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# The Value Relevance of Reputation for Sustainability Leadership

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**Abstract** This study investigates whether the market valuation of the two summary accounting measures, book value of equity and net income, is higher for firms with reputation for sustainability leadership, when compared to firms that do not enjoy such reputation. The results are interpreted through the lens of a framework combining signalling theory and resource-based theory, according to which firms signal their commitment to sustainability to influence the external perception of reputation. A firm's reputation for being committed to sustainability is an intangible resource that can increase the value of a firm's expected cash flows and/or reduce the variability of its cash flows. Our findings are according to expectations and show that the net income of firms with good sustainability reputation has a higher valuation by the market, when compared to their counterparts.

**Keywords** Corporate sustainability · Reputation · Value relevance

## Introduction

Evidence on the increasing importance of corporate sustainability (CS) and the reporting thereof abounds. For example, a recent report from the United Nations Global Compact and Accenture (Lacy et al. 2010) shows that 93 % of the 766 CEOs from all over the world who participated in the study consider sustainability an “important” or “very important” factor for their organisations' success. Moreover, 81 % stated that sustainability issues are now fully embedded into the strategy and operations of their organisation.

Engagement in activities promoting sustainable development is increasingly analysed as a source of competitive advantage for the firm (Porter and Kramer 2006). Rather than being seen as a cost, CS is perceived as a valuable resource which can be used to improve the future performance of the firm. Some previous literature provides evidence on a positive relation between reputation for good sustainability and financial performance (e.g. Cheung 2011; Consolandi et al. 2009; Lo and Sheu 2007; Robinson et al. 2011; Wagner 2010).

This study analyses whether this resource is value relevant for investors. More specifically, we analyse the value relevance of the traditional summary accounting measures, such as book value of equity and net income, of firms with good reputation for sustainability, when compared to firms without such reputation. Reputation for sustainability leadership is proxied by membership to the Dow Jones Sustainability Index (DJSI). An increasing number of studies on sustainability issues use DJSI as a proxy for good reputation for sustainability (Cheung 2011; Consolandi et al. 2009; Lo and Sheu 2007; López et al. 2007; Lourenço et al. 2012; Robinson et al. 2011; Ziegler and Schröder 2010).

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The empirical analysis relies on the largest US 600 firms in the Dow Jones Global Total Stock Market Index with data available for the 3-year period 2008–2010. These firms are classified into two groups, depending on whether they are included or not in the DJSI US every year for the 3 years sample. We aim to investigate whether the market valuation of book value and net income is higher for firms with a reputation for sustainability leadership, when compared to firms without such reputation.

We started by estimating a regression model which associates the market value of equity with the firm's book value and net income, but allowing the coefficients of these two variables to vary according to whether the firm has reputation for leadership in sustainability. In addition, and considering that managers do not choose randomly which type of strategy to develop in terms of sustainability, but rather on the basis of firm's characteristics, we control for self-selection bias by implementing the two-stage switching regression procedure suggested by Heckman (1976, 1979) and Lee (1976, 1978).

Our results show that the net income of firms with reputation for sustainability leadership has a higher valuation by the market, when compared to firms without such reputation. The results are interpreted through a lens of analysis combining signalling theory with resource-based theory (RBT), according to which company's signal sustainability leadership mainly to influence the external perception of reputation. A firm's reputation for being committed to sustainability is an intangible resource that can increase the value of a firm's expected cash flows and/or reduce the variability of its cash flows (Robinson et al. 2011).

This study contributes to the literature by bringing additional evidence on the value relevance of non-financial information. Some previous studies have already found a significant relation between the market value of equity and non-financial information, like network advantages (Rajgopal et al. 2003), environmental performance (Hassel et al. 2005), eco-efficiency (Sinkin et al. 2008), technological conditions (Matolcsy and Wyatt 2008), social or environmental reporting (Berthelot et al. 2012; Schadewitz and Niskala 2010) or social or environmental performance (Lourenço et al. 2012; Semenova et al. 2010). We extend these conclusions to the issue of reputation for sustainability leadership.

The remainder of the paper is organised as follows. “[Background and Related Literature](#)” section analyses the concept of CS and reviews the related literature on the value relevance of non-financial information, in particular pertaining to CS issues. “[Theory and Hypothesis](#)” section explains the theoretical lens of analysis and the main hypothesis of the study. The fourth section describes the research design and the fifth section analyses the empirical results. Finally, the sixth section presents the summary and concluding remarks.

## Background and Related Literature

Engagement in activities leading to sustainable development, that is CS, has emerged as an important dimension of corporate voluntary practice. CS may be defined as “meeting the needs of a company's direct and indirect stakeholders (employees, clients, pressure groups, communities, etc.), without compromising its ability to meet the needs of future stakeholders as well.” (Dyllick and Hockerts 2002, p. 131) The notion of CS is nowadays related to issues such as protecting the environment, fighting against poverty, countering corruption, promoting human rights, ensuring health and safety at work.

The arguments that for some time have been presented for CS arise, at least in part, from the idea that the objective of business is to maximise shareholder wealth and that a firm should engage in socially responsible activities only if it allows value to be created (McWilliams et al. 2006; Siegel 2009). For its engagement with CS to be a source of value creation, a company needs to disclose information on its sustainability performance. Corporate communication of sustainability performance is nowadays primarily made through sustainability reports (KPMG 2011). Sustainability indices, such as the DJSI or the FTSE4Good, have been developed with the aim of providing investors with further insight into CSP (Searcy and Elkhawas 2012). Since it reflects endorsement of a firm's sustainability practices by a highly respected outside organisation, listing on said indices is deemed a major accomplishment for a firm (Robinson et al. 2011, 497).

Research on value relevance has a long history (Beaver 2002). An accounting value is defined as value-relevant if it is significantly related to the dependent variable (ibid.). Most applications of value relevance have focused on accounting variables (Carnevale et al. 2012). However, the reported gap between the market value of firm's shares and their book value has led many researchers to explore the value relevance of non-financial information, generally concluding that accounting information alone has only a limited ability to explain a firm's market value and its variations (ibid.).

Some previous studies have already found a significant relation between the market value of equity and non-financial information. Examples not related to CS are the cases of network advantages (Rajgopal et al. 2003) and technological conditions (Matolcsy and Wyatt 2008). Rajgopal et al. (2003) provide evidence that network advantages are important intangible assets that are valued by the market, in spite of not being recognised in financial statements. Matolcsy and Wyatt (2008) examine the association between market value and a different information source, technological innovation, and provide evidence that the

interactions of current earnings with technology conditions are associated with market value.

In the literature related to CS, the majority of studies applying value relevance pertain to environmental performance, either disclosed by the firm itself or by an external party (Al-Tuwaijri et al. 2004; Barth and McNichols 1994; Clarkson et al. 2004; Cormier et al. 1993; Cormier and Magnan 1997, 2007; Hassel et al. 2005; Hughes 2000; Johnston et al. 2008; Moneva and Cuellar 2009; Sinkin et al. 2008). Hussainey and Salama (2010) examined how corporate environmental reputation affects the association between current annual stock returns and current and future annual earnings. Chapple et al. (2011) investigate the impact of the proposal for the introduction of a national Emissions Trading Scheme by the Australian Government on the market valuation of Australian Securities Exchange firms, hypothesising a negative relation between a firm's value and its carbon intensity profile. Studies analysing whether investors assign value relevance to CS in its various dimensions (Lourenço et al. 2012; Semenova et al. 2010) or the reporting thereof (Berthelot et al. 2012; Carnevale et al. 2012; Schadewitz and Niskala 2010) are fewer and more recent.

The general conclusion that emerges from studies made in a predominantly North American context or a European context similar to the North American (such as the UK) is that non-financial information related to CS issues is value relevant (Al-Tuwaijri et al. 2004; Barth and McNichols 1994; Berthelot et al. 2012; Chapple et al. 2011; Clarkson et al. 2004; Cormier et al. 1993; Cormier and Magnan 1997; Hughes 2000; Hussainey and Salama 2010; Johnston et al. 2008; Lourenço et al. 2012; Sinkin et al. 2008). On the contrary, mixed evidence is reported by studies conducted in different institutional settings, such as a Continental European context, with only a few studies finding that non-financial information related to CS is value relevant (Schadewitz and Niskala 2010; Semenova et al. 2010), whereas the remaining studies do not corroborate such findings (Cormier and Magnan 2007; Moneva and Cuellar 2009; Hassel et al. 2005; Carnevale et al. 2012).

## Theory and Hypothesis

There are a number of reasons underlying the belief that firms with good corporate sustainability performance (CSP) will perform better financially than their counterparts (Branco and Rodrigues 2006; Chatterji et al. 2009; Dhaliwal et al. 2011; Fairchild 2008; Lyon and Maxwell 2008): CS can benefit companies by attracting socially consumers who care about sustainable development issues; CS can contribute to reducing the threat of government regulation; CS may appease concerns from activists and non-governmental

organisations; socially responsible investors may be willing to pay a premium for the securities of firms engaging in CS; CS can lead to material efficiency and energy and waste minimisation. Dhaliwal et al. (2011) argue that arguments such as these highlight the importance of information on CSP in reducing information asymmetry and uncertainty related to factors affecting firm value.

Sustainability indices serve as sort of informational intermediaries, which are viewed as objective, professional benchmarks assessed by "neutral parties", between companies and their stakeholder groups by evaluating the sustainability information they report (Robinson et al. 2011). The importance of the information conveyed by sustainability indices pertains to its role in the context of information asymmetry between a company's managers and its stakeholders. Given that it is fundamentally concerned with understanding behaviour in contexts characterised by information asymmetry, signalling theory is of assistance to our endeavour.

Signalling theory can be traced back to the works of Akerlof (1970) and Spence (1973), who received, with Joseph Stiglitz, the 2001 Nobel Prize in Economics for their work in information economics. When applied to situations of information asymmetry between a company's insiders and outsiders, the basic premise of signalling theory is that the managers of a high-quality firm want to signal the firm's value to its stakeholders (Magness 2009).

Signalling theory is useful in the understanding of the importance of information on the CSP of a company to investors, both in the case of information disclosed by the firm itself (Hasseldine et al. 2005; Magness 2009; Toms 2002) and in the case of information provided by external parties (Hussainey and Salama 2010). Following signalling theory, companies are considered to engage in sustainability reporting and, more importantly for our purposes, in processes leading to the institutional endorsement of CSP, as a way to signal their reputation to stakeholders. A firm's reputation signals value-relevant information to investors about how the firm's organisational effectiveness compares to that of competing firms (Hussainey and Salama 2010). Information on CSP helps resolve investor uncertainty and influences the share price response (Ramchander et al. 2012).

As Ramchander et al. (2012, p. 305) contend, "while imperfect information lies at the heart of examining the impact on share prices", the RBT "provides a meaningful framework for predicting the direction of the response". There is a wealth of literature analysing firms' engagement in CS activities through the lens of the RBT (Branco and Rodrigues 2006; Clarkson et al. 2011; Hussainey and Salama 2010; McWilliams et al. 2006; Siegel 2009; Surroca et al. 2010). The RBT suggest that companies generate sustainable competitive advantages by effectively controlling and manipulating resources and capabilities that are

valuable, rare, cannot be perfectly imitated, and for which no perfect substitute is available (Barney et al. 2011).

According to RBT, differences in a firm's endowment of resources, especially intangibles, lead to differences in firm performance, given that such resources are difficult to acquire or develop, to replicate and accumulate, and to be imitated by competitors (Surroca et al. 2010). Human capital and reputation are considered to be among the resources of greatest strategic importance (ibid.). CS can be demonstrated to have positive effects on employees' motivation and morale, as well as on their commitment and loyalty to the company (Brammer et al. 2007). In addition to productivity benefits, companies also save on costs for recruitment and training of new employees (Vitaliano 2010).

Corporate reputation has been identified as one of the most important intangible resources that provide a firm sustainable competitive advantage (Roberts and Dowling 2002). Among the main benefits of CS are those related to its effect on corporate reputation (Branco and Rodrigues 2006; Hussainey, and Salama 2010; Orlitzky et al. 2003; Orlitzky 2008). Companies with a good sustainability reputation are able to improve relations with external agents such as customers, investors, bankers, suppliers and competitors. Summarising the intangible benefits related to reputation for CS, Schnietz and Epstein (2005, p. 329) suggest that such reputation "may facilitate complex, long-term stakeholder management which, in turn, ought to enhance a firm's ability to outperform against its competitors, either by increasing revenues or reducing costs." Not only reputation allows stakeholders with imperfect information about a firm's product quality or commitment to CS to assess the firm's ability to create value, as well as it serves as a signal of the difficulty to imitate firm's past interactions with stakeholders, and can create value by way of enhancements in the capacity to attract, recruit, motivate, and retain fundamental stakeholders, such as investors, employees, customers and suppliers (ibid.).

Companies with good CS reputation will see the cost of contracts (implicit and explicit) with governments, suppliers, community representatives and other stakeholders reduced (Liston-Heyes and Ceton 2009). Thus, they invest heavily in building and signalling a reputation for good corporate behaviour to convince investors and other stakeholders. Applying for a "best in class" index such as the DJSI is likely to be an effective way to signal sustainability leadership in a credible manner (Robinson et al. 2011). Besides benefiting from the growing demand for sustainability-related investments, companies included in indices such as the DJSI gain the reputation of being an industry leader in strategic areas covering economic, environmental and social dimensions (Lo and Sheu 2007, p. 348).

However, the potential benefit of being listed on the DJSI depends on how it affects value (Robinson et al. 2011). Traditional financial information is considered to suffer from lack of timeliness, partial inaccuracy, and limited ability to convey prospective data and risks facing the firm (García-Meca and Martínez 2007). The knowledge-based economies that nowadays predominate and in which companies' competitiveness depends mainly of knowledge-based resources calls for recognition of intangible resources usually not included in corporate financial statements. A growing body of literature suggests that the value relevance of traditional financial information has decreased over recent decades, mainly as a consequence of the increasing importance of unreported intangible resources in the value creation process. In this context, investors are increasingly aware of the importance of company information that is not directly reflected in financial statements (ibid.).

The reputation for leadership in CS leads to lower economic uncertainty, more predictable earnings, and lower risk for investors. Such reputation makes firms more attractive to investors. It is associated with better market's ability to anticipate future earnings change (Hussainey and Salama 2010) and can increase the value of a firm's expected cash flows and/or reduce the variability of its cash flows (Robinson et al. 2011). It has an important influence on a firm's value through its effect on the risk of a firm, including regulatory, litigation, reputational, supply chain, product and technology, and physical risk (Starks 2009). In this study, we explore the relationship between reputation for sustainability leadership and market valuation. Our aim is to understand whether investors attribute a significant value to the information contained in institutional endorsement of CSP.

There is evidence that nowadays CS strategies implemented by firms in the U.S. are perceived to be value-creating by investment analysts, which translates into a positive impact on investment recommendations (Ioannou and Serafeim 2010). There is also evidence that investors from around the world, as represented by financial analysts, appear to use CS disclosure in forecasting future financial performance of firms (Dhaliwal et al. 2012). CS information is increasingly used by investors as a proxy for management quality and the potential for management to grow the value of the business (Eccles et al. 2011). Investors perceive good CSP as a signal of increased capacity to capture revenue-generating opportunities, obtain cost savings, and minimise the detrimental effects of failures, fines, and lawsuits (ibid.).

Based on the above discussion, we expect that the market valuation of book value and net income will be higher for firms with reputation for sustainability leadership, when compared to firms without such reputation. The underlying argument is that, in view of the information on

the firm's endowment of intangible resources leading to sustainable competitive advantages and on management quality and its potential to grow the value of the business offered by reputation for leadership in CS, it has information content for investors and they consider it when valuing securities. Investors will be likely to infer that because of its sustainability leadership reputation, a firm will have intangible resources and capabilities which will enhance its value.

## Research Design

### Sample and Data

The empirical analysis relies on the largest US 600 firms in the Dow Jones Global Total Stock Market Index (DJGTSM) at the end of 2010. We started by looking for all the firms with data available every year for the three year period 2008–2010. We exclude firms with negative book value at least in one of the 3 years.

Secondly, we classified the firms into two groups, firms enjoying reputation for sustainability leadership and firms without such reputation. The firms with said reputation are those included in the Dow Jones Sustainability United States Index (DJSI US) every year for the 3 years sample. The firms without this reputation are those who have never been included in the DJSI US during the entire sample period, thereby representing an on-going lack of investment in CSP. Firms which are persistently included in the DJSI US have a more substantial financial and strategic investment in CSP than firms that are only occasionally included (Artiach et al. 2010). The latest were thus excluded from the sample.

The DJSI US is a subset of the DJSI North America, which consist of the top 20 % of the 600 largest firms from Canada and the United States in the DJGTSM that lead the field in terms of sustainability (DJSI guidebook 2010).<sup>1</sup> The firm's sustainability is evaluated by the Sustainable Asset Management Group. The integrity of the DJSI as a proxy for CSP is highlighted by some authors, who recommend the SAM Group research as the best practice in CS research (Artiach et al. 2010). An increasing number of studies on the relation between CSP and firm performance use DJSI as a proxy for CSP (Cheung 2011; Consolandi et al. 2009; Lo and Sheu 2007; López et al. 2007; Lourenço et al. 2012; Robinson et al. 2011; Ziegler and Schröder 2010).

Nonetheless, the DJSI has a number of weaknesses that limit its usefulness in that capacity. First, the DJSI process favours large companies, which gives rise to the suspicion

that these companies may not represent the industry leaders in terms of CSP (Fowler and Hope 2007). Second, the emphasis on economic factors to the detriment of either social or environmental factors is difficult to reconcile with the definition of sustainable development (ibid.). Third, the considerable reliance on internal and external reporting documents provided by the own company suggests that belonging to the DJSI may be influenced more by what companies disclose than by actual performance (Cho et al. 2012).

In spite of the clear under-emphasis on environmental factors, DJSI membership has been associated with perceptions of environmental reputation (Cho et al. 2012). Cho et al. (2012) argue for the plausibility of perceiving inclusion in the DJSI as a measure of superior environmental standing leading to a higher environmental reputation and found it to influence positively perceptions of corporate reputation. Although it has some noteworthy insufficiencies, DJSI membership is clearly associated with sustainability reputation (Robinson et al. 2011).

The value relevance accounting summary measures of firms with good sustainability reputation is analysed in comparison with that of their counterparts. In order to guarantee the homogeneity of the sample, the latter firms represent the same sub-sectors as the former firms, considering the Industry Classification Benchmark (ICB) used by the Sustainable Asset Management Group in the DJSI sector classification. Therefore, firms representing ICB sub-sectors where no good sustainability reputation is assigned were excluded from the sample.

The accounting and the market data used in the empirical analysis was collected from the Thomson Worldscope Database. To ensure that regression results are not influenced by outlying observations, the top and bottom 1 % of each continuous variable distribution and also the observations with absolute studentized residual above 3 have been eliminated. Thus, the final sample is composed of 814 firm-year observations, comprising 91 firm-year observations for the firms with sustainability leadership reputation and 723 firm-year observations for the firms without said reputation.

Table 1 presents the sample distribution across industries, considering the ICB classification. When all the firms are considered together, the Technology industry is the most dominant with 40 %, followed by the Health Care, Industrial and Consumer Goods with 19, 13 and 12 %, respectively. As expected, the no good sustainability reputation predominates in all industries.

### Research Method

Following prior literature on the value relevance of accounting numbers, we support our analysis on a regression

<sup>1</sup> The DJSI Guidebook is available at <http://www.sustainability-index.com>.

**Table 1** Sample composition by industry

Industry	Firms with reputation for sustainability leadership		Firms without reputation for sustainability leadership		All firms	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Oil and gas	5	6	51	7	56	7
Basic materials	6	7	12	2	18	2
Industrials	13	14	96	13	109	13
Consumer goods	12	12	39	5	51	6
Health care	18	20	138	19	156	19
Consumer services	12	13	87	12	99	12
Technology	25	27	300	42	325	40
	91	100	723	100	814	100

Firms with reputation for sustainability leadership are those included in the DJSI US every year in the sample period 2008–2010; firms without reputation for sustainability leadership are those never included in the DJSI US during the sample period 2008–2010. Industry classification is based on the Industry Classification Benchmark (ICB)

based on the association between the firms’ market capitalisation and two summary measures of information reflected in the financial statements, namely the book value of equity and net income, given by the Eq. (1).

$$MV_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 NI_{it} + \varepsilon_{it} \tag{1}$$

where *MV* is the market value of equity,<sup>2</sup> *BV* represents the book value of equity and *NI* is the net operating income. All the variables are on a per share basis.

In order to investigate whether the market valuation of book value and net income is higher for firms with reputation for sustainability leadership, when compared to their counterparts, we use a new estimating equation, Eq. (2), which allows the coefficients of the variables *BV* and *NI* to vary according to whether the firm has good sustainability reputation or not and is given by

$$MV_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 NI_{it} + \alpha_3 DJSI + \alpha_4 DJSI \times BV_{it} + \alpha_5 DJSI \times NI_{it} + \varepsilon_{it}, \tag{2}$$

where the *DJSI* is a dummy variable which assumes the value 1 if the firm is included in the DJSI US every year in the sample period, and 0 if the firm had never been included in the DJSI US during the entire sample period.

The Eq. (2) is estimated with industry and year fixed effects. Following prior literature, some variables are used in this study to control for firm’s size, leverage and

profitability, which gives rise to three additional variables, *SIZE* (natural logarithm of total assets as of the end of the year), *ROE* (return on equity) and *LEV* (end-of-year total debt divided by end-of-year total assets).

Our predictions are as follows. If the market values the summary accounting measures differently for the firms with sustainability leadership reputation when compared to the ones without it, then the estimates for the coefficients of the interaction term of *DJSI* with *BV* and with *NI* should be statistically significant. If the market valuation of book value (net income) is higher for the firms with good reputation, when compared to firms without it, then we expect that  $\alpha_4 > 0$  ( $\alpha_5 > 0$ ).

Considering that firms are not randomly assigned to the two samples of firms with and without reputation for sustainability leadership, it is still possible that our results will be affected by the self-selection bias (see Shebata 1991). To control for these effects, we implement the two-stage regression procedure suggested by Heckman (1979).

## Results

### Descriptive Statistics and Correlations

Table 2 presents the descriptive statistics for the entire sample as well as for the sub-samples of 91 firms with reputation for sustainability leadership and 723 firms without it. When comparing the two sub-groups of firms, we find that for all the variables means and medians are higher for the group of the former firms. Untabulated results for the equality of means parametric *t* test show that the mean values are statistically different for all the variables. These findings are consistent with those of Artiach et al. (2010) in their study on the determinants of CSP. They found that leading CSP firms are significantly larger and have a higher return on equity than non-leading CSP firms.

Table 3 shows correlations for the continuous variables included in the regression equations (due to its discrete nature and limited range, we did not include dummy variables in the Pearson correlation analysis). Consistent with established results in the accounting literature, the market value of equity is positively and statistically related with *BV* and *NI*. Not surprisingly, the market value is also significantly associated with *SIZE*, *ROE* and *LEV*. The independent continuous variables included in the regressions, while showing some indications of collinearity, have no pairwise correlation coefficients in excess of 0.80, indicating that the threat of multicollinearity is limited.<sup>3</sup>

<sup>2</sup> We use the market value of equity as of fiscal year-end. However, untabulated findings reveal that our inferences are not sensitive to using prices as of fiscal year-end or as of 3 months after fiscal year-end.

<sup>3</sup> As a rule of thumb, correlation between explanatory variables in excess of 0.8 suggests that multicollinearity is a serious problem (Gujarati 1995).

**Table 2** Descriptive statistics

	Mean	Median	SD	Min	Max
All firms ( <i>n</i> = 814)					
MV	30.299	26.910	17.726	2.840	95.470
BV	12.551	10.779	7.593	1.682	42.521
NI	1.509	1.378	1.588	-5.094	6.666
SIZE	14.654	14.446	1.367	12.397	18.843
ROE	0.116	0.128	0.164	-1.089	0.628
LEV	0.117	0.099	0.115	0.000	0.475
DJSI firms ( <i>n</i> = 91)					
MV	42.812	42.330	20.973	9.5000	95.470
BV	13.776	13.527	7.402	2.197	40.962
NI	2.598	2.512	1.455	-0.506	5.738
SIZE	16.970	16.977	0.943	14.646	18.843
ROE	0.212	0.195	0.121	-0.043	0.628
LEV	0.176	0.167	0.112	0.000	0.388
Non_DJSI firms ( <i>n</i> = 723)					
MV	28.724	26.500	16.636	2.840	91.770
BV	12.397	10.644	7.607	1.682	42.521
NI	1.372	1.268	1.551	-5.094	6.666
SIZE	14.362	14.273	1.109	12.397	17.945
ROE	0.104	0.116	0.165	-1.089	0.547
LEV	0.109	0.088	0.113	0.000	0.475

DJSI firms are those included in the DJSI US every year in the sample period 2008–2010, *Non\_DJSI* firms are those never included in the DJSI US during the sample period 2008–2010, *MV* market price at the fiscal year-end, *BV* book value of equity as of the end of the year, *NI* net income of the year, *SIZE* natural logarithm of total assets as of the end of the year, *ROE* return on equity, *LEV* end-of-year total debt divided by end-of-year total assets

Regression Results

Table 4 presents regression statistics resulting from the OLS estimation of Eq. (2). The regression in column C1 includes all the covariates, while in column C2 the three control variables have been dropped from the analysis. The coefficients estimates for the accounting summary measures are statistically significant and they have the expected sign, i.e. the *BV* and *NI* coefficients estimates are both positive (0.639 and 5.485, respectively).

The findings in Table 4 indicate that the market values differently the net income of firms with sustainability reputation when compared to firms without it. When we permit the coefficients of *BV* and *NI* to depend on the type of firm in terms of reputation for sustainability, the results indicate that the coefficient estimate for the interaction term of *DJSI* with *NI* is positive and statistically significant (coefficient: 2.884; *p* value < 0.01), which means that in average the net income of firms with reputation for sustainability leadership has a higher valuation by the market (per a unit change on *NI*, the expected variation on price is

**Table 3** Correlation matrix for the continuous variables

	MV	BV	NI	SIZE	ROE
MV	1	–	–	–	–
BV	0.580***	1	–	–	–
NI	0.694***	0.504***	1	–	–
SIZE	0.371***	0.342***	0.425***	1	–
ROE	0.369***	0.041	0.706***	0.273***	1
LEV	0.260***	0.119***	0.211***	0.345***	0.089**

*MV* market price at the fiscal year-end, *BV* book value of equity as of the end of the year, *NI* net income of the year, *SIZE* natural logarithm of total assets as of the end of the year, *ROE* return on equity, *LEV* end-of-year total debt divided by end-of-year total assets

**Table 4** OLS regression results

	C1	C2
Intercept	10.729*	12.388***
<i>BV</i>	0.639***	0.732***
<i>NI</i>	5.485***	5.297***
<i>DJSI</i>	-1.221	-4.175
<i>DJSI</i> × <i>BV</i>	0.032	0.055
<i>DJSI</i> × <i>NI</i>	2.884***	3.850***
<i>SIZE</i>	-0.484	
<i>ROE</i>	-3.443	
<i>LEV</i>	10.952***	
Adjusted <i>R</i> <sup>2</sup>	0.635	0.572
<i>F</i> value	59.639***	218.439***

OLS regression with industry and year fixed effects. Dependent variable: *MV* (market price at the fiscal year-end). Independent variables: *BV* (book value of equity at of the end of the year); *NI* (net income of the year); *DJSI* (an indicator variable that equals 1 if the firm is included in the DJSI US every year in the sample period and 0 otherwise); *SIZE* (natural logarithm of total assets at of the end of the year); *ROE* (return on equity); *LEV* (end-of-year total debt divided by end-of-year total assets)

\*\*\*, \*\* and \* indicate statistically significant at the 0.01, 0.05 and 0.10 levels, respectively

2.884 units higher when compared with the same variation on firms without said reputation net income). In terms of *BV*, as the estimated coefficient for the interaction term is not statistically significant it means that a unit variation on *BV* has the same expected variation on price, in spite of being a firm with or without good sustainability reputation.

Controlling for Self-Selection Bias

The basic value relevance analysis showed in the previous section documents that market valuation of net income is higher for firms with reputation for sustainability leadership when compared to firms without such reputation. However, an important assumption in the valuation equation is that engaging in a strategy of sustainability and

therefore to be firms with good sustainability reputation does not represent a choice for firms.

If being a firm with reputation for sustainability leadership implies a greater market valuation of the firm's net income, why do managers not engage on such strategy even further to garner greater market values for their firms? Surely, there must be costs or constraints associated with developing a strategy of sustainability. Thus, it can be expected that managers do not choose randomly which type of strategy to develop, but rather on the basis of the firm's characteristics and the comparative advantages of each alternative. Prior literature on the determinants of CSP provides empirical evidence on this issue (e.g. Artiach et al. 2010; Bansal 2005; Chih et al. 2010; Ziegler and Schröder 2010).

Considering that firms are not randomly assigned to the two samples of firms with and without reputation for sustainability leadership, a potential self-selection bias may be introduced when contrasting the way as the market value the two summary accounting measures of these two groups of firms. To control for the effects of self-selection bias, we implement the two-stage switching regression procedure suggested by Heckman (1976, 1979) and Lee (1976, 1978). This econometric procedure has also been applied in accounting research by Shebata (1991) who studied the role of self-selection bias in the analysis of economic consequences of mandatory accounting changes. The switching regression model consists of three equations and may be specified as follows:

$$DJSI_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 LEV_{it} + \alpha_3 FCF + \alpha_4 ROE_{it} + \alpha_5 PB_{it} + \varepsilon_{it} \tag{3}$$

$$MV_{1it} = \alpha_0 + \alpha_1 BV_{1it} + \alpha_2 NI_{1it} + \varepsilon_{1it} \tag{4}$$

$$MV_{2it} = \alpha_0 + \alpha_1 BV_{2it} + \alpha_2 NI_{2it} + \varepsilon_{2it} \tag{5}$$

In the first stage, the sustainability choice Eq. (3) is estimated for the total sample using the probit analysis. The variables included in Eq. (3) are those considered in the Artiach et al. (2010) study based on the stakeholder theory where it is hypothesised that CSP is positively related with firm's size, free cash flow, profitability and growth options, and negatively related to firm's leverage. The Eq. (3) is estimated exactly as in Artiach et al. (2010). Then, the estimated value is then used to generate the Mills ratio for each observation (see Shebata 1991, pp. 771–772, for details).

In the second stage, the Mills ratios are added (as explanatory variables) to Eqs. (4) and (5), which allows us to measure the association between the firms' market value of equity and the two summary measures of information reflected in the financial statements, BV and NI, separately for the firms with and without reputation for sustainability

leadership (1 and 2, respectively). We also computed the Wald test for BV and NI coefficients comparison between the Eqs. (4) and (5).

Table 5 reports the estimates of the switching regression model. The probit estimates of the sustainability choice Eq. (3) are presented in Panel A, and the OLS estimates of Eqs. (4) and (5), corrected for self-selection bias and for heteroskedasticity, are reported in Panels B and C for the firms with and without reputation for sustainability leadership, respectively. The results in Panel A indicate that the sustainability choice model has good overall explanatory power and high classification ability (94 % of the firms in the sample are correctly classified). The estimated coefficients of the variables SIZE and PB are positive and

**Table 5** Two steps switching regression results

	Coefficients
Panel A: DJSI equation	
Intercept	-17.850***
SIZE	0.995***
LEV	-0.511
FCF	-0.299
ROE	0.801
PB	0.160**
Log-likelihood = -123.356	
Cases correctly classified as leading CSP firms = 60 (91)	
Cases correctly classified as non-leading CSP firms = 704 (723)	
Panel B: MV equation (leading CSP firms)	
Intercept	8.496***
BV	0.605**
NI	9.938***
Selectivity variable	-0.556
Adjusted R <sup>2</sup> = 0.760	
Panel C: MV equation (non-leading CSP firms)	
Intercept	10.894***
BV	0.804***
NI	4.697***
Selectivity variable	4.718**
Adjusted R <sup>2</sup> = 0.610	

Panel A—Probit analysis with industry and year fixed effects. Dependent variable: *DJSI* (an indicator variable that equals 1 if the firm is included in the *DJSI* US every year in the sample period and 0 otherwise). Independent variables: *SIZE* (natural logarithm of total assets as of the end of the year); *LEV* (end-of-year total debt divided by end-of-year total assets); *FCF* (free cash flow divided by net sales); *ROE* (return on equity); *PB* (price-to-book ratio)

Panels B and C—OLS regressions corrected for self-selection bias and for heteroskedasticity. Dependent variable: *MV* (market price at the fiscal year-end). Independent variables: *BV* (book value of equity as of the end of the year); *NI* (net income of the year); selectivity variable (Mills ratio as defined in Shebata (1991))

\*\*\*, \*\* and \* indicate statistically significant at the 0.01, 0.05 and 0.10 levels, respectively

statistically significant, which is consistent with findings of Artiach et al. (2010) that leading CSP US firms are significantly larger and have higher levels of growth than non-leading CSP firms.

The results presented in Panels B and C indicate that the two groups of firms, the firms with and without reputation for sustainability leadership, are quite different in terms of the market valuation of their summary accounting measures. The estimated coefficients of the variable NI (BV) in the firms with good sustainability reputation is larger (smaller) than those in the firms without such reputation. In addition, the estimated coefficient of the selectivity variable for the firms with good sustainability reputation is positive and statistically significant at a 3 % level, which suggests that the average market value for firms without good sustainability reputation with given measured characteristics is likely to be lower than what it would be if they were firms with reputation for sustainability leadership.

For comparative purposes, we also computed the Wald test for the BV and NI coefficients comparison between the Eqs. (4) and (5). The results are presented in Table 6. As one can see, when the coefficients from Eqs. (4) and (5) are compared, we conclude that the difference in coefficients is statistically significant only in for the variable NI. It means that, as we had previously shown, in average the variation in the NI has bigger impact on price for firms with reputation for sustainability leadership when compared to firms without such reputation.

The results reported above are confirmed by these additional tests, indicating, in line with previous literature (Matolcsy and Wyatt 2008; Rajgopal et al. 2003; Schadewitz and Niskala 2010) information about CS is value relevant for investors.

#### Additional tests

We evaluate the robustness of our results by performing some additional tests.

First, as the treatment of outlying observations could influence the estimation results, the truncation has been replaced by the distributions' winsorisation. Therefore, it was assumed a constant value for the 1 % top observations. Untabulated results corroborate the paper's conclusions.

Second, and following Matolcsy and Wyatt (2008), Eq. (2) is re-estimated including interaction terms between earnings/book value and SIC codes. These two additional

interaction terms address the concern that our main conclusions can be due to the omitted correlated industry membership variables. Untabulated results confirm our findings that information about CS is still value relevant for investors, despite the inclusion of these terms.

Finally, in order to minimise potential scaling bias, we perform additional analysis using alternative deflating variables. Following prior literature in the value relevance of financial information (e.g. Ali and Hwang 2000; Hung and Subramanyam 2007; Jifri and Citron 2009), we estimate Eq. (2) deflating the accounting variables by the book value at the end of the period, instead of the number of shares outstanding. In addition, we used total sales of the period and the lagged market value of equity. Untabulated results indicate that the sign of the coefficients' estimates and the probability associated to the significance tests are quantitatively unchanged. Thus, all the additional tests corroborate our main findings pointing for the importance of CS information for investors.

#### Summary and Concluding Remarks

This study analyses whether the market valuation of the two summary accounting measures, book value of equity and net income, is higher for firms with reputation for sustainability leadership, when compared to firms without said reputation, using a theoretical framework combining signalling theory and RBT. According to this framework, managers increasingly consider CS leadership as a signal of improved conduct to influence the external perception of reputation. By demonstrating that they operate in accordance with social and ethical criteria, companies can build reputation, whereas failing to do so can be a source of reputational risk.

We use inclusion on the DJSI as a signal of a company's sustainability leadership reputation (Robinson et al. 2011). A reputation for sustainability influences stakeholders' perception of a company in a way that increases expected cash flows, and therefore value (ibid.). Our results provide evidence that the market valuation of net income is higher for firms that have a reputation for sustainability leadership. Our results support the view that accounting measures alone have only a limited ability to communicate a firm's value to investors.

Our findings are consistent with those of previous literature on the value relevance of non-financial information that find a significant relation between the market value of equity and non-financial information unrelated to CS in the North American context (Matolcsy and Wyatt 2008; Rajgopal et al. 2003). We extend their conclusions to the issue of CS. Our findings are also consistent with those of similar studies related to CS in a North American context (Berthelot et al. 2012; Barth and McNichols 1994; Cormier

**Table 6** Wald test coefficients comparison results

F statistic (BV leading versus non-leading CSP firms)	0.574
F statistic (NI leading versus non-leading CSP firms)	21.349***

\*\*\*, \*\* and \* indicate statistically significant at the 0.01, 0.05 and 0.10 levels, respectively

et al. 1993; Cormier and Magnan 1997; Hughes 2000; Johnston et al. 2008; Sinkin et al. 2008) or a European context similar to the North American, such as the UK (Hussainey and Salama 2010). In particular, they are consistent with the findings of Hussainey and Salama (2010), who suggest that other information, namely reputation for leadership in terms of environmental performance, leads to a better forecasting ability of future earnings by investors. Hence, our study contributes significantly to this literature by extending these results to the issue of CS.

Our results, consistent with the theoretical framework proposed, show that firms with a valuable intangible resource such as CS reputation exhibit a long-term advantage, which Hussainey and Salama (2010) identify as the ability they have to signal their long-term future prospects to investors. These firms signal value-relevant information to investors to distinguish themselves from firms without CS reputation. Our study shows that CSP reputation helps investors to better evaluate a firm's value. This leads us to accept our research hypothesis.

However, the results of our study differ from some prior European studies that used environmental reporting (Cormier and Magnan 2007; Moneva and Cuellar 2009), social reporting (Carnevale et al. 2012) or environmental performance (Hassel et al. 2005). Only Schadewitz and Niskala (2010) and Semenova et al. (2010) report findings consistent with ours. The findings of some of these prior studies indicate that the interaction between social reporting, financial statement information and firm stock market value is conditioned by the reporting context that firms face (Cormier and Magnan 2007; Carnevale et al. 2012). Hence, it is prudent to conclude that our findings, obtained in the North American institutional setting, are not susceptible of generalisation to other countries, especially those with very different characteristics (for example, Germany or France).

Cormier and Magnan (2007) conclude that their findings suggest that national institutional contexts are relevant when assessing the stock market value relevance of financial and non-financial performance measures. Although further analyses are required to validate this claim, it is a promising avenue for future research (ibid.). We believe that studying international data for cross-country comparisons and industry comparisons would be an interesting future research area.

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