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Sources of variation in linking corporate social responsibility and financial performance

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Abstract

Purpose – *This purpose of this paper is to identify the possible sources of variation of results in prior studies linking corporate social responsibility (CSR) with corporate financial performance (CFP).*

Design/methodology/approach – *A meta-analysis was performed on 51 prior studies included in Orlitzky et al. in order to ensure compatibility with previous results. The meta-analysis is based on sub-groups of papers in five-year time intervals focusing on sample size and methodology employed as the sources of variation concerning the nexus between CSR and CFP.*

Findings – *The major finding of the study is that sample size and methodology are significant sources of variation in measuring the link between CSR and CFP.*

Research limitations/implications – *The findings are likely to help develop a structural framework towards broadening and deepening our understanding of the debate regarding the sources of variation in the measurement of CSR and CFP link. This research is limited to papers published up to 1999 as included in Orlitzky et al. Future research can update the findings by using data beyond 1999.*

Originality/value – *This paper can be considered an advance on the previous research as it contributes to broadening our understanding of the possible source of causes of variation in results of studies linking CSR with CFP.*

Keywords *Corporate social responsibility, Financial performance, Meta analysis, Profitability, Sub-group analysis, Company performance*

Paper type *Research paper*

1. Introduction

Research into corporate social responsibility (CSR) has generated considerable interest amongst academic and practitioners over the past decades. The issue has gained renewed momentum in the post global financial crisis era. For the purpose of this paper CSR is defined as those responsibilities that corporations undertake to satisfy organisational goals as well as societal needs in a balanced way that serves the interests of both businesses and the community. Various facets of CSR have been researched in the past. These include, for example, managerial attitudes towards CSR (Quazi, 2003), theoretical aspects of CSR and ethics (Hunt and Vitell, 1984), cross-cultural facets of CSR (Quazi and O'Brien, 2000), CSR and quality of life (Rugimbana *et al.*, 2008), and CSR and competitive advantage (Porter and Kramer, 2005). However, one particular issue concerning the relationship between CSR and the financial performance of firms has generated enormous interest amongst academics, policy makers and practitioners (Ullmann, 1985; Marom, 2006). The issue is that businesses and practitioners would like to see a business case to justify their commitment to CSR. Numerous empirical studies aimed at finding a possible answer to the question have produced mixed results (Peloza and Papania, 2008), most of which are neither straightforward nor conclusive (Griffin and Mahon, 1997; Marom, 2006). In the theoretical vein, two contrasting models have been suggested. One is rooted in the positive impact of corporate social performance (CSP) on corporate financial performance (CFP),

while the other is based on the assumption that increased costs resulting from CSP put participant businesses in a disadvantageous position as compared to those that do not support CSR. While differing methodologies and statistical techniques have been held responsible for the lack of a consistent pattern of outcomes, an alternative approach to resolve this impasse has not been suggested in the literature. Although a few meta analyses have partially contributed to possible solutions to the issue, these results have not ultimately revealed any conclusive evidence either (e.g. Orlitzky and Benjamin, 2001; Orlitzky *et al.*, 2003, Griffin and Mahon, 1997; Frooman, 1997; Wood and Jones, 1995). This apparent lacuna in the literature has prompted our meta analysis to uncover some possible sources of variation in the outcomes of 51 of the studies that Orlitzky *et al.* (2003) used in their meta-analysis. Our meta-analysis re-examines some of the issues that Orlitzky *et al.* (2003) did not specifically look at in detail. Some factors were considered and discarded for this study. For example, industry (see Cowen *et al.*, 1987) was discarded because insufficient detail is provided in the table showing effect sizes in Orlitzky *et al.*'s (2003) paper. Firm size (see Orlitzky, 2001) was also discarded because individual data was not available for all the firms in the studies included in Orlitzky's (2001) paper. Finally, country (see Quazi and O'Brien, 2000) was discarded because most studies in Orlitzky *et al.* (2003) were US-based.

Size of sample used, statistical techniques employed and the timing of publications of the papers are all available for consideration as factors. The above three propositions were arrived at based on the available characteristics of the literature, particularly those included in Orlitzky *et al.* (2003). Over three decades of research has been conducted on CSR and CFP. We wish to derive a statistical measure of whether there has been any movement towards a consensus over time. Sample size is a key determinant of precision, and while Orlitzky *et al.* (2003) provide sample sizes, the authors carry out no further analysis of them. Researchers have used a variety of statistical techniques in their research and we wish to determine whether the choice of technique has an impact on the strength of the relationship. Time is used to subdivide studies by Griffin and Mahon (1997). Sample size is provided by Orlitzky *et al.* (2003). Firm size is also suggested as a possible confounding variable by Orlitzky (2001). In a similar way, we examine the magnitude of the effect of sample size on effect size. Since sample size is an element of the formula for effect size, we know a priori that sample size influences effect size. Our analysis helps us to determine what the magnitude of the effect is.

To our knowledge, the effect of statistical methodology has not been studied previously. Our concern is that a restricted number of statistical techniques have been used to study the relationship between CSR and CFP and that this narrow focus on correlation, *t*-tests and regression may not model the complete relationship.

It is to be noted that this paper includes those previous studies that looked at the relationship between CSR and financial performance of firms in specific terms and this principle has been followed throughout the analysis process of our meta-research.

2. Literature review

The question of whether there is any relationship between CSR and CFP has led to lively debate amongst academics and researchers since the 1960s (Cochran and Wood, 1984). Does social responsibility pay off? Can a firm that exercises social responsibility make higher profits than one that does not? Are socially responsible firms good investment risks? These are some of the typical questions raised in the literature and addressed in several studies; these have expressed contrasting views based on research findings about the possible relationship between a firm's social responsibility and its financial performance. For example, McGuire *et al.* (1988) reported three different views on this point, which can be reclassified into two meaningful models presented earlier in this paper. The first is that firms "face a trade-off between social responsibility and financial performance". This view is based on the argument that socially responsible firms are economically in a more disadvantageous position than those who are less responsible as a result of the cost incurred by the former for their socially responsible actions (Preston and O'Bannon, 1997; Aupperle *et al.*, 1985; Ullmann, 1985; Vance, 1975; Preston and O'Bannon, 1997). The second view, which is in sharp contrast to the

first, is that a firm may benefit from being socially responsible as it leads to increased employee morale and improved productivity (Moskowitz, 1972; Parket and Eilbirt, 1975). The cost of social responsibility may be high but can be offset by the reductions in other firm costs such as legal expenses, worker compensation costs, product replacement costs and the like (Herremans *et al.*, 1993). A further contemporary view strongly suggests that there is a nexus between CSR and competitive advantage in terms of building a unique image of the firm in the market. A firm can build this image through CSR orientation and use that unique image as a differentiated strategy to increase its competitiveness in the market over non-CSR oriented firms (Porter and Krammer, 2004).

There is also a CSR perspective rooted in the moral principle which suggests that corporations should be socially responsible simply because it is the right thing to do irrespective of the financial outcome of that socially responsible action. This perspective is underpinned by deontological philosophy, which assesses an action or behaviour in terms of its inherent rightness or wrongness and does not take into account the nature and extent of outcome of that action (Frankena, 1973).

Overall, the literature on the relationship between CSR and CFP is inconclusive. Several issues have been held responsible for the lack of a consensus. These include inconsistent methodologies (Griffin and Mahon, 1997), misspecification of models (Ullmann, 1985), inclusion of confounding factors (Margolis and Walsh, 2003), and the lack of clarity of both CSR (Griffin, 2000) and CFP (Margolis and Walsh, 2003) variables. Ullmann (1985) summarised the findings of 12 studies as showing no clear tendency. A mixture of positive, negative and no correlation outcomes were observed. The findings regarding the relationship between social responsibility and financial performance ranged from no correlation to various significant positive or negative linear relationships (Ullmann, 1985). Orlitzky *et al.* (2003) included 52 papers published from 1974 to 1999 and found a similar pattern of outcomes. Mill (2006) lists six meta-analyses from 1995-2005, spanning articles published from 1970 to 2002. It is to be noted here that there does not appear to be any research to date on the existence of possible curvilinear relationships.

Most studies of the relationship between CSR and CFP have used a regression model, correlation analysis, or a *t*-test. Only a few papers have used a different methodology. For example, Mill (2006) adopted a mixture of a case-control study and a longitudinal study over a four-year period and found that firms with a positive commitment to CSR recorded better financial outcomes as compared to those with no commitment to CSR. This implies that firms that have invested in CSR in programs have, in financial terms, achieved a higher level of gains.

Wu (2006) conducted a meta-analysis of 121 papers that were published prior to 2000 using subset analyses by definition of CSR, definition of CFP and firm size. In general Wu found a positive relationship between CSR and CFP. Wu also found that the relationship between CSR and CFP tended to weaken when analysis was conducted by the subgroups mentioned above. In a discussion paper, Chand (2006) pointed to an important issue by advocating the use of industry as a factor.

Most of the findings reported in the literature suggest that the correlation between corporate social responsibility and financial performance is generally positive. However, it would not be wise to conclude that the tendency is towards a positive relationship. There are a number of reasons for this reservation. These include the identification of CSR as an “elusive concept” (Lee, 1987) and the use of “poor experiments, unfortunate use of proxies, inappropriate mathematics or controls, and so forth” (Cottrill, 1990).

3. The rationale, scope and objectives of the research

Following the recent collapse of a number of corporations at the international level, ethics and CSR have attracted the renewed attention of boardroom barons as well as other stakeholders such as investors, creditors, legislators, politicians and the general public. While numerous aspects of CSR and ethics have been addressed in the contemporary business literature, a vital question remains unresolved. That is, to link the effects of being ethical and socially responsible to the financial performance of firms. The main reason

behind the difficulty of finding a clear-cut answer to the question is that research in this area has used a variety of methodologies, measurement scales and statistical methods. This has made the results debatable, and consequently no consensus has been reached. In response, some authors such as Orlitzky *et al.* (2003) attempted to resolve the issue using meta-analyses of results.

In view of the above, this paper is aimed towards contributing to the arrival of a possible consensus on this issue. In reaching towards the aim we have employed a sub-group meta-analysis of the results of the studies identified by Orlitzky *et al.* (2003). More specifically, we have conducted a number of meta-analyses of the results of studies by date of publication, sample size and statistical methodology. The aim was to find out whether the differences in methodologies and statistical method have made any contribution to the impasse relating to the nexus between CSR and financial performance of firms.

4. Methodology

A meta-analysis is used as a method of investigation for this research. Meta-analysis is an advanced technique used to combine the results of a number of studies in order to gain a better overall picture of the underlying relationships between the variable of interest in relation to a particular study. In the past, researchers simply carried out a textual analysis of studies, or applied a simple vote-counting procedure in an attempt to determine the overall nature of the relationship(s). Glass (1976) published one of the first meta-analysis procedures for combining effect sizes in a statistically appropriate manner (Hunter *et al.*, 1982). Meta-analysis has since been used in many studies and by now it has emerged as a useful statistical technique in terms of combining the results of a number of studies; especially in clinical trials (for example, see www.cochrane.org). Similar systematic reviews in the fields of education, crime and justice and social welfare are published by the Campbell Collaboration (see www.campbellcollaboration.org). For the purpose of this paper we have based our meta-analysis on 51 of the papers included in Orlitzky *et al.*'s (2003) meta analysis. This meta analysis is the latest study in this particular area. In their abstract, Orlitzky *et al.* (2003) referred to 51 papers and an overall positive effect of CSR on CFP, although the effect was moderated by the definitions of CSR and CFP used in each paper. The authors provided year of publication, effect size and sample size for the 51 papers used in their original analysis. These 51 papers form the basis of our analysis for the current paper. We have decided to confine our analysis to the 51 papers in order to maintain consistency with the previous work as well as to be able to compare some of the results of our meta-analysis with those of prior studies. This means that this paper will specifically focus on definitions of corporate financial performance as used by the 51 papers that have been included in this meta-analysis ranging from return on asset (ROA) to return on investment (ROI).

As can be seen in Table I, many of the studies included in Orlitzky *et al.*'s (2003) meta analysis provided more than one effect size. This can be due to multiple measures of CSR and CFP, or other ways of subdividing the data. For example Davidson and Worrell (1992) report results for several different types of product recall. Herremans *et al.* (1993) report results across a number of years. Simerly (1994) uses seven different measures of CFP and O'Neill *et al.* (1989) use four different measures of CSR. In some cases it even turned out that some of the effect sizes were positive and some were negative. If this occurred, then the entry in column 4 of Table I is recorded as "variable". This is because the results were not consistent in their direction. Because of the variety of effect sizes available within individual studies, in this paper we have analysed and presented the results of our meta-analysis using three choices of effect size. Firstly, we defined the most pessimistic effect. The pessimistic effect refers to the effect size that is closest to zero, or equal to zero provided the effect sizes in a particular study range from positive to negative. Secondly, we defined the most optimistic effect in a positive direction. The most optimistic positive effect refers to the effect size closest to 1.0 in a particular study. Third, we defined the most optimistic effect in a negative direction. The most optimistic negative effect is the effect size closest to -1.0 in a particular study. The rules for obtaining these three effect sizes from the range of effect sizes in a particular paper is shown in Table II.

Table I Nature of correlation revealed in the papers included in Orlitzky *et al.*'s (2003) meta analysis along with the method of analysis used

<i>Name of authors</i>	<i>Date</i>	<i>Method</i>	<i>Nature of correlation found</i>	<i>Comments (selected nature of CSP and CFP)</i>
Abbott and Monsen	1979	<i>t</i> -test	Positive	D and ROI
Alexander and Buchholz	1978	Correlation	Variable	R and market return
Anderson and Frankle	1980	<i>t</i> -test	Variable	D and stock returns
Aupperle <i>et al.</i>	1985	Mixed	Variable	CSR1 and ROA
Balkaoui	1976	T-test	Variable	SA/P/O and market return
Blackburn <i>et al.</i>	1994	Correlation	Variable	SA/P/O and market return
Bowman	1978	<i>t</i> -test	Positive	CSR1 and n/a
Bowman and Haire	1975	Mixed	Positive	D and ROSBTA
Bragdon and Marlin	1972	Correlation	Positive	D and ROE
Brown and Perry	1995	Correlation	Positive	SA/P/O and ROE
Chen and Metcalf	1980	Correlation	Variable	SA/P/O and profitability
Cochran and Wood	1984	<i>t</i> -test	Positive	R and market valuation
Conine and Madden	1987	Correlation	Positive	R and perceptual survey measures
Cowen <i>et al.</i>	1987	Correlation	Variable	D and ROE
Davidson and Worrell	1992	<i>t</i> -test	Variable	D and security returns
Dooley and Lerner	1994	Correlation	Positive	CSR1 and ROA
Fogler and Nutt	1975	Correlation	Negative	SA/P/O and P/E ratio
Fombrun and Shanley	1990	Correlation	Positive	SA/P/O and ROIC
Freedman and Jaggi	1982	Correlation	Variable	D and ROA
Freedman and Jaggi	1986	<i>t</i> -test	Variable	D and market return
Graves and Waddock	1994	Correlation	Positive	SA/P/O and ROA
Greening	1995	Correlation	Positive	SA/P/O, R and ROA
Griffin and Mahon	1997	Correlation	Variable	SA/P/O, R and ROA
Hansen and Wernerfelt	1989	Correlation	Positive	CSR1 and ROA
Heinze	1976	Correlation	Variable	R and ROA
Herremans <i>et al.</i>	1993	Correlation	Variable	R and market return
Ingram	1978	<i>t</i> -test	Variable	D and portfolio return
Kedia and Kuntz	1981	Correlation	Variable	SA/P/O and ROA
Levy and Shatto	1980	Correlation	Positive	SA/P/O and net income
McGuire <i>et al.</i>	1988	Correlation	Variable	R and ROA
Newgren <i>et al.</i>	1985	<i>t</i> -test	Variable	SA/P/O and P/E ratio
O'Neill <i>et al.</i>	1989	Correlation	Variable	CSR1 and ROA
Parket and Eilbirt	1975	<i>t</i> -test	Positive	Questionnaire and ROE
Patten	1990	<i>t</i> -test	Variable	D and market returns
Pava and Krausz	1995	<i>t</i> -test	Variable	SA/P/O and market return
Preston	1987	<i>t</i> -test	Positive	D and market return
Reimann	1975	Correlation	Positive	CSR1 and survey measures
Roberts	1992	Correlation	Positive	SA/P/O and ROA
Russo and Fouts	1997	Correlation	Positive	SA/P/O and ROA
Shane and Spicer	1983	<i>t</i> -test	Variable	SA/P/O and returns
Simerly	1994	<i>t</i> -test	Positive	R and ROI
Simerly	1995	<i>t</i> -test	Positive	R and ROE
Spencer and Taylor	1987	Correlation	Variable	R and ROA
Spicer	1978	Correlation	Positive	SA/P/O and ROE
Starik	1990	Correlation	Variable	SA/P/O and ROI
Sturdivant and Ginter	1977	Correlation	Positive	R and EPS growth
Turban and Greening	1997	Correlation	Variable	SA/P/O, R and ROA
Vance	1975	Correlation	Negative	R and share price
Waddock and Graves	1997	Correlation	Positive	SA/P/O and ROA
Wartick	1988	<i>t</i> -test	Positive	SA/P/O and survey measures
Woktuch and Spencer	1987	<i>t</i> -test	Positive	SA/P/O and ROA

Notes: Codes for corporate social responsibility (CSR): D, disclosures; R, reputational indices; SA/P/O, social audit, process and outcome measures; CSR1, Aupperle's and others' measures of corporate principle and values. Codes for corporate financial performance (CFP): ROA, return on assets; ROE, return on equity; ROI, return on investment; P/E ratio, price/earnings ratio. An actual count of the papers that Orlitzky *et al.* (2003) included in their meta-analysis revealed that 51 of the papers had effects sizes recorded, hence 51 papers have been included in our meta-analysis

We carried out our meta-analyses using these three choices of effect size in order to see the impact on the meta analyses that results from the different effect sizes reported in each of the prior studies (i.e. the 51 studies).

Table II Conversion of a range of effect sizes to a set of three effect sizes

<i>Effect size</i>	<i>Pessimistic</i>	<i>Optimistic positive</i>	<i>Optimistic negative</i>
Between $-x$ and $-y$	0	0	$-x$
Between $-x$ and y	0	y	$-x$
Between x and y	x	y	x

It is to be noted that in some cases, a range of sample sizes is also provided in the papers listed above (Table I). For our paper the smallest sample size will be used for the relevant analysis. This choice leads to a “worst-case” contribution to the meta analysis. Our results could then be even stronger if the larger sample size was taken into consideration for the relevant analysis.

Based on the above discussion, the following propositions are presented for testing:

- P1.* Year of publication of the papers will have an effect on the strength of the relationship between CSR on CFP.
- P2.* Sample size of the concerned studies will have an effect on the strength of the relationship between CSR on CFP.
- P3.* Statistical techniques used will have an effect on the strength of the relationship between CSR on CFP.

5. Results of meta-analysis (1974-1999)

As mentioned earlier, our meta-analysis has examined the relationships between CSR and the financial performance of firms focusing on the following aspects: five-year time intervals, sample size and methodology employed.

5.1 Meta analysis by five-year time intervals

We propose that time (year) of publication of the concerned studies has an effect on the results of the studies. Orlitzky *et al.*'s (2003) meta analysis involves 51 papers published between the period 1974-1999. In order to maintain a reasonable number of papers in each time interval, while still having a reasonably large number of time intervals, we decided to group the years of publication of the concerned papers into five-year intervals, starting in 1970. It has been assumed that the year of publication is closely related to the year(s) in which the study data was collected. Confidence intervals for the effect size by five-year time intervals can be seen in Table II. These intervals were calculated using the Hedges method described by Field (2005, pp. 301-3). In this method effect sizes are converted to standard normal variates, then their weighted average is calculated. The weights are based on the within-study and between-study variance of the studies. A confidence interval for the overall effect size is then found using the normal distribution, and a formula for the standard error of the mean effect size. Three intervals are shown for this purpose. The pessimistic interval uses the effect size closest to zero defined earlier in Table II. The optimistic positive interval used the most positive effect size defined in Table II. Finally, the optimistic negative interval uses the most negative effect size defined in Table II.

The results revealed that with the passage of five-year periods, the results tend to become more precise (confidence intervals become generally narrower). Furthermore, with the passage of time the meta-analysis estimate of effect size also tends to be more positive. In other words, it can be said that the results of the more recent studies have higher interpretive value. The conclusion that can be drawn from this finding is that the quality of studies in terms of precision and strength has improved as time progressed.

The half-decade intervals used are standard in time series analysis (e.g. Cochran and Wood, 1984). Neither two-year nor ten-year intervals provided a better indication of the change in quality as time progressed (see Table III).

Table III Meta analysis of effect size by year

Year	95 per cent CI (pessimistic)	95 per cent CI (optimistic positive)	95 per cent CI (optimistic negative)	Number of papers
1970-1974	— ^a	— ^a	— ^a	1
1975-1979	[−0.03, 0.15]	[0.03, 0.77]	[−0.19, 0.19]	14
1980-1984	[−0.12, 0.47]	[0.21, 0.91]	[−0.51, 0.43]	7
1985-1989	[0.00, 0.35]	[0.17, 0.53]	[−0.07, 0.32]	11
1990-1994	[−0.02, 0.08]	[0.14, 0.53]	[−0.34, −0.03]	10
1995-1999	[0.03, 0.22]	[0.24, 0.56]	[0.00, 0.21]	12
Total				51

Note: Only one study: $n = 12$, $r = 0.22$

The above results make sense because as time progresses it is to be expected that firms will improve their ability to implement CSR from a strategic viewpoint. Therefore, the likelihood of firms experiencing positive financial outcomes from CSR will increase leading to greater engagement with CSR in the long term.

5.2 Meta analysis by sample size

We propose that sample size has an effect on the results of the studies. Orlitzky *et al.* (2003) listed the sample sizes in each of the 51 papers. In some cases, a range of sample sizes is provided. We have used the smallest sample size in each case to ensure that our results reflect the weakest outcome possible. The intervals for the sample size were chosen to ensure that there were a similar number of studies in each interval. They also show a broadly exponential increase in the upper limit of the sample sizes (see Table IV).

As the sample size increases, the confidence intervals generally become narrower and the effects generally become more positive. The conclusion that can be drawn from this finding is that the quality of studies in terms of precision and strength improves as sample size increases. This result makes sense, as it is a general statistical property of estimators that they become more precise as the sample size increases.

5.3 Meta analysis by methodology

We propose that the method of analysis has an impact on effect size. Orlitzky *et al.* (2003) record the measure of CSR and CFP used in each paper, and whether the effect size was derived from a correlation or from a *t* statistic (see Table V).

The intervals using *t*-tests are always wider than the intervals using correlation. This could suggest that correlation methods give more precise results. It may also be simply due to the fact that there are more correlation studies. Furthermore, one of the studies revealed an effect size very close to 1.00, which may skew the results in favour of the correlation methodology.

We looked at the original papers to see if more detail on the method of analysis was available. Our searches located 34 of the 51 papers. Of these, only two studies used

Table IV Meta analysis of effect size by sample size

Sample size	95 per cent CI (pessimistic)	95 per cent CI (optimistic positive)	95 per cent CI (optimistic negative)	Number of papers
< 10	[0.85, 0.98]	[0.33, 0.74]	[−0.37, 0.54]	8
10-19	[−0.03, 0.31]	[0.27, 0.68]	[−0.27, 0.23]	10
20-49	[−0.07, 0.33]	[0.16, 0.81]	[−0.51, 0.25]	7
50-99	[0.01, 0.39]	[0.22, 0.52]	[−0.07, 0.37]	9
100-199	[−0.02, 0.23]	[0.17, 0.53]	[−0.06, 0.21]	13
200 +	[0.03, 0.12]	[0.14, 0.18]	[0.03, 0.12]	4
Total				51

Table V Meta analysis of effect size by methodology employed

<i>Method</i>	<i>95 per cent CI (pessimistic)</i>	<i>No. of papers</i>	<i>95 per cent CI (optimistic positive)</i>	<i>No. of papers</i>	<i>95 per cent CI (optimistic negative)</i>	<i>No. of papers</i>
Correlation	[0.05, 0.21]	34	[0.24, 0.41]	33	[− 0.02, 0.17]	32
<i>t</i> -test	[0.02, 0.23]	17	[0.34, 0.77]	18	[− 0.17, 0.17]	19
Total		51		51		51

methods other than correlation, regression or two-sample tests. These were MANOVA and binomial tests. The effects were found to be generally positive. In terms of the width of the confidence intervals, they appear to become wider as consideration shifts from correlation and *t* tests and other methods. This may simply be due to the much smaller number of studies using other methodologies.

Our objective here is not to assess which methodology gives the best estimate of effect size in an absolute sense, but to compare the relative performance of methodologies employed. Our conclusion showed that the papers in the meta-analysis that employ *t*-tests resulted in a wider confidence interval for the effect size than papers employing correlations. Our results do not indicate which methodology provides results that are closest to the true effect size. The results do indicate that *t*-tests provided more consistent results than other methodologies for the papers in the meta-analysis.

6. Modelling the effect of year, sample size and methodology on effect size

The varying confidence intervals in the meta-analyses above suggest that a model relating effect size to sample size, year and method will reveal which of these three factors has the strongest impact on effect size. Our model is based on a multiple linear regression where sample size is a scale variable, time is a categorical variable measured in five-year intervals, and method is a categorical variable in two categories.

Once the regression model has been fitted using least squares in SPSS, it is possible to carry out an analysis of variance (ANOVA) to assess the relative importance of sample size, year, and method in determining effect size. The ANOVA based on the optimistic positive effect sizes is shown in Table VI.

The *p*-values in the last column of Table VI shows that the effect of time (five-year intervals) is not significant ($p = 0.4187$). However the effect of sample size is significant at the 5 per cent level ($p = 0.0142$), and the effect of method is also significant at the 5 per cent level ($p = 0.0157$). We therefore suggest that more attention be paid to increasing the sample size and choosing a powerful statistical method when designing future research on CSR.

It is noteworthy that Orlitzky (2001) studied whether the association between CSR and CFP is caused by the confounding effect of firm size. The author found that controlling for firm size still results in a positive association between CSR and CFP. Also, Orlitzky and Benjamin (2001) subdivided a meta-analysis by definition of CSR and definition of CFP. They operationalised CFP as firm risk and then further subdivided that into accounting risk and market risk. They subdivided CSR into CSP disclosures, CSP reputation indices and social audits as well as CSR1 (see notes to Table I).

Table VI Analysis of variance

<i>Source</i>	<i>df</i>	<i>Sum of squares</i>	<i>Mean square</i>	<i>F-value</i>	<i>p-value</i>
Sample size	1	0.4769	0.4679	6.5365	0.0142
Time (five-year intervals)	5	0.3716	0.0743	1.0186	0.4187
Method	1	0.4618	0.4618	6.3289	0.0157

7. Discussion and implications

This paper has reported on three additional aspects of the relationship between CSR and CFP not explicitly covered by Orlitzky *et al.* (2003). We based our meta-analyses on Orlitzky *et al.* (2003) in order to maintain consistency with their work so that any additional findings can contribute to furthering our understanding of the elements that are causing the variation. We therefore expect that our work will prompt further research into the factors influencing the effect size on CSR and CFP. The three additional factors reported in this paper were sample size, year of publication and statistical methodology. Our meta-analysis revealed sample size and statistical methodology to be important sources of variation in the relationship between CSR and CFP followed by year of publication.

Combining sample size and statistical methodology suggests that the overall study design is an important factor influencing study effect. An implication of this is that a structural framework of the relationship between CSR and CFP and the variables that may moderate and mediate such a relationship may be effective in capturing many aspects of the relationship. An initial interpretation of the results of our meta analysis provide some important clues as to a possible structural framework capturing some important aspects of CSR and their outcomes in terms of some specification of financial performance. These specifications include variables such as profit, market share, share price, ROI and so on. Research has also found culture to be a possible moderating factor (Pesqueux, 2005; Maignan, 2001; Quazi and O'Brien, 2000). Marom (2006) proposes a mathematical model and also suggests some mediating variables including the level of corporate reputation, the degree of business risk and the level of support of regulatory bodies. Peters and Mullen (2009) include firm size and industry as variables in their model of CSR and CFP. These variables are also considered critical, as they are likely to affect the level of CFP. Industry type and national cultures are also considered instrumental in understanding the relationship between CSR and CFP and these variables have been picked up by prior studies (Kim and Kim, 2010; Vitell *et al.*, 2003; Maignan, 2001; Quazi and O'Brien, 2000). However, whether some other moderating or mediating factors would be relevant in the realm of the relationship is the subject of more comprehensive future studies.

In order to set up the proposed framework, new data would be needed in order to broaden our understanding of the complexities of the relationship in the context of the dynamism of the issues of CSR and CFP. For example, the current global financial crisis is about to upset much conventional wisdom that has dominated academic thought over the past half century since the global depression of the 1930s. Therefore, we are keen to extend the framework in terms of time scale into the last ten years (2000-2009) and beyond in our next study. This would then update and advance the knowledge beyond what Orlitzky *et al.* (2003) covered in their studies for the period 1974-1999. We would also be keen to study the effect of national culture on effect size. The current studies are exclusively based in the USA, and there has been considerable work in the past few years in the context of other countries or regions including Australia, Japan (Okamoto, 2009), Taiwan (Shen and Chang, 2009), China (Wang and Juslin, 2009) and Spain (Sanchez and Sotorrio, 2007). These studies should also be included in future research in order to develop a universal framework for understanding the link between CSR and CFP.

8. Limitations and future research

This paper has some limitations that should be noted. Firstly, industry has not been included as a factor in the meta-analysis. Future research should aim to examine the possible impact of this factor on CFP. Secondly, we have confined our meta-analysis to the papers included in Orlitzky *et al.* (2003) before 1999. Future research can update this time frame beyond 1999. Thirdly, it has been assumed that the year of publication is closely related to the year(s) in which the study data was collected. In the worst case, the study data will lag a few years behind the publication date, which will reduce the impact of time on the relationship between CSR and CFP. Future research can take account of this lag or avoid it by using study data dates as a factor. Fourthly, typologies of ways of measuring CSR and CFP would greatly assist future research in this area. Such a typology would allow researchers to connect CSR to various types of financial performance, for example ROI, ROA, ROE and the price/earnings ratio.

Future research can also link the measurement of firms' commitment to CSR using the triple bottom line as the theoretical underpinning (Elkington, 1997). The three bottom lines are the social, economic and environmental obligations of corporations. Next, the relationship between sustainability and CSR commitment of firms can also be explored in future research that links these two to CFP.

Finally, we strongly suggest that future researchers should consider a wider variety of statistical methodologies when studying the effect of CSR on CFP. Only two papers out of 34 employed methods other than the very traditional *t*-tests and regression. Whilst it is perfectly sensible to use a *t*-test or regression when the data and research questions call for them, our results do show that methodology has a significant effect on effect size. Therefore, we propose that the use of a wider range of methodologies may help answer important questions about the relationship between CSR and CFP.

9. Conclusion

To summarise, we carried out a sub-group meta-analysis of studies investigating the extent of the relationship between CSR and CFP. While individual studies have found a relationship that varies from strongly positive to strongly negative, a meta-analysis conducted by Orlitzky *et al.* (2003) found that the overall effect was moderately positive. Our re-analysis by sub-groups according to sample size, year of publication and methodology shows that the effect of time is not a significant factor in determining the effect size. However, sample size and statistical technique play an important role in determining the link between CSR and CFP. By combining these two factors, we can conclude that research methodology can be singled out as the major source of variation in the strength of the relationship between CSR and CFP.

Identifying this major source of variation in the measurement of links between CSR and CFP will contribute to the refinement of the measurement process in further research. More specifically, this sub-group meta-analysis can be considered as an advancement over the previous meta analysis in that our analysis identified more specific contributing factors towards resolving the controversy regarding the acceptance of CSR as a viable business choice. This research will also contribute to future modelling of the effect of CSR on CFP. New important variables have been identified, and others gathered together from existing literature as a guide to future modelling processes.

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