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## Corporate social and financial performance: Revisiting the role of innovation

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## RESEARCH ARTICLE

# Corporate social and financial performance: Revisiting the role of innovation

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**Abstract**

R&D intensity has been highlighted as an important factor in analyzing the relationship between corporate social (CSP) and corporate financial performance (CFP). However, the underlying mechanisms of how R&D intensity influences the CSP-CFP relationship have caused a great deal of confusion: first, while controlling for R&D intensity, studies have continued to report ambiguous results and, second, many studies have found R&D intensity to be negatively related to CFP. Motivated by insights from the innovation literature, we revise the functional relationship and examine moderation effects of R&D intensity. Accordingly, we find a u-shaped relationship between R&D intensity and CFP. We conclude that this functional relationship is an essential finding for future CSP-CFP studies in order to avoid misspecifications. Further, we cannot find empirical support for a moderation effect of R&D intensity. Thus, we conclude that R&D intensity and CSP should not be considered to be mutually reinforcing drivers of CFP.

**KEYWORDS**

corporate financial performance (CFP), corporate social performance (CSP), innovation and sustainability, R&D management

## 1 | INTRODUCTION

Analyzing the relationship between corporate social performance (CSP) and corporate financial performance (CFP) is part of a long-standing debate in management science (Cochran & Wood, 1984; Griffin & Mahon, 1997; Lu et al., 2020; Margolis et al., 2009; McGuire et al., 1988; Ullmann, 1985; Waddock & Graves, 1997). Essentially, the debate is driven by the ambiguity of the results. Over the years, researchers have identified positive, negative, and neutral relationships between CSP and CFP (e.g., Delmas & Nairn-Birch, 2011; Feix & Philippe, 2020; Fourati & Dammak, 2021; Zhao & Murrell, 2016). In addition to other factors, omitted variables, simultaneity, and measurement errors have been identified as some of the main drivers of this ambiguity (Hassan & Romilly, 2018).

Several studies have pointed out that more fine-grained analyses are needed to better understand the underlying mechanisms that shape the relationship between CSP and CFP (Vishwanathan et al., 2020; Wang & Bansal, 2012). Wang et al. (2016) emphasize that further research is needed on the role of firm-level moderators, in order to clarify their impacts on the CSP-CFP relationship. In this study, we focus on the role of R&D intensity as a firm-level moderator to the CSP-CFP link, and aim to bridge findings from innovation and strategic management research in order to improve our understanding of the CSP-CFP relationship. One of the first methodological contributions in that regard was made by McWilliams and Siegel (2000), who emphasized the importance of R&D intensity and its conceptual interrelations with CSP when analyzing the relationship between CSP and CFP. However, after reviewing subsequent studies within this

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debate, the role of R&D intensity has become increasingly equivocal. First, integrating R&D intensity should have eased the ambiguity concerning the relationship between CSP-CFP. Yet, there is no more clarity in the empirical results: despite integrating R&D intensity when investigating the CSP-CFP relationship, the results of ensuing studies remain inconclusive. Scholars still report positive (Barnett & Salomon, 2012; Berrone et al., 2007; Lee et al., 2016), neutral (Chang et al., 2013; Darnall et al., 2008), and negative results (Garcia-Castro et al., 2010; Lioui & Sharma, 2012). Second, many studies have found a significant relationship between R&D intensity and CFP—but one that points in a negative direction (Barnett & Salomon, 2012; Callan & Thomas, 2009; Erhemjants et al., 2013).

In an effort to address the inconclusiveness of ensuing studies, our article provides two main contributions to the literature. First, our paper constructs a bridge that had been missing between the innovation and strategic management literature. Analyzing the relationship between CSP and CFP, R&D intensity has been well established in both literature streams as a significant factor that influences CFP (Artz et al., 2010; Demirel & Mazzucato, 2010; Griliches, 1979; Jefferson et al., 2006), yet more recent studies in innovation literature stress that the functional relationship between R&D intensity and CFP tends to be more complex and follows a curvilinear relationship (Bracker & Ramaya, 2011; Coad, 2019; Huang & Liu, 2005). When transferring this insight to the CSP-CFP debate, our results propose a u-shaped relationship between R&D intensity and CFP on the firm level. Thus, next to effects of CSP on CFP, very low and high values of R&D intensity contribute to enhanced CFP. This functional relationship between R&D intensity and CFP is an essential finding for future studies analyzing the relationship between CSP and CFP, since the functional misspecification was potentially responsible for the inconclusive results of previous studies.

Second, we investigate the potential influences of R&D intensity on the CSP-CFP relationship by conducting a moderation analysis. From a theoretical perspective, overlaps between R&D intensity and CSP have been emphasized, as both aspects focus on product and process improvements (McWilliams & Siegel, 2000). Accordingly, R&D intensity could also have a moderation effect on the relationship between CSP and CFP. In that case, the positive relationship between CSP and CFP could be more pronounced for a company with a high level of R&D intensity. However, based our results, we cannot find any empirical support for this moderation effect on the CSP-CFP relationship. Accordingly, this finding demonstrates that R&D intensity and CSP are not mutually reinforcing drivers of CFP; instead, each construct seems to be independently relevant for CFP.

## 2 | THEORY AND HYPOTHESES

### 2.1 | The CSP-CFP linkage

The relationship between CSP and CFP has been analyzed by many scholars over the last decades (Bansal, 2005; Carroll, 1979; Fourati & Dammak, 2021; Griffin, 2000; Griffin & Mahon, 1997; Margolis

et al., 2007; Margolis & Walsh, 2003; Ullmann, 1985). Researchers have identified negative, neutral and positive relationships when analyzing the link between CSP and CFP (Friede et al., 2015; Orlitzky et al., 2003). Different theories have been proposed to explain the underlying relationship. Initially, theories hypothesized a negative relationship between CSP and CFP. For instance, according to shareholder theory, CSP is considered to be a costly activity that does not create any additional value (Friedman, 1970). In contrast, theories that stipulate a positive relationship between CSP and CFP are founded on instrumental stakeholder theory (Jones, 1995) or the resource-based view (Barney, 1991; Hart, 1995; Porter, 1991). Here, investments in CSP are considered to create additional value for the firm. Furthermore, other studies have outlined that there is no relationship between CSP and CFP (e.g., McWilliams & Siegel, 2000). Following this view, all financially material information is already covered by other aspects (e.g., R&D, advertising) and CSP is merely a by-product that complements these activities but does not create additional value.

In addition to these different theories, several econometrical issues have been highlighted as potential causes for the inconclusive results (e.g., Allouche & Laroche, 2005; Bansal, 2005; Brammer & Millington, 2008; Orlitzky et al., 2003; Vishwanathan et al., 2020; Wang et al., 2016). Studies have highlighted that several theoretical and econometrical issues have caused the ambiguous results, e.g., functional misspecification (e.g., Barnett & Salomon, 2012), omitted variable bias (e.g., Boulouta, 2013; McWilliams & Siegel, 2000), simultaneity bias (e.g., Jo & Harjoto, 2011), and measurement errors (e.g., Orlitzky & Benjamin, 2001). Accordingly, analyses need to consider the right functional specification, the right set of control variables, and the right measurement of CSP in order to be able to assess the relationship between CSP and CFP.

The literature has highlighted that CSP is a multi-dimensional latent construct (Chatterji et al., 2007; Orlitzky et al., 2003; Wood, 2010). First measurements have sought to broadly capture the multidimensionality of CSP. Highly aggregated CSP scores (e.g., KLD net score) and index affiliations (e.g., DSI 400 affiliation) have been utilized to measure CSP (Griffin & Mahon, 1997; McWilliams & Siegel, 2000; Waddock & Graves, 1997). These highly aggregated CSP scores have been frequently used as they blend different factors into one single measurement. The advantage is that applying a single measurement significantly reduces complexity when comparing CSP among different firms. However, highly aggregated CSP measurements also blend a variety of different aspects into one number, often without out proper testing for construct validity and reliability. Accordingly, aggregation also comes with a loss of variability as, for example, either social or environmental aspects could be drivers of firm performance that lead to the same levels CSP for different firms. Suppressing this heterogeneity in CSP is leading to a very high-level assessment that most likely is not only reflecting a firm's CSP, but rather mimicking a firm's overall strategic direction. Following previous studies (e.g., McWilliams & Siegel, 2000), we also expect no significant relationship between CSP and CFP for highly aggregated measurements, as these broad constructs mimic a firm's generic

strategic aspects that are already more precisely captured by other firm-level variables (e.g., such as Size or Risk).

**Hypothesis 1a.** *There is a neutral relationship between CSP and CFP for aggregated CSP scores.*

In the more recent literature, many critics have questioned the utilization of highly aggregated CSP scores (Chen & Delmas, 2011; Erhemjamts et al., 2013; Reverte, 2012; Rowley & Berman, 2000). By using index affiliations or netting CSP strengths and concerns, performance differences in the individual CSP dimensions will be averaged out. Studies relying on such scores face the significant risk of harming construct validity and the reliability of the results. This is particularly true in extreme cases (e.g., dichotomization into binary variables), where the loss of variation suppresses an assessment of the multi-dimensional character of CSP, and effect sizes are likely to be underestimated for the CSP-CFP relationship (Burke et al., 2019; Dawson & Weiss, 2012; MacCallum et al., 2002). Accordingly, to better understand the role of R&D intensity when analyzing the CSP-CFP relationship, we utilize more disaggregated CSP scores. Thus, in our analysis we separate CSP strengths from concerns as suggested by a vast amount of the literature (e.g., Mattingly & Berman, 2006). Based on these more disaggregated CSP scores, we expect to find a positive relationship between CSP and CFP as previously indicated by meta-analyses (Allouche & Laroche, 2005; Friede et al., 2015; Orlitzky et al., 2003). As such, we formulate our second baseline hypothesis:

**Hypothesis 1b.** *There is a positive relationship between CSP and CFP for disaggregated CSP scores.*

## 2.2 | The R&D-CFP linkage

Innovation in the corporate context is defined as significant product or process improvements (Acs & Audretsch, 1988; Morbey, 1988; Stam & Wennberg, 2009). R&D expenses are considered to be a central construct that can be used to measure innovativeness. In this regard, R&D is viewed as an integral input variable that constitutes the basis of a firm's innovativeness.

Reviewing publications in this realm, initial studies were grounded in the finance and economics literature that analyzes the relationship between innovativeness and national economic growth (Demirel & Mazzucato, 2010; Malerba, 2007). The general findings of these initial studies indicate a positive relationship between innovativeness and economic growth. Advancing from this macro view, studies in the innovation and strategic management literature have built upon these findings and focused on internal aspects of the firm in order to analyze the relationship between firm growth and productivity (Coad, 2019). Again, a positive relationship between innovation and firm performance has been the underlying research hypothesis for most of these studies (Artz et al., 2010; Hull & Rothenberg, 2008). Reviewing the strategic management literature, this understanding is closely in line with the resource-based view.

stipulates that innovation can be considered an intangible capability that results in competitive advantages and improves CFP (Lee & Min, 2015; Nerkar & Paruchuri, 2005; Sher & Yang, 2005).

In general, the literature on the R&D-CFP link tends to presume a rather unequivocal picture: by advancing product and process innovations, firms create unique capabilities to outperform competitors, which, in turn, contributes to enhanced CFP. Accordingly, firms would be encouraged to foster their innovativeness as it will result into advanced financial performance. Limited theoretical stipulations have been made to explain a potential negative R&D-CFP relationship. However, within the recent CSP-CFP publications in the strategic management literature, multiple empirical results that indicate a negative relationship between R&D intensity and CFP have been reported (Barnett & Salomon, 2012; Callan & Thomas, 2009; Erhemjamts et al., 2013). In other words, this outcome would entail that innovativeness is harming financial performance. These inconclusive and surprising empirical outcomes underscore the fact that the underlying relationship between R&D and CFP may be more complex than previously hypothesized (Artz et al., 2010; Demirel & Mazzucato, 2010; Gao et al., 2017; Jefferson et al., 2006).

Porter (1980) emphasizes the existence of generic competitive strategies, explaining that firms can have different focuses and individually arrange their resource allocations. Thus, firms are able to organize their R&D activities in terms of magnitude and timing according to their strategic directions. Reviewing the nature of investments in R&D, we find benefits as well as related costs. The benefits of R&D are mainly driven by the expected positive impact of product and/or process innovations. On the other hand, these innovations can become very costly and risky, as not all efforts will eventually result into meaningful and beneficial innovations (Quirnbach, 1993).

Curvilinear functional relationships for R&D have already been proposed and tested on an industry level in the innovation literature, which has identified an inverted u-shaped form (Faff et al., 2013; Hatzikian, 2015). However, Coad (2019) emphasizes the existence of "a large amount of heterogeneity in R&D intensities among firms in the same sector" (p. 1). Thus, companies within the same industry do not necessarily follow or diverge from the same strategic path. Instead, companies could follow different strategies as reflected by their R&D expenditures.

Focusing on the firm level, we root our theoretical arguments in the industrial organization literature and the resource-based view. Motivated by theoretical arguments in the industrial organization literature (Porter, 1980), we expect that lower R&D investments will support a cost leadership position and, thus, enhance CFP. Motivated by the resource-based view (Barney, 1991), higher R&D investments can be interpreted as a source of improved CFP. By utilizing unique R&D capabilities, companies can differentiate their services or products from their competitors and achieve a competitive advantage. As such, we propose a u-shaped relationship between R&D intensity and CFP when analyzing the CSP-CFP relationship.

**Hypothesis 2.** *There is a u-shaped relationship between R&D intensity and CFP.*

## 2.3 | The R&D-CSP linkage

Bridging the different stipulations about the linkage between CSP-CFP and R&D-CFP, researchers have also pointed out potential interrelations between CSP and R&D (e.g., Bansal, 2005; Javed et al., 2020; Vishwanathan et al., 2020; Wang et al., 2016). McWilliams and Siegel (2000) have been among the first to emphasize that R&D intensity is a key variable when analyzing the relationship between CSP and CFP to tackle the inconclusiveness of the results in this debate. However, reviewing the empirical results in the CSP-CFP debate, studies have reported positive (e.g., Barnett & Salomon, 2012; Lee et al., 2016), negative (e.g., Garcia-Castro et al., 2010; Lioui & Sharma, 2012) and neutral results (e.g., Chang et al., 2013; Darnall et al., 2008), despite integrating R&D intensity. Therefore, in the following, we will disentangle the interrelations between R&D intensity and CSP in more detail.

Based on the resource-based view, R&D intensity and CSP can each be the source of unique capabilities that are relevant for product innovations and process improvements (Bansal, 2005; Vishwanathan et al., 2020). Thus, to a certain extent, both constructs tend to be related to the same aspects. In addition to that, we also see interrelation resulting from a stakeholder theory point of view (Hart & Sharma, 2004). Shifting the focus to the diverse needs of multiple stakeholders, Flammer and Bansal (2017) point out that stakeholder orientation also leads to an increase in innovation. Correspondingly, CSP is also one of the core topics when engaging with stakeholders to better understand stakeholder requirements. Thus, also according to stakeholder theory, there are elements that are connecting CSP and R&D intensity. Following these theoretical interrelations, we expect that R&D intensity and CSP mutually reinforce each other. Accordingly, we propose that different levels of R&D intensity do not only influence CFP, but also moderate the CSP-CFP relationship. With increasing levels of R&D intensity, we expect a stronger CSP-CFP relationship.

**Hypothesis 3.** *R&D intensity positively moderates the CSP-CFP relationship; for higher levels of R&D intensity, the positive relationship between disaggregated CSP scores and CFP will be stronger.*

## 3 | METHOD

Conducting a fine-grained analysis on the role of R&D intensity in the CSP-CFP context, we use the MSCI KLD database to compile different measurements of CSP for our study. This database rates companies based on their social performance in 13 different categories. These evaluations are used to reveal a firm's social performance, as well as to construct social indices, such as the DSI 400. In line with our underlying baseline hypotheses, we will review the impact of the different measurements of CSP to better separate the effect of R&D intensity. Accordingly, we will review three different measurements of CSP. First, motivated by McWilliams and Siegel's (2000) original study

on the role of R&D intensity, we will integrate the affiliation with the DSI 400 as a proxy for CSP. Next, we will integrate the KLD net score, as this has been one of the most frequently used measurements in the CSP-CFP context. And finally, we will follow the recommendation to separate CSP strengths and concerns. In order to avoid inconsistencies in the dataset, and because the rating methodology has changed over time, we only use data from 2005 to 2013 for our analysis. We obtained financial data from Compustat, resulting in an unbalanced panel of 927 firms with more than 3500 firm year observations.<sup>1</sup> In order to account for extreme values, we cut off all variables independently at the 5th and 95th percentiles to avoid bias from outliers (Flammer & Bansal, 2017; Zhao & Murrell, 2016).

## 3.1 | Dependent variables

For CFP, we apply both accounting-based (return on assets, ROA) and market-based (Tobin's Q) measures. The accounting-based measures are based on ex-post accounting data. Therefore, this information can be regarded as backward looking. Market-based measures, on the other hand, are considered to capture a forward-looking view by integrating investor evaluations. ROA is calculated by dividing net income and total sales; Tobin's Q is based on the market value of equity plus the market value of debt over the book value of equity plus the book value of debt.

## 3.2 | Independent variables

### 3.2.1 | DSI 400

The first independent variable follows the design of McWilliams and Siegel's (2000) study and is based on the affiliation with the DSI 400, which is now known as the MSCI KLD 400 Social Index. Technically, this results in a dichotomous CSP variable: either a company is or is not part of the DSI 400. Since the publication of McWilliams and Siegel's study in 2000, only a limited number of further studies have considered the DSI 400 affiliation as a measure of CSP (see, for instance, Tsoutsoura, 2004).

### 3.2.2 | KLD net score

As for the second independent variable, the KLD net score is calculated based on the difference between KLD strengths and concerns. Here, all strengths or concerns from the previously outlined assessment categories are aggregated to obtain a single score for each company. This aggregation results in a greater variation and has frequently

<sup>1</sup>Matching KLD with Compustat data, we consider our final dataset to be a sample of a larger population, as KLD data is not available for all firms that are part of the Compustat database. We conducted *t*-tests in order to assess differences between the means of our sample and the population. We only conducted this analysis for the financial variables derived from Compustat since KLD values are only available for the sample. For all financial variables, we could not find that the means between our sample and the population differ significantly (95% confidence interval).

been used by other studies (Barnett & Salomon, 2012; Griffin & Mahon, 1997; Shi & Sun, 2015; Waddock & Graves, 1997). For our sample, we could obtain more than 3500 observations with an average value of -0.3, ranging from -12 to 19.

### 3.2.3 | KLD strengths and concerns

Aggregating CSP data into a net score has been widely criticized because performance differences are averaged out by this process (Chen & Delmas, 2011; Erhemjants et al., 2013; Rowley & Berman, 2000).<sup>2</sup> Additionally, there are empirical issues regarding the appropriateness of combining strengths and concerns without testing the validity of the factor aggregation (Mattingly & Berman, 2006). In response to this aggregation issue, our third CSP measurement accounts for KLD strengths and concerns separately (Burke et al., 2019; Ioannou & Serafeim, 2015; Muller, 2018; Walls et al., 2012). For all KLD strengths, we obtain an average value of 1.7, ranging from 0 to 22, and for KLD concerns, we obtain an average value of 2.0, ranging from 0 to 18.

### 3.3 | Control variables

We use controls for size, risk, R&D intensity, advertising intensity, and industry affiliation, based on the 4-digit SIC. Size is measured by total assets, and risk is measured by the ratio of debt to assets. For risk and size, we calculated the log values. R&D and advertising investments are divided by sales to compute the corresponding intensities.

### 3.4 | Research model and robustness

For our analyses, we are using dynamic firm- and time-fixed effects estimations to account for unobserved heterogeneity, as well as for time effects. Following our baseline hypotheses, we are introducing different measurements of CSP to better separate the effect of R&D intensity (Barnett & Salomon, 2012; Ioannou & Serafeim, 2015; Shi & Sun, 2015). Additionally, and in line with our second hypothesis, we are investigating whether there is a curvilinear relationship between R&D intensity and CFP in the context of CSP-CFP:

$$PERF_{i,t} = f(CSP_{i,t}, Size_{i,t}, Risk_{i,t}, R\&D_{i,t}, R\&D2_{i,t}, INDADINT_{i,t}, PERF_{i,t-1} + Year_{i,t} + (\Omega Individual_i + \mu_{i,t}))$$

<sup>2</sup>To assess the internal consistency of our KLD strengths and concerns, we built on the findings from Mattingly and Berman (2006). Additionally, we also calculated the coefficient alpha for both scores (individual aspects: community, corporate governance, diversity, employee relations, environment, human rights, and product as well as the production, sale, or service of alcohol, gambling, firearms, military, nuclear power, and/or tobacco). For KLD strengths, we find the coefficient at 0.7205 and for KLD concerns at 0.6316. Preferably, alpha values between 0.7 and 0.9 are considered to be an appropriate threshold for ensuring internal consistency. However, also values between 0.6 and 0.7 can be considered sufficient (Nunnally & Bernstein, 1994). Accordingly, both variables are meeting the requirements.

Firms and time are denoted by *i* and *t*. In addition, we also include year dummies to control for time-fixed effects and a 1-year lag of the dependent variable to control for within-firm effects. Utilizing a dynamic panel model design, we are aiming to mitigate potential issues arising from serial correlation. *Individual<sub>i</sub>* represents the firm-fixed effect in order to control for time-invariant, firm-specific characteristics. The remaining error term captures all other influencing factors that are omitted through this setup. Beginning with pooled OLS, we tested for unobserved individual heterogeneity by applying the Breusch-Pagan Lagrange Multiplier test. Additionally, we performed a Hausman test to analyze whether the error terms are correlated with the other independent variables. The test results indicate that neither pooled OLS estimations nor random effects estimations are robust enough for this analysis (*p* < 0.01 for all models).<sup>3</sup> Hence, fixed effects estimation has been used for all models.

In line with our third hypothesis, we are refining our research model in order to investigate whether R&D intensity is moderating the relationship between CSP and CFP:  $PERF_{i,t} = f(CSP_{i,t}, Size_{i,t}, Risk_{i,t}, R\&D_{i,t}, INDADINT_{i,t}, PERF_{i,t-1} + CSP_{i,t} \times R\&D_{i,t} + Year_{i,t} + (\Omega Individual_i + \mu_{i,t}))$

Again, we mainly followed the same approach as described above, but integrated an interaction term of CSP and R&D intensity by multiplying both variables to model the moderation effect.

## 4 | RESULTS

Table 1 presents the descriptive statistics. For ROA and Tobin's Q, we can find moderate positive mean values of 0.031 and 1.001, and standard deviations of 0.065 and 0.874. For R&D intensity, we identified a mean of 0.030 and a standard deviation of 0.061. Additionally, all CSP variables remain in an expected range for their mean values and standard deviations. Furthermore, we find that all correlations are statistically significant. The correlations between almost all variables are maintained at a moderate level and only reach critical levels for KLD net score and KLD strengths or concerns. However, these variables are not integrated in the same model. Further, to better understand potential influences arising from multicollinearity, also calculated the variance inflation factor

<sup>3</sup>A Hausman test has been conducted for all research models, indicating the utilization of fixed-effects models instead of random-effects models.

Model	Hausman test		Selection
	$\chi^2$	<i>p</i>	
1	262.82	<0.01	Fixed-effects
2	161.52	<0.01	Fixed-effects
3	172.43	<0.01	Fixed-effects
4	167.01	<0.01	Fixed-effects
5	171.91	<0.01	Fixed-effects
6	182.35	<0.01	Fixed-effects
7	92.75	<0.01	Fixed-effects
8	185.69	<0.01	Fixed-effects

TABLE 1 Descriptive statistics

Variable	Mean	SD	ROA	Tobin's Q	KLDnet score	KLD strengths	KLD concerns	R&D intensity	Advertising intensity	Size	Risk
ROA	0.031	0.065	1.000								
Tobin's Q	1.001	0.874	0.340	1.000							
KLD net score	-0.323	2.811	0.079	0.044	1.000						
KLD strengths	1.720	2.622	0.123	0.021	0.774	1.000					
KLD concerns	2.043	1.836	0.059	-0.034	-0.426	0.243	1.000				
R&D intensity	0.030	0.061	-0.041	0.363	0.095	0.056	-0.060	1.000			
Advertising intensity	0.005	0.011	0.020	0.021	0.095	0.101	0.002	-0.005	1.000		
Size	7.346	1.406	0.053	-0.320	0.193	0.411	0.252	-0.235	0.031	1.000	
Risk	-1.941	1.114	-0.047	-0.087	-0.036	0.041	0.109	-0.099	-0.007	0.115	1.000

for all research models. As all values are below the suggested cutoff value of 10 (Cohen et al., 2003), we conclude that multicollinearity does not influence our results.<sup>4</sup>

Table 2 reports the results of our analyses. Models 1–4 reflect the results for our baseline Hypothesis 1a. Models 1 and 2 investigate the CSP-CFP relationship in the context of the DSI 400 affiliation. Similar to McWilliams and Siegel (2000), we also do not find any statistically significant relationship between CSP and CFP, neither for ROA nor for Tobin's Q. For models 3 and 4, we use the KLD net score as our CSP variable. Here, we also cannot find any statistically significant relationship for both market-based and accounting-based variables. Thus, we find support for our first baseline hypothesis that the CSP-CFP relationship is neutral for highly aggregated CSP scores.

In line with our second baseline Hypothesis 1b, models 5 and 6 are based on CSP strengths and concerns separately. While the relationship between KLD strengths and both CFP variables remains neutral, we find a significant negative relationship for CSP concerns for ROA ( $p < 0.1$ ) and for Tobin's Q ( $p < 0.1$ ). This latter finding supports our second baseline hypothesis, as this implies that a decrease in CSP concerns is positively related to CFP. Thus, analyzing more specific CSP constructs via disaggregated measures yields a better understanding of the CSP-CFP relationship.

In models 5 and 6, we also test our Hypothesis 2. In line with several previous studies, we find a significant negative relationship

between R&D intensity and CFP. However, all squared R&D intensities are also highly significant and point in a positive direction, that is, proposing a u-shaped relationship. Thus, we find support for our second hypothesis indicating a curvilinear relationship between R&D intensity and CFP in the context of CSP. Interestingly, after plotting the results, we identified that the turning points of the functions for ROA, as well as for Tobin's Q, can be found at the upper end of the R&D intensities. This implies that at the upwards trend of the curve only very high levels of R&D intensity are eventually related to improved CFP.

Models 7 and 8 test whether R&D intensity moderates the CSP-CFP relationship. In both models, we again find a significant relationship between CSP concerns and CFP. An interaction requires that the main effect is significant. Accordingly, models 7 and 8 only show the interaction term for CSP concerns and R&D intensity. However, we cannot find a statistically significant interaction. Thus, R&D intensity is not moderating the relationship between CSP and CFP and we reject our third hypothesis.

In order to test for potential influences of endogeneity in models 5 and 6, an instrumental variable estimation has been conducted. An appropriate instrument needs to be correlated with our CSP variable of interest and uncorrelated with the dependent variable. Accordingly, we use industry- and firm-related instruments in a two-stage least squares regression. Several scholars have used industry average CSP scores as their key instrumental variable (El Ghoul et al., 2011; Koh et al., 2014; Wang et al., 2008). Hence, we divide the firm-specific CSP score by the corresponding industry average CSP score in order to account for firm- and industry-specific systematic patterns (Garcia-Castro et al., 2010). Such an instrument can be considered to be "independent of any observable characteristics that affect the value of all firms in a given industry and year in the same manner" (Campa & Kedia, 2002). Additionally, we tested for the relevance and exogeneity of the outlined instrument. The under-identification test statistic (i.e., the Kleibergen-Paap test) yielded results with  $p = 0.000$ . Thus, the instrument appears to be sufficiently correlated with the endogenous variable. The weak identification statistics (i.e., Cragg-Donald Wald  $F$ -test) are greater than

<sup>4</sup>Exemplary, we indicate here the variance inflation factor for one of our core models, Model 5. The figures are significantly below the suggested cutoff value of 10 (Cohen et al., 2003) and are on average at 2.03. Therefore, we conclude that multicollinearity does not influence our results.

Variable	VIF	1/VIF
R&Dint	4.29	0.232941
R&Dint <sup>2</sup>	4.14	0.241405
Size	1.93	0.517269
CSP strengths	1.51	0.661555
CSP concerns	1.40	0.713105
Risk	1.15	0.866152
ADint	1.02	0.984079
Mean VIF	2.03	

**TABLE 2** Revisiting the role of R&D intensity on CSP-CFP

Variables	(1) ROA	(2) TQ	(3) ROA	(4) TQ	(5) ROA	(6) TQ	(7) ROA	(8) TQ
DSI400	0.0106 (0.0126)	0.0703 (0.1661)						
Score			0.0006 (0.0007)	0.0063 (0.0056)				
Strengths					-0.0002 (0.0008)	5.59e-06 (0.0073)	-7.88e-05 (0.0008)	0.0012 (0.0073)
Concerns					-0.0021* (0.0012)	-0.0192* (0.0108)	-0.0028** (0.0012)	-0.0293** (0.0116)
Size	0.0081** (0.0036)	-0.0773* (0.0415)	0.0030 (0.0055)	-0.363*** (0.0626)	0.0039 (0.0056)	-0.358*** (0.0615)	0.0032 (0.0055)	-0.355*** (0.0617)
Risk	-0.0035 (0.0055)	-0.1735** (0.0777)	-0.0091*** (0.0016)	-0.118*** (0.0163)	-0.0091*** (0.0016)	-0.118*** (0.0162)	-0.0092*** (0.0016)	-0.117*** (0.0165)
RDint	-0.2676* (0.1478)	1.634 (1.655)	-0.739*** (0.0937)	-4.027*** (1.253)	-0.739*** (0.0937)	-4.018*** (1.252)	-0.445*** (0.0427)	-2.434*** (0.598)
Rdint <sup>2</sup>			0.273*** (0.0712)	4.516* (2.569)	0.273*** (0.0713)	4.520* (2.568)		
ADint	0.1340 (0.4002)	9.4638* (4.9740)	-0.243 (0.435)	-3.046 (4.958)	-0.234 (0.435)	-2.910 (4.965)	-0.213 (0.458)	-2.826 (4.947)
Lag ROA			0.0132 (0.0084)		0.0128 (0.0084)		0.0145* (0.0082)	
Lag TQ				0.0126 (0.0088)		0.0126 (0.0088)		0.0114 (0.0088)
R&D x Concerns							0.0129 (0.0104)	0.227 (0.147)
Constant	-0.1150*** (0.0301)	0.5842* (0.3464)	0.0577 (0.0401)	4.008*** (0.454)	0.0563 (0.0401)	4.001*** (0.450)	0.0418 (0.0390)	3.920*** (0.449)
Observations	452	455	3286	2688	3286	2688	3286	2690
R-squared	0.579	0.726	0.210	0.259	0.211	0.260	0.196	0.261
No. of firms	452	455	868	740	868	740	868	741
Industry dummies	Yes	Yes	No	No	No	No	No	No
Firm FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

the 10% maximal IV size Stock-Yogo critical values, which confirms the relevance of our instrument (Stock & Yogo, 2005). Reviewing Hansen's J statistic ( $p = 0.784$ ) to test for over-identifying restrictions, we also find support for our instrument selection, thus ensuring that our instrument is exogenous (Cameron & Trivedi, 2005). The instrument was then used in the second stage to re-estimate our research models. The results remained consistent over the instrumental variable estimation, as reported in Table 3.

## 5 | DISCUSSION AND CONCLUSION

Reviewing the role of R&D intensity in the context of the CSP-CFP debate, this study seeks to clarify the underlying mechanism that drives the relationship between the three constructs. Researchers have indicated several econometrical issues as potential causes for the inconclusive results when analyzing the relationship between CSP and CFP (e.g., Bansal, 2005; Vishwanathan et al., 2020; Wang et al., 2016). Specifically, R&D intensity has been highlighted as one



**TABLE 3** Results of the instrumental variable estimation

Variables	(9) ROA	(10) TQ
IV concerns	−0.002** (0.001)	−0.033*** (0.008)
Size	0.007** (0.004)	−0.341*** (0.050)
Risk	−0.009*** (0.001)	−0.120*** (0.014)
RDint	−0.749*** (0.072)	−0.687 (0.548)
Rdint <sup>2</sup>	0.280*** (0.048)	0.525 (0.423)
ADint	−0.154 (0.331)	−6.197*** (2.621)
Observations	3640	3732
R-squared	0.149	0.086
No. of firms	728	740
Firm FE	Yes	Yes
Time FE	Yes	Yes

Note: Robust standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

key parameter that influences the results. Nevertheless, the introduction of R&D intensity has not eased the inconclusive findings on the CSP-CFP relationship, but has added further complexities that require a deeper investigation.

Our findings confirm that it is important to control for R&D intensity when investigating the CSP-CFP relationship. In line with our first baseline hypothesis, we find no statistically significant relationship between CSP and CFP for highly aggregated CSP scores (i.e., DSI 400; KLD net score). However, the results change when CSP is disaggregated into strengths and concerns, as emphasized by several recent studies (Chatterji et al., 2009; Jayachandran et al., 2013; Kölbel et al., 2017; Lee et al., 2016; Mattingly & Berman, 2006). Consequentially, our two baseline hypotheses confirm the importance of choosing the right level of CSP aggregation when investigating the CSP-CFP relationship in order to be able to derive managerial implications.

Our study contributes to the literature with two important insights regarding the role of R&D intensity in the CSP-CFP context. First, we stress that the functional form of R&D intensity in the CFP context is more complex (Cabral, 2003) than hypothesized in previous management studies (e.g., McWilliams & Siegel, 2000). Assuming a linear function for R&D intensity tends to be a source of further misspecifications. This can be illustrated by multiple studies that have reported a significant negative relationship between R&D intensity and CFP (Barnett & Salomon, 2012; Callan & Thomas, 2009; Erhemjants et al., 2013). In other words, this outcome would lead to the odd suggestion that, in general, minimizing R&D expenses contributes to enhanced CFP. In line with Bracker and Ramaya (2011) and Huang and Liu (2005), we identify a curvilinear relationship between

R&D intensity and CFP. In contrast to these previous studies from the innovation literature, we find the curvilinear relationship to be u-shaped. The difference in the results can be related to the treatment of R&D intensity. The previous studies used industry related R&D intensity due to limited data availability. The resulting assumption is that there is no firm-specific heterogeneity between companies' R&D expenses. However, this is a considerable assumption, since Coad (2019) emphasizes that R&D intensities among companies within the same industry do not tend to be homogeneous. For example, the many competing firms in the automotive industry do not all follow the same strategic paths concerning R&D intensity. Depending on its strategic path, each firm will adapt its R&D strategy to achieve a competitive advantage in terms of differentiation or cost leadership. Our findings in the CSP-CFP context highlight that these intra-firm differences and, accordingly, a u-shaped R&D intensity, need to be reflected in research models.

Second, we build on a recent study of Wang et al. (2016) who propose that future research should investigate moderating effects in the CSP-CFP context. Furthermore, Vishwanathan et al. (2020) that find that innovation capacity acts as a mediator in the CSR-CFP relationship. Based on both studies, we propose for R&D intensity a moderating effect. However, we cannot find empirical support for a moderation effect of R&D intensity on the relationship between CSP-CFP. Our interpretation of this outcome is that since R&D intensity and CSP cover different aspects of CFP, neither construct seems to reinforce the other and, thus, each construct should be viewed as an independent determinant of CFP. This finding contrasts with the previous studies, which analyzed the role of R&D intensity in the CSP-CFP debate. Specifically, McWilliams and Siegel (2000) were among the first to emphasize that both CSP and R&D intensity cover product improvements as well as process improvements and, thus, similarly influence CFP. Following this line of thought, we would have expected a positive moderation of R&D intensity on the CSP-CFP relationship. However, we cannot find any empirical support for such a mutually reinforcing interrelation. One explanation for this outcome could be rooted in instrumental stakeholder theory (Jones, 1995): CSP goes beyond product or process improvements and covers a broad range of aspects that concern multiple stakeholders (e.g., addressing gender equality or compliance with Human Rights Standards). Many of these aspects do not require any R&D expenses and, therefore, have an independent effect on CFP. This argument can also explain the difference between Vishwanathan et al.'s (2020) study and our study. Their meta-analysis finds that innovation capacity acts as a mediator in the relationship between corporate social responsibility and CFP. Innovation capacity is a firm-internal capability that firms either do or do not possess. We focus on R&D expenses, and—at the time of occurrence—it is not certain whether they will result in actual innovations at a later point in time. This argument becomes even more obvious considering the fact that Hypothesis 1b can only be confirmed for CSP concerns. The measurement of CSP concerns is mainly based on an assessment of Environmental, Social and Governance (ESG) controversies (MSCI, 2016). CSP concerns can therefore be regarded as the visible CSP outcomes resulting from deficits

related to how badly certain processes and systems have been implemented. These deficits can be interpreted as irresponsible firm behavior, which stakeholders take into consideration and which, in turn, negatively affects CFP. However, overcoming these deficits typically does not require R&D expenses. Instead, poorly performing firms need to acknowledge their social responsibility and proactively focus on improving their processes and systems.

Further, our findings indicate two important implications that practitioners should incorporate in their decision making. First, our study is emphasizing that sustainability and innovation cover different aspects of corporate financial performance. Accordingly, firms cannot only focus on innovation to cover sustainability aspects or vice versa. Instead, firms need to separately define clear innovation and sustainability strategies to create additional firm value. Furthermore, our results show that different directions for innovation strategies will pay-off on the firm level. Accordingly, firms need to decide to follow either a cost leadership approach with low R&D expenditures or a strategy with high levels of R&D expenditures. Following a clear path will provide additional value to a firm's financial performance, while a mixture of both strategies would result into adverse effects on financial performance.

Finally, we are encouraging future research to further improve the understanding on the underlying processes and mechanisms that shape the relationship between CSP, R&D intensity, and CFP. Specifically, we propose evaluating the role of individual stakeholder groups in that regard. An improved understanding of the expectations and perception of CSP strengths and concerns from different stakeholder groups could provide more refined research insights and guidance for companies.

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