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Are investments in material corporate social responsibility issues a key driver of financial performance?

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Abstract

In this study, we address a lesser-studied aspect of corporate social responsibility (CSR): distinguishing between investments in material versus immaterial CSR issues. The financial performance of stock portfolios formed according to material and general CSR issues is examined over the period 2007 to 2018 in the European Union and the United States. We find that materiality is relevant to finding the best and worst firms both in terms of CSR and financial performance, more significantly in the EU than in the US market. However, general CSR scores, including material and immaterial issues, do not discriminate the best firms.

Key words: Corporate social responsibility; Material CSR issues; Non-financial information; Portfolio performance evaluation; Socially responsible investing

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[Correction added on 24th May 2022, after first online publication: The copyright line was changed.].

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1. Introduction

As early as 1924, Sheldon (1924) introduced the concept of corporate social responsibility (CSR). Almost a hundred years later there is still an extensive ongoing debate about the relationship between CSR and corporate financial performance (CFP). Prior evidence is inconclusive, with some studies finding a positive link between CSR and CFP, and others showing a negative or non-existent relationship (Barauskaite and Streimikiene, 2021; Huang, 2021). Researchers have asserted that inconsistent findings in prior studies may be due to the neglect of factors such as measurement errors, mis-specifying models, undersized and multi-industry samples, multi-dimensionality of CSR, curvilinear relationships or immaterial CSR investments (Wood and Jones, 1995; Khan *et al*., 2016; Javed *et al*., 2016; Man, 2017; Chen *et al*., 2018; Hinze and Sump, 2019; Huang *et al*., 2020). One major problem in CSR is the guarantee of quality. When investments are made in sustainable firms, what guarantees are there that they really are? Non-financial information auditing systems are still underdeveloped, and some recent examples of companies once considered to be highly responsible have suffered major environmental mishaps (e.g., Volkswagen) or legal non-compliance issues (e.g., Apple). As Arribas *et al*. (2019) show, controversial firms appear on sustainable indices. It is therefore necessary to continue working on the quality of non-financial information (Przychodzen *et al*., 2018; Goicoechea *et al*., 2019; Chen *et al*., 2021).

Despite conflicting results, institutional and private investors have gradually incorporated socially responsible firms into their investment portfolios (Ferruz *et al*., 2012). They evaluate not only financial criteria (returns and risk) in their investment decisions, but also the non-financial attributes of socially responsible investing (SRI) (Galema *et al*., 2008). Environmental, social and governance (ESG) issues are becoming more important in investors' decision-making, in efforts to help identify the long-term opportunities and risks for firms. Rising individual awareness of environmental, social and ethical issues is strongly influencing purchasing decisions of investors (Mollet and Ziegler, 2014). Asset managers have considered ESG criteria across $11.6 trillion in assets, an increase of 44 percent from $8.1 trillion in 2016 (USSIF, 2018). The EUROSIF (2018) report discloses sustained growth for the most sustainable and responsible investment strategies. The period 2016–2018 showed signs of SRI becoming integral to European fund management.

Many firms are also paying closer attention to CSR policies, strategies and demands. A positive relationship between CSR and CFP may be attributable to the fact that only successful firms have the resources to engage in CSR-related activities (Ullmann, 1985). However, CSR may positively influence CFP in several ways. In fact, many prior literature review studies document a positive effect of CSR on CFP and valuation (e.g., Orlitzky *et al*., 2003; Margolis *et al*., 2009; Lu *et al*., 2014; Javed *et al*., 2016; Man, 2017). Firms enhancing, for instance, employee incentives may achieve higher levels of worker motivation,

thereby increasing their productivity and resulting in more efficient manufacturing processes. Therefore, improving incentives will have positive effects on corporate products, brand and reputation, resulting in a likely increase of sales. Firms improving, for instance, manufacturing processes using new technology may, for example, reduce emissions, process time and work accidents, and enhance employees' safety, resulting in lower costs from safety issues such as infractions and penalties. This could positively affect community relations and help firms to obtain alternative and additional financial resources from socially conscientious intermediaries.

In this study, we address a lesser-studied aspect of CSR: distinguishing between investments in material versus immaterial CSR issues. Khan *et al.* (2016) highlighted that one potential reason for the inconclusive results on the link between CSR and CFP is that prior studies do not distinguish between CSR issues that are material for a firm versus immaterial CSR issues. Material aspects refer to issues that, when managed effectively, represent a significant contribution to the firm's value, but if not, may lead to a significant loss of value and opportunities to create or preserve future value (Eccles and Youmans, 2016). Firms paying attention to CSR issues associated with their main operations and focused on enhancement in the material areas where their performance is lower, will gain a competitive advantage over their competitors and achieve higher corporate social and financial performance (Khan *et al.*, 2016).

Material CSR issues are those that have a significant financial impact for firms in a particular industry. Material CSR relates to CSR activities that are value-enhancing to the firm. By contrast, immaterial CSR activities are either value-neutral or value-destroying. Herz and Rogers (2016) noted the importance of using a targeted approach to rating ESG practices of firms based on material items for each industry. For instance, for automobile firms, investors want to evaluate progress on developing alternative fuel vehicles to curb use-phase emissions and capitalise on changing consumer preferences. In the case of commercial banks, investors want to know about financed activities, such as loans to oil and gas companies, and to industrial and utility companies. For software and IT companies, investors want to know the energy intensity of data centres, which carries regulatory and reputational risks along with innovation opportunities.

According to the *2019 ESG Trends to Watch* report (MSCI, 2019), investors now have to turn their attention from data proliferation to relevant signals. Although there is a lot of ESG and sustainability information disclosed publicly, often it is difficult to identify and assess which information is the most useful for making financial decisions (Beske *et al.*, 2020; Haji *et al.*, 2021). Investors are currently becoming familiar with the ESG data framework, but the most successful will be those who recognise that they have an advantage only if they have a clear view of a material signal. From now on, having more data will be the easy part; the hard part, and material, will be

identifying the most important signal to achieve an improved financial performance. The Sustainability Accounting Standards Board (SASB) has developed the Materiality Map to help investors in this regard. It allows both investors and firms to identify financially material issues across different industries, which are reasonably likely to impact the financial condition or operating performance of a firm in a significant way. Materiality is relevant to firms so they can focus their CSR strategies on the most important issues; for investors, materiality is important in evaluating portfolio exposure to specific material and immaterial CSR risks and opportunities.

This paper assesses the financial performance of stock portfolios formed according to material CSR issues and general CSR issues over the period 2007–2018. Our main research question is the following: Are investments in material CSR issues a key driver of financial performance? Khan *et al.* (2016) showed that US firms with strong performance on CSR material aspects outperform firms with poor performance. Our original dataset includes companies from the United States (US) and the European Union (EU) – although not all listed European countries belong to the EU, we grouped them under this designation. Evaluating firms from the US and the EU is particularly interesting given the heterogeneity in the patterns of development of SRI across countries (Neher and Hebb, 2016; Garcia and Orsato, 2020). The extension of SRI research to other geographical areas is further motivated by Hörisch *et al.* (2015), who indicate that country-specific factors tend to affect the relationship between corporate social and financial performance. Badía *et al.* (2020) find that the financial impact of socially responsible investing is geographically dependent. Also, investors' ESG concerns can differ from region to region. For instance, Eccles *et al.* (2011) found that European investors are more concerned with environmental information, while US investors are more interested in governance issues. In turn, Cortez *et al.* (2012) identified geographical differences in the investment style of socially responsible funds.

We use firms' scores from an original dataset, TruValue Labs, which, as far as we are aware, has not been used before in this regard. TruValue Labs has integrated the SASB Materiality Map standards into the TruValue Labs dataset. TruValue Labs collects and analyses information related to the leading industry standards set by SASB for ESG factors that are material for financial performance in each industry. Data is collected from more than 100,000 sources to provide insights and analysis for positive and negative portfolio filtering and company monitoring. Using TruValue data, Serafeim (2020) assesses how the market pricing of firms' CSR practices may be affected by public sentiment and how it may impact returns of portfolios based on ESG criteria. He uses a measure of the direction, or trend, of ESG performance of a firm (momentum score). From TruValue data, we use the insight score, which reflects the enduring sentiment around a firm over time. The insight score is less sensitive to daily events and measures a company's longer-term ESG sentiment.

Whereas the momentum score measures the trend of ESG performance of a firm, the insight score measures long-term ESG performance of the firm.

In order to evaluate the financial performance of portfolios and check the robustness of our results, we use several financial performance measures. The magnitude and sometimes even the sign of the long-run abnormal returns are sensitive to alternative measurement methodologies (Fama, 1998; Loughran and Ritter, 2000). Specifically, we use the penalised internal rate of return (Gómez-Bezares and Gómez-Bezares, 2012) and the four-factor Carhart (1997) model. Our results are also robust to alternative specifications such as the Sharpe ratio and the 6-factor model (as in Fama and French, 2018). Our results are displayed graphically, which allows us to clearly observe the effect of investing in material and immaterial CSR aspects on financial performance.

The structure of the paper is as follows: Section 2 presents an overview of the effects of CSR on financial performance and provides the development of our hypotheses. Section 3 describes the data and Section 4 contains the empirical analysis. Section 5 discusses our main findings and Section 6 summarises the main results and offers some concluding remarks.

2. CSR insights and hypotheses

Many studies have hypothesised the effects of CSR strategies on firm stakeholders (Hoepner *et al*., 2016; Xie *et al*., 2019). Man (2017) highlighted that CSR affects all aspects of firms, both internal corporate operations and behaviour of external stakeholders. According to Armstrong and Green (2013), stakeholders are creditors, consumers, distributors, employees, local communities, suppliers, owners; i.e., 'any group of individuals who can affect or is affected by the achievement of a firm's objectives' (Freeman, 1984, p. 40). Obviously, employee motivations and rights are a key aspect of the economic health of firms. Companies enhancing employee relations can, for example, encourage employees to be more efficient, to take greater care in their relationships with clients and suppliers, to accept voluntary work and, in the end, align employee motivations with corporate goals, therefore increasing employee productivity and the firm's economic performance. Sharing goals with suppliers and knowing their needs seems relevant to establishing efficient supply chains and therefore avoiding problems with provisions or manufacturing processes. CSR is becoming increasingly important in the corporate arena, yet its expansion is dependent on the supply chain relationship (Chen *et al*., 2019). Creditors exhibit a positive view of the long-term perspective and stability that CSR implies, and also the local community, given its sensitivity to issues such as a good working climate or caring for the environment. On the other hand, CSR strategies may provide firms with a reduction of corporate risks related to environmental concerns. Firms concerned with environmental aspects are better equipped to deal with environmental requirements and to innovate in cleaner manufacturing processes. The participation of firms in ESG

activities provides a stimulus to the mechanisms for building firms' innovation capacity, which in turn has an impact on their performance levels (Broadstock *et al*., 2020). Innovation in social and environmental aspects allows firms to search for and achieve joint solutions to problems linked to stakeholders (Alonso-Martínez *et al*., 2019). Open innovation creates new solutions calling for significant stakeholder interaction to achieve them (Chesbrough, 2003; Cook *et al*., 2019). Solving problems in society demands a constant collaboration among all actors, and social innovation is crucial to transform an idea into a solution that creates value for stakeholders (Osburg, 2013). By improving CSR strategies and showing them to stakeholders, firms can enhance the reputation associated with the brand and increase their financial performance. Reputation is a bottom determinant in the relationship between CSR and financial performance of firms (Javed *et al*., 2020). Reputation benefits consumer perceptions and tends to decrease consumers' price sensitivity and increase their brand loyalty.

Prior empirical studies evaluated these arguments. For example, Filbeck and Preece (2003), Fulmer *et al*. (2003) and Edmans (2011) assessed the relationship between employee satisfaction and financial performance of firms using stocks listed in the '100 Best Companies to Work For in America'. They found that companies with stronger employee satisfaction outperformed conventional firms. Derwall *et al*. (2005) compared the financial performance of two stock portfolios that differ in eco-efficiency characteristics and found that a portfolio of high-ranked eco-efficiency firms outperformed a portfolio of low-ranked ones. Filbeck *et al*. (2013) assessed whether the fact of being listed on public surveys of exceptional companies (e.g., *Business Ethics*' 'Best Corporate Citizens') adds value to a portfolio. They found that firms on the 'Most Admired Companies' and the 'Best Corporate Citizens' rankings are the most influential.

Despite these results, there is little consensus in the empirical evidence of the benefits of CSR activities on the financial performance of firms (Badía *et al*., 2020). One potential reason for the inconsistent results is the fact that studies do not distinguish between material and immaterial CSR issues (Khan *et al*., 2016). However, only firms focused on material CSR issues associated with their main operations should gain a competitive advantage and achieve a higher social and financial performance. CSR activities and innovations should be performed on material aspects, because otherwise a positive effect on financial performance is not expected. Indeed, investments in immaterial issues may involve additional corporate costs without any associated social and financial performance return. For example, for a bank, evaluating the CSR policies of their clients before granting a loan is a material aspect aligned to their industry activity; however, caring for the conservation of marine ecosystems is an immaterial aspect, as it is not linked to their industry operations. Focusing on material issues is important for firms, as they invest in social aspects that profoundly affect their operations. Despite the fact that

issues such as product safety, climate change and resource use intensity have an impact across several industries, as Herz and Rogers (2016) noted, those effects often vary to a great extent from one industry to the next. Risks may be everywhere, although they are indeed also specific. Consequently, firms in specific industries have their own particular CSR profiles. Therefore, a firm investing in material CSR issues is likely to achieve positive financial performance. Meanwhile, a firm investing in material but also in immaterial CSR issues is not likely to achieve superior financial performance. These arguments lead to our first two hypotheses:

Hypothesis 1: Firms scoring high on material CSR issues outperform firms scoring low on these issues.

Hypothesis 2: Firms scoring high on material and immaterial CSR issues perform similarly to firms scoring low on material and immaterial CSR issues.

In this paper, we evaluate firms from the US and the EU. This assessment is of particular interest given the heterogeneity in the patterns of development of CSR and the different SRI strategies implemented in these regions (Neher and Hebb, 2016; Miralles-Quiros *et al.*, 2017b; Cahan *et al.*, 2021). Louche and Lydenberg (2006) explored the development and main practices of CSR and SRI in the US and EU markets, and showed that there are differences in terms of definitions of CSR, SRI screening strategies, actors involved in leading CSR roles, and approaches to engagement with firms in the CSR community. For example, they noted that in Europe, environmental issues carry greater weight than in the US. Eccles *et al.* (2011) also identified the fact that European investors are more interested in environmental aspects, while US investors are more concerned with governance issues. In fact, they noted that, in the US market, there is considerable scepticism about the potential effects of climate change. The findings of Badía *et al.* (2020) confirmed the regional and cultural idiosyncrasies in SRI showing that North American firms are more sensitive to governance issues, while European firms paid closer attention to social and environmental demands. Sandberg *et al.* (2009) suggested that there are at least three cultural and ideological differences between different regions: differences in values and norms, ideology among different SRI stakeholders and the market setting of SRI. Louche and Lydenberg (2006) argued that, indeed, differences in definitions reflect cultural differences between the US and EU markets. Despite the differences between the two regions, they both place emphasis on using the investment process as a means to change and improve the behaviour of firms on social and environmental issues. In fact, Ullmann (1985) noted that investors have the power to influence management's CSR activities, and SRI demands have led firms to be more concerned with their CSR strategies. Badía *et al.* (2019) even suggest that SRI can be used as a tool to enhance the ESG policies of countries. Their results on the financial performance of government bond portfolios formed according to ESG criteria

showed that investors screening government bonds based on their sustainability scores could influence countries in terms of ESG guiding principles.

Cultural and ideological differences between regions likely affect the financial performance of firms (Badía *et al*., 2021). In fact, empirical studies evaluating the financial performance of firms from the US and EU markets found distinct outcomes. Auer and Schuhmacher (2016), for instance, found that US firms ranked highly according to ESG dimensions performed similarly to low-ranked ones, while high-ranked European firms, depending on the industry and the ESG screening used, performed worse than low-ranked firms. Likewise, studies on specific markets showed mixed results. For example, in the US market, Borgers *et al*. (2013) and Eccles *et al*. (2014) found that firms ranked highly according to ESG dimensions outperformed low-ranked ones, but Lee *et al*. (2013) and Halbritter and Dorfleitner (2015) did not find significant financial differences between high- and low-ranked sustainable firms. In Europe, Mollet *et al*. (2013) and Auer (2016) found that high-ranked firms outperformed low-ranked ones, but Van de Velde *et al*. (2005) and Humphrey *et al*. (2012) did not find any significant differences between high- and low-ranked firms.

Both social and financial performance differences identified in prior research lead us to presume that firms from the US and the EU may perform differently. Thus, our third hypothesis is established as follows:

Hypothesis 3: Firms from the US perform differently than firms from the EU in terms of financial performance associated with CSR aspects.

3. Data

Our sample includes firms from Europe and the United States over the period from 2007 to 2018. We evaluate firms from the main stock exchanges of both regions with social responsibility scores.[1] Monthly discrete returns of all stocks are computed based on the total return series (in US dollars) collected from the Thomson Reuters database. We use the social responsibility ratings of companies provided by the TruValue Labs database to form portfolios. TruValue has been used by both researchers (e.g., Henisz and McGlinch, 2019; Serafeim, 2020) and asset managers (e.g., Calvert Research and Management) and asset owners (e.g., Brunel Pension Partnership). TruValue Labs provides an overall score and specific performance for individual categories. TruValue Labs delivers timely material CSR Insights using the SASB standards, which are widely considered the industry standard for identifying material CSR issues by industry. TruValue Labs has incorporated the SASB Materiality Map standards into the TruValue Labs dataset. The SASB's Materiality Map[2]

[1]Appendix I displays stock exchanges where firms are traded.

[2]For further information about the SASB's Materiality Map standards, visit: https://materiality.sasb.org

Table 1
Stocks over the sample period (2007–2018)

Period	US	EU
2007	118	27
2008	735	199
2009	1058	257
2010	1291	302
2011	1569	351
2012	1796	368
2013	2008	399
2014	2223	440
2015	2558	474
2016	2881	532
2017	2842	560
2018	2853	573

includes five CSR dimensions and 30 general issue categories, which make up SASB's universe of CSR issues. Underlying each general issue category is a set of industry-specific, CSR disclosure topics in the SASB standards. These categories are defined by the SASB, and the categories considered material to financial performance vary by industry. TruValue Labs is independent but it is partnered with the SASB to develop TruValue Labs SASB Edition.

Table 1 displays the evolution of the number of stocks included in the sample. As expected, the number of stocks increased throughout the sample period. Also, firms from the US market are more evaluated than firms from the EU market, likely due to the fact that the SASB was founded in the US market, seeking to create industry CSR standards for the disclosure and recognition of financially material environmental, social and governance impacts of publicly traded US firms.

4. Empirical analysis

4.1. Portfolio formation

We form portfolios using the firms' materiality score, which aggregates only the material categories, as defined by the SASB, and also using the firms' all-category score, which aggregates all 30 categories as defined by the SASB. The Materiality portfolios are formed at the beginning of each year as equally weighted portfolios of firms' stocks based on their materiality scores in the previous year.[3] We form a high-rated portfolio that comprises stocks with the

[3]TruValue Labs performs a daily update of the data: the firm's ESG score at day t is updated around 5 a.m. from the firm's ESG score at day $t-1$.

best materiality-rated firms and a low-rated portfolio that includes those with the worst materiality-rated firms. The All-category portfolios are constructed in the same way. As in prior studies (e.g., Auer, 2016; Badía *et al.*, 2020), we use different cut-offs to form the portfolios (10, 20 and 30 percent), thus allowing us to evaluate portfolios that are more restricted or broader with respect to the social criteria used. Then, we form the difference portfolio, which is obtained by subtracting the low-ranked portfolio returns from the returns on the high-ranked stock portfolio, thus representing a strategy of going long in the high-rated stocks and short in the low-rated stocks. The analysis of the performance of the long-short portfolios enables us to conclude whether there are statistically significant differences between the performance of high- and low-rated portfolios.

Table 2 presents descriptive statistics of the Materiality and All-category portfolios under different cut-offs.[4] Comparing for the different cut-offs, the high-rated portfolios show higher average returns than the low-rated ones in both markets, using materiality and all-category scores. We observe that the biggest differences appear using the materiality scores in both markets under the most demanding level, the 10 percent cut-off. This can be considered, initially, as evidence that materiality could be relevant to the financial performance of portfolios. As for standard deviation, in the EU market, the high-ranked portfolios show, in general, a similar variability of returns to low-ranked ones, whereas in the US market, the high-ranked portfolios show a greater variability than low-ranked ones. These findings encourage the use of risk-adjusted measures to evaluate the financial performance of portfolios.

4.2. *Financial performance*

Portfolio financial performance is evaluated using several approaches, in line with Scholtens (2008) and Carvalho and Areal (2016). Different methods often affect the results (Fama, 1998), hence, we use financial performance measures that are substantially different.

4.2.1. *Penalised internal rate of return (PIRR)*

To start, we use the PIRR ratio given by the following equation (Gómez-Bezares and Gómez-Bezares, 2012, 2015):

$$PIRR_p = \mu_p - \left[\frac{(\mu_m - R_f)}{\sigma_m}\right] \times \sigma_p$$

where μ_p is the average monthly return of portfolio p, μ_m is the average monthly return on the market portfolio, R_f is the risk-free rate, σ_m is the standard

[4]Appendix II displays in-depth descriptive statistics.

Table 2
Descriptive statistics

	High [10]	Low [10]	High [20]	Low [20]	High [30]	Low [30]
Panel A. EU market						
Materiality						
Mean	0.0066	0.0023	0.0066	0.0039	0.0059	0.0042
Diff	0.0043		0.0027		0.0017	
SD	0.0596	0.0600	0.0623	0.0604	0.0624	0.0621
Diff	−0.0004		0.0019		0.0002	
All-category						
Mean	0.0075	0.0045	0.0068	0.0038	0.0064	0.0042
Diff	0.0031		0.0029		0.0022	
SD	0.0616	0.0605	0.0619	0.0611	0.0622	0.0622
Diff	0.0012		0.0008		0.0000	
Panel B. US market						
Materiality						
Mean	0.0059	0.0040	0.0052	0.0041	0.0048	0.0046
Diff	0.0019		0.0011		0.0002	
SD	0.0594	0.0569	0.0584	0.0541	0.0580	0.0543
Diff	0.0025		0.0042		0.0037	
All-category						
Mean	0.0058	0.0057	0.0055	0.0049	0.0056	0.0051
Diff	0.0001		0.0006		0.0005	
SD	0.0577	0.0551	0.0573	0.0552	0.0562	0.0546
Diff	0.0026		0.0021		0.0015	

This table displays a summary statistic of the high- and low-rated portfolios at the 10% [10], 20% [20], and 30% [30] cut-offs using materiality and all-category scores. Mean (SD) is the average return (standard deviation) of portfolios. Diff is the mean (SD) difference between high- and low-rated portfolios. The full sample period is from January 2007 to December 2018.

deviation of the rate of return on the market portfolio, and σ_p is the standard deviation of the rate of return of portfolio p. The market portfolio and the risk-free asset are specific for each region, and they are obtained from Professor Kenneth French's website. In line with Gómez-Bezares *et al.* (2016), we interpret $PIRR_p$ as the reward-to-variability performance measure for total risk.

The results of applying the PIRR ratio are presented graphically.[5] Figure 1 shows the PIRR values associated with the Materiality and All-category portfolios at the different cut-offs in the EU and US markets. In the EU market, using materiality scores we find that the more restricted the cut-off is – from 30 percent to 10 percent – the better the high-rated portfolios perform, whereas the low-rated portfolios perform worse. These results suggest that

[5]Our results are consistent using the Sharpe ratio.

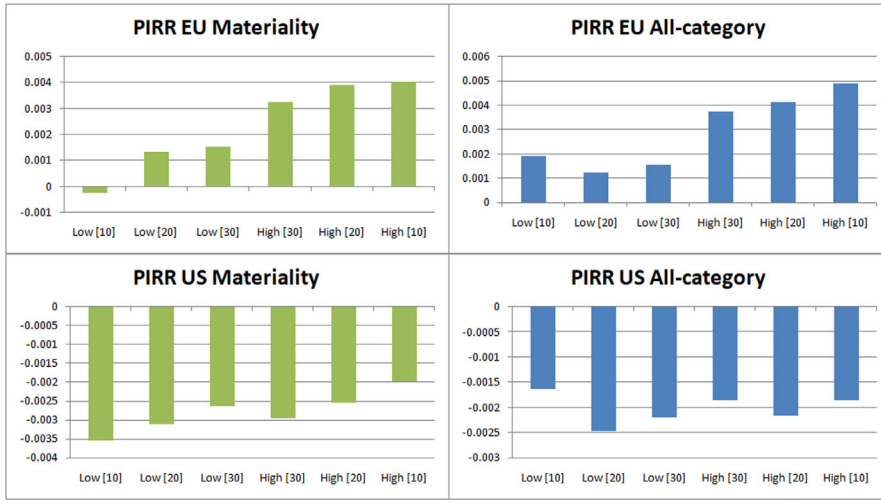

Figure 1 PIRR values associated with the Materiality and All-category portfolios at the different cut-offs in the EU and US markets. [Colour figure can be viewed at wileyonlinelibrary.com]

investors who are more socially demanding, since the firms included in their portfolios are the best in material issues, achieve better financial performance. This is in line with the claim of Khan *et al.* (2016), who noted that firms focused on material CSR issues gain a competitive advantage over their competitors and achieve a higher corporate social and financial performance. Using all-category scores, we find a similar pattern, but with some differences. The low-rated portfolio at the 10 percent cut-off achieves better financial performance than those of the low-rated portfolios at the 20 and 30 percent cut-offs. This suggests that all-category scores are not as discriminatory as materiality scores to selecting firms that are, not only the best or worst in socially responsible aspects, but also in financial performance.

In the US market, using materiality scores, we find a view similar to that in the EU market. The more restricted the cut-off used, the better the high-rated portfolios perform, whereas the low-rated portfolios perform worse, except for the less-demanding socially responsible level (the 30 percent cut-off). However, we find a quite different result using all-category scores. The low-rated portfolio performs better than the high-rated portfolio at the 10 percent cut-off. This suggests that all-category scores do not allow us to discriminate among firms performing well in socially responsible issues and also in financial performance. Firms scoring high on the all-category are, as Khan *et al.* (2016) suggested, spending corporate resources on CSR aspects that do not have a positive financial impact on firm valuation. In sum, these findings suggest that the materiality scores are more useful than the all-category scores in selecting the best firms in terms of social aspects and of financial performance.

Table 3
Correlations with respect to the ideal order

Portfolio	Spearman p	Kendall T	Hoeffding D
EU Materiality	1,0000***	1,0000**	1,0000***
EU All-category	0,8286*	0,7333*	0,5000**
US Materiality	0,9429**	0,8667*	0,3333*
US All-category	−0,0286	0,0667	0,0000

This table displays the correlation coefficients by the Spearman, Kendall and Hoeffding tests. Correlation is measured for the PIRR results of portfolios EU Materiality, EU All-category, US Materiality, and US All-category. ***, ** and * represent statistical significance at the 0.1, 1 and 5 percent levels, respectively.

It is interesting to perform an ordinal correlation analysis between the ideal order (the priority in performance coincides with the ESG requirement level of the portfolios) and the order in which the portfolio financial performance has actually been placed for the portfolios (PIRR EU Materiality; PIRR EU All-category; PIRR US Materiality; and PIRR US All-category). The correlation coefficients and their significant levels are shown in Table 3.

Although based on few observations, we find very significant results in the first case (EU Materiality), quite significant in the second (EU All-category) and third (US Materiality), and nothing significant in the fourth (US All-category). These findings confirm our previous evidence from an examination of Figure 1: (i) ranking firms by using the materiality scores is useful in sorting portfolios according to their financial performance, and better in the EU than in the US market; (ii) the all-category scores work poorly to rank portfolios according to their financial performance, although relatively better in the EU than in the US market. Additionally, we performed analyses using combinatorics and number of reversals in series, which are not included here, and the conclusions remained unchanged.

4.2.2. Multi-factor model

To evaluate portfolio performance, we also compute alphas from a multi-factor model, as, for example, in Van de Velde *et al.* (2005), Edmans (2011) and Humphrey *et al.* (2012). We examine performance using the four-factor Carhart (1997) model that allows us to capture the risk premiums associated with size and value/growth (as in Fama and French, 1993) as well as momentum, motivated by Jegadeesh and Titman (1993). The Carhart (1997) four-factor model is expressed by:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_{p,RMRF} RMRF_t + \beta_{pSMB} SMB_t + \beta_{p,HML} HML_t + \beta_{p,MOM} MOM_t + \epsilon_{p,t}$$

where $R_{p,t}$ is the return of portfolio p at time t, $R_{f,t}$ is the risk-free rate and α_p is the estimated performance measure of the portfolio. In relation to the risk factors, $RMRF_t$ represents market excess returns (relative to the risk-free rate) at time t; SMB_t is the difference between the returns on diversified portfolios of small stocks and large stocks; HML_t is the difference between the returns on diversified portfolios of high book-to-market (value) stocks and low book-to-market (growth) stocks; and MOM_t is the difference between the returns on diversified portfolios of winning and losing stocks in the past year. The betas in the model represent the estimated risk measures associated with the risk factors: market, size, value/growth and momentum. Finally, $\varepsilon_{p,t}$ represents the residuals. The specific independent variables for each region are obtained from Professor Kenneth French's website.

Table 4 displays the financial performance of the high- and low-rated portfolios as well as the long-short (L-S) portfolios.[6] Statistic alphas for the high- and low-rated portfolios are associated with outperforming the market benchmarks, i.e. conventional investments, as, for instance, in Carvalho and Areal (2016). In the EU market, both the Materiality and the All-category high-rated portfolios obtain positive and significant extra financial performance – at the 1 percent significance level – using any cut-off. Furthermore, some low-rated portfolios obtain positive and significant alphas, although to lower levels. These results show that all high-rated portfolios, and also some low-rated ones, based on materiality and all-category scores outperform conventional investments. However, given the only positive and statistically significant alpha of the Materiality long-short portfolio at the 10 percent cut-off, only materiality scores allow us to identify the best and worst firms both in terms of ESG and of financial performance. This suggests that, in Europe, firms investing well in material issues related to their industries, and thereby obtaining a high-materiality score, are capable of outperforming firms investing poorly in material issues.

In the US market, most Materiality and All-category high- and low-rated portfolios obtain negative financial performance. Materiality, in this case, also positively affects the financial performance of firms under the most demanding level (10 percent cut-off). We find that the long-short portfolio at 10 percent cut-off obtains a positive alpha of 0.17 percent, although it is not significant. In addition, materiality in this market allows us to identify substantial negative financial performance associated with some low-ranked firms. For example, the low-rated portfolio at the 20 percent cut-off obtains a negative and statistically

[6]As we are focusing on the performance of SRI portfolios, only the alphas of the portfolios are reported. Nonetheless, coefficients related to specific risk factors are available upon request.

Table 4
Portfolio financial performance

	High [10]	Low [10]	L-S [10]	High [20]	Low [20]	L-S [20]	High [30]	Low [30]	L-S [30]
Panel A. EU market									
Materiality									
Alpha	0.0046***	0.0012	0.0034**	0.0044***	0.0027*	0.0016	0.0039***	0.0030**	0.0009
t-stat	2.9383	0.6843	2.3067	3.4835	1.7140	1.3631	3.7219	2.0731	0.7536
All-category									
Alpha	0.0061***	0.0032	0.0029	0.0052***	0.0027*	0.0024*	0.0046***	0.0029*	0.0017
t-stat	5.2668	1.5141	1.4215	5.2419	1.7545	1.9246	4.5184	1.7366	1.3463
Panel B. US market									
Materiality									
Alpha	−0.0001	−0.0019	0.0017	−0.0008	−0.0015*	0.0007	−0.0013	−0.0010	−0.0003
t-stat	−0.0823	−1.5914	1.1162	−0.6664	−1.6777	0.6401	−1.3786	−1.1476	−0.4291
All-category									
Alpha	0.0000	0.0005	−0.0005	−0.0004	−0.0005	0.0000	−0.0002	−0.0003	0.0001
t-stat	−0.0387	0.4454	−0.4233	−0.4528	−0.5276	0.0484	−0.2401	−0.3719	0.1475

This table shows estimates of alpha (abnormal returns) of the high- and low-rated portfolios as well as the long-short portfolios at the 10% [10], 20% [20], and 30% [30] cut-offs using materiality and all-category scores. The long-short portfolio is formed by subtracting the returns of the low-ranked portfolio from the returns of the high-ranked portfolio (L-S). Panel A displays results for the EU market and Panel B shows results for the US market. Portfolio performance is evaluated by means of the alpha from the four-factor Carhart (1997) model. The model is estimated by OLS based on the heteroskedasticity and autocorrelation adjusted errors of Newey and West (1987). The independent variables are obtained from Professor Kenneth French's website. The asterisks are used to represent the statistically significant coefficients at the 1% (***), 5% (**) and 10% (*) significance levels. The full sample period is from January 2007 to December 2018.

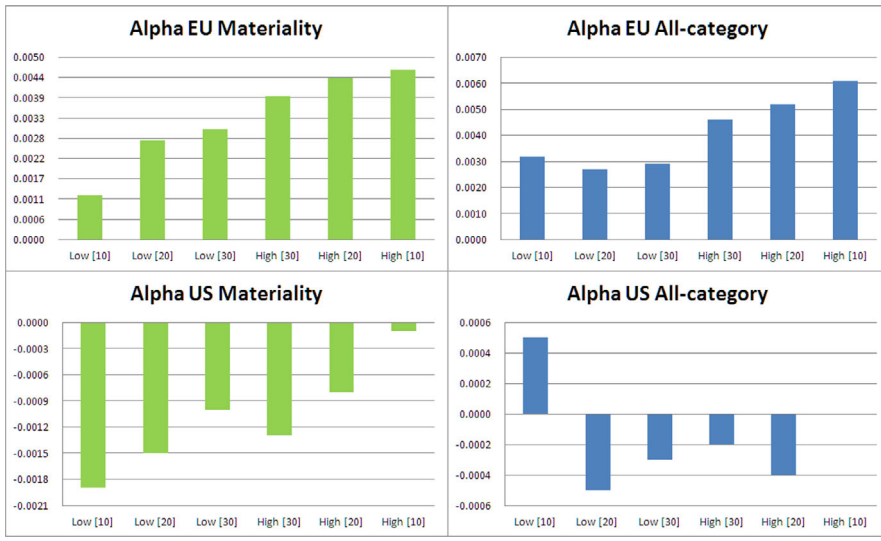

Figure 2 Alpha values associated with the Materiality and All-category portfolios at the different cut-offs in the EU and US markets. [Colour figure can be viewed at wileyonlinelibrary.com]

significant alpha of 0.15 percent, and the low-rated portfolio at the 10 percent cut-off obtains a negative alpha of 0.19 percent. These negative financial performances lead to positive financial performances for the long-short portfolios at the 10 and 20 percent cut-offs. Finally, as for the all-category scores, again they do not allow us to discriminate the best firms in terms of ESG and financial performance.[7]

Additionally, we display the alpha results graphically (Figure 2), in order to identify visual parallels in the results of applying the methodologies. As we can see, the figures for both markets using both materiality and all-category scores are very similar to those obtained by applying the PIRR ratio. This proves the robustness of our results and confirms the consistency of our methodologies. Given its obvious resemblance, in this case, we neither repeat the ordinal correlation coefficients, as for Figure 1, nor comment on the rest of the evidence. Our conclusions are the same using both procedures (despite the fact that the methodologies are completely different); all of which should be interpreted as further proof of robustness.[8]

Results using the multi-factor model are in line with the findings using the PIRR ratio. In general, using materiality scores, the more restricted the cut-off used, the better the high-rated portfolios perform, whereas the low-rated

[7]Our results are robust to a 6-factor model specification (as in Fama and French, 2018).

[8]Our results are consistent to the inclusion of controls for specific risks associated to industries following Geczy *et al.* (2005).

portfolios perform worse, more significant in the EU than in the US market. However, we cannot identify a tendency as evident using all-category scores. In sum, these findings confirm our three hypotheses.

5. Discussion

Our results for the EU market are new. We show that materiality is relevant in finding the best and worst firms in terms of both ESG and of financial performance. Furthermore, we find this effect under the most SRI-demanding level, the 10 percent cut-off. As for the findings for the US market, our results are in contrast to Khan *et al.* (2016), as they find that US firms with strong performance on material aspects outperformed firms with poor performance on material topics, and we find a less significant positive effect of materiality on the firm's financial performance, although material aspects allow for the identification of the worst firms in terms of ESG and financial performance.

The different results from Khan *et al.* (2016) could be due to several factors. First, in order to evaluate the implications of CSR investments on financial performance, they orthogonalise a firm's change in materiality score with respect to changes in firm size, market-to-book ratio, leverage, profitability and sector membership. This process attempts to isolate unexplained changes in the score of firms. We implemented this process – orthogonalisation – on the materiality and all-category scores of each firm and our results remained unchanged. Second, the sample periods are different. Whereas Khan *et al.* (2016) assessed the period from 1993 to 2013, we evaluated the period from 2007 to 2018; our data on materiality scores of firms begin in 2007. Both periods have different market conditions, and prior studies determined that different market states affect the financial performance of SRI portfolios (e.g., Becchetti *et al.*, 2015; Leite and Cortez, 2015; Carvalho and Areal, 2016; Berkman *et al.*, 2021). Since the period of Khan *et al.* (2016) is longer than ours, turbulent market states, such as the international financial crisis, could be offset by up periods, affecting the results on the financial performance of portfolios over the full sample period. In order to identify whether market phases over our sample period are affecting the financial performance of US portfolios, we follow Nofsinger and Varma (2014) and Badía *et al.* (2019) and include two dummy variables in the four-factor model. The model allows risk and performance to vary across different market states. To identify the different market states across the sample period, we use the Pagan and Sossounov (2003) approach, in line with Lee *et al.* (2013). Our results show that US high- and low-ranked firms, according to materiality scores, performed similarly in bull and bear periods. Hence, bull and bear phases did not affect the financial performance of US firms throughout our sample period. It would be of interest to extend the analysis to a longer period in order to assess whether it affects the results.

Third, materiality scores are constructed differently. Khan *et al.* (2016) based their scores on the materiality guidance from the SASB, using MSCI KLD as the source of CSR data. Specifically, they download each industry standard that identifies material CSR issues for firms within an industry. To classify topics, one researcher took the lead in one sector and all the industries included in that sector. Each topic identified by the SASB as material is then mapped to a KLD item, when one is available. After completing the map, another researcher followed the same process. The two maps are then compared by a third researcher, who assesses any differences. They classify each KLD item by hand as material, thereby running into potential selection-induced bias. As we detail in Section 3, the process of identifying material issues by TruValue Labs is substantially different and, as a result, our findings could also be substantially different. The use of different ESG information sources has been one of the most highlighted factors causing different results on the financial performance of SRI (Miralles-Quiros *et al.*, 2017a; Henriksson *et al.*, 2018). For instance, Halbritter and Dorfleitner (2015) found that the overall ESG score of ASSET4 and Bloomberg had a significant influence on the returns. However, the overall ESG score of KLD did not provide any link between the ESG level of firms and their financial performance. Mixed results are, for example, Derwall *et al.* (2005), who found that US high-ranked firms, according to Innovest ESG scores, outperformed low-ranked firms, whereas neither Galema *et al.* (2008) using KLD scores nor Lee *et al.* (2013) using SAM scores found significant differences.

6. Conclusions

In this study we assess the financial performance of stock portfolios formed according to material and immaterial CSR issues. Our dataset includes companies from the United States and Europe. Evaluating firms from US and Europe is particularly interesting given the heterogeneity in the patterns of development of SRI across countries (Neher and Hebb, 2016). In the European market, our results show that using different cut-offs allows financial performance to be discriminated: the ESG quality hierarchy moves to a priority in financial performance, and this is improved by using material issues. As for the US market, the evidence is less significant, although the relationship between ESG and financial performance improves when using material issues. Different results for the US and EU markets are in line with prior studies identifying cultural and ideological geographical differences affecting the financial performance of SRI portfolios. Our results confirm regional and cultural idiosyncrasies in SRI.

We consider that materiality is important to both firms and investors, as it allows firms to focus their CSR strategies on the most important issues, and it permits investors to evaluate portfolio exposure to specific material and immaterial CSR risks and opportunities. Eccles and Youmans (2016) noted

that materiality, in its essence, is entity-specific. Material issues for the stakeholders change from firm to firm, depending on sector, location, strategy, business model and the time frame under consideration. Our results suggest that, especially in the US market, the material entity-specific information should be still further developed and improved.

It would be of interest to extend this investigation over a longer period in order to assess whether this affects the results. In addition, material issues should be defined in an appropriate manner so that investors and firms can use them as an appropriate tool, especially in the US market. This information should be improved by focusing on the specifications of each firm. Also, it is important that financial analysts learn to distinguish ESG material and immaterial practices of firms and their distinct implications (Hinze and Sump, 2019). Finally, other geographical areas should be evaluated, as well as employing alternative methodologies to evaluate the financial performance of SRI portfolios (Fama, 1998).

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Appendix I: Stock exchanges and associated countries

Stock Exchange	Country
VIE	Austria
BRU	Belgium
CPH	Denmark
HEL	Finland
PAR	France
FRA	Germany
ATH	Greece

(continued)

Appendix I (continued)

Stock Exchange	Country
ISE	Italy
AMS	Netherlands
WAR	Poland
MAD	Spain
STO	Sweden
ZHR	Switzerland
LON	United Kingdom
NAS	United States
NYSE	United States

Appendix II: Descriptive statistics

	Mean	Median	Maximum	Minimum	SD	Skewness	Kurtosis
Panel A. EU market Panel A. EU market							
Materiality							
High [10]	0.0066	0.0076	0.1890	−0.2555	0.0596	−0.4564	5.2232
Low [10]	0.0023	−0.0031	0.2132	−0.1891	0.0600	0.0044	4.2202
High [20]	0.0066	0.0065	0.1990	−0.2826	0.0623	−0.6109	5.9463
Low [20]	0.0039	−0.0027	0.2281	−0.2245	0.0604	−0.0688	4.9102
High [30]	0.0059	0.0057	0.2144	−0.2676	0.0624	−0.4746	5.5288
Low [30]	0.0042	0.0000	0.2311	−0.2347	0.0621	−0.1291	4.9761
All-category							
High [10]	0.0075	0.0057	0.2279	−0.2754	0.0616	−0.5735	6.3926
Low [10]	0.0045	0.0044	0.1971	−0.2279	0.0605	−0.2921	4.1340
High [20]	0.0068	0.0079	0.2295	−0.2618	0.0619	−0.4088	5.7437
Low [20]	0.0038	0.0036	0.2279	−0.2352	0.0611	−0.1865	4.9190
High [30]	0.0064	0.0066	0.2247	−0.2687	0.0622	−0.4808	5.7885
Low [30]	0.0042	0.0019	0.2284	−0.2463	0.0622	−0.2447	5.1205
Panel B. US market							
Materiality							
High [10]	0.0059	0.0126	0.1976	−0.2198	0.0594	−0.5443	4.5782
Low [10]	0.0040	0.0095	0.1990	−0.2494	0.0569	−0.5459	5.6762
High [20]	0.0052	0.0145	0.2139	−0.2218	0.0584	−0.4217	4.8545
Low [20]	0.0041	0.0084	0.1840	−0.2180	0.0541	−0.5105	4.9796
High [30]	0.0048	0.0120	0.2141	−0.2321	0.0580	−0.4654	5.2047
Low [30]	0.0046	0.0089	0.1956	−0.2217	0.0543	−0.5031	5.3815
All-category							
High [10]	0.0058	0.0114	0.1959	−0.2388	0.0577	−0.5539	5.2144
Low [10]	0.0057	0.0095	0.2209	−0.2235	0.0551	−0.3189	5.7652
High [20]	0.0055	0.0125	0.2074	−0.2432	0.0573	−0.5475	5.5786

(continued)

Appendix II (continued)

	Mean	Median	Maximum	Minimum	SD	Skewness	Kurtosis
Low [20]	0.0049	0.0084	0.2123	−0.2281	0.0552	−0.4382	5.7258
High [30]	0.0056	0.0124	0.2087	−0.2368	0.0562	−0.5168	5.6779
Low [30]	0.0051	0.0090	0.2096	−0.2233	0.0546	−0.4314	5.6101