Opening the Black Box of Relationship between Sustainability Performance and Financial Performance

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Abstract

Last three decades have witnessed a huge amount of research trying to establish a link between company's sustainability performance (SP), sustainability disclosure (SD) and financial performance (FP). Researchers have applied various methods to investigate this relationship yet the results appear fragmented and competing. In this article, we intend to open this black box of relationship between SP, SD, and FP by applying multifarious analyses. To achieve our objective of opening the black box, we analyse the underlying relationship at dimensional and sub-dimensional level. The data for different SP dimensions and sub-dimensions are obtained by applying manual content analysis technique on the sustainability reports of 100 best performing the Global Fortune firms from year 2007 to 2011. Our results show that, to achieve conclusive results, there is a need to use stable SP measurement framework with congruent dimensions and sub-dimension. Correspondingly, we find that the interlinkages between different SP dimensions and sub-dimension are weak and sometimes contrasting. The results are useful to draw important policy implications for development of SP reporting framework.

Keywords: Corporate Sustainability Performance, Disclosure, Global Reporting Initiative, G3 Guidelines, Financial Performance.

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1. Introduction

Does it pay to be green, has been a question of many studies in last three decades (Friede, Busch, and Bassen, 2015) yet the results are fragmented (Song, Zhao, and Zeng, 2017). Recent literature reviews and meta-analytical reviews by Horváthová (2010); Endrikat, Guenther, and Hoppe (2014); Lu, Chau, Wang, and Pan, (2014) suggest that operationalization of sustainability performance (SP) measures is the main cause of prevailing competition. Indeed, the existing literature so far has neglected the multifaceted nature of sustainability measurement (Trumpp, Endrikat, Zopf, and Guenther, 2015). Most of the researchers in the given SP and financial performance (FP) nexus either used third party measurement like Kinder, Lydenberg, Domini and Co. KLD[1] (see e.g. Waddock and Graves, 1997; Lioui and Sharma, 2012; Tang, Hull, and Rothenberg, 2012) or self-defined measurement matrices (e.g. Schnietz and Epstein, 2005; Mahoney, LaGore, and Scazzero 2008; Godfrey, Merrill, and Hansen, 2009; Pae and Choi, 2011; Alrazi, De Villiers, and Van Staden, 2016). These matrices in different studies are essentially different in their very construction. Undeniably, this lack of stable and congruent SP measurement framework has created confusion about the nature of relationship between SP and FP. To clear up this confusion, we analyse the SP-FP relationship on dimensional and sub-dimensional level of SP. Our measurement is based on widely accepted Global Reporting Initiative framework[2].

To achieve this objective, we used third party ESG disclosure data as well as hand collected SP data. We analyse 152 sustainability reports by applying manual content analysis technique. This enabled us to categorise the performance information for each indicator category; economic, environmental, and social, in bifurcated form, i.e. good, and bad. Such categorization permits us to calculate a SP index for each

[1] Currently, Kinder, Lydenberg, Domini and Co. (KLD) covers 3000 public companies and provides data on corporate social performance of covered firms. The KLD helps investors to find socially responsible investment options. It excludes companies that are involved in any unethical behavior. The database provides performance data on environmental, social, governance, employees and supply chain, and customers.

[2] The Global Reporting Initiative (GRI) was established in 1997 and is an international independent standards organization. The first guidelines where issued in year 2000, and to date, many updated versions have been launched. GRI helps businesses, governments and other organizations understand and communicate their impacts on issues such as climate change, human rights and corruption.

indicator and sub-indicator categories. We also test the inter-linkages (Lozano and Huisingh, 2011; Antolin-Lopez, Delgado-Ceballos, and Montiel, 2016; Bradford, Earp, Showalter, and Williams, 2016) between individual SP components by collecting data on sub-dimensions of each SP indicator. This helped us provide fact based results about the SP-FP relationship and reflect upon the major reasons of prevailing competition among extant results.

The empirical results reveal several interesting findings. First, we note that mere disclosure does not show any significant relationship with FP measures. Contrarily, the performance measures are vividly linked to some FP measures. Second, the relationship between environmental performance (EP) remains positive and significant across all FP measures while social performance is only linked to accounting based FP. Third, we document that few SP sub-dimensions show positive relationship with FP measure and other show no and/or sometimes negative relationship. We also observe that few sub-dimensions are negatively related within indicator and across indicators. Fourth, our results contribute to the existing debate on SP-FP relationship by showing that there is a need to develop a framework with compatible SP dimensions and sub-dimensions. Our results also contribute towards the stakeholder theory by showing that investment in sustainability initiative is appreciated by the stakeholders and these investments are beneficial for the firms. The observed results are useful to draw relevant policy implications for designing a comprehensive and value-added SP measurement framework.

The remainder of the paper is organized as follows: The next section discusses the findings of extant literature. Section 3 is devoted to the discussion about theory and hypothesis development. Section 4 contains the description of our methodology. In section 5, we present the empirical findings. In last two sections we discuss our results and provide conclusion, implications, and future research directions.

2. Prior Evidence

There are diverse schools[3] of thoughts in SP-FP nexus (see for reviews see, Molina-Azorín, Claver-Cortés, López-Gamero, and Tarí 2009; Revelli, and Viviani, 2015; Wang, Dou, and Jia, 2016). Proponents of neoclassical school (traditionalist view) argued that sustainability initiatives impose additional costs (see e.g. Walley and Whitehead, 1994; Palmer, Oates, and Portney, 1995; Hamilton, 1995), whereas Porter (1991) and Porter & Van der Linde (1995) supported the revisionist view and argued that such initiatives create win-win situations by enhancing performance and social welfare. Hart and Ahuja (1996), Wagner (2010) and Ameer and Othman (2012) empirically supported this view. Recently, Flammer (2015) notes that investment in sustainability yields positive accounting performance. Similarly, Wang and Tuttle (2014); Liesen, Figge, Hoepner, and Patten, (2016) argue that sustainability has become an important contributor towards the investment returns by sending positive signal to financial market.

A third stream of research challenges both traditionalist as well as revisionist views and supported an inverse U-shaped relationship (see e.g. Lankoski, 2000; Wagner, 2001) by arguing that sustainability is beneficial up to a certain point until it becomes detrimental for FP. Some others argued for a neutral association between firms' responsible behaviour and resulting benefits (see McWilliams and Siegel, 2001). Table 1 provides an overview of the mixed empirical results.

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Literature supporting revisionist view identifies several incentives of sustainability engagement (Gray, 2006). These benefits include: improved competitiveness (Porter and Van der Linde, 1995), improved relations with stakeholders and compliance with regulations (Bansal and Roth, 2000; Rivera-

[3] There are traditionalists and revisionists views about firm's engagement is sustainability initiative and its impact on FP. Friedman (1962) provide the bases for the former by arguing that mangers' only social responsibility is to earn economic profit for the shareholders. According to Friedman, the engagement of manager in any activity other than profit economic maximization is a theft of shareholders' resources. He argues that CSR is a "subversive doctrine" (p.133). On the other hand, Porter (1991) and Porter and Van der Linde (1995) present porter hypothesis according to which the investment in sustainability and/or corporate social responsibility is in the long term benefit of stakeholders as well as investors.

Camino, 2001), better access to new markets (Stefan and Paul, 2008), higher return on investments and lower financing cost (Derwall and Koedijk, 2009; Orens, Aerts, and Cormier, 2010), higher shareholders' value (Porter and Kramer, 2011), better share performance (Eccles, Ioannou, and Serafeim 2014), and many more.

Conversely, Shane and Spicer (1983); Cordeiro and Sarkis (1997), Preston and O'Bannon (1997) argue that sustainability engagement is detrimental for FP. Schröder (2007) analysed 29 socially responsible stock indices and note higher riskiness as compared to conventional indices. Hamilton (1995) conducted an event study on 463 US firms and found a negative relationship between toxic release inventory and share price. Similarly, Khanna and Damon (1999) also found a negative impact of toxic release inventory on return on investment. Likewise, Konar and Cohen (2001) note that Information about toxic chemical disclosure impacts financial performance negatively in US manufacturing sector. Menguc and Ozanne (2005) conducted a path analysis of 140 Australian manufacturing firms and found a negative impact of firms' natural environmental orientation on sales growth.

There are several studies in the same line of inquiry that have found no relationship between SP and FP (see e.g. Fogler and Nutt, 1975; Alexander and Buchholz, 1978; Chen and Metcalf, 1980; Pava and Krausz, 1996; Murray and Vogel, 1997; Godfrey and Hatch, 2007). Edward (1998) studied 51 environmentally proactive UK based firms and note insignificant results. Many others like Gilley, Worrell, Davidson, and El–Jelly (2000), King and Lenox (2001), Watson, Klingenberg, Polito, and Geurts (2004), Link and Naveh (2006), and Arago´n-Correa and Rubio-Lo´pez (2007) also report insignificant relationship between SP and FP.

Few others observe entirely different results. Fujii, Iwata, Kaneko, and Managi (2013) note an inverted U-shape relationship between SP and FP among Japanese firms while Trumpp and Guenther (2015) report a U-shaped relationship between EP and FP among US firms. Wagner (2001) report inverse U-shape relationship and McWilliams and Siegel (2001) proposed a neutral relationship between EP and FP. Similar competition among reported results can be seen in many others studies. Horváthová (2010) conducted a meta-analysis on 64 outcomes from 37 empirical studies and conclude that the fragmentation

and inconsistency prevail due to inconsistency in the methods. More recently, Wang et al. (2016) analysed 119 outcomes from 42 empirical studies and found that the measurement of SP constructs create variation in the results. The body of knowledge is growing yet the results are inconclusive (Friede et al., 2015). Keeping in view the competing results, our study aims to fill this void by using a more refined measurement of SP.

3. Theoretical Lens and Hypothesis Development

The review of existent literature shows that not only the empirical findings are competing but the use of theoretical lenses is also inconsistent (see table 1). Moreover, the theories used in existing SP-FP nexus literature are based on some competing assumptions. For example, if we compare agency theory used by Seifert, Morris, and Bartkus (2003), Surroca and Tribo (2008), Al-Najjar and Anfimiadou (2012) to link various SP aspects with FP and stakeholder theory of (see e.g. Barnett and Salomon 2006, Trumpp and Guenther 2015, and Hoepner, Oikonomou, Scholtens, and Schröder 2016) these two theories are based upon opposing assumptions (Hussain, Rigoni and Orij, 2016). Many researchers have used these theories to provide rationale for same research question.

More specifically, Keele and DeHart (2011) and Yadav, Han and Rho (2015) use efficient market theory to explain the relationship between EP and FP while Mishra and Suar (2010) use signalling theory. While, Gallego-Álvarez, García-Sánchez, and Silva Vieira (2014) use trade-off theory for studying a similar research problem. Others, like Judge and Douglas (1998) and Menguc and Ozanne (2005), use resource based view, Seifert et al. (2004) take theoretical supports from resource dependence theory, and Chauvey, Giordano-Spring, Cho, and Patten (2015) use legitimacy theory for linking SP with FP. This could be one of the reasons for inconsistency in the results as the theory provides lens for looking at the underlying research problem. In this vein, McWilliams and Siegel (2001) argue that stakeholder theory is a dominant theoretical paradigm to provide theoretical justification for SP and FP relationship.

Stakeholder theory assumes that firm should take into account the need of wider variety of stakeholders and not only the owners of the firm (Freeman, 1984). Endorsing stakeholder theory as relevant theoretical lens for non-profit making firm actions, Freeman (2010) argues that although

shareholders' wealth creation is the top corporate priority, firms should not ignore the needs of wider variety of stakeholders. He further argues that stakeholders play a vital role for the success, survival, and growth of a firm. Considering the long term perspective of stakeholder theory argument (Wahba, 2008) maintains that corporate sustainability initiatives can lead to higher FP. Under the similar assumption Russo and Fouts (1997) document a significant positive relationship between environmental disclosure and FP. Similarly, King and Lenox (2002) observe a positive relationship between EP and FP. Waddock and Graves (1997) argue that if the firm does not incur explicit cost of being sustainable then it has to incur implicit cost of losing competitive advantage. Similarly, Lee (2008) argues that firms need to maintain a good relationship with shareholders as well as other stakeholders like employees, government, and customers for its long term survival in the market. He further maintains that firm can achieve this purpose by providing required information to diverse stakeholders. Likewise, Hull and Rothenberg (2008) maintain that SP is a tool to improve stakeholder management.

In the extant literature on SP-FP nexus, various studies use accounting as well as market based measures of FP (see table 1). Under the assumptions of stakeholder theory, several researches attempt to study the relationship between SP and FP. Some use actual performance data while others link SD with FP. Khurana, Pereira, and Martin (2006) observe a positive relationship between nonfinancial disclosure and FP. Judge and Douglas (1998) find a positive link between environmental planning and FP. Recently, Ameer and Othman (2012) explore a link between SD and FP. Many other research contributions use diverse measures for SP and explore the underlying relationships, nevertheless the contention prevails.

To achieve the objective of finding conclusive results about the relationship various measures of SD, SP, and FP. We use stakeholder theory perspective as this framework is better aligned with the very definition of sustainability. Moreover, stakeholder theory argues for a positive relationship between both SD and SP with FP. At the same time, recent empirical findings show that there are inter-linkages issues between various SP indicators. To validate theoretical claims and corroborate empirical findings we hypothesize following relationships:

H1: *Sustainability disclosure is positively linked to financial performance*.

H2: *Sustainability performance is positively linked to financial performance*.

H2a: *All the SP dimensions are positively linked to financial performance*.

H2b: *All the SP sub-dimensions are positively linked to financial performance*.

4. Methodology

4.1. Sample Design and Data Collection

To achieve our study objectives, we delimit our research to US companies belonging to the Global Fortune 100 best performing companies list, as compiled and published in 2013. According to the GRI's annual list of reporting firms (http://database.globalreporting.org/), we selected only those companies that issued sustainability report at least once during a 5-years period, from 2007 to 2011[4]. This selection principle allows us to identify 44 companies out of 100 covering different sectors. From the website of each company and/or the Corporateregister.com website (http://www.corporateregister.com/), we collected all the sustainability reports issued by these 44 companies[5], but we examined only those reports prepared according to the GRI G3 guidelines. Summarizing, our final dataset includes 152 sustainability reports issued by 44 companies. Table 2 shows the distribution sample firms and reports over the study period.

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4.2. Research design & variable measurement

4.2.1 Research design

To test our hypotheses, we employed three sets of panel regression models with financial performance measures as the dependent variables and a set of sustainability indexes as the independent variables. All the models included a set of relevant control variables identified in prominent literature.

[4] The selected time range is the longest period without updates or modifications of the sustainability reporting guidelines (G3 guidelines).

[5] Corporateregister.com Ltd is an independent and self-funded company holding world's largest directory of sustainability reports.

Specifically, the models aimed at testing the difference between the effects produced by SD measures and those measuring SP on dimensions and sub-dimensions levels. Therefore, in the first regression model we include traditional SD indexes: *Environmental*, *Social* and *Governance* (ESG parameters), as provided by Bloomberg and discussed in the next section. In more formal terms, we tested the following model:

$$FP_{it} = \alpha + \beta_1 ESG_{Environmental\,it} + \beta_2 ESG_{Social\,it} + \beta_3 ESG_{Governance\,it} + \beta_x Controls_{it} + \varepsilon_{it} \quad (1)$$

Contrarily, the following two regression models focus on the relationship between SP measures and firm's accounting and market based FP measures, as resulted from a comprehensive analysis of the sustainability reports. Formally, our second and third models are:

$$FP_{it} = \alpha + \beta_1 EC\_SUST_{it} + \beta_2 EN\_SUST_{it} + \beta_3 SO\_SUST_{it} + \beta_x Controls_{it} + \varepsilon_{it} \quad (2)$$

$$FP_{it} = \alpha + \beta_1 EC\_SUSTsub1_{it} + \beta_2 EC\_SUSTsub2_{it} + \beta_3 EC\_SUSTsub3_{it} + \beta_4 EN\_SUSTsub1_{it} + \beta_5 EN\_SUSTsub2_{it} + \beta_6 EN\_SUSTsub3_{it} + \beta_7 SO\_SUSTsub1_{it} + \beta_8 SO\_SUSTsub2_{it} + \beta_9 SO\_SUSTsub3_{it} + \beta_{10} SO\_SUSTsub4_{it} + \beta_x Controls_{it} + \varepsilon_{it} \quad (3)$$

In all the equations above '*x*' is vector of betas linked to a set of control variables. Based upon the Hausman (1978) specification test results, we ran a fixed-effect panel regression analysis for all our models. We proxied the financial performance both with accounting based measures (ROA and ROE) and a market measure (Tobin's Q), alternatively.

4.3. Measurement of Variables

4.3.1 Measurement of sustainability variables

To test our first model, we used the Environmental, Social and Governance (ESG parameters) provided by Bloomberg. Bloomberg monitors the ESG performance of companies and elaborates published data and news, turning them into one number: a disclosure score. Bloomberg ESG scores range from 0 to 100 depending on the number of data points disclosed by companies. The more the company

discloses, the higher is the score. Therefore, the Bloomberg ESG scores measure the company transparency, not its SP.

Furthermore, the data provided in ESG estimation covers a broad range of items (from greenhouse gas emissions waste, water and energy consumption, amount of investment in sustainability, employee training costs and turnover percentages, workforce accidents, percentage of women employees to the corporate governance characteristics, including the women on the board of directors and shareholder rights (Bloomberg, 2013, p. 16)), but not catalogued by any internationally accepted standards. Therefore, the ESG scores are broad, although not verifiable, measures of firm sustainability disclosure. We used the ESG scores to understand whether, despite their characteristics and limitations, such measures are relevant for the FP of the sample firms.

In model 2 and 3, that are our main regressions for the SP-FP analysis, we used scores different from the ESG scores as they are more verifiable and based on internationally accepted sustainability standards (the GRI guidelines). GRI argues that sustainability reports based on its guidelines can be used as benchmark for organizational performance and demonstration of organizational commitment towards sustainable development goals (GRI, 2006). The GRI reporting framework dares firms to report about positive and negative aspects of their performance, according to a specific list of items classified in three distinct dimensions decomposed in other sub-dimensions. Therefore, according to GRI indications, we measure the performance (and not only the disclosure transparency) of the economic, environmental, and social dimensions as well as the performance of each sub-dimensions of these three sustainability pillars.

GRI broke down the economic dimension in 9 items belonging to three sub-dimensions: *Direct Economic Performance*, the *Market Presence*, and the *Indirect Economic Impact*. Each sub-dimension has in turn a list of items: the direct economic performance (item 1-4), the market presence (item 5-7) and the indirect economic impact (item 8 and 9).

GRI indicated 30 items for the EP, grouped in 3 sub-dimensions. Therefore, the environmental dimension is resulting as a joint score related to: 1. Inputs (material, energy, and water); 2. Outputs

(emissions, effluents, and waste); and 3. Compliance (environmental compliance, and other relevant information such as environmental expenditure and the impacts of products and services). More specifically, the input contains 10 items of measurement in the GRI G3 guidelines (Item 1-10); output is measured by other 10 items (item 16-25) while biodiversity and compliance are measured by 10 items (Item 11-15 and 26-30). Similarly, the social dimension of the sustainability also contains sub-dimensions for performance measurement. These sub-dimensions are: 1. Labor Practices and Decent Work (item 1-14), 2. Human Rights (item 15-23), 3. Society (items 24-31), and 4. Product Responsibility (item 32-40). Therefore, in total 40 items in the GRI guidelines composed the social performance, declined in 4 sub dimensions.

We performed our content analysis using the GRI framework illustrated above. Specifically, according to the list of items that GRI provided we analysed each report in function of its sustainability information. We examined the disclosure issue along two criteria: the quantity of information disclosed, that we called as disclosure level, and the quality of the disclosure provided. In our framework, the distinction of these two components is relevant as the combination of them allow us to better investigate the sustainability performance effects.

First, to capture the disclosure level of each dimension/sub dimension, we generated a disclosure index (*DISC_INDEX*). This indicator is based on the number of items disclosed in the report compared to the total number of items listed by the GRI for the specific category, that is, the potential items related to an indicator. In more formal terms, the disclosure index is calculated as:

$$\boldsymbol{DISC\_INDEX_{it}} = \boldsymbol{Items\ disclosed_{it}} / \boldsymbol{Total\ items\ on\ an\ indicator_{it}} \quad (4)$$

Where *i* represents each report and *t* the year.

To calculate the numerator of the index, that is the items disclosed in the report, we followed the approach used in previous works by Jones, Frost, Loftus, and Laan (2007) and Michelon and Parbonetti

(2012). Therefore, for each dimension we measured the disclosure level on a binary scale (1 when the information on an item is provided, 0 otherwise) and then, we calculated the cumulative score of each sustainability category. This procedure allows us to generate various disclosure indexes, measuring the disclosure level in each sustainability dimension and sub dimension: the economic (*EC_DISC* and three sub dimensions *EC_DISCsub1*, *EC_DISCsub2*, *EC_DISCsub3*), the environmental (*EN_DISC* and three sub dimensions *EN_DISCsub1*, *EN_DISCsub2*, *EN_DISCsub3*) and the social one (*SO_DISC* and four sub dimensions *SO_DISCsub1*, *SO_DISCsub2*, *SO_DISCsub3*, *SO_DISCsub4*).

As for the quality of the sustainability disclosure, for each report and dimension we calculated a *Quality Index* built on the classification in positive and negative information disclosed. Our classification technique relied on the definitions provided by Patten and Crampton (2003, p. 40). This approach is consistent also with Plumlee Brown, Hayes, and Marshall (2015) and Hussain et al. (2016). They defined the information as a positive one when it provides an indication of firm harmony with sustainable development goals. In contrast, the negative information indicates a negative impact of firm operations on the environment or society.

Following these guidelines, we marked the information as positive and scored it as +1 according to two coding rules. First, the information provided coincided with the inherent objective of the focal item. Second, the information was clear and specific about improvement towards sustainable development goals. Following Mahoney, Thorne, Cecil, and LaGore, (2013) argument of neutral disclosure as a firm commitment towards sustainability, we treated neutral information as positive assigning +1 score to each disclosed item. Finally, scoring the information as a negative one (-1) also followed some coding rules too. First, if the information was negative by definition e.g. Greenhouse gas emission. Second, if there was a sign of decreased level of proclivity towards underlying sustainability issue. Lastly, since some core items required clear information about firm initiatives to foster sustainability, we scored such information as -1 if a clear indication of these initiatives was not provided.

The classification of the sustainability information as positive and negative allowed us to calculate a quality index that is a normalized algorithm proposed by Krajnc and Glavič, (2005) and used

by Jo and Harjoto (2014) and Hussain et al. (2016) for SP measurement:

$$Quality\ Index_{it} = \frac{Real\ Score_{it} - Minimum\ Score_{it}}{Maximum\ Score_{it} - Minimum\ Score_{it}} \quad (5)$$

In above equation, *i* represent each report and *t* each reporting year. *Real Value* is the algebraic sum of positive and negative scores, *Minimum* is the minimum potential score assigned to each sustainability category, that occurs when all the information provided have been classified as negative while *Maximum* indicates the contrary, the maximum potential number of information with positive sign. Thus, for instance, the total number of items in the economic dimension is 9. In this case, the *Minimum* represents the worst case (-9): the firm provides negative information for all the items of the category; while *Maximum* means (9) there is a full disclosure with all positive and/or neutral information. This same rationale was also used for environmental and social indicators, where the count of items was 30 and 40 respectively, and for the sub indicators too.

Based on this approach, we created various measures capturing the disclosure quality for each sustainability dimension and sub dimension: the economic (*EC_QUALITY* and *EC_QUALITYsub1*, *EC_QUALITYsub2*, *EC_QUALITYsub3*), the environmental (*EN_QUALITY* and *EN_QUALITYsub1*, *EN_QUALITYsub2*, *EN_QUALITYsub3*) and the social one (*SO_QUALITY* and *SO_QUALITYsub1*, *SO_QUALITYsub2*, *SO_QUALITYsub3* and *SO_QUALITYsub4*).

Finally, we combined the disclosure level (the quantity of the information) and the quality (the type of information) of the sustainability information provided by companies, through the product of the two indexes previously calculated. In this way, we generated three interaction variables for the sustainability dimensions (*EC_SUST*, *EN_SUST* and *SO_SUST*) and other for the sub dimensions (*EC_SUSTsub1, EC_SUSTsub2, EC_SUSTsub3; EN_SUSTsub1, EN_SUSTsub2, EN_SUSTsub3; SO_SUSTsub1, SO_SUSTsub2, SO_SUSTsub3,* and *SO_SUSTsub4*). As our argument is based on transparency and accountability, the interaction variables approach enabled us to capture performance and transparency jointly. To conclude, the scores we have calculated differ from the Bloomberg ESG parameters, as they are measures of sustainability performance, not just of disclosure. For testing the

hypothesis related to SD and FP, one can argue to use more structured disclosure information i.e. sustainability report disclosure. We prefer using ESG scores as disclosure measures because ESG scores are based upon firm's sustainability disclosure in sustainability reports as well as in financial reports, newsletters, website etc. Table 3 summarizes the sustainability indexes and variables we have calculated and discussed. we winsorized data at 10^{th} and 90^{th} percentiles.

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To ensure the reliability of content analysis based measures, we calculated "Krippendorf Alpha" as the reliability measure for our extracted data. We measure inter-coder reliability using Krippendorf Alpha on 25% of the coded data by two researchers. The value of alpha should be greater than 0.67 for useful conclusions (Krippendorff 2004, p. 241). We find that all the alpha values for disclosure and quality indexes are well above the acceptable threshold value.

4.3.2 Selection and measurement of financial performance variables

To proxy the firm performance we used both market and accounting performance measures.
In the first category, we select the Tobin's Q ratio that measures the market appreciation/depreciation of the firm value with respect to the book value of the company (Lindenberg and Ross 1981). It has been calculated as the ratio between the market value of the company over its book value at time (*t*).
For the accounting measures, we select *ROA* and *ROE*. *ROA* has been calculated by dividing the firm operating income over its total assets. *ROE* has been calculated by dividing the pre-tax income over the shareholders' equity. Table 4 summarizes the main references in prior literature supporting the choice of our financial performance proxies.

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4.3.3 Selection and Measurement of Control Variables

We select a set of control variables according to the extant literature. Therefore, we used: the firm size (*SIZE*), measured by the logarithm of total assets, sales growth (*SALE_GROWTH*) measured as the percentage change in sales with respect to previous year sales, the capital intensity (*CAP_INT*), calculated as the ratio of the capital expenditure over the total sales, the debt-to-equity ratio (*D*/*E*), measured as the firm total debt over the book value of its equity. In line with Hussain et al. (2016), we include the *ENV_SENS* variable, this is a dummy variable capturing if the company belongs to an environmental sensitive industry. It takes value equal to 1 if the company does belong to such an industry, 0 otherwise. Table 5 contains detailed information about measurement and treatment of different variables in the regression models.

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5. Empirical Results

5.1 Descriptive Statistics

Table 6 provides descriptive statistics for the entire dataset and by type of industry (environmental sensitive or not). Specifically, Panel A reports statistics referring to the sustainability disclosure measures (*ESG disclosure indicators*) while Panel B and C show details for the sustainability performance measures we have extracted and elaborated from the company reports. Panel D provides details for the dependent variables and Panel E for the controls used in the regression analysis.

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Panel A documents that, as expected and supported by the literature (see e.g. Xu, 1999), the mean level of transparency in the disclosure of the sustainability issues (as measured by the ESG parameters) depends systematically on the kind of industry considered: the ESG scores of the environmentally sensitive industries are greater than the scores attributed to non-sensitive industries. The Wilcoxon rank-sum test results support this notion.

In contrast, Panel B shows that the sustainability performance does not vary by industry type. In other words, the environmental sensitivity trait does not affect the average level of sustainability performance of GRI reporting firms. This result is in line with our expectations since we selected companies that have in common their attitude towards the sustainability issues, regardless to industry-specific features.

Therefore, combining the evidence, we documented that GRI reporting firms can differ in the level of sustainability disclosure transparency, but they perform similarly from a performance perspective. Panel C reports the sub-dimensions' statistics and supports the lack of dependence of the sustainability performance measurement on the kind of industry considered. The differences between the environmentally sensitive and non-sensitive industries are not significant in most cases indicating again a not systematic relation between sustainability sub-dimensions' performance and industry characteristics.

Spearman's correlation coefficients were calculated to assess the relationship among the main variables of our models. Table 7 presents the results. We found the highest positive and statistically significant correlations between the SP variables, both in the dimension and sub dimension form, and the FP variables. A noteworthy relationship is the one between *EC_SUSTsub1* and *EN_SUSTsub2* which is (-0.220) negative and significant. Similarly, there is a negative correlation (-0.240) between *SO_SUSTsub1* and *SO_SUSTsub4*. These results help us corroborate the existing evidence of weak and sometimes opposing inter-linkages between different SP components. No significant correlation has been detected between the ESG parameters and the financial performance. Furthermore, no relevant relationship has been found between the ESG sustainability indicators and our sustainability performance indicators. This latter evidence further supports the difference between the two kinds of measures used.

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5.2 Multivariate Results

5.2.1 Sustainability Disclosure and Financial Performance

Table 8 reports the results of model (1).

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Our findings show that no ESG parameter is significantly to FP. This is valid for both the accounting performance (*ROA* and *ROE*) and the market performance (*TOBINQ*). Given the correlation results we tested for the multicollinearity of the model variables running the Variance Inflation Factor (*VIF*) test, but the results do not indicate the presence of any multicollinearity issue in the model. This evidence suggests that the level of the company commitment to the transparency and accountability, as elaborated in the *ESG* parameters is not relevant for the financial performance of a company.

As for the control variables, *ENV_SENS* has a positive and significant relationship with the accounting performance. Similarly, the *SALE_GROWTH* found positively linked with *ROA* and *ROE*, but the link with Tobin's Q seems weak. *RD_INT* is negatively associated with the company accounting performance, but it does not relationship with the market based FP. *SIZE* is weakly significant for *ROA* only, while the ratio *D*/*E* is never relevant for the company performance.

5.2.2 Sustainability Performance and Financial Performance

Table 9 and 10 report the results of our main regression models (equation (2) and (3)).

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Table 9 shows that the impact of the three dimensions of sustainability performance is different depending on the financial performance proxy considered. Specifically, for the accounting performance of the reporting firms, the environmental and social performance measures are significant and have a positive impact both on *ROA* and on *ROE* of companies. The economic dimension is on the contrary never relevant. This latter result does not hold when we measure the FP by the company Tobin's Q ratio. In this case, the economic dimension has a significant negative relationship with *TOBINQ* while

environmental shows still a positive and significant link. We find no significant association of social performance pillar with market based FP measure.

With regard to the control variables, *SALES_GROWTH* is positively related to all the financial performance measures, while *ENV_SENS* found positively associated with *ROA* and *ROE*, but not with *TOBINQ*. *RD_INT* has a negative association both with *ROA* and *ROE*, but not on *TOBINQ*, while *SIZE* is negative and significant for *ROA* and *TOBINQ* only. Finally, the ratio *D*/*E* and *CAP_INT* are never significant.

Table 10 reports the results concerning the decomposed of SP dimensions into sub-dimensions. These findings allow us to identify which specific components of SP are related to FP. Many aspects are worthy to be pointed out. First, the result concerning EC-SUST detected in Table 9 for the *TOBINQ* variable disappears in this step: no economic-related sub dimension shows any influence on the financial performances of a company. Furthermore, not all the sub components of the environmental pillar have similar association FP measures. The sub dimension *EN_SUSTsub1* is positive and significant (at 5%) for *ROE* (Column (6)), *EN_SUSTsub2* is never relevant, while *EN_SUSTsub3* is positive and significant at 5% for *ROA* (Column (3)) and at 1% for *TOBINQ* (Column (9)). Results show that not all the dimensions are in line with each other for representing the real relationship of *EP* with *FP*.

With regard to the social sub-dimensions, they show different effects on different FP measures. *SO_SUSTsub1* has a positive effect on *ROA* and *TOBINQ*, while *SO_SUSTsub2* and *SO_SUSTsub4* affect positively the accounting measures only. Finally, *SO_SUSTsub3* is weakly positively significant just for the *TOBINQ* (Column (9)). In the table 9 we note that social performance is not linked to TOBINQ however further in depth analyses show that some aspects of the same measures are positively linked to market based FP. For both equations (2) and (3) we ran the VIF test to check for the multicollinearity issue. The results did not raise any concerns.

Summarizing, our empirical evidence showed that the transparency of a company sustainability commitment, as measured by the ESG parameters, is not related to the company's financial performances. However, SP is significantly linked to accounting as well as market based measures of FP. Furthermore,

we found a negative relationship between the economic sustainability performance of reporting companies and their market value. This shows weak and contrasting links between various pillars of SP.

The sub-dimension analysis enabled us to better investigate the most relevant results about components in each sustainability dimensions. Specifically, with regard to the environmental pillar, the *Inputs* and the *Compliance* dimensions (sub dimension 1 and 3, respectively) showed a positive and significant relationship with both accounting and market based FP. With regard to the social dimension, the sustainability performance on *Human Rights* and *Product Responsibility* (sub dimension 2 and 4, respectively) show link with the accounting performance only. The reported sustainability performance on *Labour Practices & Decent Work* (sub dimension 1) has an impact on both the accounting performance and the market value, while the one on *Society* (sub dimension 3) may increase the company market value only.

6. Discussion of the Results

Our analysis aimed at exploring the relationship between SP and FP. Our findings provide new lens to get more insights about the competition in existing findings (see for comparison, Brammer et al., 2006; Mishra and Suar, 2010; Fujii et al. 2013; Flammer, 2015; Trumpp and Guenther, 2015; Hoepner et al., 2016). Our starting model (model 1), reported in Table 8, replicate previous analyses (e.g. Nollet, Filis, and Mitrokostas, 2016) but use a special dataset of various US companies. This specific sample selection allows us to show that the ESG indicators, standard measures capturing the transparency in the sustainability voluntary disclosure of companies, are not related FP, neither from an accounting nor from a market perspective. Although, these results are not in line with our expectations but they help us know the reason of prevailing fragmentation in the existing results. We believe that the ESG indicators are not appropriate tools to analyse the sustainable firm behaviour as they lack specific performance measurement criteria.

Existing literature so far has neglected the multifaceted nature of sustainability measurement (Trumpp Endrikat, Zopf, and Guenther, 2015). This creates a huge knowledge gap which we try to fill by providing fact based findings. According to our framework, the traditional measures employed by prior literature

might be misleading. For this reasons, we elaborated a set of innovative indicators that are more suitable to capture the essence of companies' efforts towards sustainability: the SP measures included in model (2) and (3). As predicted, these models, reported in Table 9 and 10, suggest that findings support our intuition. The SP pillars, measured in terms of performance and not just disclosure, may affect significantly the financial performance of reporting companies. Specifically, we found that the inclusion of our variables significantly improved the overall explanatory power of the regression models and that the coefficients differ according to the specific sustainability dimension considerably.

The most important result of our analyses is the negative relationship between economic SP and market based measures of financial performance. We measure SP on various dimensions and show that there is a need to look for better and more aligned dimensions for sustainability reporting and SP measurement. This is also evident from the negative correlations found in various sub-dimensions of social indicator and economic and environmental sub-dimensions. Our findings are supported by the fact that GRI has already revised the G3 guidelines in 2012 and the new guidelines (G4) have modified 78% the items under the economic indicator. At the same time the environmental and social dimensions are restructured by 57% and 37% respectively. More specifically, GRI has eliminated entire *EC_SUSTsub3*. Moreover, 85% of the input dimension of environmental indicator has been updated. Similarly, 50% of the society (*SO_SUSTsub3*) and 33% of the product responsibility (*SO_SUSTsub4*) dimension has been updated (GRI, 2012). In light of observed results, we argue that there is a need for continuous improvement in the reporting frameworks. Alternatively, our empirical evidence can be interpreted as support for the choice of integrated reporting as argued by Dong (2017) in his recent experiments. An integrated reporting framework provides a holistic view on a firm's financial and non-financial performance avenues. Building inter-linkages between economic and non-economic performance will provide better performance analysis prospects (Lozano and Huisingh 2011; Antolin-Lopez et al., 2016; Bradford et al., 2016).

7. Conclusion, Implications, and Future Research Directions

The objective of this research is to open the black box of relationship between SP and FP by utilizing unique measures of SP based upon the globally acceptable SP reporting framework. The review of the existing literature shows that there is a huge competition among existing evidences (Revelli and Viviani, 2015; Wang et al., 2016). These reviews motivated the present study to link FP with SP and SD. We find that sustainability performance measurement matters and can provide better and conclusive results about the direction of relationship between sustainability engagement and firm performance. Our research also provides important insight about the compartmentalization of SP measurement dimension by showing that these dimension need to be revisited and realigned.

More specifically, our results reveal that no matter how big the disclosure amount is, the real impact of this costly initiative of standalone reporting can only be achieved by providing considerable firm commitment towards sustainable development goals. These results provide further support for the Porter hypothesis by showing that genuine commitment towards corporate sustainability generates positive outcomes. In line with the findings of Gómez-Bezares, Przychodzen, and Przychodzen (2017) we argue that firms should put sustainability in their strategic planning and invest more in the social and EP of the firm to achieve manifold performance objectives. We also conclude that the sustainability is important for all firms with better visibility as these firms have wider variety of stakeholders than less visible.

Our results provide some important policy implications for the standard setter in terms of providing novel evidence about the need of more aligned parameters for overall sustainability reporting standards. We hope that this will motivate firms to report more on the sustainability issues as firms would consider these reporting standards value creating tools. Based upon our findings about the relationships between various dimensions and sub-dimensions of SP we invite future research in the global context and corroborate the findings in other less developed or developing economies. We consider that using sub-dimensional analysis of SP can provide better insight about the pros and cons of various SP measurement frameworks.

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Tables

Table 1: Review of empirical literature

Study	SP Measures	FP Measures	Sample Size	Coverage years	Theory	Country	Results
Jaggi and Freedman(1992)	Environmental performance	ROA, ROE, Net Income, Cash Flow	13	1	No Specific Theory	US	Negative
Hamilton (1995)	SP disclosure	Stock price performance	463	1	No specific theory	US	Negative
Hart and Ahuja (1996)	SP disclosure	ROA, ROE, ROS	127	4	No specific theory	US	Positive
Cordeiro and Sarkis (1997)	Toxic Release Inventory disclosure	Analysts earnings per share forecast	523	1	No Specific Theory	US	Negative
Judge and Douglas (1998)	Self-defined environmental measures	ROI, Sales Growth, earnings growth	196	1	Resource based view	US	Positive
Wagner et al. (2002)	Environmental performance	ROE , ROS, and ROCE	57	3	No Specific theory	European firms	Negative
Seifert et al. (2003)	SP disclosure	ROA, ROE, ROS	90	1	Agency theory	US	Insignificant
Goll and Rahsheed (2004)	Discretionary Social Responsibility	ROA, ROS	62	1	Stakeholder theory	US	Positive
Seifert et al. (2004)	Corporate Philanthropy	Cash flow/sales	157	2	Resource dependence theory	US	Positive
Menguc and Ozanne (2005)	Environmental orientation	Sales Growth	140	1	Resource based view	Australia	Negative
Barnett and Salomon (2006)	Self-defined measures of SP	Risk adjusted FP	61	28	Stakeholder theory	US	Positive
Brammer et al. (2006)	CSR performance	Stock returns	296	1	No specific theory	UK	Negative
Luo and Bhattacharya (2006)	CSR Rating	Tobin's Q , stock returns	452	4	Stakeholder theory	US	Positive

Table 1 Continued

Table 1 Continued

Mahoney et al. (2008)	Self-defined measures of SP	ROA	44	5	Signalling theory	US	Positive
Prado-Lorenzo et al., (2008)	SP disclosure	Sales Growth	117	1	Stakeholder theory	Spain	Positive
Scholtens (2008)	CSR Rating	Financial Risk and Return	289	13	No specific theory	US	Insignificant
Surroca and Tribo (2008)	Corporate social performance	ROA, Tobin's Q	448	4	Agency Theory	22 different countries	Negative
Makni et al. (2009)	Corporate Social Performance	ROA, ROE, Market Return	179	2	Stakeholder theory	Canada	Negative
Mishra and Suar (2010)	SP Disclosure	ROA	150	1	Signalling and social identity theory	India	Positive
Orens et al. (2010)	Web-based CSR disclosure	Cost of Financing	895	1	No specific theory	US and Europe	Negative
Siregar and Bachtiar (2010)	SP reporting	ROA	87	1	Stakeholder theory	Indonesia	Insignificant
Kelee and DeHart (2011)	Partnership with USEPP	Stock price reaction	103	1	Efficient market theory	US	Negative
Al-Najjar and Anfimiadou (2012)	Environmental performance	Various measures of market based performance	350	10	Agency theory	UK	Positive
Fujii et al. (2013)	Greenhouse gas emission disclosure	ROA	758	8	No specific theory	Japan	Inverted U shaped relationship
Gallego-Álvarez et al. (2014)	Environmental performance	ROA	855	4	Trade-off theory	International sample	Positive
Wang et al (2014)	Greenhouse gas emission disclosure	Tobin's Q	69	1	Stakeholder theory	Australia	Negative
Dangelico and Pontrandolfo (2015)	Environmental performance (perceptual)	Firm performance (perceptual)	122	1	No specific theory	Italy	Positive
Trumpp and Guenther (2015)	Environmental performance	Changes in stock prices and dividends, ROA	696	5	Stakeholder theory	US	U shaped relationship

Table 1 Continued

Table 1 Continued

Yadav et al. (2015)	Environmental performance disclosure	abnormal stock returns	394	2	Efficient market theory	US	Positive
Gregory et al. (2016)	CSR performance	Firm Value	48 industries	18	No specific theory	US	Positive
Hoepner et al. (2016)	Sustainability performance	Cost of debt	470	8	Stakeholder Theory	International sample	Insignificant

Notes: Table 1 present an overview of the extant literature showing that many researchers have tried to find a link between CSR and FP but the results are competing and fragmented. In the similar vein many other researchers have studied the CSR-FP nexus and reported competing results (see for instance, Cohen et al., 1995; Russo and Fouts, 1997; Khanna and damon, 1999;Gilley et al., 2000; Alvarez Gil et al., 2001; King and Lenox, 2001; Konar and Cohen, 2001; McWilliams and Siegel, 2001; King and Lenox, 2002; Al-Tuwaijri et al., 2004; González-Benito and González-Benito, 2005; Menguc and Ozanne, 2005; Wagner, 2005; Khurana et al., 2006; Link and Naveh, 2006; Arago´n-Correa and Rubio-Lo´pez, 2007; Earnhart and Lízal, 2007; Jones et al., 2007; Nakao et al., 2007; Wagner, 2010; Guenster et al., 2011; Ameer and Othman, 2012; Flammer, 2015).

Table 2: Distribution of Sample Sustainability Reports over Time

Sector	**2007**	**2008**	**2009**	**2010**	**2011**	**Total**
Technology & Equipment	6	7	7	8	9	37
Oil & Gas Producers	4	5	4	5	5	23
Chemicals & Pharmaceuticals	7	4	6	6	7	30
Food & Beverages	3	2	3	2	2	12
Banks & Financial Services	3	1	3	3	6	16
Automobiles	0	1	2	2	2	7
Retailer	1	0	1	2	3	7
Household Goods	1	1	1	1	1	5
Industrial Transportation	1	1	1	1	1	5
Telecom	0	1	1	1	1	4
Airlines	0	0	1	1	1	4
Media	0	1	0	1	0	2
Total	**26**	**24**	**30**	**33**	**38**	**152**

Table 3: Disclosure and Sustainability Indexes

Name of Variable	Type of Information	Variable Description
EC_DISC	Economic Disclosure Index	It is amount of disclosure calculated as a cumulative score of items disclosed over total items on economic indicator of sustainability
EN_DISC	Environmental Disclosure Index	Calculated as an amount of cumulative score of items disclosed over total number of items on environmental indicator of sustainability
SO_DISC	Social Disclosure Index	Calculated as a ratio of cumulative score of items disclosed and total items on social indicator of sustainability
EC_QUALITY	Economic Quality Index	Economic Quality Index is obtained from the standardized formula of calculating quality index.
EN_ QUALITY	Environmental Quality Index	Environmental Quality Index is obtained from the standardized formula of calculating quality index.
SO_ QUALITY	Social Quality Index	Social Quality Index is the measure of social impact of firm. This is the standardization of positive and negative score of items on social indicator
EC_SUST	Interaction variable	Interaction of economic Disclosure Index and Economic Sustainability index
EN_SUST	Interaction variable	Interaction of Environmental Disclosure Index and Environmental Sustainability index
SO_SUST	Interaction variable	Interaction of Social Disclosure Index and Social Sustainability index

Note: table 3 presents the name and description of sustainability variables. *EC_DISC* is a ratio of disclosed items on economic indicator over total item on economic indicator. Similarly we calculate the *EN_DISC* and *SO_DISC* for environmental and social indicator respectively. This individual quality index for economic *EC_QUALITY*, environmental *EN_ QUALITY*, and social *SO_ QUALITY* is obtained by utilizing the positive, neutral and negative disclosure of item comprised in each sustainability indicator. *EC_SUST*, *EN_SUST*, and *SO_SUST* are the interaction variable (performance measures) and have been calculated as a product of disclosure indexes and their respective quality indexes.

Table 4: Dependent and control variables in the existing literature

Study	Financial Performance Measures	Controls
Cohen et al. (1995)	ROA and ROE	Control Sample
Hart and Ahuja (1996)	ROA, ROE, Return on sales (ROS)	Firm Size, Capital Intensity Growth, R&D Intensity, Leverage, and advertising intensity
Russo and Fouts (1997)	ROA	Size, Sales growth, Capital intensity, R&D intensity, Industry growth, and Industry concentration
Judge and Douglas (1998)	ROI, ROA	Industry and Size
Stanwick and Stanwick (1998)	Profitability	Firm Size
King and Lenox (2001)	Tobin's Q, ROA, ROE, and ROI	Firm Size, Capital Intensity, Growth, Leverage, and R&D Intensity
Konar and Cohen (2001)	Tobin's Q	Advertising expenditures, R&D expenditure, Capital intensity, Growth in Sales, and Age of Assets
King and Lenox (2002)	ROA and Tobin's Q	Firm size, Capital intensity Growth, R&D intensity, and Leverage
Wagner et al. (2002)	ROS, ROE and ROCE	Firm size, Square of firm size Debt–equity ratio, Asset–turnover ratio, Other sub-sector, Industrial sub-sector, Mixed sub-sector
González-Benito and González-Benito (2005)	ROA	Size and Industry
Wagner (2005)	ROCE, ROE, and ROS	Debt-to-equity ratio, Asset turnover ratio, and Country, Sub-sector, Firm size
Wahba (2008)	Tobin's Q	Firm Size, Capital Intensity, Age, Ownership Structure, Industry, Risk
Ameer and Othman (2012)	Sales growth, ROA, EBT, and cash flows	Control sample

Table 5 Dependent, Independent, and control Variables

Dependent:	
TOBINQ	Tobin's Q ratio
ROA	Return on Assets
ROE	Return on shareholders' Equity
Independent:	
ESG_Environmental	ESG indicator on Environmental Disclosure Transparency
ESG_Social	ESG indicator on Social Disclosure Transparency
ESG_Governance	ESG indicator on Governance Disclosure Transparency
EC_SUST	Economic Sustainability Performance Measure
EN_SUST	Environmental Sustainability Performance Measure
SO_SUST	Social Sustainability Performance Measure
EC_SUSTsub1	Economic Sustainability Performance Measure – 1st sub dimension
EC_SUSTsub2	Economic Sustainability Performance Measure – 2nd sub dimension
EC_SUSTsub3	Economic Sustainability Performance Measure – 3rd sub dimension
EN_SUSTsub1	Environmental Sustainability Performance Measure – 1st sub dimension
EN_SUSTsub2	Environmental Sustainability Performance Measure – 2nd sub dimension
EN_SUSTsub3	Environmental Sustainability Performance Measure – 3rd sub dimension
SO_SUSTsub1	Social Sustainability Performance Measure – 1st sub dimension
SO_SUSTsub2	Social Sustainability Performance Measure – 2nd sub dimension
SO_SUSTsub3	Social Sustainability Performance Measure – 3rd sub dimension
SO_SUSTsub4	Social Sustainability Performance Measure – 4th sub dimension
Control:	
ENV_SENS	Dummy variable taking value 1 if firm belongs to an environmental sensitive industry, 0 otherwise
SIZE	Log of total Assets of the firm as measure of size
CAP_INT	Capital Intensity of the firm as ratio of capital expenditure and sales
SALE_GROW	Sales Growth
D/E	Capital Structure Measure

Table 6: Descriptive Statistics

Panel A		**Sustainability Disclosure Measures (ESG parameters)**			
		Full sample	**Not environmental sensitive industry (ENV_SENS=0)**	**Environmental sensitive industry (ENV_SENS=1)**	**Wilcoxon rank-sum test**
(ESG_Environmental)	N	143	92	51	
	mean	38,888	36,866	42,536	**
Social disclosure transparency (ESG_Social)	N	144	92	52	
	mean	41,201	39,363	44,453	**
(ESG_Governance)	N	144	92	52	
	mean	63,951	62,927	65,762	***

***** p<0.01, ** p<0.05**

Note: Panel A provides the main descriptives for the ESG indicators (ESG_Environmental, ESG_ Social, ESG_Governance). The table reports the descriptives for the full sample and by industry, distinguishing between environmentally sensitive industries and non-sensitive ones. The last column reports the Wilcoxon rank-sum (Mann-Whitney) test for the two sub-sample means.

Panel B		**Sustainability Performance Measures (our indicators)**			
		Full sample	**Not environmental sensitive industry (ENV_SENS=0)**	**Environmental sensitive industry (ENV_SENS=1)**	**Wilcoxon rank-sum test**
Economic Sustainability Performance (EC_SUST)	N	152	99	53	
	mean	.4107375	.4102756	.4116003	not sig.
Environmental Sustainability Performance (EN_SUST)	N	152	99	53	
	mean	.4530373	.458844	.4421908	not sig.
Social Sustainability Performance (SO_SUST)	N	152	99	53	
	mean	.4674671	.4777304	.448296	not sig.

***** p<0.01, ** p<0.05, * p<0.1**

Note: Panel B provides the main descriptives for the sustainability performance indicators (EC_SUST, EN_SUST and SO_SUST).

Table 6 Continued

Panel C		**Sustainability Performance Measures - Sub dimensions (our indicators)**			
		Full sample	**Not environmental sensitive industry (ENV_SENS=0)**	**Environmental sensitive industry (ENV_SENS=1)**	**Wilcoxon rank-sum test**
EC_SUSTsub1	N	152	99	53	not sig.
	mean	.4810855	.4643308	.5123821	
EC_SUSTsub2	N	152	99	53	not sig.
	mean	.4013158	.3827161	.4360587	
EC_SUSTsub3	N	152	99	53	
	mean	.34375	.4027778	.2334906	***
EN_SUSTsub1	N	152	99	53	
	mean	.5	.5169192	.4683962	not sig.
EN_SUSTsub2	N	152	99	53	
	mean	.5329605	.5287374	.5408491	not sig.
EN_SUSTsub3	N	152	99	53	
	mean	.3708882	.3719697	.3688679	not sig.
SO_SUSTsub1	N	152	99	53	
	mean	.5699684	.5955988	.5220928	not sig.
SO_SUSTsub2	N	152	99	53	
	mean	.5644087	.5556803	.5807128	not sig.
SO_SUSTsub3	N	152	99	53	
	mean	.5147512	.5476641	.4532724	**
SO_SUSTsub4	N	152	99	53	
	mean	.3858837	.3616411	.431167	not sig.

***** p<0.01, ** p<0.05, * p<0.1**

Note: Panel C provides the main descriptives for the sustainability performance indicators based on the sub dimensions of the main sustainability pillars.

Table 6 Continued

Panel D		**Financial Performance Measures (Dependent Variables)**			
		Full sample	**Not environmental sensitive industry (ENV_SENS=0)**	**Environmental sensitive industry (ENV_SENS=1)**	**Wilcoxon rank-sum test**
ROA	N	151	98	53	
	mean	7.343.708	7.265.791	7.487.781	not sig.
ROE	N	151	98	53	
	mean	1.862.149	1.982.205	1.640.158	not sig.
TOBINQ	N	151	98	53	
	mean	2.867.427	3.149.875	2.345.164	*

***** p<0.01, ** p<0.05, * p<0.1**

Note: Panel D provides the main descriptives for the financial performance measures used in the regression models (ROA, ROE, TOBINQ).

Panel E		**Firm specific Control Variables**			
		Full sample	**Not environmental sensitive industry (ENV_SENS=0)**	**Environmental sensitive industry (ENV_SENS=1)**	**Wilcoxon rank-sum test**
SIZE	N	152	99	53	
	mean	1.126.084	1.130.225	1.118.348	not sig.
DE	N	152	99	53	
	mean	2.347.912	2.582.601	1.909.531	not sig.
CAP_INT	N	152	99	53	
	mean	-.0466116	-.042238	-.0547811	***
RD_INT	N	152	99	53	
	mean	.036065	.026195	.0545014	***
SALES_GROWTH	N	150	98	52	
	mean	7.525.959	6.475.572	9.505.535	*

***** p<0.01, ** p<0.05, * p<0.1**

Note: Panel E provides the main descriptives for the control variables used in the regression models.

Table 7: Spearman Correlation Statistics

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	ESG_Environmental	1,000																		
2	ESG_Social	**0,477**	1,000																	
3	ESG_Governance	**0,488**	**0,593**	1,000																
4	EC_SUST	**0,252**	**0,330**	**0,393**	1,000															
5	EN_SUST	0,116	-0,065	-0,029	**0,333**	1,000														
6	SO_SUST	**0,184**	-0,043	0,009	**0,279**	**0,722**	1,000													
7	EC_SUSTsub1	0,144	**0,310**	**0,297**	**0,699**	0,082	0,131	1,000												
8	EC_SUSTsub2	**0,219**	**0,241**	**0,356**	**0,881**	**0,400**	**0,283**	**0,400**	1,000											
9	EC_SUSTsub3	**0,169**	0,106	**0,165**	**0,535**	**0,270**	**0,230**	0,030	**0,404**	1,000										
10	EN_SUSTsub1	**0,244**	0,157	**0,213**	**0,504**	**0,470**	**0,474**	**0,345**	**0,450**	**0,264**	1,000									
11	EN_SUSTsub2	-0,055	**-0,201**	**-0,209**	-0,013	**0,681**	**0,442**	**-0,220**	0,096	**0,194**	-0,128	1,000								
12	EN_SUSTsub3	0,028	-0,084	-0,044	**0,223**	**0,807**	**0,559**	0,063	**0,292**	0,147	0,140	**0,488**	1,000							
13	SO_SUSTsub1	0,068	-0,021	-0,029	**0,271**	**0,435**	**0,582**	0,105	**0,332**	0,133	**0,407**	**0,202**	**0,315**	1,000						
14	SO_SUSTsub2	0,133	-0,018	-0,013	**0,248**	**0,639**	**0,746**	0,156	**0,242**	0,132	**0,303**	**0,420**	**0,533**	**0,391**	1,000					
15	SO_SUSTsub3	0,087	-0,099	-0,038	0,023	**0,348**	**0,557**	-0,049	0,013	**0,165**	**0,239**	**0,277**	**0,193**	0,003	**0,242**	1,000				
16	SO_SUSTsub4	0,141	0,147	0,163	0,073	**0,271**	**0,392**	0,049	0,048	0,130	0,111	**0,207**	**0,257**	**-0,240**	0,090	**0,278**	1,000			
17	ROA	0,124	0,063	-0,037	**0,264**	**0,641**	**0,680**	0,115	**0,300**	**0,174**	**0,327**	**0,434**	**0,539**	**0,505**	**0,600**	**0,171**	**0,206**	1,000		
18	ROE	0,014	-0,003	-0,079	**0,161**	**0,624**	**0,584**	0,035	**0,235**	0,070	**0,303**	**0,460**	**0,483**	**0,430**	**0,553**	**0,184**	0,150	**0,821**	1,000	
19	TOBINQ	-0,013	-0,097	-0,162	**0,172**	**0,642**	**0,596**	-0,015	**0,274**	0,061	**0,292**	**0,442**	**0,539**	**0,584**	**0,542**	0,135	-0,029	**0,675**	**0,759**	1,000

Note: Table 7 reports the Spearman correlations among the main variables of the models. All variables have been defined in Table 2 and 3. Significant correlations at 0.05 are bolded.

Table 8. Regression models with ESG parameters.

VARIABLES	(1) ROA	(2) ROE	(3) TOBINQ
ESG_Environmental	0.0327	0.0638	-0.0198
	(0.627)	(0.758)	(0.423)
ESG_Social	-0.0506	-0.0170	0.00764
	(0.251)	(0.887)	(0.727)
ESG_Governance	-0.0520	-0.0210	-0.0194
	(0.583)	(0.939)	(0.540)
SIZE	-3.483*	-6.424	-1.437
	(0.0972)	(0.335)	(0.113)
ENV_SENS	4.841***	13.71***	-0.378
	(1.27e-05)	(5.10e-05)	(0.202)
D/E	-0.0265	-0.0201	-0.00948
	(0.319)	(0.794)	(0.205)
CAP_INT	24.19	60.35	-10.82
	(0.572)	(0.648)	(0.223)
RD_INT	-205.4***	-561.8***	4.169
	(0.00723)	(0.000502)	(0.778)
SALES_GROWTH	0.0955***	0.197**	0.0142*
	(0.00340)	(0.0138)	(0.0707)
Constant	57.36***	107.4	20.24*
	(0.00805)	(0.120)	(0.0529)
Observations	143	143	143
R-squared	0.264	0.163	0.216
Number of tickers	42	42	42
Company FE	YES	YES	YES
Year FE	YES	YES	YES

Robust p-value in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Regression models with the sustainability performance variables (main dimensions)

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROE	(5) ROE	(6) ROE	(7) TOBINQ	(8) TOBINQ	(9) TOBINQ
EC_SUST	-1.311		-2.409	-2.217		-3.665	**-1.365***		**-1.434****
	(0.427)		(0.112)	(0.586)		(0.422)	(0.0682)		(0.0422)
EN_SUST	**7.130****		**6.004****	**9.712****		**8.914****	**1.885****		**1.483****
	(0.0137)		(0.0166)	(0.0340)		(0.0264)	(0.0108)		(0.0438)
SO_SUST	**9.041****		**9.331*****	**23.66****		**25.02*****	**2.001***		1.702
	(0.0156)		(0.000798)	(0.0140)		(0.00337)	(0.0939)		(0.109)
SIZE		-3.547**	-2.625***		-5.746	-3.981		-1.729**	-1.421**
		(0.0169)	(0.00802)		(0.232)	(0.194)		(0.0404)	(0.0364)
ENV_SENS		4.332***	4.871***		13.53***	14.74***		-0.158	-0.0195
		(0)	(0)		(0)	(0)		(0.268)	(0.857)
D/E		-0.0340	-0.0284		-0.0236	-0.00806		-0.00627	-0.00734
		(0.125)	(0.110)		(0.711)	(0.892)		(0.350)	(0.231)
CAP_INT		23.08	25.47		58.11	74.67		-8.048	-9.384
		(0.562)	(0.408)		(0.641)	(0.481)		(0.292)	(0.225)
RD_INT		-212.3***	-233.1***		-552.9***	-599.5***		-2.146	-5.456
		(0.00865)	(0.00179)		(0.000168)	(9.53e-07)		(0.887)	(0.660)
SALES_GROWTH		0.0960***	0.0965***		0.196**	0.197***		0.0130*	0.0138*
		(0.00226)	(0.000419)		(0.0103)	(0.00490)		(0.0844)	(0.0673)
Constant	0.405	54.76***	38.79***	4.025	100.8*	68.23**	1.634***	22.17**	17.85**
	(0.754)	(0.00114)	(0.000461)	(0.244)	(0.0657)	(0.0435)	(0.00118)	(0.0226)	(0.0245)
Observations	151	150	150	151	150	150	151	150	150
R-squared	0.202	0.266	0.450	0.142	0.164	0.310	0.148	0.187	0.295
Number of tickers	43	43	43	43	43	43	43	43	43
Company FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust p-value in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10. **Regression models with the sustainability performance variables (sub dimensions)**

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROE	(5) ROE	(6) ROE	(7) TOBINQ	(8) TOBINQ	(9) TOBINQ
EC_SUSTsub1	1.975		1.498	3.367		2.228	-0.589		-0.648
	(0.154)		(0.246)	(0.398)		(0.566)	(0.124)		(0.101)
EC_SUSTsub2	-1.685		**-2.691***	-4.087		-6.261	-0.0882		-0.196
	(0.366)		(0.0990)	(0.377)		(0.140)	(0.853)		(0.629)
EC_SUSTsub3	-1.018		-0.554	-0.269		0.983	-0.782		-0.675
	(0.521)		(0.681)	(0.941)		(0.739)	(0.252)		(0.286)
EN_SUSTsub1	2.439		2.885	7.769		**9.854****	0.348		0.220
	(0.202)		(0.113)	(0.141)		(0.0480)	(0.537)		(0.709)
EN_SUSTsub2	0.765		0.164	2.685		2.273	0.306		-0.0610
	(0.535)		(0.861)	(0.353)		(0.382)	(0.342)		(0.870)
EN_SUSTsub3	**4.051****		**3.624****	2.551		1.682	**0.870****		**1.010*****
	(0.0324)		(0.0184)	(0.524)		(0.609)	(0.0308)		(0.00412)
SO_SUSTsub1	**3.763****		**2.644****	4.364		3.281	**2.171****		**1.820****
	(0.0439)		(0.0478)	(0.363)		(0.337)	(0.0111)		(0.0216)
SO_SUSTsub2	2.684**		2.436**	6.698*		6.038**	0.201		0.215
	(0.0337)		(0.0142)	(0.0668)		(0.0423)	(0.503)		(0.431)
SO_SUSTsub3	0.804		1.556	3.051		4.681	**0.573***		**0.619***
	(0.571)		(0.104)	(0.371)		(0.100)	(0.0705)		(0.0597)
SO_SUSTsub4	**1.797*****		**1.905*****	**4.663*****		**4.693*****	0.0382		0.0242
	(0.00188)		(0.00309)	(0.00553)		(0.00483)	(0.910)		(0.940)
SIZE		-3.547**	-3.403***		-5.746	-4.887		-1.729**	-1.367***
		(0.0169)	(0.000955)		(0.232)	(0.163)		(0.0404)	(0.00243)
ENV_SENS		4.332***	3.622***		13.53***	11.38***		-0.158	0.168
		(0)	(5.79e-07)		(0)	(3.47e-09)		(0.268)	(0.263)
D/E		-0.0340	-0.0255*		-0.0236	-0.0221		-0.00627	-0.00247
		(0.125)	(0.0762)		(0.711)	(0.670)		(0.350)	(0.594)
CAP_INT		23.08	28.05		58.11	78.67		-8.048	-11.70
		(0.562)	(0.430)		(0.641)	(0.481)		(0.292)	(0.175)
RD_INT		-212.3***	-248.0***		-552.9***	-606.1***		-2.146	-14.91
		(0.00865)	(0.00119)		(0.000168)	(4.26e-06)		(0.887)	(0.243)
SALES_GROWTH		0.0960***	0.0947***		0.196**	0.227***		0.0130*	0.00974
		(0.00226)	(7.00e-05)		(0.0103)	(0.000551)		(0.0844)	(0.266)
Constant	-0.501	54.76***	47.95***	2.804	100.8*	79.23*	1.126	22.17**	16.88***
	(0.724)	(0.00114)	(0.000108)	(0.471)	(0.0657)	(0.0576)	(0.137)	(0.0226)	(0.00176)
Observations	151	150	150	151	150	150	151	150	150
R-squared	0.251	0.266	0.494	0.157	0.164	0.337	0.286	0.187	0.394
Number of tickers	43	43	43	43	43	43	43	43	43
Company FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust p-value in parentheses

*** p<0.01, ** p<0.05, * p<0.1