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ORIGINAL PAPER

The impact of corporate sustainability performance on information asymmetry: the role of institutional differences

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Abstract This paper empirically investigates whether corporate sustainability performance (CSP) affects information asymmetry (IA) for European firms listed in the STOXX Europe 600 from 2002 to 2013. We find a significantly negative effect of CSP on IA. By exploiting institutional differences between the European countries, we determine that the negative effect of CSP on IA is more pronounced in liberal market economies compared to coordinated market economies, thus pointing to a substitutive effect of CSP and economic coordination. Further, the impact is greater in countries with stricter disclosure requirements. In such countries, there is generally a greater appetite for company-specific information. However, disclosure requirements fulfil this need only partially because they concentrate on the corporate governance dimension of corporate sustainability. Hence, information on the social pillar especially matters to investors in a complementary manner and drives the overall effect. Our study contributes to the literature on the positive capital market effects of CSP by showing the proposed effect in European capital markets and the institutional determinants of its strength.

Keywords Corporate social responsibility · Corporate sustainability performance · Information asymmetry · Corporate governance · Institutional differences

JEL Classification M41 · G14 · G30 · Q01

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1 Introduction

Milton Friedman (1970) famously stated, "The social responsibility of business is to increase its profits." This perspective consequently focuses on profit maximization and can be interpreted as a strict shareholder value philosophy (Rappaport 1986). Therefore, any unnecessary consideration of social or ecological aspects would result in avoidable costs and reduce shareholder value. However, in recent years, this view has been increasingly challenged. Although Friedman proposes a negative relationship between corporate sustainability performance (CSP)[1] initiatives and financial performance, Edward Freeman (1984) argues that such initiatives not only result from an abstract moral obligation to benefit society but also ensure the going concern of the business. Thus, CSP initiatives do not hamper shareholder value creation but instead are an important means to this end (Freeman et al. 2010).

With these two opposing positions as starting points, a stream of empirical research has evolved that investigates whether CSP and financial outcomes are positively or negatively associated (Barnett and Salomon 2012), particularly with regard to accounting-based measures of profitability,[2] market-based measures of financial performance,[3] or both.[4] Although corporate sustainability practices have been of considerable interest to U.S. corporations since the 1970s, their adoption by Continental European companies gained momentum only around the millennium (Beckmann 2007; Steurer 2010). Therefore, the majority of research rests on U.S. samples or observations from the United Kingdom.[5]

Despite extensive CSP research, very few studies have investigated its effect on information asymmetry (IA). This situation is surprising because information is indisputably important in capital markets (Healy and Palepu 2001) with regard to both corporate financing (Myers and Majluf 1984) and market efficiency in general (Fama 1970, 1991). Typically, management has more information regarding a company's relevant characteristics and activities than external shareholders do (Jensen and Meckling 1976). Information on sustainability practices is especially prone to asymmetry due to a predominant lack of comprehensive mandatory sustainability reporting (Tschopp 2005). IA is considered to be the means by which the capital market effects of CSP, such as lower firm risk, lower costs of capital, and higher shareholder value, are achieved (Lopatta et al. 2015).

In contrast to prior research on the *negative* impact of CSP on IA in the United States (Cho et al. 2013; Cui et al. 2013; Lopatta et al. 2015), such research for

[1] The difference between CSP, corporate social responsibility, and corporate social performance is discussed in Sect. 2. In this paper, CSP is the extent to which a company contributes to environmental, social, and economic development (Commission of the European Communities 2001).

[2] See Russo and Fouts (1997), Waddock and Graves (1997), Shen and Chang (2009), Barnett and Salomon (2012), Tang et al. (2012), and Wu and Shen (2013).

[3] See Brammer et al. (2006), Brammer and Millington (2008), Surroca et al. (2010), Aktas et al. (2011), Dhaliwal et al. (2011), El Ghoul et al. (2011), Goss and Roberts (2011), and Jo and Harjoto (2011).

[4] See Lee et al. (2009), Nelling and Webb (2009), Choi et al. (2010), Garcia-Castro et al. (2010), and Jo and Harjoto (2012).

[5] Russo and Fouts (1997) and Wu and Shen (2013) investigate a global sample without focusing on regions. Shen and Chang (2009) conduct a national study in Taiwan.

Europe is completely absent. However, the U.S. results cannot, per se, be generalized to European capital markets due to institutional differences (McWilliams et al. 2006a, b). This result is mainly due to different legal frameworks, financing peculiarities such as the lower liquidity of the stock markets in Europe, the relatively high importance of bank loans (La Porta et al. 2008), and partially divergent corporate governance structures. With respect to governance structures, a monistic management model is established in the United States, whereas a dualistic approach dominates in Continental Europe. In the monistic system, management and governance structures are combined into one organ. Hence, the representation of interests is mostly limited to the owners. In the dualistic system, however, the management and governance structures are separated. In particular, the employees are frequently conceded the right to co-decide. Thus, the flow of information varies systematically, especially with regard to the dissemination of management's knowledge and expectations. In the dualistic system, for example, employees are typically better able to "institutionally voice" their wishes and concerns, which may otherwise be part of "good CSP." Given that it offers institutional differences in all facets, the European setting is well suited to disentangle their relevance in the effect of CSP on IA. This suitability is especially the case because countries not only are different in terms of institutions but are also (largely) located in the European Union and participate in the Single European Market and are thus sufficiently comparable. Studies that compare the United States and Europe find different levels of CSP activity and communication (Hartman et al. 2007) and conclude that institutionalized stakeholder involvement substitutes for explicit corporate sustainability practices.

Building on these research results, this study is the first to investigate whether CSP reduces IA in European capital markets. In addition, it analyzes the impact of nation-level institutional differences on this relationship.

From a methodological perspective, we first must distinguish between corporate sustainability *reporting* and CS*P*, or corporate sustainability *practices*. Corporate sustainability reporting is considered a voluntary non-financial disclosure, which has generally been shown to reduce IA (Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Verrecchia 2001; for a European overview, see Dumontier and Raffournier 2002). Moreover, Graham et al. (2005) find that the reduction of IA is an important motive for voluntary disclosure. Given the close positive connection between (explicit) corporate sustainability activity and disclosure (e.g., Dhaliwal et al. 2011) and the close negative connection between disclosure and IA (e.g., Verrecchia 2001), we use the Thomas Reuters ASSET4 CSP evaluations for the empirical investigation to ensure that our measurement for CSP captures not only disclosure but also sustainability practices. Both sustainability disclosure and external reports, such as from news sources on, for example, the environmental damage caused by companies, affect these CSP scores. Given companies' potential reluctance to report such issues, these would not be captured by the disclosure term but instead by the impact on the ASSET4 score. Thus, the construct measured is broader than mere disclosure. However, assuring that all types of sustainability activities are measured is unrealistic because companies may not claim "distinctive authorship" of corporate sustainability practices and may "still be acting responsibly" (Jackson and Apostolakou 2010, p. 376). Therefore, we refer to our CSP measure construct to proxy for so-called perceptible CSP.

In an empirical investigation of European companies in the STOXX 600, we predict and find that CSP also reduces IA in European capital markets. For European practitioners, this result indicates that pursuing and communicating CSP initiatives is not only charity but also a means to lower IA and thus facilitate corporate financing. To assess the impact of the institutional environment on this relationship, we draw upon neo-institutional theory and comparative institutional analysis. As predicted in the second hypothesis, the negative effect of CSP on IA is more pronounced in countries with less institutionalized stakeholder involvement, which is attributed to corporate sustainability *activities* (beyond mere disclosure). This finding indicates a substitutive effect of CSP and formal stakeholder involvement. In addition, we investigate the effect of the extent of disclosure requirements on the impact of CSP on IA. In line with the third hypothesis, we find that CSP leads to a stronger reduction in IA under strict disclosure requirements. Based on supplemental analyses, we also conclude that the general information appetite is greater in countries with strict disclosure requirements. These requirements mainly capture corporate governance issues, leaving an informational void, especially with regard to social issues. Thus, content-wise, CSP is considered *complementary*.

Hence, our study contributes to the literature in at least three ways. First, we show that the negative effect of CSP on IA, which has been identified in the U.S. market, is also prevalent in European capital markets. Second, the level of coordination is identified as a lever that influences the magnitude of the CSP effect on IA, with greater impact in less coordinated countries. Third, we unravel the effect of differentially strict disclosure requirements on the association of CSP and IA. Here, a higher CSP effect becomes visible under stricter disclosure requirements.

This paper proceeds as follows. Section 2 discusses the theoretical background and derives our hypotheses. Section 3 describes the study design, and Sect. 4 presents the results. Section 5 provides a discussion and concludes the paper.

2 Related literature and hypothesis development

2.1 Csp

The Commission of the European Communities (2001) defines CSP as the extent to which a company contributes to environmental, social, and economic development, the so-called *triple bottom line* (Elkington 1999; Gray 2006). In the growing body of literature, different terms prevail. The term *corporate social responsibility* often refers exclusively to the social and ecological dimensions, thus diminishing the economic dimension (van Beurden and Gössling 2008), whereas *corporate social performance* stresses the social dimension (Wu 2006).[6] Nonetheless, these terms are

[6] A detailed description of the individual concepts and a concrete distinction is provided by van Beurden and Gössling (2008).

frequently used interchangeably in the empirical research. Because most studies use overall sustainability scores, this paper uses the term *CSP* throughout.

The triple bottom line implies that a company's purpose is not only to satisfy *shareholders,* as assumed in classical principal-agent theory (Jensen and Meckling 1976) but also to incorporate *stakeholders'* interests into management practice (Freeman et al. 2010). Because a company's sustainability initiatives are considered a vital contribution to ensuring the company's long-term going concern, Freeman et al. (2010, p. 12) conclude "that Friedman's maximizing shareholder value view is compatible with stakeholder theory. After all, the only way to maximize value sustainably is to satisfy stakeholder interests." Consequently, an influence of specific stakeholders on management decisions can be assumed (Deegan and Unerman 2011). One method of maximizing value is minimizing the cost of capital by reducing IA (Leuz and Verrecchia 2000).

Stakeholder orientation in corporate sustainability can take both explicit and implicit forms (Matten and Moon 2008). Explicit forms comprise voluntary activities pursued as a part of the business strategy—and, as such, are highlighted in disclosure—whereas implicit forms are considered the "corporations' role within the wider formal and informal institutions for society's interests and concerns" (Matten and Moon 2008, p. 409). One main difference is observed in communication. Explicit forms may result in deliberate actions with the (at least) partial intent of disclosing them; implicit forms may also be reported, but not as the consequence of deliberate activities. Therefore, the main shortcoming of investigating corporate sustainability *disclosure* is that the same activities can be treated differently across companies. Thus, with an external, independent assessment following consistent criteria, both explicitly reported activities and external information can be incorporated into an overall assessment that considers both forms. These assessments have been found to be reliable proxies of "surface CSP" (Brammer et al. 2006; Nelling and Webb 2009; Garcia-Castro et al. 2010; El Ghoul et al. 2011). However because one cannot guarantee that 100 % of the true (and potentially unknown) CSP will be captured, we refer to these scores as the maximum of disclosed and otherwise attainable information on CSP (perceptible CSP).[7]

2.2 Related empirical research

The relationship between CSP and financial performance has been subject to numerous empirical investigations (Orlitzky et al. 2003; Margolis et al. 2009) that can be distinguished by their measurement of financial performance in accounting- or market-related performance (Orlitzky et al. 2003; Wu 2006; van Beurden and Gössling 2008).

The vast majority of studies that use accounting-based measures show a positive correlation between sustainability performance and firm profitability (Russo and

[7] Note that this understanding also captures the case in which a company improves its score by reporting sustainability activities that were previously pursued but unobservable. Simultaneously, the impact of favorable but unjustified reporting is limited because disclosed facts do not automatically impact the scores.

Fouts 1997; Shen and Chang 2009; Barnett and Salomon 2012; Tang et al. 2012; Wu and Shen 2013). Proponents of market-based performance indicators especially doubt the informational value of accounting-related data, which is typically retrospective, given that the value of a company to shareholders stems from its risk-adjusted discounted *future* cash flows (Brammer and Millington 2008). Although studies based on accounting information mainly state a positive relationship between sustainability and financial performance, market-based studies show mixed results (Brammer et al. 2006; Brammer and Millington 2008; Choi et al. 2010; Surroca et al. 2010; El Ghoul et al. 2011).

Despite the growing importance of information about corporate sustainability for investors, there is particularly scarce evidence on whether and how CSP affects the uncertainty that they face due to IA. Using a three-step simultaneously estimated model, Cui et al. (2013) conclude that there is a negative impact of CSP on IA for U.S. firms. Lopatta et al. (2015) investigate the link between CSP and IA by measuring on the abnormal stock returns for U.S. companies, and they find a negative relationship. Cho et al. (2013) also measure IA as the relative bid-ask spread in stock prices based on a U.S. sample and find a U-shaped relationship instead of the clear-cut linear negative relationship between CSP and the IA. Furthermore, these authors note that the relative influence of CSP weaknesses is greater than that of CSP strengths.

To date, no study on the association between CSP and IA has been conducted for the European market, nor has any study illuminated the institutional differences in the relationship between CSP and IA.

2.3 Hypothesis development

2.3.1 Baseline hypothesis

Corporate sustainability is a comprehensive management concept that ensures the going concern of a company and supports its long-term economic success (Lopatta et al. 2015). For non-investing stakeholders, such as employees or creditors, this long-term orientation appears to be clearly beneficial. For (potential) shareholders, however, this long-term orientation can only be assumed to be beneficial in the short term if two preconditions are met: (1) shareholders must receive CSP information, and (2) the CSP information must matter to shareholders.

Regarding the first criterion, investors will consider a company to be an investment opportunity only if sufficient information is available (Merton 1987; El Ghoul et al. 2011; Lopatta et al. 2015). With regard to CSP, information diffusion presumably differs between positive and negative information. Good news is proactively communicated to the capital market to signal the positive sustainability characteristics of the company (Clarkson et al. 2008; Dhaliwal et al. 2011). Therefore, to truthfully report good news, firms must pursue corporate sustainability activities. Thus, current sustainability performance drives future transparency. The positive aspects of such reporting initiatives, including higher analyst following (Hong and Kacperczyk 2009) and more favorable analyst recommendations (Ioannou and Serafeim 2010), have been reported. By contrast, bad news will frequently not be marketed actively by a company. However, in cases of major negative incidents, release in the media is likely for publicly listed companies.[8] Thus, companies will seek to explain this bad performance to reduce social pressure (Baron et al. 2011) and reduce the risk of litigation (Tzavara 2009), thereby releasing sustainability information to the market (Patten 2002). Consequently, for both positive and negative incidents, there are triggers that lead to the release of sustainability information to the market. As the structured assessment of CSP through providers such as KLD, EIRIS, or ASSET4 gains momentum, firms have an incentive to disclose information on the relevant criteria. Thus, CSP ratings can be supposed to further stimulate (and verify) sustainability information.

For the second criterion (CSP information matters), prior research reveals that CSP is relevant to investors in Europe. Fieseler (_ENREF_332011) reports that German equity analysts perceive sustainability initiatives as value creating through increased disclosure and dialogue. In addition, recent evidence underscores that investors especially rely on third-party assessments by the institutes noted above (Canadian Institute of Chartered Accountants 2010; Cohen et al. 2011). Therefore, CSP seems to be relevant for equity valuation, which means that investors consider CSP information to be important (Cho et al. 2013). Consequently, revealing *relevant* information about business practices should reduce IA and hence investor uncertainty through additional *relevant* transparency between companies and their investors (Diamond and Verrecchia 1991). For the European setting, we thus assume the same pattern as observed for the U.S. market and posit the following baseline hypothesis.

H1 CSP has a negative effect on IA in European capital markets.

2.3.2 Interaction hypotheses for the institutional environment

Country-level institutions impact the mutual relationships between shareholders and stakeholders (Capron and Guillén 2009). Hence, to investigate the effects of CSP performance, which directly address a firm's stakeholder orientation, these institutions are also likely to matter.

Comparing the United States and Europe, Jackson and Apostolakou (2010) test two competing hypotheses to unravel the reasons for different levels of CSP activity: whether (1) CSP "mirror[s] the patterns of institutionalized stakeholder involvement" (Jackson and Apostolakou 2010, p. 375), as in the Continental European system (Campbell 2007), or (2) whether voluntary sustainability activities are more pronounced in countries with less institutionalized stakeholder involvement (Matten and Moon 2008). In accord with the second line of thought, explicit sustainability activity substitutes for institutionalized stakeholder involvement (Khanna and Palepu 2006), leaving the assessment and appreciation largely to (potential) shareholders. Jackson and Apostolakou (2010) find support for the second of the competing hypotheses and conclude that institutionalized stakeholder involvement substitutes for explicit corporate sustainability practices. These authors

[8] Prominent examples are labor exploitation, child labor, and leakages on oil and gas exploration platforms or the planned sinking of the Brent Spar oil platform.

build their analysis on neo-institutional theory and comparative institutional analysis in the CSP context, which relies on the "varieties of capitalism" approach. This factor-analytical approach clusters nations according to the pre-dominant mode of coordination. Liberal market economies (LMEs) and coordinated market economies (CMEs) are viewed as the two theoretical extremes between which the countries are classified (Hall and Gingerich 2004; Hall and Gingerich 2009),[9] a classification that rests upon the following main categories of criteria: ordinary shareholders' power relative to managers or dominant shareholders (La Porta et al. 1998); the dispersion of control indicating the number of widely versus closely held firms in an economy (La Porta et al. 1999); the size of the stock market relative to the gross domestic product; the level at which unions coordinate wages (national level, intermediate level, or firm level); the degree to which wage bargaining is strategically coordinated; and labor turnover rates (Hall and Gingerich 2009). Along these lines, Doh and Guay (2006) find that differences in institutional environments affect expectations concerning CSP. Although the *antecedents* of CSP have been investigated with respect to nation-level institutions, the *effects*—such as a potential reduction in IA—are largely unexplored.

Jackson and Apostolakou (2010) suggest that voluntary CSP in LMEs serves to substitute for institutionalized forms of stakeholder participation in CMEs. Up to this point, we have highlighted the distinction between sustainable business practices and mere disclosure. For the second hypothesis, we focus on the first aspect, the "real" business practices. Carney et al. (2011) argue that internal mechanisms can help fill an institutional void in the governance context. Shareholders typically face IA with regard to internal business practices. This IA with regard to CSP should be lower under a stakeholder-oriented system in CMEs because at least certain minimum criteria can be safely assumed, for example, through the negotiation of wages and other working conditions coordinated by unions and the subsequent release in the press. Thus, CSP *activities* (besides CSP disclosure) are likely to work (at least partially) as a *substitute* for institutional regulations in LMEs. Consequently, we assume the reduction in IA through CSP to be more impactful in countries that tend to be LMEs in contrast to countries with CME characteristics. In other words, we assume a greater marginal utility for CSP in LMEs because higher base levels of factors going into the CSP construct prevail in CMEs, as stated in the following hypothesis.

H2 CSP reduces IA to a greater extent in LMEs in contrast to CMEs.

We now shift our attention to the disclosure aspect. Hall and Gingerich (2009) explain that firms in LMEs typically receive financing from large equity markets. Such markets typically have institutionalized strong disclosure requirements to ease contracting (La Porta et al. 2006), generally indicating a higher appreciation of information revealed by the companies in LMEs. Therefore, strong country-level disclosure requirements lead to less IA (Li et al. 2006).

[9] Hall and Gingerich (2009) exemplify Germany as a typical example of a country that reflects more coordinated traits and the United States as a typical LME country. The United Kingdom and Ireland are further noted as typical LMEs.

The term *disclosure requirements* typically embraces issues revolving around the corporate governance dimension of CSP. For example, the popular index on disclosure requirements by La Porta et al. (2006) comprises mandatory disclosure on insider compensation, large shareholder ownership, insider ownership, contracts outside the normal course of business, related-party transactions, and the mandatory ex ante delivery of prospectuses to potential investors. Bhat et al. (2006) argue that different transparency sources can substitute for each other. Hence, investors' needs with regard to additional corporate governance information should be generally lower under strict disclosure regimes. However, disclosure requirements typically do not (or only marginally) capture environmental or social issues.

Up to this point, we have argued that investors in LMEs generally have a greater appetite for company-specific information, which is largely catered to by stronger disclosure requirements. Nevertheless, these requirements typically focus on corporate governance. Because investors consider all sustainability information to be relevant (Fieseler 2011), in LMEs, the generally greater need for information is not completely fulfilled. This assumption is supported by the notion that CSP disclosure is more intense for strong nation-level institutions (Cahan et al. 2015). Thus, we assume CSP *disclosure* to be *complementary* and its impact to be higher under strict disclosure requirements that emerged due to the greater information need:

H3 CSP reduces IA to a greater extent under strict disclosure requirements than under weak disclosure requirements.

3 Study design

The empirical analysis must meet two methodological requirements. First, the measures of IA, CSP, and the institutional environment must be identified. Second, given potential endogeneity issues, an appropriate statistical model must be identified to examine the relationship between CSP and IA in the capital market.

3.1 Measures of IA

Leuz and Verrecchia (2000) propose a set of three alternative proxies to measure IA: the relative bid-ask spread of stock prices, trading volume, and stock price volatility. They stress that the relative bid-ask spread is the most explicit method of measuring IA because it directly "addresses the adverse selection that arises from transacting in firm shares in the presence of asymmetrically informed investors" (Leuz and Verrecchia 2000, p. 99). Higher spread values indicate higher IA. Trading volume measures investors' willingness to buy or sell a security and should thus be inversely related to IA. Leuz and Verrecchia note that this measure can be influenced by numerous other factors[10] and thus may not only capture adverse selection issues. Stock price volatility is a very complex measure (Bushee and Noe

[10] Leuz and Verrecchia (2000) exemplify portfolio rebalancing, liquidity shocks and changes in risk preferences.

2000) that is assumed to be positively related to IA and to also reflect other factors unrelated to IA (Leuz and Verrecchia 2000). Stock price volatility or measures derived from stock price volatility are frequently used not to proxy IA but instead to proxy firm risk (e.g., Coles et al. 2006; Low 2009; Kravet 2014; Sauset et al. 2015). Hence, the relative bid-ask spread is considered the most reliable proxy for IA. Therefore, we follow Cho et al. (2013) and measure our dependent variable as the relative bid-ask spread in stock prices (*SPREAD*).[11] In line with these authors and to facilitate the interpretation of the coefficients, *SPREAD* is a percentage measure, and the initial values are therefore multiplied by 100.

3.2 Measures of CSP

For the measurement of CSP, we rely on the Thomson Reuters ASSET4 CSP dataset, which has been demonstrated to be a powerful proxy of overall CSP in prior studies (Ioannou and Serafeim 2012; Cheng et al. 2014; Desender and Epure 2014; Eccles et al. 2014). ASSET4's assessment of overall CSP as a summary measure is based on more than 750 data points aggregated into 250 indicators (Thomson Reuters 2012). A specially trained research staff collects data that are publicly available, objective, and auditable (Cheng et al. 2014), such as stock filings, sustainability reports, and news sources (Ioannou and Serafeim 2012). In contrast to the KLD measure, the resulting ASSET4 values draw a more precise picture of CSP performance: KLD marks strengths, weaknesses, and neutral assessments with integer values (+1, −1, 0), whereas ASSET4 provides values between zero and 100.[12]

ASSET4 categorizes its data points and indicators into four so-called pillars that reflect sustainability in the economic domain and the environmental, social, and governance (ESG) domains, with sub-scores for each pillar and a summary measure as an equal-weighted index of the four sub-scores.

The most important advantage of the ASSET4 data for this study is that their collection uses a fixed catalogue of criteria that is identical for all firms analyzed. With regard to the discussion of CSP above, the strict criteria catalogue facilitates a balanced view and limits the influence of firm-specific disclosure.

Two issues must be discussed to evaluate the appropriateness of the proxy. First, does our main independent variable sufficiently reflect the dimensions of CSP outlined above? Second, does the equal-weighted index represent a reasonable empirical proxy? Regarding the first question, environmental, social, and economic developments are addressed in the triple bottom line definition, which is contained

[11] The baseline models for testing H1 are also calculated with trading volume and stock price volatility as dependent variables to exemplify the robustness of the results. However, given the number of statistical models needed to validly assess the hypotheses, we focus our main analyses on the bid-ask spread.

[12] We acknowledge that the KLD measure has the advantage of clearly defining strengths and weaknesses. This advantage allows Cho et al. (2013) to conclude that positive and negative CSP leads to effects of different magnitude. To replicate such an approach with ASSET4 data, we would need to rely on, for example, a median split based on industry and year. However, even if all firms in a given industry and year performed badly, the above-median performance (which would still be bad) would be rated as a strength. Hence, we refrain from such an approach.

as the sub-scores of three pillars. Other sustainability definitions revolve around the ESG dimensions. Hence, the governance perspective is explicitly contained. From the stakeholder theory perspective, there are good reasons to argue in favor of incorporating the governance perspective, especially in Europe, due to mandatory employee codetermination in some European countries. Hence, the four pillars of the ASSET4 summary index reflect the CSP dimensions according to the understanding explained above.

Addressing the second issue, factor analysis confirms that all of the four pillars load on one common factor.[13] Thus, we use the summary index as the main independent variable (*CSP_TOT*).

However, from the empirical perspective, one may be concerned that it is only the economic perspective that drives the results, the ESG dimensions being irrelevant. To mitigate this concern, we provide models with two different CSP proxy sets as robustness checks: In the first category, we aggregate the three ASSET4 ESG pillars in an equal-weighted index (*CSP_ESG*).[14] Thus, we hold the aggregation methodology constant and only eliminate the economic perspective from the summary index. In the second category, we integrate the three separate ESG pillar sub-scores into the models (e.g., Cheng et al. 2014). These models also make it possible to assess the impact of the different pillars on IA, thus providing further information on the relative importance of the ESG dimensions.

3.3 Measures of the institutional environment

To measure coordination, we rely on the coordination index (*COORD*) proposed by Hall and Gingerich (2004, 2009), which measures the level of market coordination. The coordination index results from a factor analysis ranging from zero (LME) to one (CME) based on the corporate governance and the labor relations sub-indices. It comprises items such as shareholder power, dispersion of control, stock market size, and level of wage coordination. The index can be viewed as a reflection of a shareholder-oriented model (values close to zero) or a stakeholder model (values close to one).

Disclosure requirements are measured by using the disclosure requirements index (*DISCLO*) of La Porta et al. (2006), which ranges from zero to one, with higher values implying stricter disclosure requirements. It comprises mandatory disclosure on insiders' compensation, ownership by large shareholders, insider ownership, contracts outside the normal course of business, related-party transactions, and the mandatory ex ante delivery of prospectuses to potential investors (La Porta et al.

[13] The data for the four variables (*CSP_ECN, CSP_ENV, CSP_CGV,* and *CSP_SOC*) are well suited for the principal component analysis. The variables correlate significantly at the 1 % level, and the Kaiser–Meyer–Olkin measure of sampling adequacy shows a satisfactory value (0.714). The factor in the one-factor solution has an eigenvalue of 2.372 (above the Kaiser criterion of one) and an explained variance of 59.31 %. The second factor would have an eigenvalue of only 0.720 and thus does not meet the Kaiser criterion. A visual scree test indicates that the one-factor solution is advisable. The component matrix reveals the following values: *CSP_ECN,* 0.700; *CSP_ENV,* 0.825; *CSP_CGV,* 0.647; and *CSP_SOC,* 0.885.

[14] We also repeat the principal component analysis for the index by incorporating only three pillars. The results remain qualitatively identical.

2006). It is regarded as a comprehensive proxy of disclosure requirements. However, the dimensions captured stem mainly from the governance dimension (Leuz et al. 2009). Hence, a reduction in IA by CSP could still be complementary. For this reason, the analysis of the separate CSP dimensions becomes even more important.

Although *COORD* is a comprehensive measure of cross-country differences, *DISCLO* cannot be assumed to capture all cross-country heterogeneity. However, the combination of various established measures can lead to multicollinearity problems. Hence, in choosing further cross-country variables, we mainly follow Hüttenbrink et al. (2014), who emphasize that their set does not cause multicollinearity problems. We measure shareholder protection with the shareholder rights index, *SH_PROT*—developed by La Porta et al. (1998) and revised by Djankov et al. (2008)—and law enforcement quality with the rule of law index, *RULE_LAW* (Kaufmann et al. 2009; values from the World Bank's World DataBank). We address the typical country-specific financial structure by distinguishing between bank- and market-based financial structures, using *FIN_STRUC* (Demirguc-Kunt and Levine 2001; Levine 2002).[15]

According to our hypotheses, *COORD* and *DISCLO* are moderating effects that must be interacted with CSP variables. To alleviate multicollinearity issues, the variables in the interaction terms are mean centered (Aiken and West 1991).

3.4 Control variables

Our choice of control variables follows the research of Surroca and Tribó (2005), Campbell (2007), Artiach et al. (2010), Chih et al. (2010), Cho et al. (2013), and Lourenço and Branco (2013). The log of total assets (*SIZE*) is included to control for company size (Artiach et al. 2010). The *EQ_RAT* variable is the equity ratio and controls for leverage (Lourenço and Branco 2013). Free cash flow per share (*FCF*) is used to consider the free funds available to finance sustainability initiatives (Chih et al. 2010), and free float (*FREEFLOAT*) is used to measure ownership concentration (Leuz and Verrecchia 2000). Further controls include the following: firm age, *AGE,* as a proxy for organizational resources (Surroca and Tribó 2005); the listing of American depository receipts, *ADR* (international listing status; see Lourenço and Branco 2013); research and development (R&D) intensity, *R&D* (Artiach et al. 2010); and employee productivity (*EMP_PROD*), to proxy for human capital (Campbell 2007). We include industry and year fixed effects to control for industry and time effects. The previous literature also considers country fixed

[15] Hüttenbrink et al. (2014) control for countries' financial structure by including the standard measure of stock market development, the ratio of market capitalization of the listed firms to the gross domestic product. These authors also suggest additional non-institutional (firm-specific) governance measures in an executive compensation context. However, these measures do not appear to be relevant to our research question. Because the variables *SH_PROT*, *RULE_LAW*, and *FIN_STRUC* serve only as controls, we do not comprehensively discuss their peculiarities. The values for *SH_PROT* range from one to five, with higher values indicating stronger shareholder protection. *RULE_LAW* shows values of up to 10, with higher values reflecting stronger enforcement. Financial structures are marked with a dummy variable, in which 1 indicates a bank-based structure and 0 a market-based structure.

effects. However, these fixed effects would capture the cross-country variation in which we are genuinely interested.

3.5 Sample

We collected data from Thomson Reuters Datastream for the STOXX Europe 600 from 2002 to 2013. For *AGE*, data were manually collected from public sources, mainly annual reports and company websites. To avoid potential survivorship bias, we define the sample from an ex ante perspective as of January 2002. Because accounting variables are hardly comparable and special regulations apply, we excluded financial and utility firms (ICB industries 7000 and 8000), which led to 5364 initial firm-year observations.[16] We further excluded companies with headquarters or a primary listing outside their country of residence (252 observations). Companies from Greece and Luxembourg were removed because country-level institutional data were not available (60 observations). CSP data were missing for 1672 firm-year observations. Of these 1672 observations, data for the *SPREAD* dependent variable were simultaneously missing in 1098 cases. Because these are our main variables of interest and a non-negligible proportion of the total sample showed missing values, we discuss this potential sample selection issue further in the next section. In addition, 69 observations were missing for the mean relative bid-ask spread.

Among the additional company-specific data, R&D data especially caused a missing-values problem (1149 additional missing observations). To address this issue, the first step was to manually collect additional data from annual reports. For the remaining observations with missing values, R&D was manually set to zero. To capture a potential systematic effect of missing R&D data, a R&D dummy (*R&DMISSING*) was introduced and set to one if the R&D value itself was manually set to zero (e.g., Rapp et al. 2011). Further missing company-specific data reduced the sample size by 312 observations. Thus, the final sample consists of an unbalanced panel of 2999 firm-year observations (see Table 1 for the detailed sample selection procedure).

3.6 Statistical analysis

3.6.1 Overview

Two challenges must be addressed to deliver credible results: potential endogeneity issues between dependent and independent variables and the potential selection bias.

Studies concerning the effects of CSP are prone to endogeneity (Wu and Shen 2013). Endogeneity means that the outcome and the explanatory variables are simultaneously determined, leading to a correlated omitted variables problem and mean error term values that systematically deviate from zero. Instrumental variable (IV) approaches are particularly suited to tackle this problem (Larcker and Rusticus 2010). The basic idea is to substitute the explanatory variable through one or more instruments that must be exogenous—that is, the instrument(s) *must not* co-vary

[16] We report the results, including financial and utility firms, as part of the robustness check.

Table 1 Sample selection procedure

Selection step	# of Obs.
All companies listed in STOXX Europe 600 as of January 1, 2002	7200
Financial and utility firms (ICB industries 7000 and 8000)	1836
Non-financial and non-utility firms	5364
Firms with headquarters or primary listing outside their country of residence	252
Missing country-specific data	60
Missing CSP data[a]	1672
Missing relative bid-ask spread	69
Further missing company-specific data	
Total assets (*TA*)	7
Equity ratio (*EQ_RAT*)	54
Free cash flow (*FCF*)	18
Return on equity (*ROE*)	87
Number of shares in free float (*FREEFLOAT*)	4
Employee productivity (*EMP_PROD*)	142
Final sample	2999

[a] Data for the relative bid-ask spread (*SPREAD*) are simultaneously missing in 1098 of the 1672 cases with missing CSP data

with the error term—and relevant—that is, the instrument(s) *must* co-vary with the potentially endogenous explanatory variable (Wooldridge 2013). Multiple instruments for an endogenous variable are preferred over a single-instrument approach, if they are available (Larcker and Rusticus 2010). If the explanatory variable is *endogenous*, the instrument is *exogenous* and *relevant*, and the model is *not overidentified*, then the IV approach reliably estimates the impact of CSP on IA. The IV approach is our main instrument of analysis.

Although the IV approach is appropriate to tackle the problem of endogenous variables, it is not well suited to eliminate potential selection bias. The sample composition section reveals numerous missing observations for the explanatory variable, coinciding with missing dependent variables in the majority of cases. We cannot exclude non-randomly missing values, that is, companies with missing CSP data could show systematically different levels of CSP compared to companies with reported CSP values. Hence, we run a (classical) Heckman (1978) two-stage sample selection model, which is regarded as useful "in case of nonrandom sample selection due to missing data in dependent or independent variables" (Wooldridge 2013, p. 491). In the first stage, a probit model is estimated to link the determinants of CSP, which are investigated in the previous literature, to the likelihood of high versus low CSP values, acknowledging that CSP data could be observed for companies with certain characteristics only.[17] In the second stage, the dependent

[17] Most likely, the best-known example is the wage of married women in the labor force (Heckman 1974), which is only observable if the women are participating in the labor force. The likelihood of participation depends on certain factors, such as marriage, children, education, and age, and is modeled in the first stage, whereas the actual wage model is the second stage, which is linked to the first stage via the inverse Mills ratio, correcting the sample selection bias.

variable for IA is regressed on the endogenous binary variable and a set of control variables. To account for a correlation between the error terms of both regressions, the inverse Mills ratio is calculated from the probit model and included in the second-stage regression as an additional regressor. In doing so, the error term of the second-stage regression is no longer correlated with the binary choice variable of high- versus low-CSP companies (Lennox et al. 2012). The Heckman selection model is used prior to the main analysis to investigate whether a selection bias prevails.

Closely related to the Heckman selection model is the treatment effect model (for a detailed description of the differences, see Guo and Fraser 2015).[18] Although technically related, it is viewed as a method of countering endogeneity and thus an alternative to the IV approach. For this reason, we estimate treatment effect models as a robustness check. The main difference between the Heckman selection model and the treatment effect model is the assumption of the latter that CSP values are not subject to sample selection. Instead, the model assumes that all companies choose a certain level and thus self-select into the "treatment group" (high CSP) versus the "non-treatment group" (low CSP). The likelihood of selection into the treatment group is estimated in a probit model based on the known CSP determinants in the first stage. The dummy variable (high vs. low CSP) is then entered into the second-stage model, with the inverse Mills ratio correcting for potential endogeneity.

3.6.2 IV approach

As outlined above, if the explanatory variable is endogenous, then a set of instruments that is both exogenous and relevant and that does not lead to overidentified models must be found. Appropriate IVs need economic reasoning. The CSP literature basically considers two types of instruments. First, Jo and Harjoto (2011) suggest using firm age as an instrument. This approach neglects the fact that firms pass through the life cycle with differing degrees of rapidity, which stems from the characteristics of both the industry and the individual company. Two problems arise: Elsayed and Paton (2009) demonstrate that one of the ESG pillars, environmental performance, is impacted by the firm life cycle. In addition, the relationship between age and firm life cycle stage is assumed to be U shaped, not linear (Dickinson 2011). Consequently, we disregard firm age as a CSP proxy. Second, Cheng et al. (2014) argue that a firm's CSP performance is influenced by the external pressure that stems from the time-invariant component of being in a certain industry and country (Ioannou and Serafeim 2012). Furthermore, they suggest that individual CSP performance also has a time-varying component. Eccles et al. (2014) find that CSP varies over time, for example, due to changes in rules and regulations. For this reason, Cheng et al. (2014) advocate the use of a country-year CSP average as their second instrument. However, we are genuinely interested in

[18] The treatment effect model is occasionally known as the treatreg model (Guo and Fraser 2015). Given its close relationship to the Heckman selection model, it is also known as the Heckit model (Greene 2012).

the country-level impact, which could be diluted by such a proxy.[19] Because rules and regulations are likely to impact the companies of a certain industry in the same manner, we rely on industry-year membership instead. Hence, we use two instruments for CSP: the average country-industry and industry-year CSP values (both excluding the CSP values of the focal firm). In contrast to a single instrument, the two-instrument approach offers the opportunity to perform additional tests to assess the validity and relevance of the instruments (Larcker and Rusticus 2010; Cheng et al. 2014).[20]

Two baseline models to test H1 are used; the first contains the *COORD* variable to capture institutional differences, and the second uses the set of four country-specific variables:

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_TOT + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} COORD + \sum_k \beta_k INDUSTRY_k + \sum_i \beta_i YEAR_i + u \end{aligned} \tag{1}$$

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_TOT + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} DISCLO + \beta_{13} SH\_PROT + \beta_{14} FIN\_STRUC \\ & + \beta_{15} RULE\_LAW + \sum_k \beta_k INDUSTRY_k + \sum_i \beta_i YEAR_i + u \end{aligned} \tag{2}$$

The interaction models for both the ordinary least squares (OLS) and IV approaches to test H2 and H3, respectively, are as follows:

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_TOT + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} COORD + \beta_{13} CSP\_TOT \times COORD \\ & + \sum_k \beta_k INDUSTRY_k + \sum_i \beta_i YEAR_i + u \end{aligned} \tag{3}$$

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_TOT + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} DISCLO + \beta_{13} SH\_PROT + \beta_{14} FIN\_STRUC \\ & + \beta_{15} RULE\_LAW + \beta_{16} CSP\_TOT \times DISCLO \\ & + \sum_k \beta_k INDUSTRY_k + \sum_i \beta_i YEAR_i + u \end{aligned} \tag{4}$$

[19] Indeed, initial attempts to employ the same two proxies led to overspecified models, which is another strong econometric argument for modifying the approach.

[20] El Ghoul et al. (2011) also employ the average CSP values of the industry. It is noteworthy that the use of the average values of an industry alone as an instrument is also discussed critically (e.g., Larcker and Rusticus 2010); however, the combination of two instruments relying on averages that are economically motivated should reveal a reliable estimation.

3.6.3 Heckman selection and treatment effect models

As outlined above, the Heckman and treatment effect models are very similar in terms of setup and computation (Guo and Fraser 2015). Hence, we introduce them together.

For the first stage of the models, the binary decision variable *CSP_BIN* is estimated with the help of a probit model to indicate whether companies performed above (*CSP_BIN* = 1) or below (*CSP_BIN* = 0) the median CSP each year (see the "Appendix" for the variable definitions). The second stage incorporates the binary decision variable *CSP_BIN* and the inverse Mills ratio (*MILLS*). We acknowledge that the binary CSP proxy for the second stage neglects information, but we must rely on this approach to account for potential selectivity. The first-stage regressions read as follows (again, based on the method of incorporating institutional differences):

$$\begin{aligned} CSP\_BIN = \; & \propto_0 + \propto_1 SIZE + \propto_2 EQ\_RAT + \propto_3 MTB + \propto_4 FCF + \propto_5 ROE \\ & + \propto_6 FREEFLOAT + \propto_7 AGE + \propto_8 R\&D + \propto_9 R\&DMISSING \\ & + \propto_{10} EMP\_PROD + \propto_{11} ADR + \propto_{12} COORD \\ & + \sum_k \propto_k INDUSTRY_k + \sum_l \propto_l YEAR_l + u \end{aligned} \tag{5}$$

$$\begin{aligned} CSP\_BIN = \; & \propto_0 + \propto_1 SIZE + \propto_2 EQ\_RAT + \propto_3 MTB + \propto_4 FCF + \propto_5 ROE \\ & + \propto_6 FREEFLOAT + \propto_7 AGE + \propto_8 R\&D + \propto_9 R\&DMISSING \\ & + \propto_{10} EMP\_PROD + \propto_{11} ADR + \propto_{12} DISCLO + \propto_{13} SH\_PROT \\ & + \propto_{14} FIN\_STRUC + \propto_{15} RULE\_LAW \\ & + \sum_k \propto_k INDUSTRY_k + \sum_l \propto_l YEAR_l + u \end{aligned} \tag{6}$$

Lennox et al. (2012, p. 609) note the importance of exclusion restrictions for selection models, that is, "to justify and explain which of the independent variables in the first stage model can be validly excluded from the second stage model" (see also Puhani 2000). The market-to-book ratio (*MTB*) is integrated to control for varying investment opportunities in the first stage (Lourenço and Branco 2013). Based on theoretical reasoning and prior empirical results, *MTB* can be argued to be relevant for the first stage because investment opportunities could impact spending on sustainability initiatives. However, the link to IA is far less direct. For this reason, *MTB* is removed from the second stage.[21] The second-stage models are as follows:

[21] We also conducted the analyses by including *MTB*. The results are inferentially identical, and the *MTB* variable is insignificant in all of the models.

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_BIN + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} COORD + \beta_{13} MILLS \\ & + \sum_k \beta_k INDUSTRY_k + \sum_l \beta_l YEAR_l + u \end{aligned} \tag{7}$$

$$\begin{aligned} SPREAD = {} & \beta_0 + \beta_1 CSP\_BIN + \beta_2 SIZE + \beta_3 EQ\_RAT + \beta_4 FCF + \beta_5 ROE \\ & + \beta_6 FREEFLOAT + \beta_7 AGE + \beta_8 R\&D + \beta_9 R\&DMISSING + \beta_{10} ADR \\ & + \beta_{11} EMP\_PROD + \beta_{12} DISCLO + \beta_{13} SH\_PROT + \beta_{14} FIN\_STRUC \\ & + \beta_{15} RULE\_LAW + \beta_{16} MILLS + \sum_k \beta_k INDUSTRY_k + \sum_l \beta_l YEAR_l + u \end{aligned} \tag{8}$$

Due to the two-stage estimation, the two regressions are directly correlated (Maddala 1991; Tucker 2010). If uncorrected, this correlation leads to bias in the second-stage regression. In this study, standard errors are bootstrapped with 400 repetitions (Wooldridge 2013).

4 Results

4.1 Descriptive statistics

Table 2 contains the descriptive statistics for our sample, incorporating the variables used in subsequent analyses.[22]

IA is measured by using the percentage relative bid-ask spread (*SPREAD*), with higher values indicating higher IA. The standard deviation (0.4323) is 1.48 times the mean value (0.2931). In combination with a median of 0.1696 (less than 60 % of the mean) and the third quartile of 0.3279 (1.12 times the mean), the indication is a relatively large proportion of high IA values.

The CSP summary score *CSP_TOT* shows a mean (median) of 74.29 (84.90). The central tendencies of the sub-indices vary and show that all of the median values exceed the mean values. A comparison of the sub-scores indicates that the social dimension scores highest (mean 75.77, median 85.20) whereas the corporate governance pillar scores lowest (mean 58.73, median 64.78). Eliminating the economic pillar by calculating *CSP_ESG* lowers the value to a mean (median) of 69.42 (75.28).

The sample can be decomposed by country, industry, and year (see Table 3 for the detailed sample composition). A total of 57.89 % of the observations in the sample are based in the United Kingdom ($n = 970$), France ($n = 443$), and Germany ($n = 323$). The average values for *CSP_TOT* by country range from 32.96

[22] Tables 2 and 4 contain the market-to-book ratio (*MTB*). This variable is used in the first stages of the Heckman and treatment effect (treatreg) models, although they are not formally tabulated.

Table 2 Descriptive statistics

Variable	# Obs.	Mean	Std. Dev.	Q1	Median	Q3
SPREAD	2999	0.2931	0.4323	0.0953	0.1696	0.3279
CSP_TOT	2999	74.2929	24.2894	63.3000	84.9000	92.4300
CSP_ESG	2999	69.4195	19.9313	59.0067	75.2767	84.5967
CSP_ECN	2999	67.2715	26.8467	48.2400	75.3200	90.3000
CSP_ENV	2999	73.7587	24.8767	61.8800	85.3500	92.6500
CSP_SOC	2999	75.7700	22.6673	64.6600	85.2000	92.9900
CSP_CGV	2999	58.7297	25.9498	39.7000	64.7800	80.6900
SIZE	2999	15.7971	1.4144	14.7800	15.7338	16.8743
EQ_RAT	2999	0.3691	0.1913	0.2452	0.3553	0.4676
MTB	2999	3.8477	12.5739	1.1634	1.9453	3.2951
FCF	2999	0.7743	7.5173	0.0310	0.3650	1.1340
ROE	2999	23.7401	180.9454	7.8100	15.0700	23.4900
FREEFLOAT	2999	71.1897	22.1989	52.0000	75.0000	91.0000
AGE	2999	74.4598	57.6202	27.0000	63.0000	109.0000
R&D	2999	0.0257	0.0608	0.0000	0.0021	0.0234
EMP_PROD	2999	0.2239	0.1662	0.1165	0.1855	0.3048
ADR	2999	0.5192	0.4997	0.0000	1.0000	1.0000
COORD	2999	0.5040	0.3228	0.0700	0.6600	0.7000
DISCLO	2999	0.6633	0.1531	0.5000	0.6700	0.8300
SH_PROT	2999	3.9170	0.9498	3.5000	3.5000	5.0000
FIN_STRUC	2999	0.4121	0.4923	0.0000	0.0000	1.0000
RULE_LAW	2999	1.5949	0.3109	1.4781	1.6636	1.7614

This table shows the arithmetic mean (mean), standard deviation (std. dev.), first quartile (Q1), median (median), and third quartile (Q3) for all 2999 firm-year observations (# obs.) according to Table 1. Detailed variable descriptions are provided in the "Appendix"

(Ireland) to 91.70 (Austria). The average *SPREAD* values by country vary between 0.1298 (France) and 1.0002 (Ireland). An interesting descriptive finding in line with H1 is that Ireland shows both the lowest CSP and the highest IA values. In addition, the United Kingdom and France show similar mean *CSP_TOT* values but very different IA (0.3750 for the United Kingdom, which is in the fourth quartile; 0.1298 for France, which is in the second quartile). Simultaneously, the coordination index *COORD* differs (0.07 for the United Kingdom; 0.69 for France), which is in line with the moderating effect suggested in H2. With respect to the disclosure index *DISCLO*, Austria shows the lowest value (0.25) and the United Kingdom the highest (0.83).

The average *CSP_TOT* values by industry range from 66.62 (healthcare) to 85.93 (oil and gas). Simultaneously, the oil and gas industry has the lowest average *SPREAD* value (0.1451), again pointing in the direction of H1. The highest average *SPREAD* is observed in the consumer services industry (0.3634), which has a *CSP_TOT* value in the second quartile (69.50).

Table 3 Sample composition

Country	Abbreviation	# Obs.	% Obs.	*Ø SPREAD*	*Ø CSP_TOT*	*COORD*	*DISCLO*
Panel A: sample composition by country							
Austria	AT	12	0.40	0.3232	91.70	1.00	0.25
Belgium	BE	54	1.80	0.2188	71.58	0.74	0.42
Denmark	DK	106	3.53	0.3135	59.79	0.70	0.58
Finland	FI	73	2.43	0.2098	85.10	0.72	0.50
France	FR	443	14.77	0.1298	79.76	0.69	0.75
Germany	DE	323	10.77	0.1993	70.18	0.95	0.42
Ireland	IE	37	1.23	1.0002	32.96	0.29	0.67
Italy	IT	126	4.20	0.3518	58.58	0.87	0.67
Netherlands	NL	172	5.74	0.1740	79.48	0.66	0.50
Norway	NO	80	2.67	0.3455	77.12	0.76	0.58
Portugal	PT	39	1.30	0.4244	73.37	0.72	0.42
Spain	ES	159	5.30	0.4549	67.21	0.57	0.50
Sweden	SE	180	6.00	0.2877	74.56	0.69	0.58
Switzerland	CH	225	7.50	0.2543	65.11	0.51	0.67
UK	GB	970	32.34	0.3750	79.61	0.07	0.83
		2999	100.00	0.2931	74.29	0.50	0.66

Industry	ICBIC	# Obs.	% Obs.	*Ø SPREAD*	*Ø CSP_TOT*
Panel B: sample composition by industry					
Oil and gas	1	151	5.04	0.1451	85.93
Basic materials	1000	284	9.47	0.2426	79.67
Industrials	2000	737	24.57	0.3376	74.55
Consumer goods	3000	536	17.87	0.2331	76.84
Health care	4000	243	8.10	0.3087	66.62

Table 3 continued

Industry	ICBIC	# Obs.	% Obs.	Ø *SPREAD*	Ø *CSP_TOT*
Consumer services	5000	676	22.54	0.3634	69.50
Telecommunications	6000	160	5.34	0.1919	84.62
Technology	9000	212	7.07	0.2968	67.73
		2999	100.00	0.2931	74.29

Year	# Obs.	% Obs.	Ø *SPREAD*	Ø *CSP_TOT*	Ø *CSP_ECN*	Ø *CSP_ENV*	Ø *CSP_SOC*	Ø *CSP_CGV*
Panel C: sample composition by year								
2002	218	7.27	0.7473	63.46	58.80	66.42	68.19	43.61
2003	217	7.24	0.5971	61.11	55.46	66.67	66.99	39.63
2004	243	8.10	0.3835	71.08	65.05	70.67	73.24	53.29
2005	290	9.67	0.2506	70.02	61.23	68.16	73.82	55.58
2006	281	9.37	0.2085	69.34	61.09	69.21	72.26	56.52
2007	271	9.04	0.1671	73.34	67.36	72.25	73.67	59.57
2008	267	8.90	0.1940	75.41	66.91	75.40	77.32	57.35
2009	264	8.80	0.2446	79.48	72.07	78.68	79.30	64.26
2010	261	8.70	0.1925	81.35	71.41	78.67	80.43	67.82
2011	257	8.57	0.1829	82.29	75.43	79.71	81.08	70.23
2012	234	7.80	0.2490	82.48	76.68	79.76	81.36	68.12
2013	196	6.54	0.2285	81.50	72.79	80.12	81.17	66.12
	2999	100.00	0.2931	74.29	67.27	73.76	75.77	58.73

This table reports the sample composition by country (Panel A), industry (Panel B, according to the Industry Classification Benchmark, ICBIC), and year (Panel C). The column heading # Obs. (% Obs.) denotes the number (percentage share) of observations, and Ø *SPREAD* (Ø *CSP_TOT*) denotes the arithmetic mean of the relative bid-ask spread (CSP score). Panel A contains the country-specific values of the coordination index (*COORD*) and the disclosure requirements index (*DISCLO*). Panel C also contains averages for the CSP sub-scores for the economic (Ø *CSP_ECN*), environmental (Ø *CSP_ENV*), social (Ø *CSP_SOC*), and corporate governance dimension (Ø *CSP_CGV*). Detailed variable descriptions are provided in the "Appendix"

Table 3, Panel C shows a year-wise sample breakdown.[23] The *SPREAD* values decrease in the first half of the sample period, from 2002 (mean of 0.7473) to 2007 (0.1671), and thereafter remain relatively constant.[24] The mean scores for *CSP_TOT* and its sub-indices (*CSP_ECN, CSP_ENV*, *CSP_SOC*, and *CSP_CGV*) rise over time, which indicates growing CSP levels over time. Consequently, the lowest mean values for each of these five measures can be found in the first 2 years, and the highest mean values can be found in the last 3 years. Simultaneously, the "order" of the means of the four sub-indices remains largely the same: *CSP_SOC* shows the highest means over the years, followed by *CSP_ENV*, *CSP_ECN,* and finally *CSP_CGV* with the lowest values.

4.2 Correlations

Table 4 depicts the correlations between the variables used in subsequent analyses. The parametric Pearson correlation coefficients are shown below the diagonal, whereas the Spearman rank correlation coefficients are displayed above.

The correlation matrix yields further support for the negative relationship assumed between the IA (*SPREAD)* and *CSP_TOT* and between *SPREAD* and all of the ASSET4 sub-indices. All corresponding Pearson and Spearman correlation coefficients are negative and significant at the 1 % level (two-tailed[25]). In addition, the ASSET4 sub-indices *CSP_ECN*, *CSP_ENV*, *CSP_ECN*, and *CSP_CGV* are all positively correlated with *CSP_TOT* at the 1 % level. Furthermore, the sub-indices are positively correlated with each other at the 1 % significance level. These findings suggest the possibility of validly aggregating the sub-scores into a single index.

The measures of the institutional environment also show the expected correlations. High levels of coordination (e.g., in Austria or Germany) are associated with less strict disclosure requirements and legal enforcement, less shareholder protection, and more bank financing (Hall and Gingerich 2004, 2009). Coordination negatively correlates with both *SPREAD* and *CSP_TOT*; hence, firms in more coordinated economies face less IA between shareholders and management in addition to lower CSP engagement.

4.3 Hypothesis tests

Before testing our hypotheses, two configurational issues must be discussed. First, the Heckman selection model should be discussed in depth only if sample selection

[23] Our panel is defined from an ex ante perspective as of January 1, 2002. Consequently, a decrease in the number of observations could be assumed over time. However, this is not the case, as can be concluded from Table 3, Panel C. The reason is—although the companies are theoretically in the sample from 2002 on—data restrictions lead to eliminations, especially through the CSP data in the early years of the sample period, which gives further impetus to the Heckman selection model to ensure that the results are not driven by data availability.

[24] The basic patterns of prior studies are reflected in the descriptive data, especially the divergence of means and medians for *SPREAD,* in addition to the development over time (Cho et al. 2013).

[25] All p-values throughout this paper are given as two-tailed values.

Table 4 Correlations

Panel A: Correlations of *SPREAD*, CSP measures, and control variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) *SPREAD*		-0.4342***	-0.3860***	-0.3471***	-0.4163***	-0.2186***	-0.5423***	0.0041	-0.0315*	-0.1920***	-0.1406***	-0.3484***	-0.0878***	-0.1301***	0.0738***	-0.2771***
(2) *CSP_TOT*	-0.2636***		0.7339***	0.7186***	0.7740***	0.6738***	0.4877***	-0.0014	-0.0678***	0.0466**	0.1078***	0.2829***	0.1489***	0.1352***	-0.0704***	0.3392***
(3) *CSP_ECN*	-0.2770***	0.7009***		0.3945***	0.4965***	0.2757***	0.3403***	0.0890***	-0.0458**	0.1510***	0.2002***	0.1999***	0.0859***	0.1090***	-0.1217***	0.2284***
(4) *CSP_ENV*	-0.2330***	0.8046***	0.4032***		0.6440***	0.2871***	0.5449***	-0.0392**	-0.1872***	0.0748***	-0.0196	0.1920***	0.2089***	0.2312***	-0.1613***	0.2980***
(5) *CSP_SOC*	-0.2452***	0.8608***	0.4972***	0.7021***		0.3535***	0.5136***	-0.0669***	-0.0766***	0.0518***	0.0316*	0.1388***	0.1590***	0.1127***	-0.0452**	0.2921***
(6) *CSP_CGV*	-0.0942***	0.6542***	0.2911***	0.3527***	0.4437***		0.1543***	-0.0281	0.0754***	-0.1003***	0.0646***	0.2825***	0.0369**	-0.0177	0.1163***	0.2125***
(7) *SIZE*	-0.3230***	0.4531***	0.3268***	0.4978***	0.4822***	0.1633***		-0.1517	-0.2356***	0.1192***	-0.0829***	0.1523***	0.1482***	0.1170***	-0.2136***	0.4355***
(8) *EQ_RAT*	-0.0202	-0.0807***	0.0123	-0.0588***	-0.1051***	-0.0808***	-0.1703***		-0.2140***	0.0077	-0.2309***	0.0597***	-0.0825***	0.1456***	-0.1780***	0.0235
(9) *MTB*	0.0673***	-0.1572***	-0.1292***	-0.1472***	-0.1330***	-0.0569***	-0.1492***	-0.0495***		0.0799***	0.4553***	-0.0534***	-0.0675***	0.0248	0.1730***	-0.0106
(10) *FCF*	-0.165	-0.0285	0.0127	-0.0387**	-0.0273	-0.0395**	-0.0132	-0.0045	0.0625***		0.2168***	0.0621***	0.0037	0.1534***	-0.0892***	0.0556***
(11) *ROE*	-0.0310*	0.0392**	0.0468**	0.0049	0.0174	0.0618***	-0.0448**	-0.1197***	-0.0090	0.0083		0.0147	0.0294	-0.0251	-0.0106	0.0362**
(12) *FREEFLOAT*	-0.2671***	0.2407***	0.1768***	0.2076***	0.1443***	0.2766***	0.1312***	0.0368**	-0.1060***	-0.0009	-0.0012		0.1066***	0.1984***	-0.0145	0.1960***
(13) *AGE*	-0.0645***	0.1623***	0.1040***	0.2115***	0.1545***	0.0587***	0.1341***	-0.0719***	-0.0673***	-0.0169	-0.0080	0.1139***		0.1191***	0.0247	0.0559***
(14) *R&D*	0.0269	-0.0531***	-0.0490***	-0.0298	-0.0081	-0.0474***	-0.0891***	0.1759***	0.0068	0.0131	-0.0291	0.0612***	-0.0026		0.1212***	0.2145***
(15) *EMP_PROD*	0.1584***	-0.0577***	-0.1457***	-0.1752***	-0.0380**	0.1458***	-0.2479***	-0.1392***	0.0308*	-0.0206	0.0268	-0.0087	-0.0145	0.2279***		-0.0703***
(16) *ADR*	-0.1893***	0.3031***	0.2232***	0.2569***	0.2862***	0.2159***	0.4311***	0.0140	-0.0773***	0.0068	-0.0100	0.1905***	0.0852***	0.1118***	-0.1047***	

Panel B: Correlations of *SPREAD*, CSP measures, and measures of the institutional environment

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	*SPREAD*							-0.1276***	0.0602***	0.1634***	-0.2019***	0.0617***
(2)	*CSP_TOT*							-0.1082***	0.1400***	0.0543***	-0.0564***	0.0361**
(3)	*CSP_ECN*							0.0753***	-0.0665***	-0.1288***	0.0391**	0.0520***
(4)	*CSP_ENV*							0.1235***	-0.0656***	-0.0233	0.1238***	0.0057
(5)	*CSP_SOC*							0.0613***	-0.0051	-0.0426**	0.1406***	-0.0936***
(6)	*CSP_CGV*							-0.4521***	0.4532***	0.3127***	-0.3522***	0.1184***
(7)	*COORD*	-0.1658***	-0.1161***	0.0781***	0.0411**	0.0167	-0.4788***		-0.8233***	-0.6786***	0.7082***	-0.1021***
(8)	*DISCLO*	0.0856***	0.1191***	-0.0580***	-0.0193	0.0325*	0.4190***	-0.8119***		0.6252***	-0.4842***	-0.0589***
(9)	*SH_PROT*	0.1756***	0.0867***	-0.1120***	0.0322*	0.0019	0.3172***	-0.7991***	0.5656***		-0.3537***	-0.0415**
(10)	*FIN_STRUC*	-0.1121***	-0.0490***	0.0270	0.0943***	0.0893***	-0.3475***	0.6940***	-0.4406***	-0.3880***		-0.6429***
(11)	*RULE_LAW*	-0.0537***	0.0961***	0.0443**	0.0764***	-0.0152	0.1481***	-0.2150***	0.0003	0.2224***	-0.5882***	

This table denotes the Spearman (above the diagonal) and Pearson (below the diagonal) correlation coefficients for all 2999 firm-year observations. Panel A contains the correlations between the relative bid-ask spread (*SPREAD*), the CSP measures, and the control variables. Panel B presents the correlations between the relative bid-ask spread (*SPREAD*), the CSP measures, and the measures of the institutional environment. Correlations already presented in Panel A are omitted from Panel B to avoid duplicating coefficients. Variable definitions are provided in the "Appendix"

***, **, * indicate significance at the 1, 5, and 10 % levels (two-tailed), respectively

bias is present. However, the results of the Heckman procedure reveal insignificant inverse Mills ratios (untabulated, all p values >0.60). Hence, a sample selection issue can be excluded. For this reason, the main analysis relies on the results achieved by using IV approaches. Second, a Breusch and Pagan (1979) test indicates heteroscedasticity, that is, time-variant residuals. Thus, robust standard errors (White 1980) are clustered at the company level to avoid the correlation of residuals over time in all of the models (Petersen 2009).[26]

Table 5 presents the multivariate regressions designed to test the hypotheses. To counter endogeneity issues, we consider IV as our main estimator. However, we present both the OLS (models 1, 2, 5, and 6) and the IV estimates (models 3, 4, 7, and 8) following Larcker and Rusticus (2010). We suggest two methods of capturing cross-country differences: models 1, 3, 5, and 7 use the coordination index, whereas the remaining models contain the set of four institutional variables.

We now focus on the first four models because they are designed to test H1. Before interpreting the coefficients, the quality of the models needs to be assessed. For the OLS regressions, reasonable adjusted coefficients of determination (R^2) are obtained (29.8 % in model 1 and 31.3 % in model 2). In addition, the maximum variance inflation factors (VIFs) are below common thresholds, which means that multicollinearity does not seem to be an issue. For the IV estimates, the adjusted R^2 values are comparable (27.4 % in model 3 and 30.4 % in model 4). Both the Durbin (1954) and Wu-Hausman (Wu 1974; Hausman 1978) tests indicate endogeneity. Hence, the IV approach is mandatory. The chosen set of instruments is relevant, given the significant explanatory power in a first-stage regression. Further, instrumental overidentification can be excluded because both the Sargan (1958) and Basmann (1960) tests show insignificant test statistics.

H1 posits that higher CSP leads to less IA. The descriptive data (Table 3) and the correlations (Table 4) are in line with this prediction. The *CSP_TOT* coefficients are significantly negative in all baseline models ($p < 0.01$), as well as in models 5–8, which contain interaction terms. Hence, we can conclude a negative effect of CSP on IA.[27] The magnitude of the coefficients varies between −0.0033 (model 4) and −0.0048 (model 3) in the baseline models. These numbers appear very small; however, they are given per share. An example may help to assess economic significance. The mean number of shares outstanding in the sample is 1.1533 billion. Hence, the increase in *CSP_TOT* by one point (on the scale from zero to 100) means an absolute reduction in IA of 38,058.9 euros at the company level. Although a direct interpretation of this value seems problematic, it gives an impression of the potential impact.

Disclosure requirements (*DISCLO*) are associated with IA in a significantly negative manner, which is the expected result. However, the *COORD* coefficient reveals that companies in more coordinated countries face less IA. This finding

[26] Petersen (2009) describes this type of correlation as an unobserved company-specific effect. The procedure described leads to unbiased confidence intervals and coefficients because the 316 clusters in the sample are sufficient. Standard errors are not additionally clustered by year due to the short time horizon (2002–2013), which would yield few clusters and thus lead to biased standard errors (Petersen 2009).

[27] We reproduced the basic results by using the two additional proxies suggested by Leuz and Verrecchia (2000), relative trading volume and stock price volatility. The results remain inferentially identical.

Table 5 Multivariate regressions

Model	1	2	3	4	5	6	7	8
Hypothesis	H1	H1	H1	H1	H2	H3	H2	H3
Estimation	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Constant	2.1900***	2.2300***	2.0500***	2.0800***	2.2300***	2.2000***	2.0800***	2.0300***
	(0.1760)	(0.1880)	(0.1160)	(0.1420)	(0.1820)	(0.1890)	(0.1150)	(0.1430)
CSP_TOT	−0.0014**	−0.0012**	−0.0048***	−0.0033***	−0.0002***	−0.0015***	−0.0061***	−0.0039***
	(0.0006)	(0.0006)	(0.0010)	(0.0009)	(0.0007)	(0.0006)	(0.0011)	(0.0010)
SIZE	−0.0649***	−0.0631***	−0.0410***	−0.0487***	−0.0642***	−0.0626***	−0.0357***	−0.0467***
	(0.0083)	(0.0090)	(0.0091)	(0.0090)	(0.0085)	(0.0090)	(0.0094)	(0.0090)
EQ_RAT	−0.1650***	−0.1300**	−0.1680***	−0.1340***	−0.1690***	−0.1340**	−0.1740***	−0.1400***
	(0.0579)	(0.0571)	(0.0389)	(0.0385)	(0.0556)	(0.0567)	(0.0389)	(0.0385)
FCF	−0.0013*	−0.0007	−0.0014	−0.0008	−0.0013*	−0.0005	−0.0016*	−0.0006
	(0.0007)	(0.0007)	0.0009)	(0.0009)	(0.0007)	(0.0007)	(0.0009)	(0.0009)
ROE	−0.0001**	−0.0001**	−0.0008**	−0.0001**	−0.0001**	−0.0001**	−0.0001	−0.0001**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
FREEFLOAT	−0.0032***	−0.0029***	−0.0029***	−0.0028***	−0.0031***	−0.0028***	−0.0027***	−0.0025***
	(0.0006)	(0.0006)	(0.0003)	(0.0004)	(0.0006)	(0.0005)	(0.0004)	(0.0004)
AGE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
R&D	0.2610	0.1590	0.1980	0.1390	0.2560	0.2020	0.1810	0.1900
	(0.4380)	(0.4380)	(0.1450)	(0.1440)	(0.4030)	(0.4250)	(0.1450)	(0.1440)
R&DMISSING	0.0000	−0.0142	−0.0170	−0.0216	−0.0059	−0.0222	0.0280	−0.0323*
	(0.0252)	(0.0242)	(0.0187)	(0.0183)	(0.0245)	(0.0239)	(0.0189)	(0.0185)
EMP_PROD	0.0621	0.0970	0.0635	0.1030**	0.0126	0.0553	−0.0030	0.0519
	(0.0779)	(0.0796)	(0.0502)	(0.0499)	(0.0827)	(0.0833)	(0.0508)	(0.0504)

Table 5 continued

Model	1	2	3	4	5	6	7	8
Hypothesis	H1	H1	H1	H1	H2	H3	H2	H3
Estimation	OLS	OLS	IV	IV	OLS	OLS	IV	IV
ADR	−0.0341	−0.0334*	−0.0193	−0.0239	−0.0320*	−0.0377	−0.0137	−0.0283*
	(0.0209)	(0.0198)	(0.0165)	(0.0161)	(0.0210)	(0.0194)	(0.0165)	(0.0160)
COORD	−0.1810***		−0.2370***		−0.2060***		−0.2810***	
	(0.0348)		(0.0289)		(0.0388)		(0.0305)	
DISCLO		−0.2580***		−0.2180***		−0.2360***		−0.1870***
		(0.0819)		(0.0651)		(0.0847)		(0.0658)
SH_PROT		0.0782***		0.0809***		0.0862***		0.0911***
		(0.0126)		(0.0092)		(0.0138)		(0.0095)
FIN_STRUC		−0.1270***		−0.1320***		−0.1190***		−0.1230***
		(0.0301)		(0.0212)		(0.0298)		(0.0211)
RULE_LAW		−0.1790***		−0.1700***		−0.1840***		−0.1760***
		(0.0482)		(0.0314)		(0.0485)		(0.0312)
CSP_TOT × *COORD*					0.0068***		0.0092***	
					(0.0022)		(0.0011)	
CSP_TOT × *DISCLO*						−0.0105***		−0.0130***
						(0.0038)		(0.0023)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2999	2999	2999	2999	2999	2999	2999	2999
Adj. R^2	29.8 %	31.3 %	27.4 %	30.4 %	31.0 %	31.9 %	27.5 %	30.7 %
Max. VIF	1.88	2.48			1.88	2.49		
Durbin			14.39	5.66			18.97	6.71

Table 5 continued

Model	1	2	3	4	5	6	7	8
Hypothesis	H1	H1	H1	H1	H2	H3	H2	H3
Estimation	OLS	OLS	IV	IV	OLS	OLS	IV	IV
(endogeneity)			($p < 0.01$)	($p = 0.02$)			($p < 0.01$)	($p < 0.01$)
Wu-Hausman			14.31	5.60			18.88	6.64
(endogeneity)			($p < 0.01$)	($p = 0.02$)			($p < 0.01$)	($p = 0.01$)
Partial first-stage R^2			0.12	0.13			0.11	0.12
First-stage F			210.00	215.76			186.85	202.42
(relevance)			($p < 0.01$)	($p < 0.01$)			($p < 0.01$)	($p < 0.01$)
Sargan			0.59	0.20			0.56	0.09
(overidentification)			($p = 0.44$)	($p = 0.65$)			($p = 0.45$)	($p = 0.76$)
Basmann			0.59	0.20			0.56	0.09
(overidentification)			($p = 0.44$)	($p = 0.65$)			($p = 0.46$)	($p = 0.76$)

This table displays the hypotheses tests via multivariate regression results. The dependent variable in all of the models is the relative bid-ask spread (*SPREAD*). Models 1, 2, 5, and 6 are OLS estimations, and models 3, 4, 7, and 8 are IV estimations. Models 5 to 8 contain interaction terms. The variables in the interaction terms are mean centered. Robust standard errors clustered at the company level are in parentheses below the standardized coefficients. Variable definitions are provided in the "Appendix". The table further presents the adjusted R^2 values. For the OLS results, the maximum VIF for each model is noted. For the IV estimations, significant Durbin (1954) and Wu-Hausman (Wu 1974; Hausman 1978) scores indicate endogeneity. Instrument relevance is tested by using partial first-stage R^2 and the first-stage F-statistic (significant scores indicate relevance). Potential instrumental overidentification is tested via the Sargan (1958) and Basmann (1960) scores (significant scores indicate overidentification)

***, **, * indicate significance at the 1, 5, and 10 % levels (two-tailed), respectively

appears somewhat surprising because raising capital in capital markets is regarded as more important in less coordinated economies.

Four of the control variables are consistently significant. Larger (*SIZE*), less leveraged (*EQ_RAT*), and more profitable (*ROE*) firms or firms with a higher free float (*FREEFLOAT*) face less IA, ceteris paribus.

Models 5 to 8 are designed to test the interaction effects proposed in H2 and H3. The models show characteristics similar to the baseline models in terms of the coefficients of determination, multicollinearity, instrumental quality, and the significance of the control variables.

H2 posits that the reduction in IA due to additional CSP is larger in LMEs than in CMEs. The relevant coefficient belongs to $CSP\_TOT \times COORD$ (model 7) and shows a significantly positive impact ($p < 0.01$). The implication is that an increase in CSP leads to a lower reduction in IA in the presence of increased coordination. Consequently, the empirical results confirm H2.

H3 suggests that CSP reduces IA to a greater extent under strict disclosure requirements. Hence, we predict a negative coefficient for $CSP\_TOT \times DISCLO$. Model 8 reveals a negative coefficient of -0.0130 ($p < 0.01$). Hence, H3 is confirmed.

4.4 Robustness checks

To assess the validity of the results in the main analysis, we pursue four categories of robustness tests that consider the following: the econometric specification, the CSP proxy, the inclusion of financial and utility firms, and differing variable configurations.

4.4.1 Econometric specification

The results of the endogeneity tests in the main analysis suggest the use of IV estimators. However, other econometric specifications are applied to further substantiate the results.

We first use the *CSP_TOT* values as the independent variable lagged by 1 year.[28] The rationale behind this approach is to capture the materialization of the independent variable prior to the expected result, that is, the IA measure. Doing so alleviates endogeneity issues and thus establishes a stronger causal relation (Oikonomou et al. 2012). The results are displayed in Table 6, models 1 to 4. These models show characteristics similar to the models in the main analysis with regard to the coefficient of determination, maximum VIFs, and the significance of the institutional and the control variables. The results for all three hypotheses are confirmed: *CSP_TOT* is consistently negative (all p values <0.05; H1), $CSP\_TOT \times COORD$ is positive ($p = 0.02$; H2), and $CSP\_TOT \times DISCLO$ is negative ($p = 0.03$; H3).

[28] The sample size is reduced from 2999 to 2644 firm-year observations because lagged CSP values for 2002 (i.e., CSP values for 2001) were not consistently available, which is why this year was eliminated throughout.

Table 6 Robustness check: econometric specification

Model Hypothesis Estimation method	1 H1 OLS, Lag	2 H1 OLS, Lag	3 H2 OLS, Lag	4 H3 OLS, Lag	5 H1 Treatreg	6 H1 Treatreg
Constant	1.9300***	1.9400***	1.9600***	1.9200***	1.7300***	1.6100***
	(0.1790)	(0.2000)	(0.1820)	(0.0200)	(0.1920)	(0.2200)
CSP_TOT	−0.0013**	−0.0012**	−0.0017***	−0.0014**		
	(0.0006)	(0.0005)	(0.0006)	(0.0006)		
CSP_BIN					−0.3470***	−0.4110***
					(0.1080)	(0.1070)
SIZE	−0.0606***	−0.0593***	−0.0597***	−0.0587***	−0.0297*	−0.0194
	(0.0083)	(0.0087)	(0.0085)	(0.0086)	(0.0152)	(0.0148)
EQ_RAT	−0.1920***	−0.1540***	−0.1910***	−0.1540***	−0.1400***	−0.1020***
	(0.0618)	(0.0592)	(0.0602)	(0.0588)	(0.0391)	(0.0390)
FCF	−0.0013*	−0.0007	−0.0013*	−0.0006	−0.0012	−0.0007
	(0.0007)	(0.0007)	(0.0007)	(0.0006)	(0.0009)	(0.0009)
ROE	−0.0001	−0.0001	−0.0001	−0.0001	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
FREEFLOAT	−0.0028***	−0.0026***	−0.0027***	−0.0024***	−0.0025***	−0.0021***
	(0.0005)	(0.0005)	(0.0006)	(0.0005)	(0.0004)	(0.0004)
AGE	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
R&D	0.2610	0.1490	0.2610	0.1860	0.1720	0.0673
	(0.3800)	(0.3850)	(0.3540)	(0.3760)	(0.1470)	(0.1460)
R&DMISSING	−0.0088	−0.0249	−0.0128	−0.0307	−0.0269	−0.0464***
	(0.0229)	(0.0218)	(0.0224)	(0.0215)	(0.0207)	(0.0203)

Table 6 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation method	OLS, Lag	OLS, Lag	OLS, Lag	OLS, Lag	Treatreg	Treatreg
EMP_PROD	0.0004	0.0324	−0.0331	0.0016	0.0134	0.0407
	(0.0662)	(0.0668)	(0.0706)	(0.0699)	(0.0519)	(0.0516)
ADR	0.0275	−0.0266	−0.0263	−0.0303*	−0.0074	0.0027
	(0.0190)	(0.0176)	(0.0191)	(0.0173)	(0.0186)	(0.0189)
COORD	−0.1580***		−0.1740***		−0.2530***	
	(0.0325)		(0.0358)		(0.0378)	
DISCLO		−0.2940***		−0.2830***		−0.1060
		(0.0812)		(0.0835)		(0.0772)
SH_PROT		0.0834***		0.0895***		0.0780***
		(0.0124)		(0.0134)		(0.0092)
FIN_STRUC		−0.1030***		−0.0980***		−0.1610***
		(0.0277)		(0.0278)		(0.0231)
RULE_LAW		−0.1530***		−0.1580***		−0.2230***
		(0.0512)		(0.0515)		(0.0327)
CSP_TOT × *COORD*			0.0048**			
			(0.0020)			
CSP_TOT × *DISCLO*				−0.0076**		
				(0.0034)		
Inverse Mills ratio					0.1950***	0.2370***
					(0.0647)	(0.0641)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation method	OLS, Lag	OLS, Lag	OLS, Lag	OLS, Lag	Treatreg	Treatreg
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2644	2644	2644	2644	2999	2999
Adj. R^2	24.6 %	26.7 %	25.4 %	27.1 %	29.7 %	31.3 %
Max. VIF	1.89	2.49	1.90	2.15		

This table displays the robustness checks with regard to the econometric specifications. The dependent variable in all of the models is the relative bid-ask spread (*SPREAD*). Models 1 to 4 are OLS estimations with lagged *CSP_TOT*. Models 5 and 6 are the second-stage results of the treatment effect models. The corresponding first stage is estimated with *CSP_TOT* and all of the control variables of the second stage. In addition, *MTB* is included in the first stage. Models 3 and 4 contain interaction terms. The variables in the interaction terms are mean centered. Robust standard errors clustered at the company level are in parentheses below the standardized coefficients. Variable definitions are provided in the "Appendix". The table further presents the adjusted R^2 values. For the OLS results, the maximum VIF for each model is noted. For the treatreg model, the inverse Mills ratio is reported

***, **, * indicate significance at the 1, 5, and 10 % levels (two-tailed), respectively

To further substantiate the direction of the effect, we re-estimate the lagged model but change the independent and dependent variables. We use *CSP_TOT* as the dependent variable and *SPREAD* as the independent variable lagged by 1 year. The p value of the lagged *SPREAD* coefficient is well above the common threshold of 10 % (untabulated).[29]

The treatment effect (treatreg) model also encounters the fact that the characteristics underlying the propensity of firms choosing certain CSP levels are not independent of the observed outcome, that is, IA (Guo and Fraser 2015). For this reason, the propensity to self-select a high CSP level is estimated by using a first-stage probit model. The resulting dummy variable (*CSP_BIN*) is then entered into the second-stage regression equations (models 5 and 6) presented. The significant inverse Mills ratio ($p < 0.01$) indicates that the two stages are not independent[30]; hence, self-selection into the high-CSP group is present (Wu and Shen 2013). The results for H1 are again in line with the main analysis: *CSP_BIN* is negative in both models (both p values <0.01). Interpreting the interactions of the endogenous variable with other variables in the treatment effect models can be very ambiguous. Thus, we refrain from using interaction models.

4.4.2 Alternative CSP proxies

Next, we consider different CSP proxies. As outlined above, economic sustainability is one of the ASSET4 pillars. To ensure that the results are not exclusively driven by this pillar (with the ESG dimensions being potentially irrelevant), we calculate the equal-weighted index without the economic dimension (*CSP_ESG*). Table 7 shows the corresponding IV results for the baseline hypothesis (models 1 and 2) and for H2 (model 3) and H3 (model 4). The results are robust to the elimination of the economic dimension from the index. Thus, we can conclude that ESG performance lessens IA. To assess the impact of each of the three dimensions, we incorporate them separately in OLS regressions. Given that all three variables are potentially endogenous, IV approaches are not feasible here.[31] The OLS models show characteristics similar to the previous models. However, the coefficients for the ESG dimensions are very surprising. Only the social dimension shows a significantly negative impact on IA (both p values $= 0.015$). The environmental dimension does not have any significant impact (both p values >0.85). Most likely, the most astonishing coefficients belong to the corporate governance dimension. They reveal a significantly positive effect on IA ($p < 0.01$) that is smaller than the negative effect of the social dimension. An increase in information asymmetry due to additional sustainability information in the corporate governance dimension seems counterintuitive. One reason could be that shareholders view additional performance beyond the desired level in more coordinated countries not as beneficial but, rather,

[29] For the model with the coordination index, the coefficient showed a t-value of -1.52 ($p = 0.129$). For the model using the four institutional variables, the t-value was -1.35 ($p = 0.179$).

[30] This interdependency is also the reason why no maximum VIF values are reported for the treatment effect models (Lennox et al. 2012).

[31] Interaction models were not also considered due to the number of potential interactions and the difficulty of their unambiguous interpretation.

Table 7 Robustness check: CSP proxies

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation	IV	IV	IV	IV	OLS	OLS
CSP Proxy	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	Sub-scores	Sub-scores
Constant	2.0800***	2.0700***	2.1400***	2.0300***	2.1600***	2.2900***
	(0.1140)	(0.1410)	(0.1140)	(0.1420)	(0.1700)	(0.1860)
CSP_ESG	−0.0057***	−0.0040***	−0.0074***	−0.0048***		
	(0.0011)	(0.0011)	(0.0012)	(0.0011)		
CSP_ENV					0.0001	0.0000
					(0.0007)	(0.0007)
CSP_SOC					−0.0020**	−0.0019**
					(0.0008)	(0.0008)
CSP_CGV					0.0016***	0.0018***
					(0.0006)	(0.0005)
SIZE	−0.0402***	−0.0477***	−0.0346***	−0.0456***	−0.0670***	−0.0645***
	(0.0092)	(0.0089)	(0.0094)	(0.0090)	(0.0083)	(0.0088)
EQ_RAT	−0.1790***	−0.1420***	−0.1890***	−0.1490***	−0.1580***	−0.1180***
	(0.0393)	(0.0390)	(0.0394)	(0.0389)	(0.0591)	(0.0577)
FCF	−0.0016*	−0.0010	−0.0018**	−0.0007	−0.0012	−0.0006
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0007)	(0.0007)
ROE	−0.0001**	−0.0001**	−0.0001*	−0.0001**	−0.0001**	−0.0001**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
FREEFLOAT	−0.0028***	−0.0027***	−0.0026***	−0.0025***	−0.0035***	−0.0032***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
AGE	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
R&D	0.2620*	0.1820	0.2560*	0.2290	0.3150	0.1740
	(0.1450)	(0.1450)	(0.1450)	(0.1450)	(0.4410)	(0.4330)

Table 7 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation	IV	IV	IV	IV	OLS	OLS
CSP Proxy	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	Sub-scores	Sub-scores
R&DMISSING	−0.0157	−0.0213	−0.0268	−0.0328*		
	(0.0188)	(0.0184)	(0.0189)	(0.0186)		
EMP_PROD	0.0688	0.1050**	0.0109	0.0588*	0.0102	0.0944
	(0.0506)	(0.0503)	(0.0511)	(0.0505)	(0.0259)	(0.0757)
ADR	−0.0218	−0.0246	−0.0140	−0.0275	−0.0421**	−0.0425**
	(0.0164)	(0.0161)	(0.0165)	(0.0161)	(0.0201)	(0.0186)
COORD	−0.2590***		−0.3170***		−0.1010**	
	(0.0314)		(0.0337)		(0.0420)	
DISCLO		−0.1980***		−0.1750***		−0.3400***
		(0.0669)		(0.0672)		(0.0884)
SH_PROT		0.0845***		0.0980***		0.0729***
		(0.0095)		(0.0098)		(0.0127)
FIN_STRUC		−0.1340***		−0.1240***		−0.0983***
		(0.0214)		(0.0213)		(0.0263)
RULE_LAW		−0.1760***		−0.1810***		−0.1770***
		(0.0314)		(0.0313)		(0.0465)
CSP_TOT × *COORD*			0.0119***			
			(0.0014)			
CSP_TOT × *DISCLO*				−0.0180***		
				(0.0029)		
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2999	2999	2999	2999	2999	2999

Table 7 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation	IV	IV	IV	IV	OLS	OLS
CSP Proxy	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	*CSP_ESG*	Sub-scores	Sub-scores
Adj. R^2	26.2 %	29.3 %	26.1 %	29.7 %	30.1 %	31.8 %
Max. VIF					2.43	2.66
Durbin	25.13	13.67	31.06	14.96		
(endogeneity)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)		
Wu-Hausman	25.08	13.57	31.04	14.86		
(endogeneity)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)		
Partial first-stage R^2	0.15	0.16	0.14	0.15		
First-stage F	269.79	280.27	239.89	264.33		
(relevance)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)	($p < 0.01$)		
Sargan	1.08	0.17	1.21	0.04		
(overidentification)	($p = 0.30$)	($p = 0.68$)	($p = 0.27$)	($p = 0.84$)		
Basmann	1.07	0.17	1.20	0.04		
(overidentification)	($p = 0.30$)	($p = 0.68$)	($p = 0.27$)	($p = 0.84$)		

This table displays the robustness checks with regard to different CSP proxies. The dependent variable in all of the models is the relative bid-ask spread (*SPREAD*). Models 1–4 are IV estimations with *CSP_ESG* as the independent variable. Models 5 and 6 are OLS estimations. Models 3 and 4 contain interaction terms. The variables in the interaction terms are mean centered. Robust standard errors clustered at the company level are in parentheses below the standardized coefficients. Variable definitions are provided in the "Appendix". The table further presents the adjusted R^2 values. For the OLS results, the maximum VIF for each model is noted. For the IV estimations, significant Durbin (1954) and Wu-Hausman (Wu 1974; Hausman 1978) scores indicate endogeneity. Instrument relevance is tested by using partial first-stage R^2 and the first-stage F-statistic (significant scores indicate relevance). Potential instrumental overidentification is tested via the Sargan (1958) and Basmann (1960) scores (significant scores indicate overidentification)

***, **, * indicate significance at the 1, 5, and 10 % levels (two-tailed), respectively

as distracting for the shareholders.[32] To summarize, the overall result seems to be mainly driven by the social dimension.

4.4.3 Inclusion of financial and utility firms

The third category of robustness checks includes financial and utility firms that were not part of the main analysis. The results of the initial IV estimates indicated either a lack of endogeneity and/or instrumental overidentification. However, because some of the models were still subject to endogeneity, simply relying on OLS estimates could be misleading. Thus, in Table 8, we report the results of the OLS estimates with lagged CSP values (also with interactions) and those of the treatment effect specifications (baseline models).

Based on these models, the effect of CSP on IA also holds in OLS models with lagged CSP and in treatment effect models that include financial and utility firms.[33] Hence, H1 appears robust to the inclusion of financial and utility firms. However, the interaction effects disappear. Consequently, the results for H2 and H3 are not robust to this sample variation. An additional interesting observation can be made in model 6. In this treatment effect model, the coefficient of the disclosure requirement index also becomes insignificant. A possible explanation could be that country-specific disclosure requirements lose their effect because financial firms and utilities are regulated in a different (but mostly common across countries) manner, especially for the Eurozone via the European Central Bank. To further investigate this issue, we reran the OLS and IV estimations of the main analysis (originally in Table 5) for financial and utility firms only (untabulated). Both the Sagan and the Wu-Hausman tests indicate no endogeneity. Consequently, we rely on OLS in testing the hypotheses for financial and utility firms only. H1 can be confirmed at the 10 % level ($p = 0.058$ in model 1; $p = 0.052$ in model 2). The interaction $CSP\_TOT \times COORD$ is positive and significant ($p = 0.028$), thus also supporting H2 for financial and utility firms only. The interaction term $CSP\_TOT \times DISCLO$ is insignificant; hence, H3 cannot be confirmed for financial and utility firms only.

4.4.4 Variable configurations

The fourth category of robustness checks revolves around alternative specifications of the models (untabulated) with regard to the treatment of extreme observations and additional controls.

As outlined above, extreme values are not eliminated or adjusted for the main analysis. However, additional models are estimated after Winsorizing all variables

[32] The sign shift from the correlation analysis to the regression results could be the result of multicollinearity. This may especially hold true given the strong correlations between the ESG dimensions. To alleviate this concern, we included the three ESG dimensions separately into three distinct models, one dimension at a time. *CSP_ENV* was insignificant ($p = 0.34$), *CSP_SOC* was significantly negative ($p = 0.05$), and *CSP_CGV* was significantly positive ($p = 0.01$).

[33] The coefficient of determination for all of the models is relatively low compared to the corresponding models without financial and utility firms (Table 6), which points to the increasing heterogeneity of the companies in the sample.

Table 8 Robustness check: all industries (including financial and utility firms)

Model Hypothesis Estimation	1 H1 OLS, Lag	2 H1 OLS, Lag	3 H2 OLS, Lag	4 H3 OLS, Lag	5 H1 Treatreg	6 H1 Treatreg
Constant	1.7500***	1.8400***	1.7800***	1.8300***	2.0900***	1.5000***
	(0.1700)	(0.1910)	(0.1740)	(0.1850)	(0.3160)	(0.4320)
CSP_TOT	−0.0025**	−0.0023**	−0.0028***	−0.0024***		
	(0.0010)	(0.0010)	(0.0010)	(0.0008)		
CSP_BIN					−1.5300***	−1.7900***
					(0.4080)	(0.4110)
SIZE	−0.0386***	−0.0379***	−0.0380***	−0.0378***	0.0315	0.0509
	(0.0140)	(0.0128)	(0.0138)	(0.0125)	(0.0368)	(0.0360)
EQ_RAT	−0.3280***	−0.2880***	−0.3270***	−0.2850***	−0.1670*	−0.1250
	(0.0840)	(0.0812)	(0.0835)	(0.0848)	(0.0855)	(0.0861)
FCF	−0.0002	−0.0001	−0.0002	−0.0001	0.0009	0.0011
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0010)	(0.0010)
ROE	−0.0002	−0.0002	−0.0002	−0.0002	−0.0001	−0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
FREEFLOAT	−0.0034***	−0.0033***	−0.0033***	−0.0032***	−0.0044***	−0.0038***
	(0.0008)	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
AGE	−0.0002	−0.0002	−0.0001	−0.0002	−0.0003	−0.0004
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
R&D	0.3650	0.2210	0.3670	0.2340	0.1160*	0.1090
	(0.3730)	(0.3750)	(0.3550)	(0.3700)	(0.0614)	(0.0613)
R&DMISSING	−0.0022	−0.0263	−0.0058	−0.0284	−0.0854*	−0.0980**
	(0.0263)	(0.0240)	(0.0258)	(0.0230)	(0.0440)	(0.0438)

Table 8 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation	OLS, Lag	OLS, Lag	OLS, Lag	OLS, Lag	Treatreg	Treatreg
EMP_PROD	0.0729	0.0244	−0.0982	−0.0345	−0.1740*	−0.1640*
	(0.0898)	(0.0803)	(0.0892)	(0.0747)	(0.0927)	(0.0926)
ADR	−0.0568*	−0.0532*	−0.0563*	−0.0537*	0.0622	0.1010*
	(0.0309)	(0.0300)	(0.0308)	(0.0294)	(0.0529)	(0.0557)
COORD	−0.1910***		−0.2050***		−0.4790***	
	(0.0463)		(0.0476)		(0.0961)	
DISCLO		−0.3960***		−0.3900***		0.0682
		(0.0965)		(0.1020)		(0.1730)
SH_PROT		0.0986***		0.1000***		0.1350***
		(0.0165)		(0.0164)		(0.0220)
FIN_STRUC		−0.1370***		−0.1350***		−0.1720***
		(0.0326)		(0.0316)		(0.0494)
RULE_LAW		−0.1910***		−0.1900***		−0.1950***
		(0.0476)		(0.0467)		(0.0651)
CSP_TOT × *COORD*			0.0035			
			(0.0021)			
CSP_TOT × *DISCLO*				−0.0027		
				(0.0078)		
Inverse Mills ratio					0.9900***	1.1500***
					(0.2470)	(0.2490)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3669	3669	3669	3669	4792	4792

Table 8 continued

Model	1	2	3	4	5	6
Hypothesis	H1	H1	H2	H3	H1	H1
Estimation	OLS, Lag	OLS, Lag	OLS, Lag	OLS, Lag	Treatreg	Treatreg
Adj. R^2	9.8 %	1.9 %	10.0 %	10.9 %	9.3 %	9.7 %
Max. VIF	2.88	2.93	2.88	2.93		

This table displays the models for all companies, including financial and utility firms. The dependent variable in all of the models is the relative bid-ask spread (*SPREAD*). Models 1 to 4 are OLS estimations with lagged *CSP_TOT* as the independent variable. Models 5 and 6 are the second-stage results of the treatment effect models. The corresponding first stage is estimated with *CSP_TOT* and all of the control variables of the second stage. In addition, *MTB* is included in the first stage. Models 3 and 4 contain interaction terms. The variables in the interaction terms are mean centered. Robust standard errors clustered at the company level are in parentheses below the standardized coefficients. Variable definitions are provided in the "Appendix". The table further presents the adjusted R^2 values. For the OLS results, the maximum VIF for each model is noted. For the treatreg model, the inverse Mills ratio is reported

***, **, * indicate significance at the 1, 5, and 10 % levels (two-tailed), respectively

at the first and 99th percentiles. The results (untabulated) remain inferentially identical.[34]

Cui et al. (2013) consider further variables to account for cost structure information. Therefore, we run additional robustness checks for the models presented in Table 5 and include sales, general costs, and administrative costs (excluding R&D expenses), in addition to the costs of goods sold (excluding depreciation), both as their proportion of total revenues. The results (untabulated) are also robust to these additional controls, with the newly introduced control variables being insignificant.[35] Given that the main analysis considers the most commonly used variable sets as controls and that the additional specifications go beyond these sets, biases due to omitted variables appear unlikely.

5 Discussion

Despite its growing importance, evidence regarding the role of information in CSP among investors is scarce. To the best of our knowledge, this study is the first to investigate this effect in European capital markets. For the European setting, we confirm the results of Cho et al. (2013), who show a negative impact of CSP on the relative bid-ask spread in the U.S. market. Hence, CSP is *one* method (among others) of reducing IA.[36] Our result is robust to various statistical methods that especially consider endogeneity and self-selection. The analyses do not identify any sample selection biases but provide impetus for considering endogeneity in CSP research. The relationship between CSP and IA holds when financial and utility firms are included. This finding underlines the results of Wu and Shen (2013), who show that CSP matters in the banking industry as well.

We argue that CSP is the cause of higher IA. However, we acknowledge that lower costs of capital via lower IA (Verrecchia 2001; Bae et al. 2008) could also lead to additional funds for CSP spending. We can rule out this reverse causality logic for the relationship between CSP and IA, which is in line with the results by Surroca and Tribó (2005), who suggest that free funds are the effect and not the cause of higher CSP engagement.

Further, we are interested in the impact of the different CSP pillars on the reduction of IA. First, the results are robust to eliminating the economic sustainability pillar, following Cheng et al. (2014), thus substantiating a significantly negative effect of environmental, social, and corporate governance issues on

[34] The OLS and IV estimates are computed according to the specifications presented as models 1–8 in Table 5. All of the models remain suitable specifications, and the CSP proxies and interaction effects remain significant at least at the 5 % level.

[35] The OLS and IV estimates are computed according to the specifications presented as models 1–8 in Table 5, with either sales, general costs, and administrative costs or the costs of goods sold as an additional control. This computation results in 16 additional models. All of the models are as similarly suitable as those in Table 5. The CSP proxies and interaction effects remain significant at least at the 5 % level. The newly introduced variables are insignificant according to conventional thresholds ($p > 0.1$, two-tailed).

[36] We emphasize that these results are not indicative of the relative impact of CSP information compared to other information.

IA. Second, among the three ESG pillars, it is mainly the social pillar that drives the results. Notably, the governance pillar works in the opposite direction.

We exploit the differences between the European countries to assess the CSP impact on IA under different institutional settings. Based on neo-institutional theory and comparative institutional analysis, we hypothesize that the impact of CSP on IA should be lower in the somewhat stakeholder-oriented systems of CME-type countries. This second hypothesis is supported, which is in line with the work of Jackson and Apostolakou (2010), who show that CSP is a substitute for institutionalized forms of stakeholder participation. The rationale behind this finding is that, in more coordinated economies, stricter minimum criteria apply, with the results being somewhat public, for example, in terms of negotiations regarding wages or working conditions through unions.

We further concentrate on the impact of stricter disclosure requirements. The reduction of IA through CSP is more intense under stricter disclosure requirements. Initially, this third hypothesis seems to contradict the second hypothesis. However, the commonly used disclosure requirements index largely concentrates on corporate governance disclosure. The additional analysis regarding the separate ESG pillars reveals that the effect is mainly driven by the social dimension, which is not captured in detail by the index. Stricter disclosure requirements can, by trend, be found in LME-type countries. In these countries, a generally greater appetite for disclosure prevails. However, it is mainly the corporate governance dimension that is catered to, leaving room for information on the social dimension. This line of thought is further substantiated by the counterintuitive impact of the corporate governance dimension. Given stricter disclosure requirements, additional corporate governance information could be interpreted by investors as “noise.” This argumentation of the *partially complementary* effect is in line with the fact that CSP disclosure is more intense under strong nation-level institutions (Cahan et al. 2015).

In summary, this study has investigated the effect of institutional environments on the relationship between CSP and IA. One main advantage of investigating European samples lies in the diversity of institutional environments that belong (at least largely) to the Single European Market. This advantage could be further exploited by investigating the effects of CSP on other outcomes. The analysis regarding market-based performance measures seems to be especially fruitful because the mixed evidence in prior studies could be resolved by considering institutional differences.

For practitioners, our results advise carefully assessing corporate sustainability initiatives in a structured process. This study substantiates the hypothesis that CSP is not only philanthropy for its own sake but also a means to be evaluated more favorably in capital markets. Because CSP is often directly related to corporate expenses, our study reveals an indirect advantage—reduced IA—that may partly offset direct expenses. This discussion underscores the relevance of the growing body of literature on corporate sustainability responsibility and performance.

To conclude, this study examines the association between CSP and IA in European markets, especially the impact of institutional environments on this association. For this reason, firms listed in the STOXX Europe 600 are analyzed for the period between 2002 and 2013. Using the Thomson Reuters ASSET4 dataset to proxy for CSP and the relative bid-ask spread to measure IA, the empirical analysis supports the hypothesized association. We find CSP to be more useful in reducing IA in LME-type countries in which CSP *activity* serves as a *substitute* for institutional forms of stakeholder participation. However, CSP information, particularly *disclosure*, also has a *complementary* effect. In countries with high disclosure requirements (typically LMEs), these requirements focus on corporate governance issues, which leaves an institutional void, especially with regard to shareholder information on the social dimension.

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Appendix

See Table 9.

Table 9 Variables definitions

Variable	Description
$SPREAD_{i,\ t}$	Relative bid-ask spread in percent, defined as the annual average of daily bid-ask spreads over the average of bid and ask prices (for the same day) of company *i* in year *t* times 100
$CSP\_TOT_{i,\ t}$	ASSET4′s equal-weighted rating based on the assessment of the economic ($CSP\_ECN_{i,\ t}$), environmental ($CSP\_ENV_{i,\ t}$), social ($CSP\_SOC_{i,\ t}$), and corporate governance ($CSP\_CGV_{i,\ t}$) situation of company *i* in year *t*
$CSP\_BIN_{i,\ t}$	Dichotomous variable (1/0) of corporate sustainability performance, generated by the yearly median split of $CSP\_TOT_{i,\ t}$ (1 = high CSP, 0 = low CSP)
$CSP\_ECN_{i,\ t}$	ASSET4's economic pillar; it reflects company *i*'s overall financial health and its ability to generate long-term shareholder value through its use of best management practices in year *t*
$CSP\_ENV_{i,\ t}$	ASSET4's environmental pillar; it measures company *i*'s impact on living and non-living natural systems, including the air, land, and water, in addition to complete ecosystems in year *t*. It reflects how well a company uses best management practices to avoid environmental risks and to capitalize on environmental opportunities
$CSP\_SOC_{i,\ t}$	ASSET4's social pillar; it measures company *i*'s capacity to generate trust and loyalty with its workforce, customers, and society through its use of best management practices in year *t*. It is a reflection of the company's reputation and the health of its license to operate
$CSP\_CGV_{i,\ t}$	ASSET4's corporate governance pillar; it measures company *i*'s systems and processes, ensuring that its board members and executives act in the best interests of its long-term shareholders in year *t*. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, in addition to checks and balances

Table 9 continued

Variable	Description
$CSP\_ESG_{i,\ t}$	Equal-weighted ESG rating, based on $CSP\_ENV_{i,\ t}$, $CSP\_SOC_{i,\ t}$, and $CSP\_CGV_{i,\ t}$
$SIZE_{i,\ t}$	Company size, defined as the natural logarithm of total assets (book value) of company i at the beginning of year t, in thousands of euros
$EQ\_RAT_{i,\ t}$	Equity ratio, defined as book equity over the total book capital of company i at the beginning of year t
$MTB_{i,\ t}$	Market-to-book ratio, defined as the market capitalization over the book value of equity of company i at the end of year t
$FCF_{i,\ t}$	Free cash flow per share of company i in year t (*after* investments, *before* financing payments)
$ROE_{i,\ t}$	Return on equity, defined as net income available to common equity in year t over the average book value of common equity in year t for company i
$FREEFLOAT_{i,\ t}$	Proportion of shares in free float, defined as 100 % less the proportion of shareholders with a greater than 5 % stake in company i at the end of year t
$AGE_{i,\ t}$	Years since the foundation of company i in year t (Khan and Watts 2009)
$R\&D_{i,\ t}$	Intensity of R&D, defined as R&D expenses divided by the total sales of company i in year t
$R\&DMISSING_{i,\ t}$	Dichotomous variable (1/0) with value of 1 if $R\&D_{i,\ t}$ is missing and 0 otherwise
$EMP\_PROD_{i,\ t}$	Employee productivity, defined as personnel expenses (wages, salaries, and benefits) over the total sales of company i in year t
$ADR_{i,}$	Dichotomous variable (1/0) for a company i's listing of American depository receipts
$COORD_i$	Coordination index by Hall and Gingerich (2004, 2009); it measures the level of market coordination in the country of company i
$DISCLO_i$	Disclosure index by La Porta et al. (2006) for the country of company i
SH_PROT_i	Shareholder rights index by La Porta et al. (1998) for the country of company i, revised values by Djankov et al. (2008)
FIN_STRUC_i	Dichotomous variable (1/0) with a value of 1 for bank-based financial structures and 0 for market-based financial structures in the country of company i
$RULE\_LAW_{i,\ t}$	Rule of law index for company i in year t according to Kaufmann et al. (2009); values from the World DataBank by the World Bank
t	Time index for a company's fiscal year

References

Aiken LS, West SG (1991) Multiple regression: testing and interpreting interactions. Sage, Newbury

Aktas N, de Bodt E, Cousin J-G (2011) Do financial markets care about SRI? Evidence from mergers and acquisitions. J Bank Finance 35:1753–1761

Artiach T, Lee D, Nelson D, Walker J (2010) The determinants of corporate sustainability performance. Account Finance 50:31–51

Bae K-H, Stulz RM, Tan H (2008) Do local analysts know more? A cross-country study of the performance of local analysts and foreign analysts. J Finance Econ 88:581–606

Barnett ML, Salomon RM (2012) Does it pay to be really good? Addressing the shape of the relationship between social and financial performance. Strateg Manag J 33:1304–1320

Baron DP, Harjoto MA, Hoje J (2011) The economics and politics of corporate social performance. Bus Polit 13:1–46

Basmann RL (1960) On finite sample distributions of generalized classical linear identifiability test statistics. J Am Stat Assoc 55:650–659

Beckmann M (2007) Corporate social responsibility and corporate citizenship. Study. Martin-Luther-Universität Halle-Wittenberg. http://edoc.bibliothek.uni-halle.de/servlets/MCRFileNodeServlet/HALCoRe_derivate_00001229/Beckmann_2007_Studie_CSR-CC_2007-1.pdf. Accessed 14 Aug 2014

Bhat G, Hope O-K, Kang T (2006) Does corporate governance transparency affect the accuracy of analyst forecasts? Account Finance 46:715–732

Brammer S, Millington A (2008) Does it pay to be different? An analysis of the relationship between corporate social and financial performance. Strateg Manag J 29:1325–1343

Brammer S, Brooks C, Pavelin S (2006) Corporate social performance and stock returns: UK evidence from disaggregate measures. Finance Manag 35:97–116

Breusch TS, Pagan AR (1979) A simple test for heterscedasticity and random coefficient variation. Econometrica 47:1287–1294

Bushee BJ, Noe CF (2000) Corporate disclosure practices, institutional investors, and stock return volatility. J Account Res 38:171–202

Cahan SF, De Villiers C, Jeter DC, Naiker V, Van Staden CJ (2015) Are CSR disclosures value relevant? Cross-country evidence. Eur Account Rev (forthcoming)

Campbell JL (2007) Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. Acad Manag Rev 32:946–967

Canadian Institute of Chartered Accountants (2010) Environmental, social and governance (ESG) issues in institutional investor decision making. Discussion brief. http://www.cica.ca/publications/list-of-publications/manual/item41881.pdf. Accessed 15 Aug 2014

Capron L, Guillén M (2009) National corporate governance institutions and post-acquisition target reorganization. Strateg Manag J 30:803–833

Carney M, Gedajlovic ER, Heugens PPMAR, Van Essen M, Van Oosterhout J (2011) Business group affiliation, performance, context, and strategy: a meta-analysis. Acad Manag J 54:437–460

Cheng B, Ioannou I, Serafeim G (2014) Corporate social responsibility and access to finance. Strateg Manag J 35:1–23

Chih H-L, Chih H-H, Chen T-Y (2010) On the determinants of corporate social responsibility: international evidence on the financial industry. J Bus Ethics 93:115–135

Cho SY, Lee C, Pfeiffer RJ Jr (2013) Corporate social responsibility performance and information asymmetry. J Account Public Policy 32:71–83

Choi J-S, Kwak Y-M, Choe C (2010) Corporate social responsibility and corporate financial performance: evidence from Korea. Aust J Manag 35:291–311

Clarkson PM, Li Y, Richardson GD, Vasvari FP (2008) Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. Account Organ Soc 33:303–327

Cohen J, Holder-Webb L, Nath L, Wood D (2011) Retail investors' perceptions of the decision-usefulness of economic performance, governance, and corporate social responsibility disclosures. Behav Res Account 23:109–129

Coles JL, Daniel ND, Naveen L (2006) Managerial incentives and risk-taking. J Finance Econ 79:431–468

Commission of the European Communities (2001) Consultation paper for the preparation of a European Union strategy for sustainable development. http://ec.europa.eu/environment/eussd/pdf/consultation_paper_en.pdf. Accessed 26 Jan 2015

Cui J, Jo H, Na H (2013) Does corporate social responsibility reduce information asymmetry? Working Paper. Korea University School of Business (Korea University) and leavey School of Business (Santa Clara University). http://www.business.kaist.ac.kr/upload/event/0820.pdf. Accessed 45 Mar 2014

Deegan C, Unerman J (2011) Financial accounting theory, 2nd edn. McGraw-Hill, London

Demirguc-Kunt A, Levine R (2001) Bank-based and market-based financial systems: cross-country comparisons. In: Demirguc-Kunt A, Levine R (eds) Financial structure and economic growth: a cross-country comparison of banks, markets, and development. MIT Press, Cambridge, pp 81–140

Desender KA, Epure M (2014) Corporate governance and corporate social performance. Barcelona GSE Working Paper No. 730. Barcelona Graduate School of Economics. http://research.barcelonagse.eu/tmp/working_papers/730.pdf. Accessed 18 Aug 2014

Dhaliwal DS, Oliver Zhen L, Tsang A, Yong George Y (2011) Voluntary nonfinancial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting. Account Rev 86:59–100

Diamond DW, Verrecchia RE (1991) Disclosure, liquidity, and the cost of capital. J Finance 46:1325–1359
Dickinson V (2011) Cash flow patterns as a proxy for firm life cycle. Account Rev 86:1969–1995
Djankov S, La Porta R, Lopez-de-Silanes F, Shleifer A (2008) The law and economics of self-dealing. J Finance Econ 88:430–465
Doh JP, Guay TR (2006) Corporate social responsibility, public policy, and NGO activism in Europe and the United States: an institutional-stakeholder perspective. J Manage Stud 43:47–73
Dumontier P, Raffournier B (2002) Accounting and capital markets: a survey of the European evidence. Eur Account Rev 11:119–151
Durbin J (1954) Errors in variables. Rev Inst Int Stat 22:23–32
Eccles RG, Ioannou I, Serafeim G (2014) The impact of corporate sustainability on organizational processes and performance. Manag Sci 60:2835–2857
El Ghoul S, Guedhami O, Kwok CCY, Mishra DR (2011) Does corporate social responsibility affect the cost of capital? J Bank Finance 35:2388–2406
Elkington J (1999) Cannibals with forks: the triple bottom line of twenty-first century business. Capstone, Oxford
Elsayed K, Paton D (2009) The impact of financial performance on environmental policy: does firm life cycle matter? Bus Strategy Environ 18:397–413
Fama EF (1970) Efficient capital markets: a review of theory and empirical work. J Finance 25:383–417
Fama EF (1991) Efficient capial markets: II. J Finance 46:1575–1617
Fieseler C (2011) On the corporate social responsibility perceptions of equity analysts. Bus Ethics Eur Rev 20:131–147
Freeman RE (1984) Strategic management: a stakeholder approach. Pitman, Boston
Freeman RE, Harrison JS, Wicks AC, Parmar BL, de Colle S (2010) Stakeholder theory—the state of the art. Cambridge University Press, Cambridge
Friedman M (1970) The social responsibility of business is to increase its profits. In: The New York Times Magazine September 13th, 1970, p. 33
Garcia-Castro R, Ariño M, Canela M (2010) Does social performance really lead to financial performance? Accounting for endogeneity. J Bus Ethics 92:107–126
Goss A, Roberts GS (2011) The impact of corporate social responsibility on the cost of bank loans. J Bank Finance 35:1794–1810
Graham JR, Harvey CR, Rajgopal S (2005) The economic implications of corporate financial reporting. J Account Econ 40:3–73
Gray R (2006) Social, environmental and sustainability reporting and organisational value creation? Whose value? Whose creation? Account Audit Account J 19:793–819
Greene WH (2012) Econometric analysis, 7th edn. Prentice Hall, Boston
Guo S, Fraser MW (2015) Propensity score analysis: statistical methods and applications, 2nd edn. Sage, Los Angeles, CA
Hall PA, Gingerich DW (2004) Varieties of capitalism and institutional complementarities in the political economy: an empirical analysis. MPIfG Discussion Paper 04/5. Cologne, Germany
Hall PA, Gingerich DW (2009) Varieties of capitalism and institutional complementarities in the political economy: an empirical analysis. Brit J Polit Sci 39:449–482
Hartman LP, Rubin RS, Dhanda KK (2007) The communication of corporate social responsibility: United States and European Union multinational corporations. J Bus Ethics 74:373–389
Hausman JA (1978) Specification tests in econometrics. Econometrica 46:1251–1271
Healy PM, Palepu KG (2001) Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. J Account Econ 31:405–440
Heckman J (1974) Shadow prices, market wages, and labor supply. Econometrica 42:679–694
Heckman J (1978) Dummy endogenous variables in a simultaneous equation system. Econometrica 46:931–959
Hong H, Kacperczyk M (2009) The price of sin: the effects of social norms on markets. J Finance Econ 93:15–36
Hüttenbrink A, Oehmichen J, Rapp MS, Wolff M (2014) Pay-for-performance—Does one size fit all? A multi-country study of Europe and the United States. Int Bus Rev 23:1179–1192
Ioannou I, Serafeim G (2010) The impact of corporate social responsibility on investment recommendations. Acad Manag Proc 2010:1–6
Ioannou I, Serafeim G (2012) What drives corporate social performance? The role of nation-level institutions. J Int Bus Stud 43:834–864

Jackson G, Apostolakou A (2010) Corporate social responsibility in Western Europe: an institutional mirror or substitute? J Bus Ethics 94:371–394
Jensen MC, Meckling WH (1976) Theory of the firm: managerial behavior, agency costs and ownership structure. J Finance Econ 3:305–360
Jo H, Harjoto M (2011) Corporate governance and firm value: the impact of corporate social responsibility. J Bus Ethics 103:351–383
Jo H, Harjoto M (2012) The causal effect of corporate governance on corporate social responsibility. J Bus Ethics 106:53–72
Kaufmann D, Kraay A, Mastruzzi M (2009) Governance matters VIII: aggregate and individual governance indicators 1996–2008. Policy Research Working Paper. The World-Bank, Washington, DC
Khan M, Watts RL (2009) Estimation and empirical properties of a firm-year measure of accounting conservatism. J Account Econ 48:132–150
Khanna T, Palepu KG (2006) Emerging giants. Harv Bus Rev 84:60–69
Kravet TD (2014) Accounting conservatism and managerial risk-taking: corporate acquisitions. J Account Econ 57:218–240
La Porta R, Lopez de Silanes F, Shleifer A, Vishny RW (1998) Law and finance. J Polit Econ 106:1113–1155
La Porta R, Lopez-de-Silanes F, Shleifer A (1999) Corporate ownership around the world. J Finance 54:471–517
La Porta R, Lopez-De-Silanes F, Shleifer A (2006) What works in securities laws? J Finance 61:1–32
La Porta R, Lopez de Silanes F, Shleifer A (2008) The economic consequences of legal origins. J Econ Lit 46:285–332
Larcker DF, Rusticus TO (2010) On the use of instrumental variables in accounting research. J Account Econ 49:186–205
Lee DD, Faff RW, Langfield-Smith K (2009) Revisiting the vexing question: does superior corporate social performance lead to improved financial performance? Aust J Manag 34:21–49
Lennox CS, Francis JR, Wang Z (2012) Selection models in accounting research. Account Rev 87:589–616
Leuz C, Verrecchia RE (2000) The economic consequences of increased disclosure. J Account Res 38:91–124
Leuz C, Lins KV, Warnock FE (2009) Do foreigners invest less in poorly governed firms? Rev Finance Stud 22:3245–3285
Levine R (2002) Bank-based or market-based financial systems: which is better? J Finance Intermed 11:398–428
Li D, Moshirian F, Pham PK, Zein J (2006) When financial institutions are large shareholders: the role of macro corporate governance environments. J Finance 61:2975–3007
Lopatta K, Buchholz F, Kaspereit T (2015) Asymmetric information and corporate social responsibility. Bus Soc (forthcoming)
Lourenço IC, Branco MC (2013) Determinants of corporate sustainability performance in emerging markets: the Brazilian case. J Clean Prod 57:134–141
Low A (2009) Managerial risk-taking behavior and equity-based compensation. J Finance Econ 92:470–490
Maddala GS (1991) A perspective on the use of limited-dependent and qualitative variables models in accounting research. Account Rev 66:788–807
Margolis JD, Elfenbein HA, Walsh JP (2009) Does it Pay to Be Good…And Does it Matter? A meta-analysis of the relationship between corporate social and financial performance. Working Paper. Harvard University, Washington University in St. Louis, University of Michigan. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1866371. Accessed 02 Feb 2015
Matten D, Moon J (2008) "Implicit" and "Explicit" CSR: a conceptual framework for a comparative understanding of corporate social responsibility. Acad Manag Rev 33:404–424
McWilliams A, Siegel DS, Wright PM (2006a) Corporate social responsibility: international perspectives. J Bus Strategy 23:1–12
McWilliams A, Siegel DS, Wright PM (2006b) Corporate Social responsibility: strategic implications. J Manag Stud 43:1–18
Merton RC (1987) A simple model of capital market equilibrium with incomplete information. J Finance 42:483–510

Myers SC, Majluf NS (1984) Corporate financing and investment decisions when firms have information that investors do not have. J Finance Econ 13:187–221
Nelling E, Webb E (2009) Corporate social responsibility and financial performance: the “virtuous circle” revisited. Rev Quant Finance Account 32:197–209
Oikonomou I, Brooks C, Pavelin S (2012) The impact of corporate social performance on financial risk and utility: a longitudinal analysis. Finance Manag 41:483–515
Orlitzky M, Schmidt FL, Rynes SL (2003) Corporate social and financial performance: a meta-analysis. Organ Stud 24:403–441
Patten DM (2002) The relation between environmental performance and environmental disclosure: a research note. Account Organ Soc 27:763–773
Petersen MA (2009) Estimating standard errors in finance panel data sets: comparing approaches. Rev Finance Stud 22:435–480
Puhani PA (2000) The Heckman correction for sample selection and its critique. J Econ Surv 14:53
Rapp MS, Schellong D, Schmidt M, Wolff M (2011) Considering the shareholder perspective: value-based management systems and stock market performance. Rev Manag Sci 5:171–194
Rappaport A (1986) Creating shareholder value: the new standard for business performance. Free Press/Macmillan, New York
Reuters T (2012) Thomson reuters datastream Asset 4 ESG content. http://thomsonreuters.com/products/financial-risk/content/07_008/datastream-esg-content-fact-sheet.pdf. Accessed 18 Aug 2014
Russo MV, Fouts PA (1997) A resource-based perspective on corporate environmental performance and profitability. Acad Manag J 40:534–559
Sargan JD (1958) The estimation of economic relationships using instrumental variables. Econometrica 26:393–415
Sauset J, Waller P, Wolff M (2015) CEO contract design regulation and risk-taking. Eur Account Rev (forthcoming)
Shen C-H, Chang Y (2009) Ambition versus conscience, Does corporate social responsibility pay off? The application of matching methods. J Bus Ethics 88:133–153
Steurer R (2010) The role of governments in corporate social responsibility: characterising public policies on CSR in Europe. Policy Sci 43:49–72
Surroca J, Tribó JA (2005) The corporate social and financial performance relationship: What’s the ultimate determinant? Acad Manag Proc 51:1–9
Surroca J, Tribó JA, Waddock S (2010) Corporate responsibility and financial performance: the role of intangible resources. Strategy Manag J 31:463–490
Tang Z, Hull CE, Rothenberg S (2012) How corporate social responsibility engagement strategy moderates the CSR-financial performance relationship. J Manag Stud 49:1274–1303
Tschopp DJ (2005) Corporate social responsibility: a comparison between the United States and the European Union. Corp Soc Responsib Environ Manag 12:55–59
Tucker JW (2010) Selection bias and econometric remedies in accounting and finance research. J Account Lit 29:31–57
Tzavara D (2009) Can the threat of costly litigation be incentive enough for companies to engage in CSR? EUI Working Paper RSCAS 2009/23. http://cadmus.eui.eu/bitstream/handle/1814/11453/RSCAS_2009_23.pdf?sequence=1. Accessed 15 Aug 2014
van Beurden P, Gössling T (2008) The worth of values—a literature review on the relation between corporate social and financial performance. J Bus Ethics 82:407–424
Verrecchia RE (2001) Essays on disclosure. J Account Econ 32:97–180
Waddock SA, Graves SB (1997) The corporate social performance—financial performance link. Strategy Manag J 18:303–319
White H (1980) A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 48:817–838
Wooldridge J (2013) Introductory econometrics: a modern approach, 5th edn. South-Western Cengage Learning, Mason, OH
Wu D-M (1974) Alternative tests of independence between stochastic regressors and disturbances: finite sample results. Econometrica 42:529–546
Wu M-L (2006) Corporate social performance, corporate financial performance, and firm size: a meta-analysis. J Am Acad Bus 8:163–171
Wu M-W, Shen C-H (2013) Corporate social responsibility in the banking industry: motives and financial performance. J Bank Finance 37:3529–3547