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The search for a relation between environmental, social, and governance (ESG) criteria and corporate financial performance (CFP) can be traced back to the beginning of the 1970s. Scholars and investors have published more than 2000 empirical studies and several review studies on this relation since then. The largest previous review study analyzes just a fraction of existing primary studies, making findings difficult to generalize. Thus, knowledge on the financial effects of ESG criteria remains fragmented. To overcome this shortcoming, this study extracts all provided primary and secondary data of previous academic review studies. Through doing this, the study combines the findings of about 2200 individual studies. Hence, this study is by far the most exhaustive overview of academic research on this topic and allows for generalizable statements. The results show that the business case for ESG investing is empirically very well founded. Roughly 90% of studies find a nonnegative ESG–CFP relation. More importantly, the large majority of studies reports positive findings. We highlight that the positive ESG impact on CFP appears stable over time. Promising results are obtained when differentiating for portfolio and nonportfolio studies, regions, and young asset classes for ESG investing such as emerging markets, corporate bonds, and green real estate.

Keywords: second-order meta-analysis; vote-count studies; financial performance; ESG criteria; business case

Introduction

Close to 60 trillion US Dollars in assets under management – or 50% of the total global institutional assets base – are currently managed by Principles for Responsible Investment (PRI) signatories (PRI 2015a). On the one hand, this development clearly demonstrates the commitment of financial markets toward environmental, social, and governance (ESG) criteria within investment decisions. However, on the other hand, far-reaching shifts of mainstream investors toward embracing sustainable investment practices remain rather slow (Reynolds 2014; Busch, Bauer, and

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Orlitzky 2015; PRI 2015b). Less than a quarter of investment professionals consider extra-financial information frequently in their investment decisions (EY 2015) and just about 10% of global professionals receive formal training on how to consider ESG criteria in investment analysis (CFA Institute 2015). For many, the business case for responsible investing seems not obvious (Feri 2009; Cohen et al. 2011; Riedl and Smeets 2015). Still, the question of how compatible ESG criteria are with corporate financial performance (CFP) has remained a central debate for practitioners and academics alike for more than 40 years.

Though there are many positive examples for the ESG–CFP relation, researchers often claim that results are ambiguous, inconclusive, or contradictory (Aupperle, Carroll, and Hatfield 1985; Griffin and Mahon 1997; Rowley and Berman 2000; van Beurden and Gössling 2008; Hoepner and McMillan 2009; Revelli and Viviani 2015). Scholars and practitioners are, in particular, undecided about the general effect including its measurement and durability (Barnett 2007; Devinney 2009; Wood 2010; Orlitzky 2011; Borgers et al. 2013; Orlitzky 2013; Reynolds 2014; Authers 2015). Thus, there is an ongoing debate about the role and the impact of the financial sector on the natural environment and society (Weber 2014). In order to derive a more comprehensive picture, several review studies summarize primary ESG–CFP studies. Yet, all these first-level review studies provide an incomplete picture. This study is the first effort to provide aggregated evidence based on more than 2000 empirical studies that have been released since the 1970s (see Figure 1).

We chose a two-step research method to analyze existing review and primary studies. First, we include findings from so-called vote-count studies. Vote-count studies count the number of studies with significant positive, negative, and nonsignificant results and "votes" the category with the highest share as winner (Light and Smith 1971). These studies provide interesting insights, but are less sophisticated from a methodological point of view. The shortcomings are well documented in the literature.[1] Second, we aggregate the findings of econometric review studies – so-called meta-analyses – to derive a second-order meta-analysis.

In total, 60 review studies – both vote-count studies and meta-analyses – with a gross number of 3718 underlying studies on the empiric relation between ESG criteria and CFP provide the starting point for our second-level review study.[2] When adjusted for overlaps, this figure reduces to a net number of more than 2200 unique studies. This still represents a dataset, which is 35 times
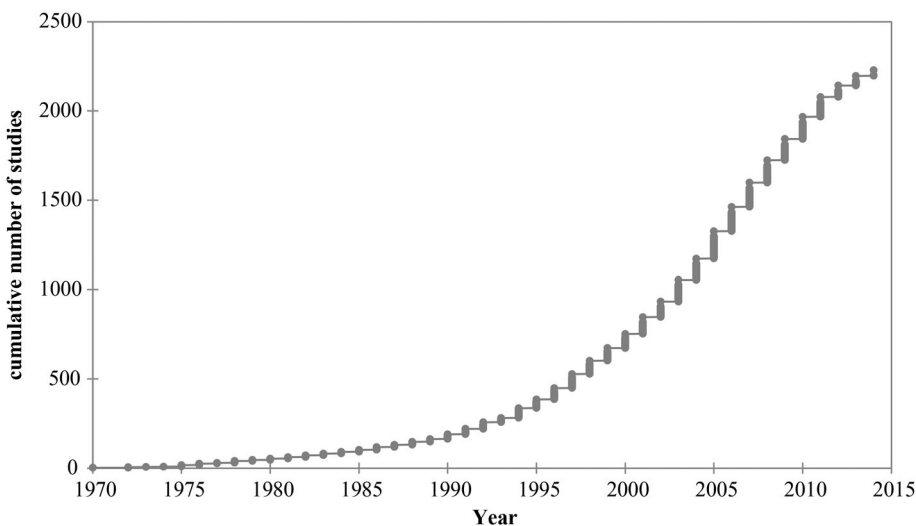

Figure 1. Estimated number of empirical studies on the ESG–CFP relation over time.

larger than the average of analyzed primary studies in prior review studies. In this study, we explain both systematic methods of summarizing extant research and present a research symbiosis of vote-count studies and meta-analyses in the spirit of a best-evidence synthesis (Slavin 1986).

Through analyzing what is by far the most comprehensive dataset on existing ESG–CFP research to date, we find that the business case for ESG investing is empirically well founded. Investing in ESG pays financially. Furthermore, we highlight that the positive ESG impact on CFP is stable over time. Based on the data, we are able to derive conclusions for portfolio and nonportfolio studies,[3] different asset classes, regions, and categories of E, S, and G. Particularly promising results are obtained when we differentiate between regions, nonportfolio studies, and asset classes other than equities.

Data

Since the earliest review of vote-count ESG–CFP studies (Aldag and Bartol 1978), the studies providing secondary analysis of this relation has risen considerably, including both academic and numerous additional practitioner papers. The growth in number of ESG–CFP research publications has been particularly tremendous since the beginning of the 1990s. Based on our sample, we find that at least 2200 empirical ESG–CFP studies exist.

Search

For our analysis, only academic studies – regardless if they are working papers, published journal papers, or written for a commercial audience – were considered. Review papers that did not provide quantitative summaries of their findings were not included in our sample. Besides ancestry research and expert opinion, all relevant scholar databases and publisher sites were searched: Academy of Management Journals, ABI/Inform, Ebsco, Emerald, Google Scholar, Oxford Journals, Sage, Science Direct, Sprinker Link, and Web of Science. We also searched for nonpublished material on Econbiz, NBER, Repec, and SSRN. The keyword search combinations included the three components of E, S, and G and its abbreviations. In particular, we used the search terms environment(al) (performance), social (performance), responsib(le/ility), sustainab(le/ility), human capital, (corporate) governance – all in relation to (corporate) financial performance.

The first 100 hits of each single database and key word query, sorted by relevance, were further processed. Within this pre-filtered results we then searched for the terms meta, review, literature, overview, analysis, study/ies, and examination. Together with the expert opinion studies, this yielded a narrower sample of 149 studies, which were analyzed in more detail by abstract or full paper. Single study designs, narrative reviews without clear tables/explicit summary results, and review studies without relevant ESG–CFP categorization were excluded. We applied a definition of ESG that reflects the exemplary list of variables of Clarkson (1995), Wood (2010), and the investment approaches in GSIA (2013). We did not differentiate whether the motives for ESG performance of the firm are for altruistic or strategic reasons (McGuire 1969; Baron 2001; McWilliams, Siegel, and Wright 2006). CFP measures were defined as accounting-based performance, market-based performance, operational performance, perceptual performance, growth metrics, risk measures, and the performance of ESG portfolios (Cochran and Wood 1984; Orlitzky and Benjamin 2001; Orlitzky, Schmidt, and Rynes 2003; Peloza 2009). We also considered specific parts of a study (Viviers and Eccles 2012; Mayer-Haug et al. 2013; Stam, Arzlanian, and Elfring 2014) when its focus was not entirely on the ESG–CFP relation – provided a vote-count estimate or effect size calculation was possible. In case of different versions of a review study, the latest version – or ideally, the published version – remained in our sample. All studies were required to be available in electronic format. The cut-off date for study inclusion was online availability until December 2014.

Table 1. Overview of studies on the ESG–CFP relation (vote-count studies sample).

Study	Focus	Number of studies (N)	Positive	Neutral	Negative	Mixed
			Share of findings			
Arlow and Gannon (1982)	S	7	42.9%	42.9%	14.3%	
Cochran and Wood (1984)	S, E	13	69.2%	23.1%	7.7%	
Aupperle, Carroll, and Hatfield (1985)	S, E	9	55.6%	22.2%	11.1%	11.1%
Ullmann (1985)	S, E	24	54.2%	20.8%	12.5%	12.5%
Capon, Farley, and Hoenig (1990)	S, E	14	75.9%		19.5%	4.6%
Wood and Jones (1995)	S, E	51	49.0%	21.6%	13.7%	15.7%
Pava and Krausz (1996)	S, E	21	57.1%	38.1%	4.8%	
Griffin and Mahon (1997)	S, E	50	44.0%	12.0%	22.0%	22.0%
Roman, Hayibor, and Agle (1999)	S, E	45	60.0%	24.4%	4.4%	11.1%
Richardson, Welker, and Hutchinson (1999)	E, S	22	50.0%	45.5%	4.5%	
Margolis and Walsh (2003)	S, E	126	42.9%	22.2%	5.6%	29.4%
Salzmann, Ionescu-Somers, and Steger (2005)	S, E	12	50.0%	25.0%	25.0%	
McWilliams, Siegel, and Wright (2006)	S, E	12	33.3%	25.0%	16.7%	25.0%
Gillan and Starks (2007)	G	39	35.9%	43.6%	5.1%	15.4%
Ambec and Lanoie (2007)	E	41	68.3%	22.0%	4.9%	4.9%
van Beurden and Gössling (2008)	E, S	34	67.6%	26.5%	5.9%	
Peloza (2009)	S, E	130	63.0%	22.0%	15.0%	
Blanco, Rey-Maquieira, and Lozano (2009)	E	32	71.9%	21.9%	6.3%	
Molina-Azorín et al. (2009)	E	32	62.5%	12.5%	12.5%	12.5%
Horváthová (2010)	E	44	54.7%	29.7%	15.6%	0%
Westlund and Adam (2010)	S	21	85.7%			14.3%
Love (2010)	G	45	77.8%	0%	22.2%	
Derwall, Koedijk, and Horst (2011)	Funds	18	16.7%	33.3%	22.2%	27.8%
Günther, Hoppe, and Endrikat (2011)	E	274	44.5%		11.8%	43.7%
Sjöström (2011)	E, S	21	23.8%	33.3%	14.3%	28.6%
Boaventura, Santos da Silva, and Bandeira-de-Mello (2012)	S, E	58	55.2%	27.6%	10.3%	6.9%
Rathner (2013)	Funds	25	13.2%	72.0%	14.9%	0%
Schultze and Trommer (2012)	E	36	50.0%	19.4%	5.6%	25.0%
Viviers and Eccles (2012)	Funds	59	23.4%	56.2%	20.3%	
Fifka (2013)	Reporting	45	53.3%	42.2%	4.4%	
Kleine, Krautbauer, and Weller (2013)	E, S, G	182	30.8%	31.9%	7.7%	29.7%
Revelli and Viviani (2013)	Funds	75	24.0%	48.0%	14.7%	13.3%
Capelle-Blancard and Monjon (2014)	Funds	61	3.3%	47.5%	16.4%	32.8%
Clark, Feiner, and Viehs (2015)	E, S, G	110	85.5%	5.1%	0.9%	8.5%
Schröder (2014)	E, S	28	57.1%	7.1%	10.7%	25.0%
Total/*n*-weighted average		1.816	48.2%	23.0%	10.7%	18.0%

This table displays all considered vote-count studies for the analysis. Meta-analytical studies with nontransferable or nontransparent effect sizes that nonetheless allow a vote-count analysis were included in the vote-count studies sample as well. Focus "S" and "E" denote a Social (S) or Environmental (E) focus. For studies with combined E and S focus, the order of S and E indicates the relative weight of S vs. E. The labeling "E, S, G" indicates no relative weight within groups. The number of primary studies in each vote-count analysis is denoted *N*. For vote-count studies with transparent vote-count on primary study, the share of findings is calculated based on this primary information. For all other cases, the reported summary results of the vote-count reviewers are used.

Sample

In total, we identified 35 vote-count studies (Table 1) and 25 meta-analyses (Table 2) which combine results from 3718 (gross) primary studies of which 1816 studies stem from vote-count studies and 1902 from meta-analyses. All studies were scaled with a unique identifier in the format author 1, author 2, ..., author i (year). Different review author citations formats, citations years of study versions, and author typing errors were normalized. All available statistical

Table 2. Overview of studies on the ESG–CFP relation (meta-analyses sample).

Authors	Focus	Number of studies (N)	Number of observations (N)	Average correlation r (uncorrected)
Frooman (1997)	E, S	22	2.161	0.312(b)
Orlitzky and Benjamin (2001)	S, E	18	6.186	0.149
Orlitzky (2001)	S, E	20	6.889	0.061
Orlitzky, Schmidt, and Rynes (2003)	S, E	62	33.878	0.184
Allouche and Laroche (2005)	S, E	79	57.409	0.143
Combs et al. (2006)	S	90	19.319	0.150
Wu (2006)	S, E	120	21.933	0.166
Rosenbusch, Bausch, and Galander (2007)	E	62	21.742	0.190
Darnall and Sides (2008)	E	9	30.000	0.077
Pavie and Filho (2008)	S, E	112	170.737	0.083
van Wijk, Jansen, and Lyles (2008)	S	28	4.627	0.190
Margolis, Elfenbein, and Walsh (2009)	S, E	214	38.483	0.133
Vishwanathan (2010)	E, S	189	n.a.	0.070
Crook et al. (2011)	S	66	12.163	0.170
Rosenbusch, Brinckmann, and Bausch (2011)	S	46	21.270	0.133
Unger et al. (2011)	S	70	24.733	0.076
Rubera and Kirca (2012)	S	153	33.544	0.146
Albertini (2013)	E	52	62.943	0.090
del Mar Miras-Rodríguez et al. (2015)	E, S	91	31.878	0.067
Dixon-Fowler et al. (2013)	E	39	22.869	0.062
Golicic and Smith (2013)	E	31	15.160	0.305
Mayer-Haug et al. (2013)	S	58	50.045	0.044(b)
Endrikat, Guenther, and Hoppe (2014)	E	148	201.511	0.082(b)
Stam, Arzlanian, and Elfring (2014)	S	43	13.263	0.157
Revelli and Viviani (2015)	Funds	80	89.496	−0.003(a)
Total/n-weighted average		1.902	992.239	0.118

This table displays all considered meta-analyses for the analysis and includes the number of primary studies in each meta-analysis and the corresponding number of observations. Amplifications on the original reported number of included primary studies have been made, if not the entire sample was used. For four meta-analyses not all originally reported number of studies could be verified through data in the provided appendix and for three studies a condensed study set was used. The gross number of studies therefore decreases from 2091 to 1902 studies. Focus "S" and "E" denote a Social (S) or Environmental (E) focus. For studies with integrated S and E focus, the order of S and E indicates the relative weight of S vs. E studies. The indices (a) and (b) for the uncorrected effect size r indicate the source of the effect size in case, it was modified from the originally stated results: (a) transformed from d/g in r and (b) derived from stated corrected study results with either a meta-analysis provided individual attenuation factor or a calculated artifact attenuation factor of 0.72.

summary information of review studies and all information reported on primary study level were imported and normalized for further statistical analysis.

Not all primary studies were made transparent by the review authors. Eight review studies containing 929 primary studies (25.0% of the sample) were not identifiable on primary level. This meant that the results were included in the summary effects, but no further analysis on primary study level was possible. Within the remaining uniquely identifiable 2789 (gross) primary studies, the overlap within review studies was subsequently accounted for. The resulting net number of identifiable unique primary studies was $n = 723$ for the vote-count studies and $n = 1214$ for the meta-analyses. Of these, 259 studies overlap within the two review approaches – which brought the final number of unique identifiable primary studies in the sample to $n = 1678$. Those 259 overlapping studies remained within the vote-count studies and meta-analyses sample as separation to one or the other review approach was not possible without losing data granularity.

Based on our sample of unique identifiable studies ($n = 1678$) and the number of nontransparent studies ($n = 929$), we estimated that at least 550 studies need to be added for a more complete estimate of the overall number of existing empirical studies on ESG–CFP published since the 1970s. This estimate was adjusted for the various overlaps within the vote-count studies and meta-analyses sample.[4]

Methods

Two different ways for aggregation of the primary and secondary study results are applied, each with different calculation methods depending on the context. For comparability between results in the vote-count studies and meta-analyses, we compute distributions of outcomes and correlation effect sizes. Besides aggregated summary effects, we provide further fine-grained analysis on sub-group level. Depending on data availability in vote-count studies and meta-analyses, an analysis for different asset classes, regions, categories of E, S, and G as well the relation over time is conducted. When both vote-count studies and meta-analyses offer this information, the more comprehensive primary study sample is chosen. When the sub-sample stems from vote-count studies, the analysis focuses on the distribution of outcomes; when the sub-sample stems from meta-analyses, the focus is on effect sizes.

Raw correlations, corrected correlations, sample sizes as well as corresponding variances, standard errors, confidence interval (CI), and credibility interval (CrI) have been extracted from the original meta-analyses as far as possible for further calculations. If necessary, some of the effect sizes and variances were transformed or derived for the calculation of a second-order meta-analysis.

Calculation of distributions

Vote-count studies

Distributions of positive, negative, neutral, and mixed outcomes are calculated for vote-count studies based on the results of the gross study sample and the net study sample. Within the gross study sample, it is possible that the same primary study is analyzed multiple times by different review study authors who may interpret each study differently. These interpretations are treated as independent study outcomes – no further adjustments are made. When a primary study is analyzed by more than one review author, the net study sample is adjusted for this constraint and different review authors' interpretations are harmonized. On average, every unique primary study in the vote-count sample is analyzed by 1.8 review authors. To decide on the overall interpretation per unique study, a binomial test with three equally probable outcomes is applied (positive, neutral, and negative). A probability of greater than .95 served as cut-off point to determine the final interpretation for the study. If no clear positive or negative assignment was possible, the study is classified as neutral and/or mixed.

Meta-analyses

Vote-count reviewers provide an assessment of the extent to which an observed relation in a primary study is a significant outcome. When undertaking a meta-analysis of primary studies, this assessment is performed by the second-level reviewer. In order to adjust for significance of the results, we employ a 95% CI and 95% CrI based on the determined meta-analytical variance in the $n = 25$ meta-analyses. We calculate the 95% CI via the determined standard error (SE) for attenuated (r) and disattenuated (p) results.

$$\text{SE}_r = \frac{\sqrt{\hat{\sigma}^2 \bar{\bar{r}}_i}}{\sqrt{n}} \quad \text{and} \quad \text{SE}_p = \frac{\sqrt{\hat{\sigma}^2 \bar{\bar{p}}_i}}{\sqrt{n}} \tag{1}$$

$$\text{CI}_L = 0 \pm 1.96(\text{SE}_{r/p}) \quad and \quad \text{CI}_U = 0 + 1.96(\text{SE}_{r/p}) \tag{2}$$

The 95% CrI is then calculated via the standard deviation of the attenuated and disattenuated correlations.

$$\text{SD}_r = \frac{\sqrt{\hat{\sigma}^2 \bar{\bar{r}}_i}}{\sqrt{n}} \quad \text{and} \quad \text{SD}_p = \frac{\sqrt{\hat{\sigma}^2 \bar{\bar{p}}_i}}{\sqrt{n}} \tag{3}$$

$$\text{CrI}_L = 0 \pm 1.96(\text{SD}_{r/p}) \quad \text{and} \quad \text{CrI}_U = 0 + 1.96(\text{SD}_{r/p}) \tag{4}$$

The true variance for $\bar{\bar{r}}_i$ (the meta-analytical mean of attenuated correlations) is $\hat{\sigma}^2 \bar{\bar{r}}_i$ and the corresponding variance for $\bar{\bar{p}}_i$ (the meta-analytical mean of disattenuated correlations) is $\hat{\sigma}^2 \bar{\bar{p}}_i$. As we are interested in the degree of significant positive and negative results, we place the intervals around zero instead of the meta-analytical mean. The resulting distributions may appear unusual on first glance as they define results significantly different from zero. The calculation is also conducted for the uncorrected and corrected correlations in the 551 primary studies, which possess transparent effect size data. We apply the same corresponding intervals that are utilized for the set of meta-analyses. Finally, we determine the number of studies that are above and below the intervals, categorize them as positive or negative and put them in relation with the sample size. All studies within the interval are classified as neutral.

Calculation of effect sizes

Vote-count studies

Even though vote-count studies usually do not report effects sizes like standardized mean differences (d/g) or correlations, it is possible to approximate them with the provided data. Methods have been introduced during the time when broader application of meta-analytical techniques were being developed (Hedges and Olkin 1980; Hedges and Olkin 1985) and were further refined in the 1990s (Bushman 1994; Bushman and Wang 1995).[5] The effect size r is determined by calculating the ratio of $p_0(\rho)$, which divides the number of positive studies by the sum of positive and negative studies, and by putting it in relation with the corresponding number of studies n. The estimation for the correlation coefficient r of a single vote-count study is subsequently determined through linear extrapolation based on the correlations coefficients provided (Hedges and Olkin 1985, 63ff). In a final step, the estimated correlation factors per vote-count study are sample-size weighted and aggregated to an overall estimation of the average correlation r for the vote-count sample.

Meta-analyses

First-order meta-analytical results for the sample of primary studies are calculated with the Hunter–Schmidt approach (Hunter, Schmidt, and Jackson 1982; Hunter and Schmidt 2004). The approach is used by more than 80% of meta-analyses in management research (Aguinis et al. 2011). It is similar to the second-order meta-analytical methodology which applies a fully random effect model.

All other average effect sizes and summary statistics of the 25 meta-analyses are determined with Schmidt and Oh's method for second-order meta-analysis (Schmidt and Oh 2013). A second-order meta-analysis combines a number of methodologically comparable and independent first-order meta-analyses. It allows knowledge aggregation across a tremendous set of primary studies. Such a meta-analysis sample is potentially closer to a complete set of studies in certain research fields and allows for robust generalizations. Apart from the efficient aggregation of huge datasets, the method is statistically superior to other approaches for summarizing first-order meta-analyses. Conventional approaches will most likely provide inaccurate estimates of the true mean effect size and are prone to second-order sampling errors in the variances across all meta-analyses. The approach chosen considerably reduces the remaining sampling error variance of first-order meta-analyses and allows a better estimation of the true (nonartifactual) variance across these mean effect sizes (Schmidt and Oh 2013). Because of the considerable number of first-order meta-analyses in our sample which make use of artifact distribution correction, we calculate our results with the artifact distribution approach of Schmidt and Oh.[6]

In order to differentiate whether correlations and corresponding variance are first-order (based on extracted primary studies) or second-order (aggregated vote-count studies or meta-analyses), we add one or two lines above letters for attenuated correlations *r* and disattenuated correlations *p*. The applied circumflex accent indicates that the values in the meaning of psychometric meta-analysis are estimates of the parameters, not the parameters themselves (Schmidt and Oh 2013; Schmidt and Hunter 2015, 229). Correlations containing lines above the letter but not marked with a circumflex are meta-analytical averages but are not determined using a psychometric meta-analysis.

Results

Figure 2 displays our summary of findings: approximately 90% of studies find a nonnegative ESG–CFP relation, of which 47.9% in vote-count studies and 62.6% in meta-analyses yield positive findings with a central average correlation level in studies of around 0.15. The following paragraphs discuss the findings in more detail.
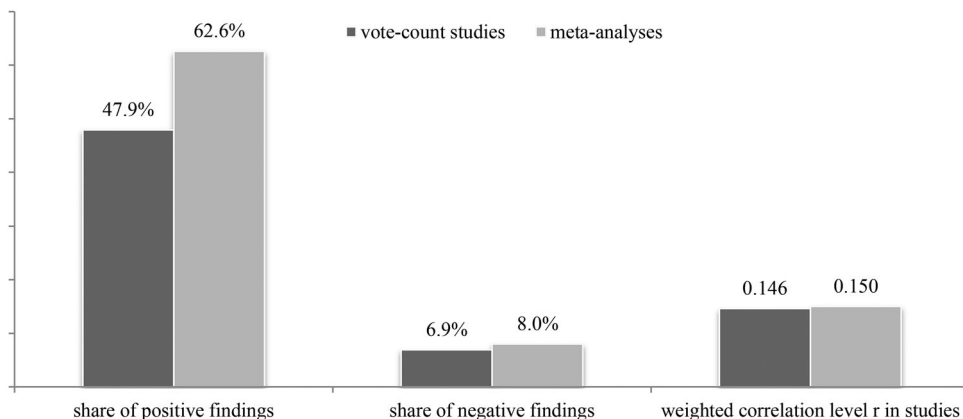

Figure 2. Overall summary results.

Summary effects: distributions

Vote-count studies

In a first step for the analysis of distribution results, all 1816 vote-count studies in the gross sample are treated as unique studies without adjusting for overlap among the vote-count studies. The overall weighted share of positive findings in the sample is calculated at 48.2%. In 41.0% of all results, the findings lead to neutral (23.0%) or mixed findings (18.0%). Just 10.7% of all analyzed studies exhibit a negative ESG–CFP relation.

In a second step, we account for the amount of nondisclosed and overlapping studies among the gross number of 1816 studies. The transparent studies are netted and in case that the first-level reviewer assessments differ, the findings are synthesized with a binomial test. The additional check does not meaningfully change the distribution of the positive and neutral findings (47.9% and 22.5%, respectively). However, a proportion of the negative findings cannot be considered statistically significant anymore if two or more reviewer interpretations are synthesized with a binomial test. The share of negative findings in the sample decreases to 6.9% of studies. Instead, the share of mixed results increases to 22.7%.

Either way, depending on which of the two approaches (unadjusted gross studies/net studies adjusted with binomial test) is applied, close to 50% of all analyzed studies in the vote-count sample find a positive relation and around 10% a negative one. The small distribution difference in the results is explained by a slightly more comprehensive overall sample and the net approach for study interpretation when more than one reviewer analyzed the same primary study (Figure 3).

Meta-analyses

Out of the 25 meta-analyses in the sample, just one study displays a summary effect size that has a negative ESG–CFP correlation – albeit very close to zero (Revelli and Viviani 2015). The sample size adjusted share of absolute positive correlation findings in meta-analytical summary effect for the 1902 studies stands with 95.8% considerable higher than in vote-count studies. However, this number is not adjusted for statistical significance. If we apply the 95% CI and 95% CrI, for the meta-analytical summary effects and the number of transparent primary studies, the figures change accordingly (Table 3). For the 25 meta-analyses, the share of positive findings is
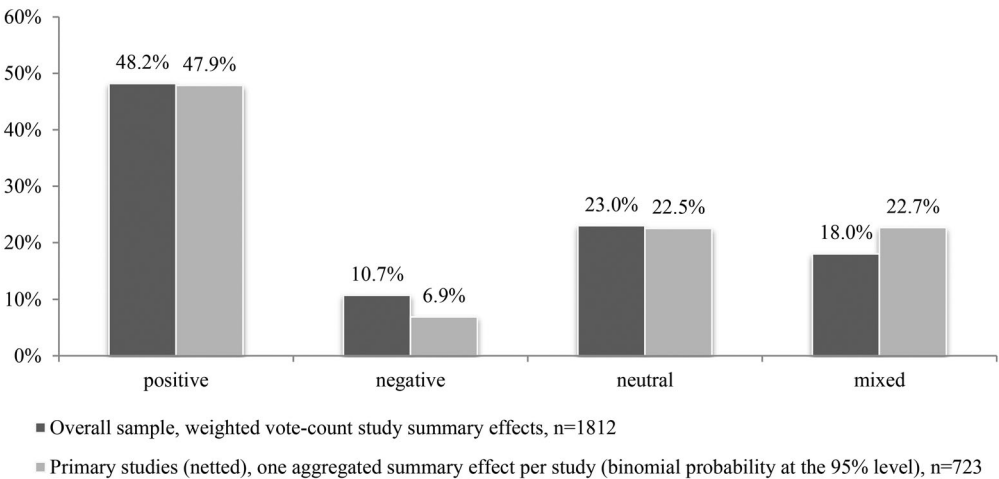

Figure 3. ESG–CFP relation in vote-count studies.

Table 3.   Distribution results in dependency of correlation intervals.

Share in	Interval type	Correlation interval (r)	Percentage of studies classified		
			Positive	Negative	Neutral
n = 25 meta-analyses	adj. 95% CI, attenuated	±0.0147	95.8	0	4.2
	adj. 95% CrI, attenuated	±0.0733	74.9	0	25.1
	adj. 95% CI, disattenuated	±0.0185	95.8	0	4.2
	adj. 95% CrI, disattenuated	±0.0924	90.7	0	9.3
n = 551 primary studies	adj. 95% CI, attenuated	±0.0147	80.9	14.2	4.9
	adj. 95% CrI, attenuated	±0.0733	62.6	8.0	29.4
	adj. 95% CI, disattenuated	±0.0185	80.9	14.5	4.5
	adj. 95% CrI, disattenuated	±0.0924	63.9	8.5	27.6

This table outlines the results of the distribution analysis of positive, negative, and neutral results in meta-analyses and in dependency of different correlation intervals. Whereas CI indicates the confidence interval and CrI the credibility interval.

reduced to 74.9% (95% CrI, attenuated results). However, the share of negative results remains at 0%, as the lowest effect in the 25 meta-analyses is –0.003. A quarter (25.1%) of the sample effect sizes is within the CrI and is correspondingly classified as neutral results.

To eliminate potential positive biases in these meta-analytical summary effects, we also drill down to the primary study level and the sample of 551 studies. The share of studies with significant positive correlations is reduced to a minimum of 62.6% (95% CrI, attenuated results) with a maximum percentage of negatives as high 14.5% (95% CI, disattenuated results). An attenuated correlation level (interval) above 0.141 would be needed to bring down the percentage of positive correlations to the level in the vote-count studies of 47.9%. This cut-off is close to the population unweighted average correlation of 0.159.

Summary effects: correlations

Vote-count studies

Next, an approximation of the correlation effect size in vote-count studies based on the vote-count method of Hedges and Olkin (1985, 47ff) is conducted. The weighted average correlation $\bar{\bar{r}}_v$ in all vote-count studies is calculated at 0.146. The corresponding p-value of <.001 indicates a correlation factor highly significant and different from zero. The additional check for statistical power (Cohen 1988; Faul et al. 2007) reveals that for the determined $\bar{\bar{r}}_v$ and the corresponding number of n, the chance of a Type II error is close to zero.

Meta-analyses

For reasons of comparability with the vote-count effect size estimate $\bar{\bar{r}}_v$, we compute the attenuated sample-size weighted average correlation for the 25 meta-analyses. The calculated correlation $\bar{\bar{r}}_m$ is 0.118. The p-value of similarity of $\bar{\bar{r}}_m$ and $\bar{\bar{r}}_v$ is notably high at 0.638. This means vote-count studies and meta-analyses determine statistically comparable results for the ESG–CFP relation. However, generalizing this finding for both methods universally may not be appropriate due to the almost independent samples containing few overlaps and very different variance levels.

Next, we calculate the first-order meta-analytical averages as both uncorrected and corrected parameters for the transparent sub-sample of 551 primary studies. The correlation $\hat{\bar{r}}_i$ is determined at 0.119 and $\hat{\bar{p}}_i$ at 0.169. The meta-analytical second-order effect size for the 25 meta-analyses

combining 1902 gross studies reveals a correlation of $\bar{\hat{\bar{r}}}_i = 0.108$ and for the corrected effect size $\bar{\hat{\bar{p}}}_i = 0.150$. Worth mentioning is that the value for the vote-count effect size $\bar{\bar{r}}_v$ is statistically not different from the first- and second-order meta-analytical results (minimum p-value .351 for the difference to $\hat{\bar{r}}_i$). Even though the vote-count technique is a rough estimate based on simplified assumptions, it nonetheless yields surprisingly comparable estimations of the ESG–CFP relation compared to the sample of meta-analyses aggregated with the method for second-order meta-analysis – at least for our setup.

The p-values for all of our meta-analytical means are below .01 and indicate a statistical highly significant positive deviation from zero. In a similar manner, the 95% CrI of 0.058–0.242 for $\bar{\hat{\bar{p}}}_i$ is another indicator of the positive nature of the ESG–CFP relation. Moreover, the control for statistical power of these values reveals very robust results, with a Cohen's power for all figures above 0.8 and in four cases close to 1 (Table 4).

Portfolio studies and nonportfolio studies

All previous vote-count and meta-analysis effects contain a blend of nonportfolio and portfolio studies. Making this differentiation is important as aggregated firm performance in virtual portfolios and financial products such as mutual funds or indices may deviate from primary firm data. Several primary portfolio studies and corresponding reviews report an abnormally low level of positive findings. And vice versa, a high level of mixed findings, compared to nonportfolio studies (Bauer, Koedijk, and Otten 2005; Peloza 2009; Kleine, Krautbauer, and Weller 2013; Revelli and Viviani 2015). In order to differentiate between portfolio and nonportfolio effects, we deconstruct all distributions and summary effect sizes with sufficient sample size in both blocks of study groups.

The relevance of this distinction becomes apparent when looking at the vote-count studies. The share of positive results in the $n = 155$ identifiable portfolio-related studies shrinks

Table 4. Effect size in dependence of aggregation approach and sample.

Number of review analyses	N	Effect size	Effect size value	power$^{\alpha = 0.05}$	$\hat{\sigma}^2$	CI$_L$	CI$_U$	CrI$_L$	CrI$_U$	Fail-Safe N
35	1.816	$\bar{\bar{r}}_v$	0.146***	0.999						
25	1.902	$\bar{\bar{r}}_m$	0.118***	0.999						
–	551	$\hat{\bar{r}}_i$	0.119***	0.804						
–	551	$\hat{\bar{p}}_i$	0.169***	0.991						
25	1.902	$\bar{\hat{\bar{r}}}_i$	0.108***	0.997	0.0014	0.094	0.123	0.035	0.182	717
25	1.902	$\bar{\hat{\bar{p}}}_i$	0.150***	0.999	0.0022	0.132	0.169	0.058	0.242	987

This table depicts first-order and second-order meta-analytical results. Attenuated correlations are marked as r and disattenuated correlations as p. The number of lines above letters indicates the first- or second-level nature of the effect size. The additional circumflex accent indicates psychometric meta-analytically effect sizes. Correlations not marked with a circumflex are meta-analytical averages but not determined with psychometric meta-analysis. $\bar{\bar{r}}_v$ is the sample-size weighted second-level effect size in vote-count analyses and $\bar{\bar{r}}_m$ the sample-size weighted second-level average effect size in meta-analyses. $\hat{\bar{r}}_i$ and $\hat{\bar{p}}_i$ are the attenuated and disattenuated first-level effects sizes in transparent primary studies, and $\bar{\hat{\bar{r}}}_i$ and $\bar{\hat{\bar{p}}}_i$ are the second-order meta-analytical attenuated and disattenuated averages. The deviation of all effect sizes from zero is tested for significance. $\hat{\sigma}^2$ is the estimated true variance for $\bar{\hat{\bar{r}}}_i$ and $\bar{\hat{\bar{p}}}_i$. Power 0.05 is Cohen's power with $\alpha = 0.05$ and for the corresponding sample and effect size. For the second-order meta-analytical correlation means $\bar{\hat{\bar{r}}}_i$ and $\bar{\hat{\bar{p}}}_i$ CI$_L$/CI$_U$ symbolize the 95% CI and CrI$_L$/CrI$_U$ the 95% CrI. L indicates the lower and U the upper bound of the interval. Fail-Safe N is Rosenthal's (1979, 1991) statistic to detect potential publication bias in meta-analyses. Fail-Safe N states the number of (future) studies with null results, until the effect size loses its significance level. A level above $5*n + 10$ for Fail-Safe N is considered unlikely to assume publication bias within studies. This can be ruled out. The significance thresholds for p-values are ***$p < .01$.
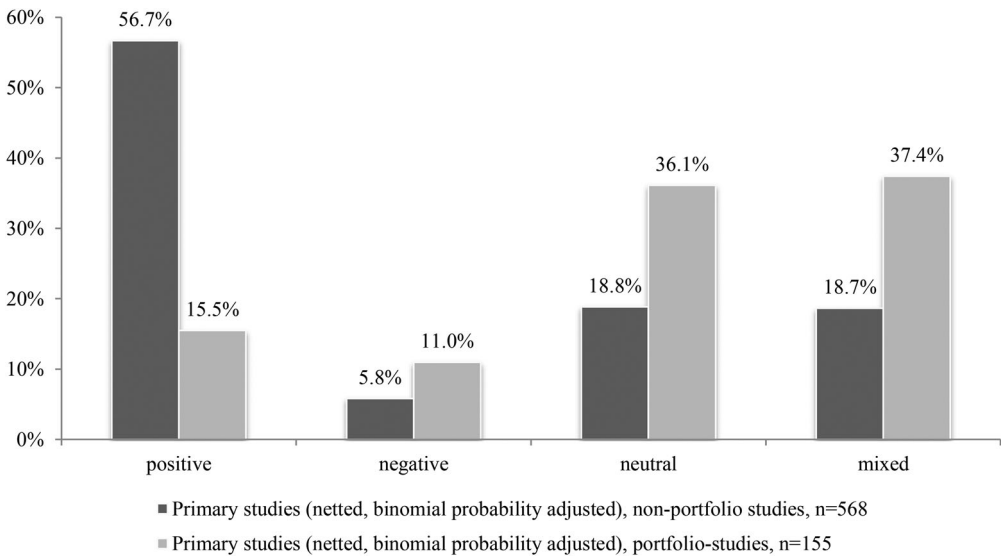
Figure 4.   ESG–CFP relation in vote-count studies in dependence of portfolio- and nonportfolio sample.

considerably (15.5%) in comparison to nonportfolio-based studies (56.7%). Studies with neutral or mixed findings increase proportionately in portfolio-based studies and constitute nearly three quarters. The share of negative studies increases marginally compared to nonportfolio studies (11.0% vs. 5.8%) (Figure 4).

Comparable results are found when all portfolio-focused vote-count studies are separately analyzed based on estimated effect sizes. The five primarily portfolio-focused vote-count studies exhibit a negative correlation $\bar{\bar{r}}_{v(p)}$ of –0.061 in comparison to the 30 primarily nonportfolio-focused vote-count studies with $\bar{\bar{r}}_{v(non-p)}$ of 0.177. The difference between both groups is highly significant (Table 5). These conclusions are supported when the first-level meta-analytical results in the transparent primary studies are deconstructed. The differences in correlations are not so pronounced, nonetheless significant (Table 5). This distinct deviation of portfolio and nonportfolio findings is examined in more detail in the "Discussion" section.

Table 5.   Effect size in dependence of portfolio and nonportfolio samples.

Number of review analyses	N	Effect size	Effect size value	power$^{\alpha = 0.05}$	Non-p and p difference
30	1.578	$\bar{\bar{r}}_{v(non-p)}$	0.177***	0.999	.238***
5	238	$\bar{\bar{r}}_{v(p)}$	–0.061*	0.154	
–	471	$\hat{\bar{r}}_{i(non-p)}$	0.131***	0.815	.076**
–	80	$\hat{\bar{r}}_{i(p)}$	0.055**	0.078	
–	471	$\hat{\bar{p}}_{i(non-p)}$	0.183***	0.981	.089**
–	80	$\hat{\bar{p}}_{i(p)}$	0.094***	0.132	

This table deconstructs the results in Table 4 for $\bar{\bar{r}}_v(p)$, $\hat{\bar{r}}_i$, and $\hat{\bar{p}}_i$ in nonportfolio studies effect sizes (non-p) and portfolio studies effect sizes (p). Power0.05 is Cohen's power with $\alpha = 0.05$ and for the corresponding sample and effect size. The difference of portfolio and nonportfolios studies in effect sizes is tested for significance. The significance thresholds for p-values are *$p < .10$, **$p < .05$, and ***$p < .01$.

Sub-effects in asset classes

Aside from the overall distribution of results and correlation factors in vote-count studies and meta-analyses, the data allow for examinations of differences in asset classes (D'Antonio, Johnsen, and Hutton 1997; Bhojraj and Sengupta 2003; Eichholtz, Kok, and Quigley 2010) – although with limited availability of nonequity classes. In a sub-sample consisting of 751 gross and 334 net studies within the vote-count sample 87.1% analyze equity-linked relations.

In contrast, nonequity asset classes both for bonds and real estate display a considerably higher share of positive findings over equities. More than two-thirds of studies uncover significant positive performance relations to ESG criteria. The share of positive votes for the 36 analyzed bond studies stands at 63.9% – with 13 neutral or mixed findings (36.1%). The relatively young research field of green real estate studies is reflected with seven studies in the total sample. Five studies (71.4%) find a positive and the other two a neutral relation (Figure 5).

Sub-effects in ESG categories

A key question is whether any of the three ESG letters may have a dominating effect on CFP. Some meta-analyses find significant positive relations for corporate environmental performance and CFP (Albertini 2013; Dixon-Fowler et al. 2013; Endrikat, Guenther, and Hoppe 2014). Human capital-focused meta-analyses (Combs et al. 2006; Crook et al. 2011; Rosenbusch, Brinckmann, and Bausch 2011) also find highly significant positive correlations. Various review studies on multifaceted corporate governance aspects and its relation to CFP exist and also support a positive relation (Dalton et al. 1999; Gillan and Starks 2007; Love 2010). However, not all of the E-, S-, and G-specific findings are free from ambiguity and no large-scale comparison between the subgroups has been undertaken yet.

For our sample of vote-count studies with identifiable ESG categories in 644 studies, we determine a relatively even positive relation for E, S, and G. The highest proportion is found in G with 62.3% of all cases. Governance-related aspects, on the other hand, demonstrate also the highest percentage of negative correlations with 9.2%. If the share of negative findings is deducted from positive ones, environmental studies offer the most favorable relation (58.7–4.3%). Studies with a social focus show 55.1% (5.1%) positive (negative) outcomes, hence the weakest relation.
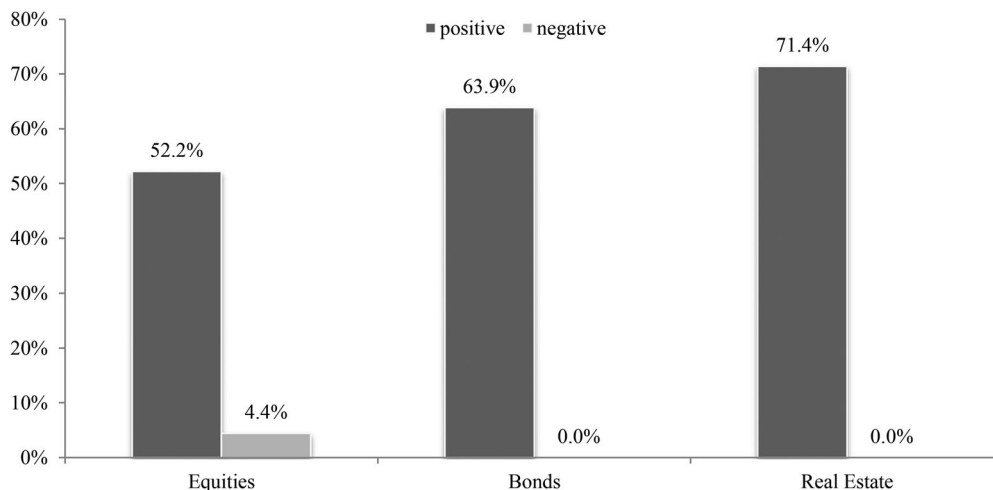

Figure 5.   ESG–CFP relation in main asset classes (vote-count studies sample), $n = 334$ net studies.
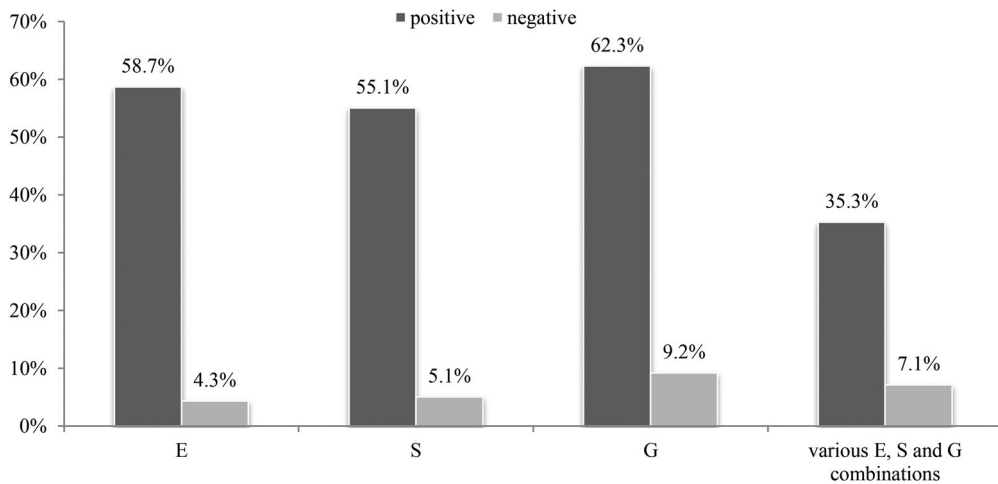
Figure 6.   E, S, and G categories and their relation to CFP (vote-count studies sample), $n = 644$ net studies.

When reviewing studies with various combinations of ESG criteria, 35.3% report positive (respectively 7.1% negative) findings. The downside bias primarily arises from a high proportion of portfolio-based studies in this section (39.1%). If all these studies were excluded, the positive (negative) rate stands at 51.7% (4.8%) which is nonetheless lower than pure E, S, and G approaches (Figure 6).

Sub-effects in regions

Some studies have analyzed potential differences in the ESG–CFP relation across regions. Though findings are far from consistent, some hypothesized that the ESG–CFP relation across countries is particularly affected by a higher humane orientation (del Mar Miras-Rodríguez, Carrasco-Gallego, and Escobar-Pérez 2015). Others find that the ESG–CFP relationship for US assets is significantly higher compared to non-US assets (Allouche and Laroche 2005; Dixon-Fowler et al. 2013). In contrast, a few researchers also discover significantly higher effects for studies conducted in the rest of the world (Albertini 2013; Golicic and Smith 2013).

We detect two main patterns in the data based on 843 gross studies with disclosed regional identifier that are netted for a final sample of 402 studies. First, developed markets excluding North America exhibit a smaller share of positive results. This contrast is most apparent between North America (42.7% positive) and developed Europe (26.1% positive). Developed Asia/Australia possess a positive share of 33.3%, though with the largest share of negatives as well at 14.3%. The total sample excluding North American stands at 27.8% positive share. A check of the underlying studies reveals a larger share of portfolio-based studies within the European and Asian/Australian sample that potentially biases the data. However, when omitting all portfolio studies for the developed market samples, the positive ratio for North America increases to 51.5%, and for Europe and Asia/Australia combined to 45.6%. This implies that the previous gap between the two samples shrinks considerably – from 14.9 to 5.9 percentage points.

Second, the Emerging Markets sample shows, with 65.4%, a considerable higher share of positive outcomes over developed markets. Excluding the proportion of portfolio studies, the ratio increases further to 70.8%. Based on 52 single studies in Emerging Markets solely focused on equity-linked studies, the spread to developed markets is considerable (Figure 7).
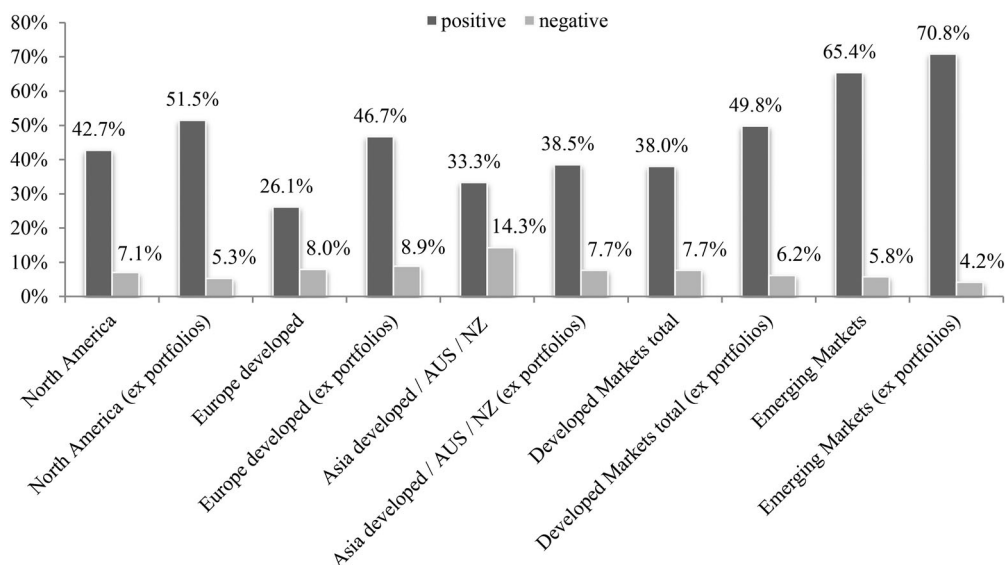
Figure 7.   ESG–CFP relation in various regions (vote-count studies sample), $n = 402$ net studies.

ESG effect over time

The question has been raised of whether the ESG–CFP relation is stable over time (Griffin and Mahon 1997; Borgers et al. 2013). Theoretically, the increasing amount of UN PRI signatories and, presuming an increasing ESG awareness within investment strategies, a decreasing ESG alpha (shrinking correlations over time) would be expected due to learning effects in capital markets. Empiric findings of meta-analyses investigating if investors' increased focus on
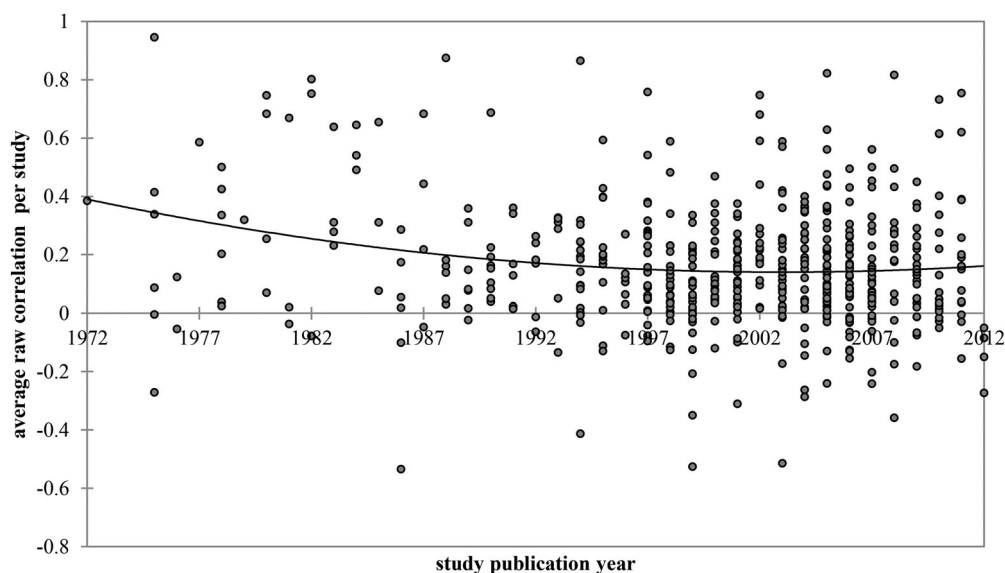

Figure 8.   ESG–CFP correlation factors in primary studies in dependency of study publishing dates (meta-analyses sample), $n = 551$ net studies.

stakeholder issues also lead to changing ESG–CFP patterns over time present a fuzzy picture (Pavie and Filho 2008; Rubera and Kirca 2012; Albertini 2013; Endrikat, Guenther, and Hoppe 2014) (Table 2).

Out of the 1214 primary studies in meta-analyses, 551 studies possess transparent correlation coefficients and publication years. For this sub-sample, we do not find indications to support the learning hypothesis. Although the dispersion of effects, positive and negative alike, increase since the beginning of the 1990s, the aggregated picture stays unchanged. Besides simple observations of the regression line, the time-invariant relation is supported by various trend tests which all fail to detect a time-dependent change of the correlation factors for every year since the mid of the 1990s (Figure 8).[7]

Discussion

Both vote-count and meta-analytic studies yield comparable results. This is a surprising outcome since the underlying studies are comprised of nearly independent samples (12.9% overlap) and apply different methods. Both methods yield robust results which reinforces the claim that there is a business case for ESG investing. On the one hand, the effect size-transformed vote-count results do not overestimate effect sizes for our sample and lead to comparable results measured as correlation r in comparison to the meta-analytical studies ($\bar{\bar{r}}_v = 0.146$ vs. mean correlation in meta-analyses between 0.108 and 0.169). Vote-count studies produce, on the other hand, more modest estimates for determining the proportion of positive and negative findings compared to meta-analyses. The share of neutral/mixed results is potentially overestimated for vote-count studies. Vote-count reviews determine whether the effect per study is significant by narrowly focusing on the underlying primary study sample size. Meta-analyses, by contrast, average effects across the entire sample of underlying studies which reduces the meta-analytical mean variance. Smaller variances mean lower thresholds (lower correlations) for significance in meta-analyses.

While overall correlation averages between 0.108 ($\bar{\hat{\bar{r}}}_i$) and 0.169 ($\hat{\bar{p}}_i$) could be considered rather "small" (Cohen 1988, 1992), they reflect common effect sizes in social sciences (Richard, Bond, and Stokes-Zoota 2003; Tamim et al. 2011; Lipsey et al. 2012) and, notably, might have relatively high relevance for competitive global securities markets. Based on correlation factors and the distribution analysis of more than 2000 empirical studies, we feel confident in generalizing that ESG criteria and CFP are, on average, positively correlated.

The distinct positive empiric result is found across various approaches, regions, and asset classes – except for portfolio-related studies. This outlier is potentially the source of the widespread misperception on the ESG–CFP relation. Institutional and private investors typically conclude that the ESG–CFP relation is, at best, neutral – consistent with the neoclassical understanding of capital markets (Markowitz 1952; Fama 1970; Friedman 1970; Fama 1991). Such an assumption about the ESG–CFP relation can be a key barrier for the broad uptake of sustainable investing among investors and investment advisors (Paetzold and Busch 2014; Reynolds 2014; CFA Institute 2015; Paetzold, Busch, and Chesney 2015).

The realized performance in portfolios depends on the overlapping effects of systematic and idiosyncratic risks (Campbell et al. 2001; Luo and Bhattacharya 2009), on construction constraints (Clarke, de Silva, and Thorley 2002), and on costs for portfolio implementation (Carhart 1997; Khorana, Servaes, and Tufano 2009) which may distorts pure ESG performance. Indeed, we find a significant difference in correlation levels of portfolio and nonportfolio studies. We argue that ESG portfolios should be expected to exhibit lower correlations to CFP and less positive findings for the following three reasons: (1) following the "drowned out by noise" argument (Peloza 2009), various overlapping market and nonmarket factors in a portfolio tend to

cover potentially existing ESG alpha. (2) Most ESG funds constitute a mixture of so-called nega-tive and positive ESG-screened funds, which could result in distortion and cancellation of any remaining effects (Derwall, Koedijk, and Ter Horst 2011). (3) Only studies on portfolios (in par-ticular mutual funds) embed management fees and other costs such as performance fees and trading costs. Observed effects in firm-specific study designs are typically calculated without such fees and costs. As roughly 2.5% per annum in various fees are carried by the average mutual fund (Carhart 1997; Barber, Odean, and Zheng 2005; Khorana, Servaes, and Tufano 2009), real correlation patterns in portfolio studies are most likely distorted. We conclude that portfolio-study findings have to be treated as a specific outcome of a subgroup within the entire ESG–CFP discussion. Investors, on average, are unlikely to harvest the existing ESG alpha after implementation costs. However, it can be argued, sophisticated investors are more likely to do so (Grossman and Stiglitz 1980; Hoepner 2013; Nagy, Kassam, and Lee 2015). Thus, our results underpin previous findings: at the worst case, investors in ESG mutual funds can expect to lose nothing compared to conventional fund investments (Hamilton, Jo, and Statman 1993; Humphrey and Tan 2014; Revelli and Viviani 2015).

Regional findings reveal that within developed markets, there is a higher share of positive results from North America compared to Europe and Asia/Australia. This can partially be explained by the lower share of portfolio studies within the sub-sample for North America.

Within the individual E, S, and G categories, E and G exhibit a slightly more positive relation than S-focused studies. However, the difference between E and S studies with positive and nega-tive outcomes is marginal (maximum 4.3% percentage points). Meta-analyses focusing on social aspects (van Wijk, Jansen, and Lyles 2008; Crook et al. 2011; Stam, Arzlanian, and Elfring 2014) usually find higher correlations, in contrast to environmental-focused meta-analyses (Albertini 2013; Dixon-Fowler et al. 2013; Endrikat, Guenther, and Hoppe 2014). We conclude that no single E, S, and G category demonstrates a meaningful superior positive relation to CFP.

The strength of our analysis is the aggregation of a large number of studies through secondary research on review studies, but it is also uncovers the inherit limitations of the underlying studies. One of them is the lengthy academic publication period of primary and likewise secondary research. Although our second-level review study includes all relevant review studies published until the end of 2014, it loses some representativeness for primary studies with a publication date of 2012 and younger.

Conclusion

Through a second-level review of 60 review studies – including both, vote-count studies and meta-analyses – on the ESG–CFP relation, we are able to combine more than 3700 study results from more than 2200 unique primary studies. Based on this sample, we clearly find evi-dence for the business case for ESG investing. This finding contrasts with the common perception among investors. The contrary perception of investors may be biased due to findings of portfolio studies, which exhibit, on average, a neutral/mixed ESG–CFP performance relation. It is impor-tant to be aware that the results of these (to date about 150 studies) are overlaid by various sys-tematic and idiosyncratic risks in portfolios and, in the case of mutual funds, by implementation costs. Still more than 2100 other – in particular company-focused – empiric studies suggest a positive ESG relation.

ESG outperformance opportunities exist in many areas of the market. In particular, we find that this holds true for North America, Emerging Markets, and in nonequity asset classes. Our results propose that capital markets so far demonstrate no consistent learning effects regarding the ESG–CFP relation: Since the mid-1990s, the positive correlation patterns in primary studies have been stable over time (Table 1).

Based on this exhaustive review effort, our main conclusion is: the orientation toward long-term responsible investing should be important for all kinds of rational investors in order to fulfill their fiduciary duties and may better align investors' interests with the broader objectives of society. This requires a detailed and profound understanding of how to integrate ESG criteria into investment processes in order to harvest the full potential of value-enhancing ESG factors. A key area for future research is to better understand the interaction of different ESG criteria in portfolios and the relevance of specific ESG sub-criteria for CFP. These insights will shed further light on the ESG determinants for long-term positive performance impacts.

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Notes

1. The statistical explanatory power in studies is usually low and the primary study might come to the conclusion, based on its calculated significance values and sample sizes, that a certain effect is nonsignificant. Vote-count reviews may also come to biased conclusions by simply concentrating on significant statistics of primary studies to decide if an effect across studies is positive or negative. Potentially they overestimate nonsignificant results. Besides, the explanatory power of vote-count studies shrinks with the increasing number of (contradictory) studies. Meta-studies directly import effect sizes and samples sizes to compute a summary effect across all primary studies. This aggregation method of data could better detect existing correlation patterns in combined samples (Hedges and Olkin 1980; Hunter et al. 1982).
2. The term "second-level review study" describes our aggregation of first-level review studies, regardless if they are vote-count studies or meta-analyses. "Second-order meta-analysis" is the psychometric aggregation technique for first-level meta-analyses as introduced by Schmidt and Oh (2013). This technique is used for the statistical aggregation of the 25 meta-analyses in our sample to compute summary effect sizes.
3. Portfolio studies comprise of studies on long-short ESG portfolios and in particular studies on ESG mutual funds and indices.
4. Two of the typical ways to treat missing data are model-based distribution estimation and the replacement of missing data (imputation) with estimated ones (Schafer and Graham 2002; Tsikriktsis 2005). The latter is applied due to the nonparametric nature of the data. We estimate the total number of missing net studies based on the subgroup means of overlaps in transparent vote-count studies, meta-analyses, and among both. The determined subgroup overlap means are applied to each subgroup of nontransparent studies.
5. The method assumes simplistically comparable sample sizes for the underlying primary studies, which is rather the exception in research synthesis. It is also constructed as fixed effect model, which assumes that studies draw samples from a population with the same standardized mean difference (Hedges and Olkin 1980). The calculated effect size for the vote-count sample should therefore be seen as quick approximate estimate instead of a final analysis (Hedges and Olkin 1985).
6. Please refer to table 1, p. 210 in Schmidt and Oh (2013) for a technical summary of the approach.
7. The applied tests are Pettitt, SNHT, Buishand, and von Neumann. The null hypothesis of the tests verifies if a time series is homogenous between two randomly selected times within the time series. The different tests allow conclusions not only for an assumed normal distribution but also for nonparametric distributions. Only data previous to 1997 are assessed as nonhomogenous to later observations in 2 of 4 tests. The SNHT test detects significantly higher results before 1985. The Buishand test detects significantly higher results previous to 1997 at the .05 level.

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