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# A cross-country analysis on the relation between sustainability performance and financial performance: Empirical evidence from Europe

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**Abstract**

The aim of this paper is to find an answer to a question that has received extended attention in prior literature, but for which evidence provided has not yet reached a single unanimous consent: is there an association between companies' corporate sustainability performance (CSP), as measured by inclusion in Dow Jones Sustainability Index Europe (DJSI Europe), and their corporate financial performance, proxied by return on assets (ROA) and return on equity (ROE)? The paper adopts pooled ordinary least square (OLS) regression models, as well as fixed effects (FE) panel data models to focus on the association between CFP and CSP in a cross-country analysis based on European companies. The application of OLS models reveals a significantly strong positive impact of high CSP on CFP, when proxied by ROA and a neutral relation when measured by ROE. Under the FE models, the coefficient for CSP is statistically insignificant when CFP is measured by ROA. A negative relation is found when CFP is measured by ROE and CSP is proxied by a measure that assesses inclusion in DJSI Europe on an annual basis. When the analysis is taken a step further, to include temporal consistency in the construction of the CSP, the sign of the association changes - for ROE, or becomes significantly positive - for ROA. Our analysis therefore suggests that when simultaneity biases are included in the model, and once temporal effects are controlled for, CSP and CFP are positively related, when CFP is measured by either ROA or ROE. Overall, the findings suggest that the CSP – CFP relation is sensitive to firm specific heterogeneity, and the choice of proxy for each of the two types of performance.

**Keywords:** corporate sustainability performance, corporate financial performance, Dow Jones Sustainability Index, Europe, panel data models

## 1. Introduction

Many studies have been published in recent years regarding sustainability reporting at international level which point out that, although this is not a common practice yet, more and more entities have chosen to report on their economic, social and environmental performance. Out of this broad category, coming from the practitioners' side, the KPMG's International Survey on Corporate Responsibility Reporting published every three years since 1993 is regarded as the most comprehensive conducted on this subject to date and is relevant to highlight the rise in coroprate social responsibility (CSR) reporting. The 2011 report shows that approximately 95% of the largest 250 companies worldwide issue social responsibility reports, up from 80% in 2008 and approximately 50% in 2005 (KPMG 2011; KPMG 2008; KMPG 2005).

The increase in the interest shown to CSR activities was accompanied by a substantial growth in academic research devoted to corporate sustainability performance (CSP) which, according to McWilliams *et al.* (2006), is often used as a synonym for CSR. McWilliams *et al.* (2006) consider that CSP is an embryonic concept in the academic literature, for which academics still struggle to find a clear definition. Research into the relation between CSR and performance outcomes has mainly focused on the impact of CSP on corporate financial performance (CFP). Relevant issues related to the CSP-CFP linkage concern understanding the type of relation that might exist (be it positive, negative, or neutral), and the direction of causality.

An important stream of research is therefore dedicated to analyses of whether firms which are perceived as sustainable outperform or underperform firms which are not perceived in the same way. Different studies, theoretical and empirical, discuss and analyze the relation between CSR activities or CSP and financial performance. Research has suggested positive (Waddock and Graves, 1997; Orlitzky *et al.,* 2003; Margolis and Walsh, 2001; Cormier and Magnan, 2007), negative (Garcia-Castro *et al.*, 2010) and neutral (Bauer *et al.*, 2005; Becchetti *et al.*, 2008; McWilliams and Siegel, 2000; Wood and Jones, 1995) relations between CSP and CFP. Recent research still provides mixed results for the relations between CSP and CFP (Garcia-Castro *et al.*, 2010). No conclusive consent has yet been reached as a result of empirical investigations. Furthermore, almost all measures of CSP discussed in the literature have been used and examined in a US context.

Considering the above mentioned facts, this study is designed with the intention to extend research in the area of CSP and CFP, by analyzing whether there is any relation between corporate sustainability performance and the corporate financial performance of the largest European companies during most recent years. To examine this relation, the empirical analysis undertaken is based on panel data and uses as starting sample the companies included in the STOXX Europe 600 Index at the end of year 2012. As a proxy measure for CSP across firms and countries this research considers high-CSP companies as the European constituents in the Dow Jones Sustainability Europe Index. Given the fact that CSP proxied by index inclusions may affect firm performance in many ways, two proxies for CFP are used; these are return on assets (ROA), and return on equity (ROE). The use of multiple proxies for CFP is expected to result in increased reliability of the findings.

The time period of the study covers five years, from 2008 to 2012. Given the increased interest shown by businesses and decision makers in CSR and related activities over the past few years, as emphasized by the results reported in the KPMG's surveys (KPMG, 2011; KPMG 2008; KPMG 2005), this seems like a salient period for analysis. Given the increased attention paid by companies to CSR activities, it is interesting to investigate the current state of the relation

between CSP and CFP. The findings are expected to reveal new empirical supporting or contradicting evidence on whether European firms with incentives to develop a high level of CSP not engaging on such strategy are 'penalized' in terms of their subsequent financial performance.

Due to the fact that the revision of prior studies and previous empirical analyses on this topic has revealed a large variety in the econometric tools used to investigate the relation between CFP and CSP, with neither of the models being precisely declared as superior over the others, it was decided to employ more than one econometric model in this study. Given these facts, a first analysis was conducted based on OLS models, with pooled data, followed by a second analysis, which made use of more advanced panel data models. This choice is expected to benefit the study as it allows comparability with a wider range of researches on one hand, while allowing for an appropriate 'like- like' comparison with the results obtained under different models.

Based on prior studies, five main firm-specific characteristics have been identified and introduced in the basic model as control variables, namely firm size, leverage, growth in sales, free cash flows, and risk. Moreover, the econometric model was extended to include the research and development investments (R&D) as another additional variable identified as having an impact on both CFP and CSP.

Some studies have provided evidence that consistency in CSP is positively associated with CFP. This type of analysis differs from the 'traditional' one in that the level of CSP is assessed by reference to the inclusion in the sustainability index over a larger period of time (usually few consecutive years, overlapping with the time horizon of the study) as opposed to the index inclusion on an annual basis. This view has been adopted as an additional analysis into this paper and implies running the same models, but considering only companies that were consistently included or excluded from DJSI Europe during 2008 – 2012.

Under the OLS pooled regression models, high CSP has a positive impact on CFP, when proxied by ROA, whereas no relation exists between CSP and ROE. In contrast with the pooled data models, the FE models report consistently different results. As such, the strong positive relation between CSP and ROA turns into a neutral relation under flexible panel data models. Similarly, contradicting results are found also for ROE. In the case of this proxy, the relations change from neutral into strongly negative.

Furthermore, an additional analysis provides evidence for a positive relationship between CSP, as proxied by a measure that considers temporal consistency, and CFP, as proxied by the two accounting based measures of performance - ROA and ROE in the econometric models that make use of lagged explanatory variables. Consequently, the results provide evidence that a high level of CSP impacts positively the CFP when CFP is measured by ROA and OLS models are used or temporal consistency is incorporated in the CSP measure. Overall, the findings suggest that the CSP – CFP relation is sensitive to the inclusion of firm specific heterogeneity in the econometric models, and the choice of proxy for each of the two variables.

The remainder of the paper is organized as follows. Section 2 provides a background, the results of the literature review, and the development of the hypotheses. Section 3 describes the research design, with reference to sample construction, data collection process and the research methodology, while Section 4 presents the descriptive statistics, the empirical results, together with a discussion of the main findings. Section 5 offers conclusions of the paper, final comments, limitations and implications for future research.

**2. Background and hypotheses development**

### *2.1. Understanding CSP*

The study of CSP has been present in management scholarship for about 45 years (Wood, 2010). Despite of this longevity, Wood (2010) considers that the CSP domain is still controversial, ambiguous, and in the same time also difficult to research. Under the same line of argumentatiuon, McWilliams *et al.* (2006) consider that CSP is an embryonic concept in the academic literature, for which academics still struggle to find a clear definition. Corporate social performance and its sister concepts – corporate social responsibility, corporate social responsiveness, corporate sustainability performance, corporate citizenship (Wood, 2010) are largely interchangeably used throughout the literature. This variety of expressions indicates once again that, seemingly, no prevalent unique meaning or definition of CSP have yet emerged.

According to McWilliams *et al.* (2006), CSP is often used as a synonym for CSR. However, according to Wood (1991), a firm's application of principles of CSR can be described as CSP. Moreover, Carroll and Shabana (2010) consider that the concept of CSP embraces both the descriptive and normative aspects of CSR, and places emphasis on firms' achievements or accomplishments in the field of CSR policies, practices and results. In other words, CSP can be looked at as an attempt to manage CSR by achieving results or emphasizing the outcomes of CSR initiatives (Carroll, 1979; Wood, 1991).

The synthesising view expressed by Wood (1991) is adopted in this study with regard to CSP and the tangential concept of CSR. As a result, this study views CSR and CSP as highly interrelated concepts, with a large degree of overlapping, but the two terms are not used interchangeably. Two separate definitions are therefore adopted for CSR and CSP. However, in both cases, the disclaimers provided by the authors themselves apply here too, in that these are just one interpretation of CSR and CSP, respectively.

On one hand, the adopted definition of CSR is the one summarized by McWilliams *et al.* (2006). McWilliams *et al.* (2006, p1) consider CSR behaviour the situations where the firm goes beyond compliance and engages in 'actions that appear to further some social good, beyond the interests of the firm and that which is required by law'. On the other hand, following the argument expressed by Orlitzky *et al.* (2003, p. 411) that Wood's (1991) definition is 'one of the most influential, helpful, parsimonious, and yet comprehensive conceptualizations of CSP', a choice was made to adopt this definition for current study also. Wood (1991, p. 693) defines CSP as: 'a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relations'.
Orlitzky *et al.* (2003) consider that the concept of CSP, as it results from the model developed by Wood (1991), is a set of descriptive categorizations of business activity, with a focus on both the impacts and outcomes for society, stakeholders and the firm itself. A firm's linkages, as defined by the principles of CSR, trigger the types of relevant outcomes. The above mentioned impacts and outcomes, processes, as well as the guidance offered by the structural principles of CSR can be measured and evaluated.

### *2.2 Review of empirical evidence*

Although it is contentious to define CSP and to differentiate it from the similar concept called CSR, a generally accepted view is that these two concepts are related, but with different focuses (Cheung, 2011). However, given the fact that the two concepts have been very often used interchangeably within various papers, the literature review of empirical evidence provided below makes reference to findings of studies that investigate the relation between corporate sustainability performance, corporate social performance or corporate social relation and corporate financial performance. The reason behind this is that it was identified the fact that, even though these concepts have different meanings, when employed into empirical analyses, they are based on very similar or even identical constructs.

*2.2.1 Measures of corporate sustainability performance*

With the rise of interest shown to CSP and CSR activities, the need for measurement instruments also came up. CSP measures the extent to which a firm embraces economic, environmental, social, and governance factors into its operations, and ultimately the impact they exert on the firm and society (Artiach *et al.*, 2010). However, CSP is a multidimensional construct, not only hard to define, but also hard to measure (Waddock and Graves, 1997).

A variety of measures have been used to operationalize CSP. In response to the need for measurement instruments, during the past few years, indices like the Dow Jones Sustainability Index, FTSE4Good, and the Domini 400 where initiated. These indices provide information about the CSR performances of these companies.

In a 'landmark article on CSP–CFP measurement' (Wood, 2010, p 60), Ullmann (1985) identified three categories of measures based on a review of 31 empirical studies of the '70s and early '80s. The measures discerned by Ullmann (1985) include: 1) social disclosure (including voluntary corporate social reporting and mandatory pollution); 2) social performance (including reputational indexes or rankings, or social disclosure as an assumed surrogate); 3) economic performance (including various accounting or market based measures of performance, like shareholder returns, price/earnings ratio, return on equity, net income, or net profit margin).

A comprehensive review of the existing empirical literature on CSP has been performed by Wood (2010). Among other aspects covered in her study, Wood (2010) has undertaken an analysis meant to determine the most popular measures of CSP used in the literature. The analysis has revealed the fact that the most frequently CSP adopted measurement variable is the Domini Kinder Lydenberg (KLD) rating. One of the reasons for the popularity of KLD might reside in the fact that researchers might have been prevented from using other significant information to use due restricted of limited data availability (Wood, 2010).

According to Orlitzky *et al.* (2003), CSP can be measures by four broad strategies: 1) CSP disclosures, 2) CSP reputation ratings, 3) social audits, processes and observable outcomes, and 4) managerial CSP principles and values. In this study, we focus on reputation ratings as a measure of CSP. Therefore, the second strategy mentioned above becomes of particular interest for current paper. Reputation ratings are based on the assumption that corporate social reputation is a good reflection of CSR policies and activities (Orlitzky *et al.*, 2003). As a

consequence, the inclusion in sustainability stock indexes can be treated as an appropriate indicator for the level of CSP (Ziegler and Schröder, 2010).

Three studies, based on micro-econometric analyses, are relevant for the strand of studies that use such indexes as measures for CSP: McWilliams and Siegel (2000); Becchetti *et al.* (2008) and Ziegler and Schröder (2010). The first two studies examine the effect of inclusion of US firms in the Domini 400 Social Index, which is an ethical stock index with a focus on corporate assessments of gambling, tobacco, and alcohol. While McWilliams and Siegel (2000) do not find a significant impact, Becchetti *et al.* (2008) report positive effects on total sales per employee, but negative effects on return on equity. The third study, on the other hand, examines the determinants of the inclusion of European firms in another two sustainability indexes, namely the Dow Jones Sustainability World Index and the Dow Jones Stoxx Sustainability Index. Ziegler and Schröder (2010) report a positive effect of CFP under a restricted econometric analysis, but the effect becomes ambiguous in more flexible panel probit models.

Similar to prior literature, current analysis infers a company's level of CSP ah high (low) by inclusion (or not) in a reputation index, in this case Dow Jones Sustainability Europe Index (DJSI Europe).

The DJSI family is offered cooperatively by RobecoSAM Indices and S&P Dow Jones Indices. The DJSI Europe was established in August 2010 to track the performance of the region's largest companies from developed countries that lead the field in terms of corporate sustainability (CS). These companies are assessed by RobecoSAM using the annual CS Assessment. According to the DJSI Index Guide (DJSI Europe Index Guide, 2013), 'the indices serve as benchmarks for investors who integrate sustainability considerations into their portfolios, and provide an effective engagement platform for companies who want to adopt sustainable best practices'. To be included or remain in the index, listed firms have to continually intensify their sustainability initiatives (DJSI Guidebook, 2012).

It should be noted that the Dow Jones Sustainability Indexes follow the best-in-class approach. The indices' best-in-class approach means that they include only companies that fulfill certain sustainability criteria better than the majority of their peers. For this purpose, firms are annually assessed with general and industry specific criteria and are compared against their peers in the same sector. No sectors are excluded from this process. Annually, at least 50% of the free-float market capitalization per sector is assessed, according to RobecoSAM. This coverage percentage is meant to ensure that a best-in-class selection can take place. The assessments are conducted by RobecoSAM and are mainly based on responses to annual written surveys with detailed questionnaires on corporate environmental and social activities. The SAM's methodology is based on the application of criteria to assess the opportunities and risks deriving from three dimensions - economic, environmental and social - for each of the eligible firms (DJSI guidebook, 2012).

*2.2.2 Corporate financial performance*

CFP can be measured by reference to accounting or stock market data. Both data types have advantages and disadvantages. Accounting-based data emphasize the firm's historical aspects of performance, while the stock market-based data is less affected by accounting rules and

managerial bias because they refer to the expectation of investors (McGuire *et al.*, 1988; Scholtens, 2008). Nevertheless, market-based data can be biased due to information asymmetries, or the values might be wrongly estimated in case of no existing active markets. It can be also claimed that stock prices are especially important for financial stakeholders while non-financial stakeholders might be more interested in other measures, oriented more towards CSR activities. Reference will be made to different types of measures used by prior study in the review of empirical evidence provided within the next subsection.

*2.2.3 CSP and CFP relation*

The increasing interest in CSR has been followed also by a growing attention paid by academics to evaluate the relation between CSP and CFP. Researchers have used different tools and methodologies to perform analyses in this field. The types of research methodologies include, without being limited to, event study methodology, portfolio analyses, association studies, and meta-analyses.

The strand of CSP studies, particularly relevant for current thesis, is based on regression analysis methodology, which is considered to explain the above mentioned long term relations based on accounting indices. Indeed, it might be also possible that the inclusion in sustainability stock indexes has a long-term effect on CFP. There is a large diversity however in the specific econometric methods used by various researches. Also, the proxies employed in respect of the two concepts – CSP and CFP present a high degree of variation. These facts will be highlighted in the next paragraphs, dealing with a review of the main studies concerned with CSP-CFP relation.

The study by Waddock and Graves (1997) has adopted three accounting measures of CFP - ROA, ROE, and ROS to be investigated in relation to KLD performance. Their study, focused on US Standard and Poor's 500 firms, reports that social performance (communities and environment) leads to better CFP. Using OLS to investigate the association in a cross-sectional setting, the study by Waddock and Graves (1997) reveals therefore a positive relation between CSP and CFP. In another study from 2000, Graves and Waddock reach again the conclusion that a positive relation exists over time between CSP and CFP. The latter study uses the same three accounting based measures of performance, but differs from the former in that the methodological approach is based on t-tests and trend analyses. Also, the longitudinal approach adopted allows the authors to assess the relation over time.

McWilliams and Siegel (2000) have reported a neutral CSP-CFP relation for another investigation placed in a US setting. Their study made use of the same measures (except ROS for CFP) as the two ones mentioned above. As a result of applying the OLS method in a cross-sectional setting, they concluded that the impact on KLD on performance changes with alternative specifications of the model.

In line with the above mentioned studies, as well as other researches in the field (Konar and Cohen, 2001; Elsayed and Paton, 2005), Becchetti *et al.* (2008) apply also accounting data based indicators as a measure of CFP. As mentioned earlier, their study examined the effect of inclusion of US firms in the Domini 400 Social Index, and the authors report positive effects on total sales per employee, but negative effects on return on equity.

Another more recent relevant study is the paper by Garcia-Castro *et al.* (2010). Using a panel data of 658 firms from 1991 to 2005, Garcia-Castro *et al.* (2010) look at whether the results reported in prior studies would change if endogeneity is taken into account. They claim that prior results are biased by unobserved firm-specific variables. Using four proxy measures for CFP, i.e. ROA, ROE, MVA, and Tobin's Q, the paper documents positive CSP – CFP relation when standard OLS is used and insignificant or negative relation when FE or instrumental variables are utilized. The study uses not only multiple proxies for performance, but also multiple types of models, including OLS, FE and random effects estimations.

Two other studies by King and Lenox (2001) and Telle (2006) can be mentioned here. The papers, concerning the relation between environmental performance and CFP, are suggestively named to point to the core of the research topic: 'Does it pay to be green? […]' (Telle, 2006) or 'Does it really pay to be green? [...]' King and Lenox (2001). Although these two studies focus on one-dimensional and rather narrow CSR indicators (Ziegler, 2012), such as emissions of pollutants, or more general indicators which only refer to the environmental dimension, the studies are relevant for this thesis from the perspective of the econometric methodology employed; reference to this will be made later in this paper.

King and Lenox (2001) use a panel of US firms and measure environmental performance by total toxic emissions and economic performance by a simplified version of Tobin's Q. Although they find evidence of an association between lower pollution and higher CFP, they conclude that a firm's mixed characteristics and strategic position might cause this association. Telle (2006) investigates the effect of environmental performance on CFP using a panel data set of Norvegian plants. A significant positive relation is found under pooled regression, while the effect becomes insignificant when the regression model controls for unobserved plant heterogeneity. The author concludes that, although greener plants tend to perform economically better, the analysis provides little support for the claim that it is because they are greener. Telle (2006) claims through the lens of his findings that conclusion that it pays to be green is premature.

In a meta-analysis of 52 studies investigating the CSP-CFP relation, Orlitzky *et al.* (2003) concluded that there is a positive association between CSP and CFP across industries and across study contexts. In addition, they conclude that the variation (from highly positive to modestly positive) in the universally positive relation occurs because of contingencies, such as reputation effects, market measures of CFP, or CSP disclosures. Under a similar approach, in a study that considered 167 CSP-CFP studies, Margolis *et al.* (2007) indicated the same type of consistent positive relation between CSP and CFP, as that reported by Orlitzky *et al.* (2003). They find no conclusive evidence that good CSP is too costly; moreover, the evidence seems to point to the opposite conclusion, i.e. it is costly to be socially irresponsible.

### *2.3 Hypotheses development*

Various studies that have investigated the relation between CFP and CSP provided mixed results. The existing contradicting results provided by prior literature, have led to the statement of the hypothesis to be tested on the association between CFP and CSP in the null form as follows.

***Hypothesis 1 (H1):*** *There is no association between the European firms' corporate financial performance (CFP) and their corporate sustainability performance (CSP), as measured by membership in Dow Jones Sustainability Index.*

Rejecting the hypothesis will imply that financial performance is associated with CSP, and the sign of correlation will point out whether it is a positive or negative relation.

Under the same stream of research, focused mainly on the association between CFP and CSP, some recent studies have conducted the investigation considering that a key aspect has been overlooked by existing studies, and this is consistency in the sustainability performance shown by the companies. In line with this argument, the papers by Artiach *et al.* (2010) and Lourenço *et al.* (2012) have included in their analyses only companies that were consistently included in a particular index during the sampled period. Such a sample construction approach has involved excluding from the analysis the companies that were only occasionally listed under a sustainability index.

The study conducted by Artiach *et al.* (2010) examined the factors that drive high levels of CSP, based on a US setting. With a focus on firm-specific characteristics and their impact on CSP, as proxied by membership on the DJSI North America, the study is based on a measure of CSP that takes into account consistent inclusion in the sustainability index. Their results show that that leading CSP firms are significantly larger, have higher levels of growth and a higher return on equity than low-CSP firms.

Lourenço *et al.* (2012) have described the link between CSP and CFP for North American companies. Their study uses a market based measure of performance, and is mainly concerned with the capital market reaction to the provision of information related to CSP. In terms of CSP measure, Lourenço *et al.* (2012) consider consistent inclusion in DJSI North America for period 2007-2010. The authors distinguished firms based on size and profitability. Their findings suggest that CSP is positively associated with the financial performance of large and profitable firms which are able to signal their sustainability performance, and has a negative association with the performance of large and profitable firms that are not able to signal their sustainability performance. Corporate sustainability makes large and profitable firms that have a reputation for being committed to sustainability, better, and large and profitable firms without that reputation, worse.

In a paper concerned with exploring how level and consistency in CSP might influence, individually or by interaction, a firm's CFP, Wang and Choi (2013) provide empirical evidence in support of the argument that the establishment of good stakeholder relations is influenced by a firm's ability to deliver consistent social performance, in addition to having a high level of CSP. Their main objective was to show that the previously reported results on the analysis of CSP-CFP relation can be altered by considering consistency in CSP. Their analysis uses a sample of 622 firms included in the Kinder, Lydenberg, Domini, & Co. data, thus again the investigation concerns US firms.

Following on from the supporting empirical evidence provided by the above mentioned studies in respect of a more refined measure of CSP, which considers also the temporal consistency of membership in a sustainability index to be relevant for better CFP, besides the

relatively high level of CSP, we have constructed a second hypothesis to test this presumption also. Given that all the studies that have been identified have offered empirical evidence that supports a positive relation between CFP and CSP, when CSP is proxied by a consistent measure that shows ongoing commitment to CSR activities over time, the second hypothesis predicts a positive relation between the two constructs.

***Hypothesis 2 (H2):*** *There is a positive association between a firm's CFP and its consistency in CSP.*

## 3. Research design

To examine the association between CFP and CSP, the empirical analysis in this paper is based on panel data and uses as starting sample the companies included in the STOXX Europe 600 Index at the end of year 2012. The STOXX Europe 600 Index is derived from the STOXX Europe Total Market Index and is a subset of the STOXX Global 1800 Index. With a fixed number of 600 components, the STOXX Europe 600 Index represents large, mid and small capitalisation companies across 18 developed countries of the European region (STOXX® Europe 600 Index). The time period of the study covers five years, from 2008 until 2012.

Similar to prior literature, current analysis infers a company's level of CSP ah high (low) by inclusion (or not) in a reputation index, in this case Dow Jones Sustainability Europe Index (DJSI Europe). The DJSI Europe Index and respective subsets track the performance of the top 20% of the 600 largest European companies in the Dow Jones Global Total Stock Market Index that lead the field in terms of sustainability.

### *3.1 Research method*

The empirical analysis of European corporations' data makes use of both pooled data and panel data models. Pooled data regression models have been the most frequent method of investigation. The studies by Graves and Waddock, 2000; Hillman and Keim, 2001; McWilliams and Siegel, 2000; Waddock and Graves, 1997 have adopted this type of approach.

The decision to use both types of models was driven mainly by the desire to investigate whether conducting research under a similar technique would yield the same results. This is also expected to result in increased comparability with the results of a variety of studies. Another reason for using more than one model was found in the paper by McWilliams and Siegel (2000). McWilliams and Siegel (2000) have reported a neutral CSP – CFP relation in an investigation placed in a US setting. Surprisingly, although the authors emphasize the importance of a correct model specification to circumvent omitted variable biases, they do not apply flexible panel data approaches, although they use panel data. However, as a result of applying the OLS method in a cross-sectional setting, they concluded that the impact on KLD on performance changes with alternative specifications of the model.

Furthermore, other former studies have documented that estimation results under pooled OLS models are biased (Garcia-Castro *et al.*, 2010; Telle, 2006), and the validity of this technique has been statistically rejected when compared to random or fixed effects models.

The explanations provided for the apparently inherent bias resides in a misspecification of these models, in that they do not take into account unobserved firm characteristics. Factors like good management, a high technological standard or specific business strategies are provided as examples of variables that could be positively correlated to both CSP and CFP and thus their omission can result to upward biases when estimating parameters using OLS models. Furthermore, Ziegler and Schröder (2010) conclude in their paper, which documented significantly different results under pooled and flexible panel probit models, that their estimation results strengthen the importance of the use of panel data and the incorporation of unobserved heterogeneity. The endogeneity problem that has been more and more often cited as another source of mixed results, besides the econometric techniques that present shortcomings should be taken into account; hence controlling for unobserved firm heterogeneity by means of use of panel data appears to be a major concern that should not be overlooked (Garcia-Castro *et al*., 2010).

The approach based on panel data models has been followed also in prior studies, although rarely than the previously mentioned technique. The application of flexible panel data models including unobserved firm heterogeneity in this paper is in line with the studies by Becchetti *et al.,* 2008; Elsayed and Paton, 2005; Garcia-Castro *et al.*, 2010; King and Lenox, 2001; Telle, 2006; and Ziegler and Shröder, 2010.

### *3.2 Sample construction and data collection*

The composition of the STOXX Europe 600 Index as at 31 December 2012 is publicly available and was obtained from the stock index's web page (STOXX® Europe 600 Index). Accounting and market values data were obtained from Thompson Worldscope Database (WSC) included in Datastream. We started by looking for all the firms with data available every year for the period 2008–2012.

A main advantage of using the composition of the STOXX 600 Europe Index to determine the universe of companies for analysis, and of inclusion in DJSI Europe as a proxy for the level of CSP, is that it allows comparison among the findings of different studies in which researchers use the same measurement instruments (Garcia-Casto *et al.*, 2010). However, as of 5th of July 2011, DJSI constituent data is no longer publicly available on the DJSI's website (www.sustainability-indexes.com). Students can request though access to historical components and weightings data by filling out and submitting an academic request and a Non-Disclosure Agreement. After having filled in and submitted such a form to SAM representatives, approval was obtained and access to relevant data was granted for research purposes. The information provided includes constituencies' lists (composition) of the DJSI Europe over the period of interest.

**Table 1.** Company-level sample selection

| | **No of obs.** |
|---|---|
| **Companies included in STOXX Europe 600 Index as at 31 Dec 2012** | **600** |
| *Less:* | |
| Companies not covered in Thomson Worldscope Database (WSC) | - |
| Period of the sample analysis - 5 years: 2008-2012 | |
| Company-year observations in WSC drawn from the 17 sample countries | **3.000** |

| | | | |
|---|---|---|---|
| *Less****: | | | |
| | Net income missing or zero | | 40 |
| | No EBIT information | | 50 |
| | Market values missing | | 90 |
| | Net sales missing or zero | | 75 |
| | No Beta in WSC | | 40 |
| | R&D missing data | | 1.323 |
| **Sample construction and further reduction for testing H2 (consistency in CSP)** | | | |
| Final sample for analysis | | | **1.382** |
| *Less^* | Companies occasionally included in DJSI Europe | 290 | |
| **Final sample for analysis** | | | **1.092** |

*high-CSP firms are those included in DJSI Europe in over the period 2008-2012.

**low-CSP firms are those companies listed under STOXX Europe 600 Index, but not included in the DJS Index in the same year for period 2008-2012.

***we have excluded companies for which financial information is not available for all five years over the sample period.

^in line with the research methodology that tests whether consistency in CSP drives CFP, the firms that were only occasionally included in the DJSI Europe during 2008-2012 were excluded from the analysis.

Following on from the composition lists under the stock and sustainability indices, the third step under the sample construction stage was represented by the split of firms in two groups. For each of the five years, the companies that are listed under DJSI Europe are considered to have a high level of CSP ('high-CSP' companies), and those companies listed under STOXX 600 Index, but not included in the DJSI Europe in a particular year of the analysis are considered to have a low level of CSP ('low-CSP' companies). This division is consistent with the analysis techniques used in prior studies (Artiach *et al*., 2010; Laurenço *et al.*, 2012; Ziegler and Schröder, 2010; Ziegler, 2012). This approach gives rise to the CSP variable used in the econometric models.

A second construct was developed in line with the presumption expressed in hypothesis H2. More precisely, temporal consistency was taken into account, and for the purpose of this analysis 'high-CSP' firms were considered those that were included in DJSI Europe in all five years from 2008 to 2012. Those companies that were never listed under DJSI, thereby representing an ongoing lack of investment in CSR (Artiach *et al.*, 2010) are considered to have a low level of CSP ('low-CSP' companies). Consistent with the papers by, for example, Artiach *et al.* (2010), Lourenço *et al.* (2012), Ziegler and Schröeder (2010), Ziegler (2012), the firms that were only occasionally included in the DJSI were excluded from the analysis when testing the presumption of significant temporal consistency, as stated in H2.

Descriptive statistics of the sample composition on years, split between CSP and non-CSP firms is presented in *Table 2*. It can be easily observed that no major fluctuations have occurred in sample composition (in terms of division according to the level of CSP) over the research period.

**Table 2.** Company-level sample description by year and CSP level

| Year | 2012 | 2011 | 2010 | 2009 | 2008 |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Final sample for analysis (annual analysis) | | | | | |
| high-CSP firms | 144 | 144 | 138 | 135 | 134 |
| low-CSP firms | 196 | 196 | 202 | 205 | 206 |
| Total | | | | | **340** |

An overview of the industry distribution of the final pooled sample used in the basic regression models, distinguishing between high- and low-CSP firms, based on the industry classification from WSC, shows that 27.86% of the sampled companies belong to the manufacturing industry, 18.6% are from Consumer goods. Basic materials and health care sectors companies score slightly above 10% of the total sample, while all other industries represent less than 10% of the sample. Industrial sector is also best represented within the high-CSP sample firms, with 23%, followed by consumer goods companies. The same two sectors lead also the sample of low-CSP firms.

*Table 1* summarizes the sample construction, subsequent reductions due to data limitations, and final company-level sample composition. The final sample for the empirical analysis comprises a pooled, cross-sectional total of 1.382 company-year observations of 340 unique companies during a period of five years, ranging from 2008 to 2012, across 15 European countries. The sample distribution by country (untabulated) reveals that United Kingdom (UK) is the leading country in terms of number of companies included in the sample. With a percentage of representation of around 24% in relative terms, UK is followed by France and Germany in both high- and low-CSP subsamples, regardless of whether the sample considers temporal consistency in CSP or not. All other countries in the sample score, individually, below 10% of the total sample. Some countries, like Austria of Ireland have no companies in the high-CSP category, but are also poorly represented in the low-CSP subsample. After the elimination of companies for which no accounting data is available in WSC, Greece is no longer present in the sample in neither set of companies.

### *3.3 Model specification*

The starting point for developing an appropriate model to test the two main hypotheses is based on the following regression, for firm *i* in year *t* (i=1,…,340; t=1 (i.e. 2008),…,5 (i.e. 2012)).

$$CFP_{it} = \alpha + \beta_1 CSP_{it} + \beta_2 X_{it} + \gamma_j Controls + \mathcal{E}$$

Previous studies have documented that CSP was found to be positively associated with prior financial performance (McGuire *et al.*, 1988; Roberts, 1992; Waddock and Graves, 1997). Thus lagged variables appear to be more appropriate for use in the empirical analysis; hence the above model was further refined to include one-year lagged profitability measures in the econometric analysis. The time lag specification applies to both CSP and various firm characteristics used to control for in the model. The inclusion of lagged variables in the model is also founded on methodological design concerns; more precisely, such design is considered appropriate to address simultaneity biases that might exist in panel data, and addresses potential endogeneity problems.

$$CFP_{it} = \alpha + \beta_1 CSP_{it-1} + \beta_2 X_{it-1} + \gamma_j Controls + \mathcal{E}$$

Where:

- $CFP_{it}$ is the variable for corporate financial performance for firm *i* in year *t*;

- $CSP_{it/t-1}$ is a dummy variable that takes the value 1 if firm *i*, listed under STOXX Europe 600 Index, is included also in the DJSI Europe in year *t*;

- $X_{it/t-1}$ is a vector referring to firm-specific characteristics that have an impact on both CFP and CSP, that will be decomposed in relevant financial firm control variables, in accordance with prior studies. A brief description of the measures considered relevant, and for which I will control for is provided below, followed by a detailed presentation of the testing models;

- $\alpha$, $\beta_i$, $\gamma_j$, ($\delta_k$, and $\theta_l$ in subsequent detailed models) are regression coefficients, and $\varepsilon$ is the residual of the regression;

- *Controls* - is a vector including industry, country and year controls dummy variables controlling for country, industry and temporal effects.

Prior literature has identified a series of factors that need to be controlled for when analyzing the relation between CFP and CSP. These factors are deemed to have an influence on both the two variables of interest, thus their omission would lead to the use of an incorrectly specified model. In accordance with previous studies that investigated the association between CFP and CSP, in this research we control for size, leverage, sales growth, availability of cash flows, and risk effects. In addition, McWilliams and Siegel (2000) show that other firm-specific variables such as research and development (R&D) intensity may affect both inclusion in a rating index and financial performance and, therefore, suggest that it should also be included as a control variable. The resulting extended model is shown below.

$$CFP_{it} = \alpha + \beta_1 CSP_{it-1} + \beta_2 SIZE_{it-1} + \beta_3 LEV_{it-1} + \beta_4 FCF_{it-1} + \beta_5 GROW_{it-1} + \beta_6 RISK_{it-1} + \beta_7 R\&D_{it-1} +$$

$$+ \sum_{j=1}^{10} \gamma_j \text{ Industry controls} + \sum_{k=1}^{17} \delta_k \text{ Year controls} + \sum_{l=1}^{5} \theta_l \text{ Country controls} + \varepsilon ,$$

All variables included in the model are defined in detail in the next subsection, 3.*4 'Measurement of variables'*. $\alpha$, $\beta_i$, $\gamma_j$, $\delta_k$, and $\theta_l$ are regression coefficients, and $\varepsilon$ is the residual of the regression. The models are constructed to include industry, country and year controls as dummy variables to control for country, industry and temporal effects.

### *3.4 Measurement of variables*

*3.4.1 Dependent variable (CFP = ROA, ROE)*

The dependent variable in the econometric models is CFP. To measure CFP, this study looks at accounting data. Consistent with previous studies (Waddock and Graves, 1997), this research will use two proxies for CFP, more precisely: return on assets (ROA), and return on equity (ROE). These two measures were among the measures of performance used most often in the past research (Margolis and Walsh, 2001).

ROA is calculated as EBIT divided by total assets for firm *i* in year *t*, whereas ROE is measured as net income before extraordinary items scaled by common equity. Thus, ROE reflects the profitability of the firm measuring the investors return calculated by the net income divided by total equity, while ROA reflects the profitability of a corporation after tax and interest.

*3.4.2 Independent variable*

The main independent variable in this research is represented by companies' level of CSP. This variable is operationalized by means of a binary variable, depending on whether a firm is included in DJS Index Europe or not. Two constructs of the CSP are used in this study, both built using the same reasoning. The constructs differ in respect of the time period considered for membership of DJSI Europe. More precisely, for the main analysis in this paper, an annual assessment for the listing under the sustainability index in respect of each company in the sample was undertaken. As a result, for each year during the research period, the CSP variable is constructed. CSP is assigned the value of 1 if a firm was included in DJSI in year *t* and 0 otherwise. A second measure of sustainability performance considers not only the level of the performance, but also consistency in that level. As a result, the variable ctCSP is constructed as a dummy variable, being assigned the value of 1 if a company is included in DJSI Europe for all years during 2008 to 2012, and 0 if a company is never included in the sustainability index.

The whole analysis in this paper is intended to test whether an association exists between the level of CSP and the financial performance of the European corporations. However, the ctCSP variable in particular is designed to investigate whether firms benefit in terms of profitability from constant high CSP, as opposed to the cases of only occasional high CSP. The high level of CSP is measured by inclusion in DJSI, as recognition of the firm's ongoing commitment to CSR.

*3.4.3 Control variables*

*Size (SIZE = lnTA)*

Size of the company is a factor that has been suggested to positively affect a firm's both financial and sustainability performance (Artiach *et al.*, 2010; Trotman and Bradley, 1981). Larger firms are more visible and thus engage in more CSR activities than smaller firms. Therefore, these companies experience higher social and regulatory pressures from their stakeholders to invest in CSR compared to smaller companies. Thus, firm size was frequently used in prior studies (Becchetti *et al.*, 2008; McWilliams and Siegel, 2000) as control factor when investigating the associations between CFP and CSP. The indicator used in this study as proxy for size is total assets, which is in line with Waddock and Graves (1997). Given the initial positive skewness in firm size, the variable of interest was defined as the natural logarithm of the total assets of a company at the end of year *t*. As a result of natural log transformation, the skew in firm size for the pooled data has been reduced within normal limits.

*Leverage (LEV)*

Based on past research, debt ratio might also be expected to have an influence on a firm's CSR (Artiach *et al.*, 2010; Ullmann, 1985; Waddock and Graves, 1997). Also, McGuire *et al.* (1988) uses the level of debt as a proxy for the management risk tolerance. Leverage, as measured by debt ratio, can also be expected to be linked with the firm's CFP. In this study, leverage was defined as an accounting measure equal to a company's debt ratio, thus measured as total debt scaled by total assets at the end of year *t*.

*Growth (GROW)*
The level of growth options in the firm's investment opportunity is also seen an indicator of both CFP and CSP (Artiach *et al.*, 2010). Sales growth, as an accounting based measure, has been perceived also in prior studies to be associated with higher levels of CSP (McGuire *et al.*, 1988). Firms with higher sales growth are relatively more likely to commit resources to CSR activities. However, there were cases when, unexpectedly, firms with higher sales growth were found to be relatively less likely to commit resources to CSR. Prior literature (McGuire *et al.*, 1988) suggested that a cause for the negative association between CSR and sales growth might be due to the high social responsibility ratings of several mature firms, which may tend to have more stable earnings than other firms. Intrinsically, sales growth is related to the firm's profitability. Consistent with prior studies, in the current research, sales growth is calculated as the percent change in net sales as compared to prior period, for firm *i* in year *t*.

*Available cash flows (FCF)*
Free cash flows from operating activities are a measure of the financial capacity of the company. Ullmann (1985) documents that, when profitability is low, a firm tends to give priority to economic demands over social ones. It is generally expected that, the higher the liquidities, the higher the level of CSP, but also CFP. FCF is calculated as cash flows from operations scaled by net sales for firm *i* in year *t*.

*Systematic Risk (RISK)*
Firm risk has been opertionalized using company's *beta* as reported in Datastream WSC.

*Intensity of research and development (R&D)*
McWilliams and Siegel (2000) show that other firm-specific variables such as research and development (R&D) intensity may affect both inclusion in a rating index and financial performance and, therefore, suggest that it should also be included as a control variable. In addition, Wang and Choi (2013) found that maintaining consistently good social performance is more important for firms with high levels of knowledge intensity. R&D as a control variable is measured as R&D investments scaled by total sales for firm *i* in year *t.*

*Other control variables*
Finally, the models are designed to include industry, country and year controls as dummy variables to control for country, industry and temporal effects.

The time period of the study covers five years, from 2008 to 2012. To control for time effects, dummies for each year have been incorporated in the model approaches (1) to (4). The corresponding dummy variables were labeled '2012', '2011', '2010', and '2009', thus '2008' is considered as the omitted category.

This study includes data from a range of 16 developed European countries. To control for possible regional differences among the sampled countries, dummy variables were included in the analysis following the same principle applied for years. Country dummies take the value of one is a company is located in that particular country. Each country was assigned a unique code number from 1-16, and corresponding dummies were included in the regressions for Belgium (2), Denmark (3), Finland (4), France (5), Germany (6), Greece (7), Ireland (8), Italy

(9), The Netherlands (10), Norway (11), Portugal (12), Spain (13), Sweden (14), Switzerland (15), and United Kingdom (16) and thus treat the dummy variable for Austria (1) as omitted category.

Industry controls have also been considered in the analysis. The dummy variables used in this respect are the ones corresponding to the sectors of activity for each company, as listed in WSC. These categories are the same as the main industries according to the Industry Classification Benchmark of Dow Jones Indexes (http://www.icbenchmark.com), namely oil & gas ('1'), basic materials ('1000'), industrials ('2000'), consumer goods ('3000'), health care ('4000'), consumer service ('5000'), telecommunications ('6000'), utilities ('7000'), financials ('8000'), and technology ('9000'). The regressions have been run with the oil & gas sector as omitted category.

As a final remark, it should be mentioned that industry and country dummy variables are constant over time, hence cannot be included in the fixed effects models.

After performing the appropriate calculations, based on the initial data used in calculations of the variables, as described above, the resulting values for all variables are winsorized at the 1 and 99 percent levels to mitigate the effects of outliers and possible inaccuracies in the data (Baum, 2006). All the statistics and results presented in this paper are obtained based on the winsorised variables.

## 4. Results

The main results of the regression model, with the two proxies for CFP are included and interpreted in turn. The results reported are based on both pooled data and advanced panel data models. The reason for such a choice is explained in detail, followed by a comparison of the results obtained under different measures of CFP. The results for H2 concerned with the impact of consistency in CSP under the CFP are also presented and discussed. This section also makes reference to the robustness tests and sensitivity analyses conducted to ensure that the results are not biased or driven by specific factors.

### *4.1. Descriptive statistics*

*Table 3* presents the descriptive statistics for the dependent and independent variables. The statistics are based on a panel of 340 unique companies, 1382 firm-year observations, and the time dimension refers to period between 2008 and 2012.

**Table 3.** Descriptive statistics

| Variable* | Min | Max | Mean | Median | SD | Variance | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| ROA | -15.27 | 41.49 | 8.2120 | 7.040 | 8.3792 | 70.211 | 1.0616 | 6.2671 |
| ROE | -90.20 | 133.29 | 13.727 | 12.52 | 23.8016 | 566.51 | 0.6469 | 13.5896 |
| lagSIZE | 12.49 | 21.163 | 16.043 | 15.76 | 1.8194 | 3.3103 | 0.6204 | 3.0988 |
| lagLEV | 0 | 0.691 | 0.2607 | 0.248 | 0.1644 | 0.0270 | 0.3603 | 2.5080 |
| lagGROW | -0.49 | 0.83 | 0.0609 | 0.054 | 0.1945 | 0.0378 | 0.7301 | 6.3941 |
| lagFCF | -0.41 | 0.77 | 0.1640 | 0.130 | 0.1670 | 0.0279 | 0.7536 | 6.2502 |
| lagRISK | 0.01 | 2.83 | 0.9330 | 0.870 | 0.6364 | 0.4050 | 0.6676 | 3.0573 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| lagR&D | 0 | 0.26 | 0.0356 | 0.014 | 0.0564 | 0.0031 | 2.4745 | 8.9036 |

*For a complete description of variables, please refer to section 3.3

The data in *Table 3* shows that, even after winsorising, both current year and lagged FCF, GROW, and R&D in particular, still display some considerable dispersion and skewness due to the influence of some extreme values. In a normal distribution, the skewness and kurtosis coefficients are zero and three, respectively, for a normal distribution (Baum, 2006). It can be seen therefore that the distributional properties of the dependent variables are also distorted, especially for ROE. The distributional assumptions of parametric tests are less likely to be conformed upon by these variables. However, the distribution of other variables is less skewed and appears to be normally distributed after winsorising.

Pearson correlations among all variables are presented in *Table 4*. Significance at 0.01 level using two-tailed tests is indicated by values in bold. The bivariate correlations between CSP, and ROA and ROE possess a negative sign, with both measures being significantly correlated (p-value<0.01) with prior level of CSP. ROA and ROE are also negatively correlated with ctCSP, the proxy for consistent inclusion in the DJSI Europe over the five years sample period. The correlation coefficients and the significance values for the multiple proxies of the dependent variable and various measures of the main independent variable are presented in *Table* 4. These correlations provide initial evidence for a negative relation between the CFP and CSP, regardless of the various proxies used for either variable of interest. However, it should be noted that this is before controlling for other characteristics that research has shown to be associated with CFP.

**Table 4.** Pearson correlation matrix

**Mutual correlations between dependent and lagged explanatory variables**

| **Variable** | ROA | ROE | lagCSP | lagSIZE | lagLEV | lagGROW | lagFCF | lagRISK | lagRD |
|---|---|---|---|---|---|---|---|---|---|
| ROA | 1 | | | | | | | | |
| ROE | **0.6031** | 1 | | | | | | | |
| lagCSP | **0.0665** | **0.0546** | 1 | | | | | | |
| lagSIZE | **0.4271** | **0.2159** | **0.3757** | 1 | | | | | |
| lagLEV | **0.1959** | **-0.055** | 0.0088 | 0.1314 | 1 | | | | |
| lagGROW | **0.0986** | 0.02 | **0.0978** | **0.0804** | 0.0002 | 1 | | | |
| lagFCF | **0.1796** | **0.1064** | 0.0343 | 0.0219 | **0.0748** | 0.0789 | 1 | | |
| lagRISK | **0.1984** | **0.1399** | **0.1022** | **0.2115** | **0.0524** | **-0.0575** | **-0.0706** | 1 | |
| lagR&D | 0.0108 | 0.0364 | 0.0136 | **0.1607** | **0.1824** | 0.0067 | -0.0101 | -0.0567 | 1 |

*For a detailed description of variables, please see Section *3.4 'Measurement of variables'*

** values in bold represent significance at 0.01 level

Correlations between independent variables provide no indication that an unacceptable level of multicollinearity is present in the data. Variance inflation factor (VIF) values are well below 10.0 in all models presented in *Table 4*, indicating that multicollinearity is not a concern (Kennedy, 1992) and should not be expected to distort the estimation results. Furthermore, the correlation matrices show positively significant coefficients between all three measures of CFP, and significant negative coefficients between firm size and CFP as opposed to significant positive coefficients between SIZE and CSP. Although opposed in terms of direction of the relation, the significant correlation coefficients suggest that there is strong association between the two variables of interest.

### *4.2 Results of the regression analyses*

**Table 5.** CFP and CSP relation - results of regressions under various approaches

| Explanatory variables | Dependent variable = **ROA** | | Dependent variable = **ROE** | | **CFP and consistent CSP associations** | |
|---|---|---|---|---|---|---|
| Type of econometric model | | | | | **ROA** | **ROE** |
| | OLS | FE | OLS | FE | FE | FE |
| lagCSP | 1.7238*** | -0.8289 | 1.8689 | -4.0150** | 5.4041*** | 12.9660*** |
| lagSIZE | -1.3688*** | -4.6122*** | -1.8596*** | -11.9028* | -4.3530*** | --9.0274 |
| lagLEV | -7.8973*** | 4.8718* | 0.3249 | 31.6844* | 5.7881* | 37.6266 |
| lagGROW | 4.3793*** | 3.2320* | 1.6735 | 1.9392 | 2.9199 | -0.7187 |
| lagFCF | 24.9183*** | 7.3060 | 38.3846*** | 26.4966 | 7.1139 | 27.3724 |
| lagRISK | -2.3754*** | -1.1612 | -7.9919*** | -14.1328 | -2.5621 | -21.5979* |
| lagR&D | -12.2733** | -24.5963 | -27.0281* | -91.0680 | -26.2599 | -84.0471 |
| Intercept | 30.61035*** | 81.3640*** | 45.8554*** | 207.2832** | 76.4203*** | 162.662* |
| F statistic (all parameters) | 20.98 | 7.67 | 6.55 | 4.83 | 6.75 | 3.20 |
| p-value | (<001) | (<001) | (<001) | (<001) | (<001) | (<001) |
| $R^2$ overall | 0.3462 | 0.1173 | 0.1418 | 0.0522 | | |
| Hausman stat. | | 82.69*** | | 24.80*** | - | - |
| No. of obs. | 1382 | 1382 | 1382 | 1382 | 1092 | 1092 |
| No. of groups | - | 340 | - | 340 | 269 | 269 |

*indicates significance at 10% level; **indicates significance at 5% level; ***indicates significance at 1% level

Time period 2008-2012; Industry, Year and country dummies included in the OLS models and Year dummies included in the FE models.

For detailed definitions and measurement of variables, please see subsection *3.4 'Measurement of variables'*.

*Table 5*, provided above, comprises the parameter estimates of the regressions based on pooled data and panel data modes. The basic model has been run, making use in turn by each of the two proxies for profitability. The results reported under the basic models are based on

a panel with 340 unique firms and 1.382 firm-year observations, for a time horizon of five years, ranging from 2008 to 2012.

All the regression coefficients have been estimated by controlling for industry, year, and country fixed effects in the case of pooled data and random effects models. The inclusion of all 15 country dummies (considering one omitted dummy variable) qualitatively led to similar estimation results for the main explanatory variables. However, the parameter estimates for these additional control variables in the pooled regression and random effects models are not reported for brevity.

The relevant corresponding statistic tests are provided for each of the model approaches. According to the F tests in the pooled regression models and fixed effects models, as well as the Wald tests in the panel data random effects models, the null hypotheses that all parameters are jointly zero can be rejected without exception at all common significance levels.

*4.2.1 Pooled data regression model results*

In the pooled regression models, results show that high-CSP is significantly positive associated with CFP, as proxied by ROA, but no relation exists between the inclusion in DJSI and ROE an alternative accounting measure of performance. These results contradict the initial direction of the relation between the main variables of interest identified based on the correlation matrix.

The positive and significant univariate correlation coefficients provide evidence that a high level of CSP, as proxied by membership of DJSI Europe is positively related to ROA. It is interesting to notice also that, while the pooled data models indicate a strong positive association between CSP and CFP, a neutral relation appears to exist between sustainability and financial performance, when the latter is measured by ROE. Partial support can be found in these results to reject H1, which predicted no association between CSP and CFP, showing a positive relation when CFP is measured by ROA. The insignificant coefficient for ROE support however H1. The inconsistent results result in an inconclusive conclusion on the association so far in our paper.

Furthermore, in line with the univariate correlation coefficients according to *Table 5*, particularly firm size and risk are negatively related with CFP, while cash flow availability appears to be positively related to CFP in all pooled regression models at the 1% significance level. Finally, firm's leverage has a negative impact on both ROA and ROE, as accounting measures of profitability.

However, the results of the OLS regression model have been interpreted with caution, and no sound conclusions have been drawn based on these coefficients, given the concerns raised by some authors in relation to this methodological approach. Overall, the results obtained and reported under the pooled OLS regression models do serve for comparison purposes with similar studies, but are not considered as a single definitive basis for drawing conclusions.

*4.2.2 Fixed effects panel data regression model results*

Further analyses have therefore been conducted to test the research question under more strictly designed models. In the case of the current paper, it has been decided to follow a panel data approach, and the results of Hausman statistic has indicated that fixed effects

models should be used in the analysis (Baum, 2006). The Hausman test pointed towards FE models instead of random effects in the panel data setting. Becchetti *et al.* (2008), Garcia-Castro *et al.* (2010) and Ziegler (2012) also used fixed effects models in order to control for unobserved firm heterogeneity in their panel data analysis.

Results reported in columns three and four of *Table 5* show that the coefficient for CSP is statistically insignificant when CFP is measured by ROA. This finding strongly contradicts the evidence provided by the pooled data OLS, under which a strongly positive association was found between the two variables. This contradiction is consistent with the predictions made by prior literature that different results would be reported under different approaches. Furthermore, due to the fact that some studies have demonstrated that the OLS method is generally the more biased one, a greater weight and importance is attached to the results of FE models. As such, when CFP is proxied by ROA, the results support our testing hypothesis H1, showing no relation between the variables of interest.

Surprisingly, the FE models report a negative association between CSP and CFP, when proxied by ROE. While at first glance the significant coefficients for ROE but not ROA contradicts the evidence provided by the pooled data models, the negative relation is consistent with the initial results shown by the correlations between variables. Taken together, no strongly conclusive evidence is found to accept or reject H1. Given the mixed evidence obtained, it could be said, however, that the relation appears to be sensitive to the measure used for CFP. When CFP is measured by ROA, H1 can be accepted considering the results of FE regressions, as these were stated in the null form. When CFP is measured by ROE, under the same line of evidence, the first hypothesis should be rejected, as they predicted no relation between CSP and CFP.

Arguments for the negative impact can be found in the explanation that the operating costs of CSR activities outweigh their financial benefits. As a consequence, high CSP can lead to reduced profits (ROE). It would be expected that engaging in socially responsible activities leads to a better reputation, and such reputation is assumed to be (have been) gained, as a result of listing under the sustainability index, which could indirectly lead to better CFP. However, the results of the analysis reveal the contrary. However, the negative relation might be present only on the short term. For example, if a company has been listed on the index for the first time, it could be assumed that it has been involved in increased volume of CSR activities to obtain membership. On the long term though, the membership could result in increased reputation, which could indirectly impact on CFP. Whether temporal consistency in CSP is indeed important is an aspect that will be considered in an additional analysis whose results are presented in the next subsection.

*4.2.3 Results of testing the CFP – CSP association under consistent CSP*

The results reported so far in the paper were based on an analysis that tested whether an association exists between the level of CSP and the CFP of the European corporations, when CSP was assessed on an annual basis. However, this subsection presents the results of the analysis conducted using the ctCSP variable. This variable is specially designed to investigate whether firms benefit in terms of profitability from constantly high CSP, as opposed to the cases of only occasional high-levels of CSP. The results of testing the association, when CSP is

proxied by a measure that takes into account temporal consistency are presented in the last two columns of *Table 5.*

Results show that the coefficient for ctCSP is positive and significant at $p < 0.01$ in the model that uses ROA as proxy for CFP. These results are consistent with the OLS test results reported earlier, but in contradiction with the insignificant results for ROA under previous FE models. When CFP is measured by ROA, H2 is supported.

Furthermore, the additional analysis confirms a positive relationship between CSP, as proxied by a measure that considers temporal consistency, and CFP, as proxied by accounting based measures of performance as it can be seen in the lagged variables model. This analysis therefore suggests that in a model that embedded simultaneity biases through the means of lagged variable and temporal effects are controlled for, CSP and CFP are positively related, when CFP is measured by either ROA or ROE. Taken together, these results provide support for the second hypothesis.

### *4.3 Robustness tests and sensitivity analyses*

Following the argument of Ziegler and Schröder (2010), we analyze panel data with advanced econometric techniques to control for unobserved firm heterogeneity over time. This approach controls for the endogeneity problem (Garcia-Castro *et al.*, 2010), and also addresses problems that can lead to biased and inconsistent estimations (Ziegler and Schröder, 2010). These risks, together with the simultaneity bias, are also mitigated by means of lagged variables that have been introduced in the model used in the analysis, as has been explained in subsection *3.3 'Model specification'*.

Furthermore, to ensure that no heteroskedasticity exists in the data, we controlled within each model when run in Stata 12.0, by use of the commands robust in pooled data models and vce(robust) in fixed effects models, respectively (Baum, 2006). All the reported results were obtained under this constraint. The command was however removed for the purpose of comparing the suitability of fixed versus random effects models, as the Hausman statistic cannot be used with vce(robust) or p-weighted data.

United Kingdom (UK), Germany, and France comprise approximately 24%, 15%, and 14% respectively of the pooled sample of companies, under both types of CSP measures, while other countries represent individually less than 10% of the sample. To mitigate the concern that these countries are driving the results, each of these countries is deleted from the sample, one at a time. Moreover, to ensure that results are robust to a sample of only 'sectorial' companies, the two industries with the highest weights in the pooled sample (i.e. Financials and Industrials) are removed in turn from estimations. Results (untabulated) are not altered. Removal of France and 'Industrials' from the sample produce, individually, the same unaltered results, with one common exception. In both cases, the estimation coefficient for ROA in the FE models with annually assessed CSP is negative and becomes significant at 10% significance level. Results appear therefore to be slightly sensitive to the inclusion of French companies or industrial companies in the analysis, even if controlling for country and sector specific fixed effects. When these are removed, the results for ROA are similar to those found for ROE, and should be interpreted in the same manner. All other results in respect of

the main independent variable compared to those in the tables presented above are very similar in terms of the signs of the coefficients and statistical significance.

## 5. Conclusion, limitations and directions for future research

### *5.1 Conclusions*

This study attempted to further investigate the relation between companies' corporate sustainability performance and their corporate financial performance. Based on a methodological approach consistent with the one employed by prior empirical studies in the area, the econometric analyses, based on panel data, have tried to offer insights on whether CFP among the companies in developed European countries is a function of the level of the firms' CSP.

In contrast to the vast majority of prior studies, this paper adopted a European perspective. As a result, the empirical analysis used as starting sample the companies included in the STOXX Europe 600 Index at the end of year 2012. The proxy measures for CSP across firms and countries were determined in accordance with companies' membership in the Dow Jones Sustainability Europe Index between 2008 and 2012. The categorization of companies as high-CSP is therefore determined by reference to the prominent DJSI Europe, which comprises the world-wide leading corporations in terms of sustainability performance (DJSI Europe Index Guide, 2013).

Consistent with some recent studies, which have provided evidence that consistency in CSP is positively associated with CFP, a similar measure was considered in this paper also. This type of analysis differed from the main one in that the level of CSP was assessed by reference to the inclusion in the DJSI Europe during the whole period of the study as opposed to the index inclusion on an annual basis. Adopting this view implied running the same models, but considering this time only companies that were consistently included or excluded from DJSI Europe during 2008 – 2012. The results of this analysis under fixed effects panel data models were reported in the paper.

Similar to prior researches, this study was based on two proxies for CFP, with a focus on accounting based measures. More precisely, CFP was inferred by statistical properties of firm's profitability with respect to ROA, and ROE. Out of a range of determinants that were identified in prior studies to have an influence on both CSP and CFP, we employed in this study corporate size, leverage, the availability of cash flows, net sales growth, firm risk, and the level of R&D investments as distinctive firm-related characteristics to control when investigating the association of interest.

The overview of existing studies has revealed a variation in the econometric tools and models used to investigate the relation between CFP and CSP. Although some of the more recent studies have argued strongly against the use of pooled OLS models, for example, this approach has not been completely abandoned. Moreover, the majority of the earlier studies have tended to use mainly OLS and the reported results are frequently used for reference in subsequent studies. As a result, in terms of methodological approach, this study has used both pooled regression models, as well as more advanced fixed effects panel data models. In

the end, this choice resulted in increased comparability options with a wider range of researches allowing for a 'like-like' comparison with the results obtained under different models.

The application of OLS regression models has revealed a stronger significantly positive impact of high CSP on CFP, when proxied by ROA, but no relation exists between CSP and ROE. These results are consistent with the reported findings of the prior studies based on a similar methodological approach. However, the results of the OLS regression models have been interpreted with caution, and no sound conclusions have been drawn based on these coefficients, given the concerns raised by some authors in relation to this methodological approach (Becchetti *et al.*, 2008; Garcia-Castro *et al.*, 2010; Telle, 2006). These studies have shown that the restricted panel data model is subject to some significant biases and, as a result, the studies propose alternative approaches that are claimed to be more appropriate to investigate the CSP-CFP association. One of these approaches refers to the use of more flexible panel data models, and has been adopted in this paper. On the basis of corresponding firm-level panel data, fixed effects models are applied, as some studies have suggested that these are able to include unobserved firm heterogeneity.

When FE models are used, the coefficients for CSP are statistically insignificant when CFP is measured by ROA. This finding strongly contradicts the evidence provided by the pooled data OLS, under which a strongly positive association was found between the two variables. This contradiction is consistent with the predictions made by prior literature that different results would be reported under different approaches. Furthermore, due to the fact that some studies have demonstrated that the OLS method is generally the more biased one, a greater weight and importance is attached to the results of FE models. The FE models report a negative association between CSP and CFP, when proxied by ROE.

The overall weak or neutral effect (in case of ROA) and negative effect (in the case of ROE) of CSP on CFP can be explained by several factors. High CSP, measured by inclusion in an index, has on one hand the potential to drive higher firm reputation which, in turn, can impact positively on the financial success of the company. On the other hand, undertaking activities that are necessary for the inclusion in the DJSI Europe could be the answer to existing market pressure, and in this case can be seen as impacting negatively on the CFP. This is in line with the reasoning that achieving a high level of CSP involves the use of resources, which are necessary for the inclusion in DJSI Europe, and which can lead to additional not directly productive costs.

However, it could be said that the estimation results do provide stronger overall support for a negative impact of CSP on CFP. The negative relation holds true in the fixed effects models only when profitability is measured by ROE and CSP is proxied by a measure that assesses inclusion in DJSI on an annual basis. When the analysis is taken a step further, to include temporal consistency in the construction of the main explanatory variable, the sign of the association changes (for ROE) and/or becomes significantly positive (for ROA). This change provides support for the evidence reported by previous studies (Artiach *et al.*, 2010; Laurenço *et al.*, 2012; Wang and Choi, 2013) that make use of a similar measure for CSP. Thus, it can be argued that, even if on the short term firms seem to be negatively affected in terms of profitability, on the long term they can benefit from showing a consistent high CSR behaviour.

Overall, no single converging conclusive evidence is found for the association between CSP and CFP. Moreover, given the variations in the CSP – CFP relation under OLS and FE models, and the mixed evidence for the same proxy, the study concludes only limited support for the first hypothesis. Our analysis also shows that once simultaneity biases and temporal effects are controlled for, CSP and CFP are positively related, when CFP is measured by either ROA or ROE. This evidence provides support for accepting H2. Taken together, the findings of this paper suggest that the CSP – CFP relation is sensitive to the inclusion of firm specific heterogeneity in the econometric models, and the choice of proxy for each of the two variables.

### *5.2 Limitations and implications for future research*

This study is subject to some limitations that will be expanded upon below. In the same time, the limitations of the current study can easily be seen as implications for future research. Such directions for future research are identified in the last paragraph, following the identified limitations.

First, the sample only includes developed European countries, and this fact could bias the results if these countries are systematically different in some aspects from other European countries, in particular emerging market countries. However, the sample countries are representative of developed European countries, on which this study was particularly focused upon.

Second, the starting point of the company selection and sample construction is represented by the composition of STOXX Europe 600 Index, which is an equity index that includes only large companies, based on their market capitalization. Hence, the study could suffer from a sample-selection bias, by including only large companies listed on the developed European countries' main stock exchanges. Given these possible biases, inferences drawn from the study may not be generalized to a whole range of European countries, or to small and/or or public companies in these countries.
Thirdly, the whole paper is based on a measure of CSP constructed by reference to the inclusion in a sustainability index. An underlying assumption is therefore the fact that the inclusion in the DJSI Europe is an appropriate indicator of CSP. However, DJS Indices are based on a best-in-class approach. This implies, for example, that less sustainable firms might be listed under the index if they are the leaders in unsustainable sectors, while sustainable companies might not be included if they are not leaders in overall sustainable sectors. Furthermore, as already mentioned, the inclusion in the sustainability index requires companies to be listed under a stock market index, with a minimum of market capitalization coverage of 20% for each Dow Jones supersector required to be reached, besides the assessment related to corporate sustainability performance. Therefore, it appears that the composition of the DJSI Europe is biased towards large corporations. Taken together, all these factors could lower the quality of the inclusion in the DJSI Europe as the proxy measure for CSP.

All of these limitations could materialize into future research questions. As such, it would be interesting to investigate whether the results of the current study still hold among a sample

of companies in emerging market countries, or what results would yield an international perspective approach. Another research direction could result in investigating whether an association exists between CFP and CSP of small or public companies, and, if any, what is the sign of that relation. Future researches could also focus on the examination of what differences and/or similarities can be revealed when using a different setting or time frame as compared to the particular one used in this paper. The analysis of the causality of the relation between CFP and CSP is another possible direction for further research. Furthermore, an analysis of alternative indicators of CFP, for example market-based oriented could also be the subject of future studies in the field. If the inclusion in the DJS Indexes will continue to be used as a proxy measure for CSP, it would also be interesting to further investigate whether consistency (be it temporal or of another nature) in the sustainability continues to be a real trigger of high CFP.

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