010). Is doing good good for you? How corporate charitable contributions enhance revenue growth. *Strategic Management Journal*, 31(2), 182-200.

Lorraine, N. H. J., Collison, D. J., Power, D. M. (2004). An analysis of the stock market impact of environmental performance information. *Accounting Forum*, 28(1), 7-26.

Margolis, J. D., Walsh, J. P. (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative Science Quarterly*, 48(2), 268-305**.**

McGuire, J. B., Simdgren, A., Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *Academy of Management Journal*, 31, 854-872.

Milne, M. J., Chan, C. C. (1999). Narrative corporate social disclosures: How much difference do they make to investment decision-making? *British Accounting Review*, 31(4), 439-457.

Oikonomou, I., Brooks, C., Pavelin, S. (2012). The impact of corporate social performance on financial risk and utility: A longitudinal analysis. *Financial Management*, 41(2), 483-515.

Orlitzky, M. (2013). Corporate social responsibility, noise, and stock market volatility. *Academy of Management Perspectives*, 27(3), 238-254.

Orlitzky, M., Benjamin, J. D. (2001). Corporate social performance and firm risk: A meta-analytic review. *Business & Society*, 40(4), 369-396.

Orlitzky, M., Schmidt, F. L., Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, 24(3), 403-441.

Patten, D. M. (1991). Exposure, legitimacy, and social disclosure. *Journal of Accounting and Public Policy*, 10(4), 297-308.

Patten, D. M. (2002). The relation between environmental performance and environmental disclosure: A research note. *Accounting, Organizations and Society*, 27(8), 763-764.

Qiu, Y., Shaukat, A., Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *British Accounting Review*, 48(1), 102-116.

Russo, M. V., Fouts, P. A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, 40(3), 534-559.

Salama, A., Anderson, K., Toms, S. (2011). Does community and environmental responsibility affect firm risk? Evidence from UK panel data 1994-2006. *Business Ethics: A European Review*, 20(2), 192-204.

Servaes, H., Tamayo, A. (2013). The Impact of Corporate Social Responsibility on firm value: The role of customer awareness. *Management Science*, 59(5), 1045-1061.

Shaukat, A., Qiu, Y., Trojanowski, G. (2016). Board attributes, corporate social responsibility strategy, and corporate environmental and social performance. *Journal of Business Ethics*, 135(3), 569-585.

Shane, P., Spicer, B. (1983). Market response to environmental information produced outside the firm. *Accounting Review*, 58(3), 521-538.

Sharfman, M. P., Fernando, C. S. (2008). Environmental risk management and the cost of capital. *Strategic Management Journal*, 29(6), 569-592.

Spicer, B. H. (1978). Investors, corporate social performance, and information disclosure: An empirical study. *Accounting Review*, 55(1), 94-111.

Toms, J. S. (2002). Firm resources, quality signals and the determinants of corporate environmental reputation: some UK evidence. *British Accounting Review*, 34(3), 257-282.

Ullmann, A. (1985). Data in search of a theory: A critical examination of the relationship among social performance, social disclosure, and economic performance. *Academy of Management Review*, 10, 540-577.

Utz, S., Wimmer, M. (2014). Are they any good at all? A financial and ethical analysis of socially responsible mutual funds. *Journal of Asset Management*, 15, 72-82.

Waddock, S. A., Graves, S. B. (1997). The corporate social performance-financial performance link. *Strategic Management Journal*, 18(4), 303-319.

Walden, W. D., Schwartz, B. N. (1997). Environmental disclosures and public policy pressure. *Journal of Accounting and Public Policy*, 16(2), 125-154.

Figure 1. Predicted relations between the endogenous variables.

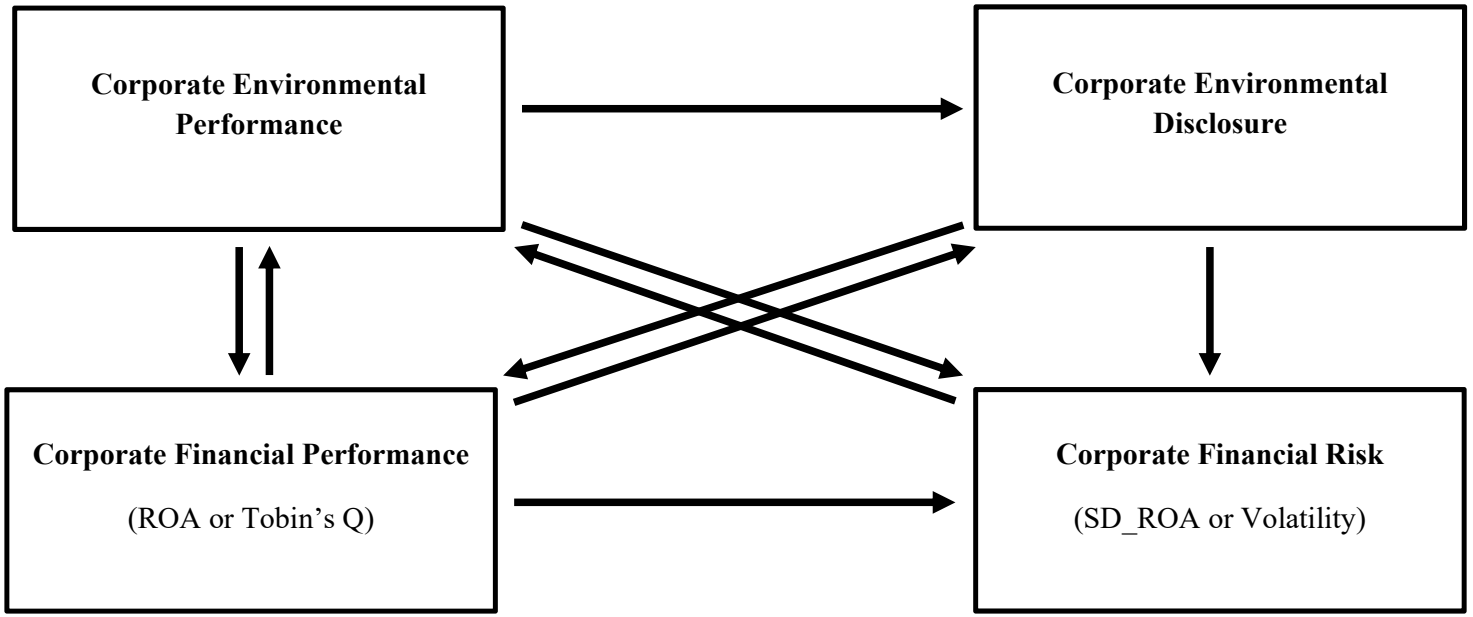

Table 1. Descriptive statistics.

	Variable	Mean	Median	S.D.	Min	Max	Pair-wise correlation coefficients											
							(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	**CEP**	66.65	72.75	23.46	10.08	96.72												
(2)	**CED**	21.99	19.38	14.90	1.55	69.42	0.57											
(3)	**ROA**	0.11	0.10	0.09	-0.80	0.65	-0.11	-0.03										
(4)	**Tobin's_Q**	1.49	1.20	1.04	0.21	10.82	-0.15	-0.05	0.53									
(5)	**SD_ROA**	3.92	2.28	4.98	0.02	46.70	-0.11	-0.07	0.10	0.15								
(6)	**Volatility**	0.35	0.31	0.15	0.13	1.24	-0.23	-0.16	-0.13	-0.14	0.17							
(7)	**Size**	14.62	14.41	1.54	11.07	19.21	0.52	0.63	-0.17	-0.21	-0.17	-0.17						
(8)	**Leverage**	0.22	0.20	0.18	0.00	1.33	0.06	0.05	-0.06	-0.07	-0.07	-0.05	0.20					
(9)	**CapEx**	0.05	0.04	0.05	0.00	0.35	-0.15	0.00	0.16	0.15	0.04	0.12	0.03	0.06				
(10)	**Asst_Grwth**	0.11	0.06	0.29	-0.85	5.08	-0.13	-0.09	0.04	0.04	-0.04	0.14	-0.02	-0.03	0.07			
(11)	**Fin_Slack**	0.11	0.08	0.10	0.00	0.67	-0.20	-0.12	0.13	0.26	0.21	0.12	-0.22	-0.26	0.02	0.09		
(12)	**Blck_Hold**	18.42	12.00	18.62	0.00	88.00	-0.34	-0.23	0.03	0.03	0.11	0.29	-0.20	-0.10	0.16	0.06	0.21	
(13)	**Asst_Intangibility**	0.25	0.21	0.21	0.00	0.82	-0.01	-0.13	-0.08	-0.04	-0.08	-0.12	-0.05	0.07	-0.41	0.05	-0.18	-0.11

Note to Table 1: All the variables are defined in "Data and methodology" section.

Table 2. Simultaneous equation model employing accounting-based measures of financial performance and risk.

Dependent variable →	**ROA**			**SD_ROA**			**CEP**			**CED**		
Regressors ↓	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value
CEP	-0.01	-3.20	0.00	0.96	3.06	0.00				0.68	5.14	0.00
CED	0.02	2.45	0.01	-2.68	-3.03	0.00						
ROA				104.87	4.00	0.00	-306.75	-2.01	0.04	73.40	3.27	0.00
SD_ROA							10.20	2.08	0.04			
Size	-0.09	-1.90	0.06	10.04	2.67	0.01	13.51	4.23	0.00	1.47	1.39	0.17
Leverage	0.09	1.30	0.19	-12.41	-2.64	0.01						
CapEx							104.92	1.15	0.25			
Asst_Grwth				-1.73	-2.51	0.01				1.92	1.63	0.10
Fin_Slack										-1.60	-0.48	0.63
Blck_Hold							-0.46	-2.99	0.00	0.07	1.78	0.07
Asst_Intangibility	0.09	1.31	0.19	-12.17	-2.51	0.01						
Intercept, Year and Industry FE		Yes			Yes			Yes			Yes	

Note to Table 2: The system is estimated by 3SLS method. All the variables are defined in "Data and methodology" section.

Table 3. Simultaneous equation model employing market-based measures of financial performance and risk.

Dependent variable →	**Tobin's_Q**			**Volatility**			**CEP**			**CED**		
Regressors ↓	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value	Coeff.	z-stat	p-value
CEP	0.26	2.91	0.00	-0.01	-3.14	0.00				0.63	5.45	0.00
CED	-0.10	-3.63	0.00	0.02	1.82	0.07						
Tobin's_Q				-0.12	-2.79	0.01	-4.59	-0.98	0.33	7.01	3.59	0.00
Volatility							220.18	2.71	0.01			
Size	-1.02	-2.45	0.01	-0.06	-1.17	0.24	9.54	7.71	0.00	2.31	2.53	0.01
Leverage	0.68	1.08	0.28	-0.01	-0.20	0.84						
CapEx							-91.64	-2.25	0.03			
Asst_Grwth				-0.02	-1.36	0.17				0.83	0.82	0.42
Fin_Slack										-2.30	-0.67	0.50
Blck_Hold							-0.55	-4.35	0.00	0.07	1.82	0.07
Asst_Intangibility	1.00	1.57	0.12	-0.07	-1.33	0.18						
Intercept, Year and Industry FE	Yes			Yes			Yes			Yes		

Note to Table 3: The system is estimated by 3SLS method. All the variables are defined in "Data and methodology" section.