DOES IT PAY TO BE SUSTAINABLE? CORPORATE SUSTAINABILITY AND
CORPORATE FINANCIAL PERFORMANCE: A STUDY BASED ON THE DOW JONES
SUSTAINABILITY INDEX (DJSI)

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INTRODUCTION

Firms that operate in a complex global environment constantly search for competitive advantages to ensure they are capable of creating value in the long-term (López et al. 2007). These firms are incentivized by their internal and external stakeholders to initiate and implement a variety of sustainable practices into their operations (Searcy and Elkhawas 2012). The concept of sustainability is generally perceived as the potential for long-term maintenance of well being of all stakeholders. It integrates the considerations of economic growth, social equity and environmental protection. When firms adopt sustainable practices, it is referred to as Corporate Sustainability (CS). Corporate sustainability is a business approach that considers all social, cultural, and economic dimensions to create long-term value that is not limited to shareholders only, but towards the natural environment as well. It is an investment strategy that ideally seeks to balance the needs of present and prospective stakeholders (Report of the United Nations World Commission on Environment and Development 1987). This presupposes that gaining competitive advantage while maintaining a balance between investors' needs and resource availability in the future is a complicated objective. Therefore, CS measures the firm's capability to adopt economic, environmental and social dimensions into its operations, and how such adoption will be effectively reflected on the firm itself and the society (Artiach et al. 2010). Adopting sustainable activities that contribute to sustainable development is professed as engaging in corporate social practices as well (Lacy et al. 2010).

Although, CS is the most commonly used concept to address such goals, there are several researchers who conceptualize the affiliation between corporations and society as Corporate Social Responsibility (CSR) (Lourenc et al. 2012). Both CS and CSR are widely acknowledged and related to the concept of sustainability (Holme and Watts 2000). In this study, we focused

more on CS since it is the most broadly used concept, although some authors still argue that these two concepts are distinct (Cheung 2011; Lo and Sheu 2007; López et al. 2007).

Researchers are interested in studying the impact of adopting sustainable practices, which has led to the emergence of sustainability indexes. This study focused on the Dow Jones Sustainability Index (DJSI), specifically the Dow Jones Sustainability Index North America (DJSI NA). The (DJSI) was established in 1999 and is the first ever family of global sustainability stock market investment benchmarks and is the largest global resource for index-based concepts, data and research; it has become a reference point in sustainability investing. Researchers consider studies based on the DJSI to contribute to the research literature since there is a consensus that the index is a good proxy for CS (Garcia-Castro et al. 2010; Waddock and Graves 1997; McWilliams and Siegel 2000; Becchetti et al. 2005).

In addition, the study utilized the Standard and Poor's 500 (S&P 500) which is a stock market index based on the market capitalization of 500 large companies having common stock listed on the NYSE or NASDAQ.

Researchers have investigated the relationship between CS and corporate financial performance (CFP); however, findings have been inconsistent. Although, the association is still debatable among researchers, they have agreed that, over a longer time period, sustainable practices can be managed to produce new strategic opportunities and control the accompanying risks.

<p style="text-align:center">Justification of the Research Problem and the Expected Contribution</p>

Since it could be hard to detect the true relationship in a short time horizon, researchers suggest considering a longer time frame for those firms that adopt sustainable practices, which in turn could strengthen the detected relationship. Although firms could improve their profitability during the beginning years of their involvement in sustainable activities, this benefit could be

offset later by incurring greater costs or a reallocation of resources. Therefore, the general performance of firms may not reflect any improvement, which can be misinterpreted as no association between CS and CFP. Researchers have reported diverse findings. Factors like the length of the study period, the length of time since firms first started investing in CS, and the general economic conditions during the selected period could significantly alter the results. Accordingly, this research has considered these issues by covering a relatively longer time frame and tracking the association at different quantiles of firm's profitability. Moreover, this paper evaluated the effect of CS among industries to determine which industries are faster in absorbing the benefits of adopting sustainable practices. In addition, it accounted for the recessionary economic conditions that dominated the selected period. Since the time frame of this study is from 2000 to 2012, there is a need to account for the financial crisis that affected the U.S. and global economy during the time frame of the study. It is commonly acknowledged that recessions influence corporate performance, which in turn may confound our main objective of clearly detecting the relationship between CS and CFP. Specifically, we are interested in whether the recession could either enforce or mitigate the association between CS and CFP. This is the first attempt that analyzes the impact of a recession on the relationship between CS and CFP.

Additionally, the methodology followed in this study is different than previous studies in two ways. First, we applied the Propensity Score Matching (PSM) method to ensure that the selection of companies is balanced, and thus, the comparisons are better than previous work. This method is advantageous in formulating the distribution of observed baseline covariates in order to equalize these measures between treated and untreated subject firms (Austin 2011). Second, we used Quantile Difference in Difference (DID) method for panel data to analyze the relationship. The method is effective for this research since outcomes are observed for two time

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periods and two groups, one of which is the treatment group. Empirical analysis is expected to detect a clear relationship between CS and CFP and expose differences in performance between firms that always engage in CS and those firms that never used such practices.

Objectives and Hypotheses of the Study

The first objective of this study is to test whether there was a significant difference in financial performance between firms that continuously practicing sustainability activities and those firms that never invested in such practices within 8 years and track the association at different quantiles of profitability to learn if different level of profitability may influence this relationship. The second objective is to determine whether corporate performance is sensitive to the level of corporate sustainability (CS) activities utilized by firms.

The third objective is to analyze the effects of CS among industries by determining which industries were faster in absorbing the benefits of investing in CS, and then testing the sensitivity of industries to the level of CS applied by firms.

Finally, the study accounted for the persistence of sustainability effects during the global recession of 2008-09. This recession represents an economic condition that may cause misleading findings if not accounted for.

LITERATURE REVIEW

Corporate Financial Performance and Corporate Sustainability

The incentive to gain competitive advantage encourages companies to engage in sustainability activities. These activities are acknowledged to provide internal and external benefits to companies (Branco and Rodrigues 2006; Orlitzky et al. 2003). Internally, investment in current and future economic, environmental and social opportunities provides benefits by focusing on quality, innovation and productivity, and helps companies in developing new resources and capabilities which are related to improving their profitability. Also, CS can

positively impact employees' productivity and performance by affecting their motivation and morale, toward being committed and loyal to the company (Brammer et al. 2007), thereby enabling companies to save on expenses for recruitment and training of new employees (Vitaliano 2010). Externally, engaging in CS has a positive effect on corporate reputation (Gallego-Alvarez et al. 2010; Hussainey and Salama 2010; Orlitzky 2008). Improved reputation has been recognized as an important invisible endowment that supplies sustainable advantage to a firm over its competitors (Roberts and Dowling 2002). So, these companies would be able to establish better relations with customers, investors, bankers, suppliers, and competitors as well as attract high qualified employees, which in turn improve financial performance. For a company to maintain access to scarce resources, it needs to nurture relationships with key stakeholders who control access to resources (Roberts 1992).

Although the findings of previous research have been inconsistent, it is agreed among researchers that, over a longer time period, sustainable practices can be managed to produce new strategic opportunities and control risks. CS requires firms to disclose more information than those is typically required for U.S. corporations (López et al. 2007) and to invest in training, product quality and safely (Waddock and Graves 1997). So, over the short term, expenses for implementation of CS practices could exceed the incremental revenue that such practices generate (Simpson and Kohers 2002. p. 102). López et al. (2007) indicated in their study that availability of surplus funds is essential to take into account sustainability investments. Also, assigning resources to sustainability investments takes away funds that could alternatively be invested in other profitable projects. Since the availability of funds is limited, profitability of a firm may be affected. By considering long-term, a firm may have access to new funds to finance CS investments.

So, it is suggested that only in the long run can firms acquire the benefits of their implemented sustainability activities. Since there is no consensus on what "long-term" means and because of the period of record for the DJSI, the maximum possible period to identify the firms that continuously practice CS is from 2005 to 2012[1]. We are interested to determine if it pays to be sustainable in about eight years of continuously practicing sustainability.

Correlation between CS and CFP: Three perspectives

Fairly few research papers have been published that analyzed the link between adopting sustainable practices and the effect on the firm's performance. These studies report different and contradictory results. The cause of such inconsistent results is explained by the fact that they followed different methodologies and used different measures of sustainability (Griffin and Mahon 1997; Simpson and Kohers 2002). Some researchers have indicated no clear or neutral relationship between CS and CFP (Curran and Moran 2007; Garcia-Castro et al. 2010; Surroca et al. 2010; McWilliams and Siegel 2000). A majority of studies, however, have found a positive (increasing) or weakly positive association (Waddock and Graves 1997; Berman et al. 1999; Graves and Waddock 2000; Hillman and Keim 2001; Margolis and Walsh 2003; Doh et al. 2010; Lo and Sheu 2007; Consolandi et al. 2009; Robin-son et al. 2011; Wagner 2010; Artich et al. 2010; Cheung 2011; Lourence et al. 2012). A third group of researchers found a negative relationship between CS and CFP (López et al. 2007).

Researchers, who found no clear and direct relationship between CS and CFP, construed from their findings that the association is complex, and there are unobserved intervening influences that cannot be controlled and managed. For these reasons, Ullmann (1985) advocated

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[1] This is the treatment period for this study, as discussed in the Methods Chapter.

that the existing theoretical presentations are insufficient to imply a direct clear relationship (Artiach et al. 2010).

For studies that found a positive association between CS and CFP, the research can be divided into three groups in terms of interpreting the reason for this positive relationship. First, some researchers indicated that the financial payback from adopting sustainable practices exceeds the costs of initial investment (McGuire et al. 1988; Barnett 2005). Another group of researchers based their interpretations on stakeholder theory which argues that investing in CS improves the financial performance by ideally managing stakeholders (Artiach et al. 2010). A third group argues that firms that invest in CS have greater resources and that they are more capable to adopt sustainability into operations and management. Having greater resources will ultimately be translated to higher financial performance (Alexander and Buchholz 1978; Waddock and Graves 1997; Clarkson et al. 2006; Artiach et al. 2010).

Finally, researchers who found out a negative relationship between CS and CFP argued that investing in corporate sustainability is costly (Alexander and Buchholz 1978; Becchetti et al. 2005). Those firms need to reallocate resources in order to meet sustainability standards such as adopting environmentally friendly practices, social and community development, employee training, improving working conditions, conducting promotions and making corporate donations (Artiach et al. 2010).

Researchers recommended that variation and ambiguity of previous studies in this area is likely due to application of diverse methodologies (Cochran and Wood 1984; Aupperle et al. 1985; Ullmann 1985; Pava and Krausz 1996; Barnett 2005). Table A in the appendix summarizes previous studies that are the closest in nature and purpose to this study, it can be noticed that it is hard to find common ground among them, with different scope and methods.

There is noticeable variation in the selected measures of CS and CFP, time periods examined and hypothesis tested.

López et al. (2007) and Lourenc et al. (2012) are the most closely related studies to this study as they based their studies on the Dow Jones Sustainability Index (DJSI) as well. López et al. (2007) examined the association between corporate performance and the adoption of corporate social responsibility (CSR) as a proxy for sustainable practices for two groups of 55 European firms during the period 1998-2004. Corporate performance was measured by the growth of profit before tax. The effect of CSR on profit before tax was estimated by regression analysis. On the other hand, Lourenc et al. (2012) studied CFP and its effects on the market value of equity for a sample of 600 Canadian and American firms from 2007 to 2010 using regression analysis.

METHODS

Sample Selection

To keep in line with the main objectives of this study, which is investigating the relation between CS and CFP over a longer period of time, and based on DJSI NA, we need to divide the sample into three groups of American firms. The first group is those firms that were always included in the index during the period 2005 to 2012, however, they should not have been listed in the index during the period of 2000-2004, since this is the baseline period of this study and we need to ensure the absence of the treatment as we will discuss in more detail in the Methodology section. The second are firms that were occasionally listed during the same period. In the second group, firms are added and removed at certain points since 2005. These firms are referred to in this study as having a low level of corporate sustainability (CS). The last group represents firms that were never listed in the index as they have never satisfied its requirements. We rely on the S&P 500 to identify this group.

The data showed that 59 American firms the index tracks that lead the field in terms of sustainability by virtue of practicing sustainability for 8 years continuously. Based on the index, eleven companies out of the 59 have been investing in CS since 2000-2004, so these 11 firms cannot be included in this study due to their involvement in CS during the baseline period. The remaining 48 firms represent the first group. Another 84 firms are included in the second group which represents non-continuously sustainability practitioners.

Corporate financial performance data for a total sample of 493 firms in The United States of America during the period 2000 to 2012 is covered in this study. The period of 2000-2004 is the baseline as it is required by the applied methodology. The lists of corporations were obtained from the DJSI which is the exclusive owner of such data and the financial data were retrieved from the COMPUSTAT Database. The COMPUSTAT Database belongs to Wharton Research

Data Service, developed in 1993 by the Wharton School at the University of Pennsylvania. It has become a common tool for research by over 290 institutions around the world.

Variables and Measures

Dependent Variables

In order to measure the corporate financial performance, different researchers have used different indicators as shown in Table A in the appendix. Particularly, López et al. (2007) focused on analyzing the growth of profit before tax and growth in revenue. However, King and Lenox (2001) analyzed the financial performance by using Tobin's q, which is a measure of the market valuation of a firm relative to the replacement costs of tangible assets (Lindenberg and Ross 1981). It simply means the cash flow a firm will be able to generate by investing one more dollar in assets (King and Lenox 2001). An increase in Tobin's q reflects better expectations about future cash flows. Tobin's q can be calculated in various ways. We will be consistent with the recent studies by using a simplified measure of it. In this study, Tobin's q is calculated by dividing the sum of firm equity value, book value of long-term debt, and net current liabilities by the book value of total assets (King and Lenox 2001).

In order to double check the relationship under consideration in this study, we used both return on assets (*ROA*) and *Tobin's q* as the dependent variables. These two variables are ones of the most commonly used in the literature.

Independent Variables

A dummy variable for corporate sustainability investment (D_i) is introduced to the model, it represents the group to which a firm belongs (continuously adopting CS, non-continuously involved in CS, or never invests in CS). To account for the effect of the 2008-09 recession, we introduced a dummy variable (Rec_i), where Rec_i equals 1 for 2008 and 2009, and 0 otherwise. In addition, the overall market performance influences the detection of a possible relationship

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between CS and CFP. Good market conditions versus bad market conditions could strengthen or weaken the effect of sustainability on firms' performance.

Control Variables

So as to use firms with similar characteristics and to ensure the homogeneity of the three groups analyzed, we include a number of measures commonly employed in the analysis of financial performance as controls (King and Lenox 2011). Additionally, controlling for these variables guarantees that the change in the firm's corporate performance is explained only by being involved in sustainable practices. These measures include *firm size*, calculated by taking the log of total assets. The size of the firms is a vital factor that could positively affect financial performance. Larger corporations generally have greater access to resources which in turn may exaggerate their profitability in comparison to small-size firms. Second, *capital intensity* which is presented in the model as capital expenditures divided by sales. Capital intensity is defined as the amount of current real and fixed capital relative to other available production factors, such as labor. It is acknowledged among researchers that the utilization of machinery and equipment raises productivity of labor which in turn improves the overall performance (Jorgenson and Vu 2005). Third, *annual growth*, calculated as the percentage change in sales, noticeably impacts profitability. Fourth, *leverage ratio* is calculated as the ratio of debt to assets, and is used to assess a firm's ability to meet its financial obligations when they become due[1]. The mix of debt and equity used by the firm can seriously affect its performance. Finally, we considered the *industry sector* which is determined by 4-digit Standard Industrial Classification (SIC). The association between CS and CFP naturally differs among different industries. Researchers suggests that some industries are faster to absorb the benefits of CS than others, which has

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[1] Investopedia website, available at http://www.investopedia.com/terms/l/leverageratio.asp

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motivated us to go further in the analysis and classify the firms by industry sector in order to determine which industries are faster in absorbing the benefits of investing in CS. The classification is done after applying the PSM method. Based on the DJSI data, we determined that the firms constituting our sample groups belong to 15 different industry sectors, which were then grouped into 7 industry sectors based on the North American Industry Classification System[2]. These seven groups are Services, Information, Utilities, Financial, Mining, Retail Trade and Manufacturing. Note that we avoided absolute values; the entire data was scaled in an attempt to remove other characteristics of firms or industries that could affect financial performance aside from involvement in sustainability activities.

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[2] North American Industry Classification System is available at https://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2012

METHODOLOGY

Propensity Score Matching Method (PSM)

Rosenbaum and Rubin (1983a) have defined the propensity score as the probability of treatment assignment conditional on observed baseline covariates, so the covariates distribution between treated and untreated subjects are alike. The propensity score matching method can be applied in randomized and non- randomized studies. In non- randomized studies, the true propensity score is unknown but can be estimated using data from the study. The propensity score is most commonly obtained by applying a logistic regression model, in which the treatment group is regressed on characteristics of the baseline (Austin 2011).

This method forms matched sets of treatment and non-treatment groups who have similar characteristics, represented by obtaining similar values of the propensity score (Rosenbaum and Rubin 1983a and 1985). One of the advantages of using such an approach is that it ensures that the treatment group will not be confounded with either measured or unmeasured baseline characteristics. The second advantage is that once matched groups have been identified, the impact of the treatment can be directly analyzed by comparing the outcomes of treated and untreated subjects (Greenland, Pearl and Robins 1999).

For the above mentioned reasons, PSM is employed in this study to ensure that the grouping procedure of companies is balanced, and thus, the comparisons are valid.

In order to get the best matched groups of firms, we need to run the following probit (or logit) model for the pre-treatment period 2000-2004:

$\{Treatment=1\} =\Omega \ (f\,(Xi))$

$\qquad \Pr\ \{D_i=1\}=\Omega\ (\textit{firm size}+\textit{capital intensity}+\textit{annual growth}+\textit{leverage ratio}) \qquad\qquad (4\text{-}1)$

where Ω is the normal logistic and D_i represents the treatment group, so it equals 1 for firms that continuously practice CS. Other variables are taken as covariates in normal linear terms. We ran

the model in equation (4-1) twice, first to get the best matched firms from the group of never

invested in CS, and second to get a similar matched group from the firms occasionally investing

in sustainability practices, in order to compare both of these groups to the treatment group. The

results of the application of the PSM model assigns a probability score for each firm ranging

from 0 to 1. The firms that were close in terms of covariates to the continuously listed firms get a

probability close to 1 and these were chosen for comparison purposes.

Analysis of the Relation between CS and CFP

We use the Difference in Difference (DID) method with quantiles to analyze the

relationship between CS and CFP. The DID method is a technique used in econometrics that

measures the effect of a treatment at a given period of time. It is often used to measure the

change induced by a particular treatment or event (Abadie 2005). Carrying out the analysis at

different quantile of the profitability of a firm will allow us to understand how different level of

profit could influence the association between CS and CFP. One of the advantages of using

quantile is that limiting the effects of outliers in the response variable on the estimates (Anglist

2009). Generally, the DID equation is commonly expressed as follows:

$$Y_i = \beta_0 + \beta_1 \ D_i + \beta_2 \ T_i + \beta_3 \ D_i * T_i + \beta_i * X_{it} + \varepsilon_i \tag{4-2}$$

where Di is the treatment, T_i is the treatment period, the interaction term represents the treatment

status, β_3 is the DID estimator, which reflects the difference between the treatment group and the

control, control variables are represented by X_{it}, and ε_i is the error term.

First, Model 1 is established to detect the association between CS and CFP by comparing

firms that invest continuously in CS and those which have never invested in CS, with the latter

taken as the baseline. In addition, we will test the impact of the recession 2008-09 on this

relationship. The interaction term of dummy variable Rec_i and ΔD_i is added as shown in equation

(4-3) below. The interaction term is needed because these variables may be interacting and the effect of Rec_i on the dependent variables will rely on whether the firm has CS or not.

Additionally, the interaction terms between each industry sector and ΔD_i are attached to the equation as well to achieve our third objective of determining which industries are faster in absorbing the benefits of CS.

$$Y_{it} = \beta_2 + \beta_1\, D_{it}{*}T_{it} + \beta_2\, Rec_{it}{*}D_{it} + \beta_3\, firm\ size_{it} + \beta_4\, capital\ intensity_{it} + \beta_5\\ annual\ growth_{it} + \beta_6\, leverage\ ratio_{it} + \beta_7\, Services_i{*}D_{it} + \beta_8\\ Financial_i{*}D_{it} + \beta_9\, Information_i\ {*}D_{it} + \beta_{10}\, Mining_i{*}D_{it} + \beta_{11}\\ Utilities_i{*}D_{it} + \beta_{12}\, Retails_i{*}D_{it} + \varepsilon_t,\ t= 2000,\ldots\ldots,2012$$

$$(4\text{-}3)$$

Then, we apply standardization to the estimates in equation in (4-3) in order to put all our coefficient estimators on an equal basis and therefore can compare them directly. In other words, we can use the beta coefficients as a measure of relative strength of the regressor variables. Standardization is attained by taking the difference of each variable from its mean and dividing by the standard deviation.

Second, the objective of Model 2 is to test if there are differences in performance among corporations that invest in different levels of CS, which reflects how corporate performance is sensitive to the level of CS utilized by firms. In this model, we focus on firms that non-continuously invest in CS and firms that have never invested in CS, with the latter taken as the baseline. All other conditions are the same as equation (4-3). Therefore, to investigate whether corporate performance is sensitive to the level of CS invested by firms and such sensitivity persists during the recession, we run equation (4-3) above with $D_{it}= D_{2t}$.

The significance of the coefficient estimators β_7 to β_{12} answer the second part of our third objective, regarding which industries are more sensitive to the level of CS applied by firms.

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EMPIRICAL ANALYSIS AND RESULTS

Multicolinearity and Heteroskedasticity

From the Pearson correlation matrix in Table 5-1, it shows some indications of collinearity. Not surprisingly, the correlation between *Tobin's q* and *ROA* is statistically significant since both are means of measuring the return on assets. Furthermore, *Tobin's q* and *ROA* are correlated to *firm size, leverage ratio* and *R&D intensity.* Although the data suggest some level of collinearity, there were no pairwise correlations that exceeded 61% except for *capital intensity* and *annual growth* where it reaches 95%. The correlation between *capital intensity* and *annual grow*th is consistent with accounting literature. As we mentioned before, it is recognized that the utilization of machinery and equipment raises the productivity of labor which in turn stimulates the growth of the firm (Jorgenson and Vu 2005). To ensure reliability of the study results, we tested whether the existence of collinearity may cause bias. The results of the models that include either *capital intensity* or *annual growth* are completely identical to the models that include both. This indicates that the threat of multicolinearity is limited and we should not omit any variables.

Table 5-1. Pearson correlation coefficients and probability values for model variables

Variable	Tobin'sq	ROA	Firm size	Capital intensity	Annual Growth
Tobin'sq	1	-	-	-	-
ROA	0.475	1	-	-	-
	(0.000)				
Firm size	0.608	0.455	1	-	-
	(0.000)	(0.000)			
Capital intensity	0.013	0.019	0.013	1	-
	(0.285)	(0.121)	(0.281)		
Annual growth	0.012	0.016	-0.012	0.991	1
	(0.311)	(0.192)	(0.008)	(0.000)	
Leverage ratio	0.158	0.178	0.033	0.019	0.020
	(0.000)	(0.000)	(0.008)	(0.117)	(0.103)

Probability (p) values are given in parentheses.

The assumptions of OLS and DID methods require the absence of heteroskedasticity in the study data. Heteroskedasticity refers to the case where the variance of the disturbance term is not constant, which violates the equal-variance assumption of methods used in this study.

The presence of heteroskedasticity may lower the precision of the coefficient estimates. However, despite non-constant variance, estimators are still linear, unbiased and asymptotically normally distributed. By using White's General heteroskedasticity test, the null hypothesis that there is a constant variance is rejected (p value = 0.0000 for Model 1 and 0.0000 for Model 2). To improve our analyses, we applied quantile DID with robust standard error to correct for heteroskedasticity.

Statistical Description

Table 5-2 presents the descriptive statistics for three sub-samples. The first section displays the statistics of DJSI continuously listed firms, the middle section shows the statistics of DJSI occasionally included firms, and the last section shows the firms that were never listed in DJSI. When comparing these three groups, we see that the mean and the median values for all variables are slightly greater for DJSI continuously listed firms compared to occasionally included firms and both continuously and occasionally listed have higher mean and median values compared to the never listed firms. These findings are consistent with Lourenc et al. (2012) who studied CFP and its effects on the market value of equity and Artiach et al. (2010) who analyzed the determinants of CFP. Both studies concluded that continuously listed corporations are significantly larger and have a higher return on equity (ROE) than non-continuously listed firms.

In addition, all three sub-samples show that the distributions of *capital intensity* and *annual growth* are highly skewed toward the right. In the case of continuously listed firms, the skewness values were 79.23 and 80.93 for *capital intensity* and *annual growth*, respectively. The same two variables had a higher and sharper distribution peak, which is presented as kurtosis values of 6367.98 and 6557.77, respectively, for continuously listed firms. At the same time, both *capital intensity* and *annual growth* have higher standard deviations for all sample groups, compared to other control variables.

Table 5-2. Descriptive statistics of the sampled firms

Variable	Mean	Median	Std Dev	Min	Max	Kurtosis	Skewness
			Continuously listed firms				
Tobin'sq	0.790	0.967	0.231	-0.608	1.000	2.738	-1.883
ROA	0.297	0.259	0.234	-0.669	1.630	1.602	1.129
Firmsize	4.015	3.981	0.663	1.458	6.380	0.837	0.270
Capital intensity	1.027	0.039	64.216	0.0001	5169.18	6382.81	79.233
Annual Growth	0.742	0.074	45.678	-1.000	3701.47	6557.77	80.931
Leverage Ratio	0.204	0.179	0.167	0	1.5108	5.158	1.447
R&D Intensity	0.001	0.001	0.012	-0.586	0.006	1102.5	-29.151
			Non-continuously listed firms				
Tobin'sq	0.788	0.883	0.232	-0.699	1.000	2.775	-1.823
ROA	0.292	0.252	0.229	-0.669	1.534	1.665	1.184
Firmsize	4.017	3.502	0.669	1.333	6.383	0.681	0.275
Capital intensity	1.020	0.029	64.582	0.000	5144.18	6367.98	79.213
Annual Growth	0.738	0.074	47.027	-1.001	3701.31	6557.17	81.003
Leverage Ratio	0.164	0.166	0.177	0.000	1.173	5.132	1.623
R&D Intensity	0.0009	0.0001	0.012	-0.666	0.005	1114.50	-29.374
			Never listed firms				
Tobin'sq	0.780	0.867	0.292	-0.409	1.000	2.723	-1.782
ROA	0.291	0.240	0.237	-0.658	1.501	1.274	1.027
Firmsize	4.016	3.518	0.703	1.444	6.000	0.379	0.298
Capital intensity	1.019	0.030	64.002	0.000	5160.05	6321.29	79.20
Annual Growth	0.731	0.071	45.002	-1.000	3600.21	6722.81	80.902
Leverage Ratio	0.128	0.129	0.204	0.000	1.444	5.364	1.426
R&D Intensity	-0.0002	0.000	0.013	-0.825	0.001	1101.17	-29.151

Results

The application of the Propensity Score Matching method (PSM) results in two sets of two groups each that are similar to the firms that are persistently listed in the index in terms of *firm size, capital intensity, annual growth, and leverage ratio*. The first is a subset of 48 firms from the group of firms that never practiced CS and the second is a subset of 48 firms from the group of occasionally listed firms. We will rely on these two subsets in the empirical analysis. Consequently, we expect some of the control variables to be statistically insignificant.

The results, as shown in table (5-3) below, shows that generally firms that continuously practicing sustainability incur a loss within a period of 8 years. This result is consistent with López et al. (2007) who conducted a similar analysis for European firms. It indicates that a period of 8 years is not enough for continuously practicing sustainability firms in the United States to cover the cost of involving in these practices. American and European firms have kind of a parallel pattern in their response to investing in CS. Also, the results illustrate there is no additional advantage for being constantly listed in the index as both continuously and occasionally participants experience a significant reduction in their profitability during the study period. These results are consistent in case of both proxies of corporate performance, ROA and Tobin'q.

By considering quantile difference in difference analysis, for model 1, the decreasing association between CS and corporate profitability still hold for lower quantiles of Tobin'q and ROA (10% and 25%), however no difference was found between firms that disclose practicing sustainability and those that do not for higher quantiles (50%, 75% and 90%). Both ROA and Tobin'q support this calculation. It can be concluded that firms with lower level of profitability couldn't recover the cost of CS investment within 8 years. However, these firms are more likely to reap the benefits of their investment in a period of more than 8 years.

For model 2, analysis of different quantiles declares similar results as in the case of Model 1, however it does not state a clear conclusion in the case of Tobin'q. In addition, for ROA, firms seem to be not sensitive to the level of sustainability involvement as both continuously and non-continuously listed report a loss within the study period.

Table 5-3. General and Quantile Average Treatment Effect of Model 1 and Model 2

Dependent variables	Model 1: D1		Model 2: D2	
	ROA	Tobin'q	ROA	Tobin'q
General	-0.008	-0.008	-0.004	-0.006
	0.014**	0.010**	0.257	0.041**
	0.30	0.46	0.27	0.43
10% Quantile	-0.005	-0.017	-0.002	-0.012
	0.039**	0.015**	0.088*	0.013**
	0.11	0.45	0.10	0.44
25% Quantile	-0.010	-0.012	-0.000	-0.006
	0.033**	0.006***	0.923	0.137
	0.18	0.29	0.17	0.28
50% Quantile	-0.006	-0.002	-0.004	-0.004
	0.130	0.553	0.434	0.291
	0.20	0.16	0.18	0.15
75% Quantile	-0.005	-0.002	-0.006	-0.005
	0.521	0.387	0.367	0.000***
	0.19	0.12	0.17	0.11
90% Quantile	0.000	-0.002	-0.006	-0.000
	0.981	0.254	0.290	0.709
	0.19	0.09	0.17	0.08

The values in the cells represent estimate, p_value and R-Squared respectively.

The third objective of this study is to analyze the effect of CS among industries in The United States. First, our goal was to figure out which industries were faster in absorbing the benefits of investing in CS. The results of the empirical analysis in Table (5-4) reveal that the *Services, Information and Retail Trade* industries more greatly reflected the benefits of CS investment during the study period of 8 years. Firms in the *Information* industry can gain 18% on average as a result of persistently being involved in sustainable practices, compared to *Manufacturing* industry firms that invest at the same intenseness in such practices, holding all

other variable constant. Similarly, continuously-practicing CS firms in *Services* industry have a

higher gain by 2.7% comparing to continuously-practicing CS firms in *Manufacturing*, however

Retail Trade industry has a non-significant and positive gain of 2%. On the other hand,

Financial, Mining and *Utilities* industries are slower in capturing the benefits of their

investments on CS. The analysis with *ROA* as the dependent variable supports all the above

mentioned findings (see Table 5-4).

Secondly, we can conclude that only *Services* and *Information* industries are sensitive to

the level of CS applied by firms, as shown in Table 5-4. In these two industries, it matters how

intensive is the investment in CS by firms. In both industries, it doesn't pay the occasionally-

listed firms although it pays the persistently listed ones within 8 years. Performance of other

industries is not responding to whether a firm is constantly listed in the index or not. It worth to

mention that only firms in the *Retail Trade* industry are gaining from CS regardless being

persistently or occasionally listed in the index. The results are consistent when analyzing *ROA*,

as shown in Table 5-4.

The effect of recession on the actual difference is negligible. We can conclude that the

presence of recession neither enforced nor moderated the total difference of the effect of CS, and

such difference persisted in the same magnitude during the recession of 2008-2009.

In addition, *firm size* and *leverage ratio* still explain some of the variation in the models,

which means that there is a wide variance in the data such that the application of the PSM

method did not completely correct for this predictor. Other control variables had less influence

especially in the case of Tobin'q.

Table 5-4. Standardized Parameter Results of Model 1 and Model 2

Variable(s)	Model 1: D1		Model 2: D2	
	ROA	Tobin'q	ROA	Tobin'q
$D_{it}*T_{it}$	0.028	0.020	0.022	0.021
$D_{it}*Rec_{it}$	-0.001	-0.015	-0.000	-0.0001
Firmsize$_{it}$	-0.183***	-0.233***	-0.168***	-0.217***
Capital intensity$_{it}$	-0.001***	0.000	-0.001***	0.000
Annual growth$_{it}$	0.001***	-0.000	0.001***	-0.000
Leverage ratio$_{it}$	-0.280***	0.194***	-0.297***	0.182***
Services$_{it}*D_{it}$	0.099***	0.027**	-0.123***	-0.043***
Financial$_{it}*D_{it}$	-0.125***	-0.335***	-0.176***	-0.273***
Information$_{it}*D_{it}$	0.020	0.180***	-0.029	-0.054***
Mining$_{it}*D_{it}$	-0.268***	-0.093***	-0.197***	-0.050***
Utilities$_{it}*D_{it}$	-0.185***	-0.050***	-0.152***	0.027
RetailTrade$_{it}*D_{it}$	0.248***	0.020	0.200***	0.091***

***, ** and * significance at the 0.01, 0.05 and 0.10 levels, respectively. Dependent variables: *Tobin's q* is calculated by dividing the sum of firm equity value, book value of long-term debt, and net current liabilities by the book value of total assets; *ROA* is Return on Asset, calculated as Net Income/Total Assets. Independent variables: D_{it} is an indicator that equals 1 if the firm have been continuously listed in the DJSI during the sample period 2005-2012 in model 1 and D_{it}=1 if a firm is non-continuously listed in model 2, and 0 if a firm has never been listed (baseline); T_{it} is the treatment period (2005-12); Rec_{it} is the recession dummy variable, it equals 1 for 2008-2009; *Firm size* is the log of total assets; *Capital intensity* equals capital expenditures / sales; *annual growth* is the percentage change in sales; *Leverage ratio* is the ratio of debt to assets; Industry dummy variables: *Services, Financial, Information, Mining, Utilities, Retail Trade , Manufacturing* (baseline).

FINDINGS SUMMARY AND CONCLUSION

Although, there have been several attempts to analyze the benefits of creating long term value for shareholders and stakeholders through CS activities, empirical evidence has been mixed. In fact, results could be influenced by factors like the study period length, time since firms started investing in CS, and the overall economic performance during the period of study. For these reasons, this research has considered these issues by covering a relatively longer time frame and accounting for defined economic conditions that dominated the selected period. The first objective of this study was to test whether there is a significant difference in financial performance between firms that continuously practice sustainability activities and those firms that never invest in such practices while accounting for the persistence of sustainability effects during the global recession of 2008-09. The second objective was to examine whether corporate performance is sensitive to the level of corporate sustainability (CS) activities by firms and if such sensitivity persisted during the 2008-09 recession. The third objective was to analyze the effect of CS among industries including which industries were faster in absorbing the benefits of investing in CS and testing the sensitivity of industries to the level of CS applied.

This study contributes to the literature by providing further support to the group of researchers who have reported a significant negative relationship between CS and CFP. We have proved the existence of a loss as a result of involvement in CS during the study period by analyzing the variation in *ROA* and the *Tobin's q* statistic. Second, a period of eight years was found to be insufficient to reap the benefits of CS and completely cover the initial cost of investment in CS for the case of U.S firms. This finding supports the explanations offered by Alexander and Buchholz (1978) and Becchetti et al. (2005) who argued that investing in corporate sustainability is costly. Also, McGuire et al. (1988) and Barnett (2005) believed that

the association between CS and CFP becomes positive when the financial payback from adopting sustainable practices exceeds the costs of initial investment. This study clarifies that CS benefits that have been being gained since 2005 are not enough to cover the expenses of initial investment in the case of U.S. firms.

Second, the financial performance of firms was not sensitive to the level of CS applied; *Tobin's Q* and *ROA* were significantly decreasing for both groups of firms. Third, empirical analysis revealed that the *Information*, *Services and Retail Trade* industries realized greater benefits of CS investment during the study period of 8 years. Moreover, we conclude that the *Information* and *Services* industries were most sensitive to the level of CS applied by firms. In the case of comparing *Retail Trade* to *Manufacturing,* only firms in the *Retail Trade* industry are gaining from CS regardless being persistently or occasionally listed in the index. The recession of 2008-09 didn't shift the total difference between CS and CFP.

To summarize, this study found out that generally 8 years of investing in CS is insufficient to cover the initial cost of investing in sustainability activities. Firms with low level of profitability are more likely to start reaping the benefits after 8 years from the initial involvement in CS. Moreover, *Information*, *Services and Retail Trade* industries are seemed to ideally managing their investment in CS. This study found out that it really pays them to be sustainable and it pays more firms in *Information* and *Services* industries for being persistently investing in CS. Such practice is proven to improve firms' financial performance. Continuously and non-continuously participants in *Retail Trade* industries are gaining from CS. Corporate sustainability efficiently work better for the case of these three industries.

It is worth mentioning that, although it is reported by The National Bureau of Economic Research that the duration of the recession was from 2008 to 2009, financial indicators still

suggest that the U.S. economy is not fully recovered, which may be a limitation of this study. Future research efforts are expected to conduct more studies on this issue, and considering even longer time frames where then U.S. economy is expected to be fully recovered. In addition, research could broaden the scope and compare the effects of CS investment between developing and developed countries. Questions like under what conditions do corporate sustainability (CS) efficiently work better could be interesting for other researchers.

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Table A. Summary of previous studies

Study	Waddock and Graves (1997)[1]	Berman et al. (1999)[3]	Graves and Waddock (2000)[3]	McWilliams and Siegel (2000)[3]
Year	1989-1991	1991-1996	1991-1997	1991-1996
Data	469 American companies belonging to Standard and Poor's 500 in 13 industries	81 American Fortune 500 companies in different industries	11 pairs of firms	524 companies
Financial Performance	ROE, ROA and ROS	ROA	ROE, ROA and ROS	ROE and ROA
Sample	Cross-sectional	Longitudinal/ panel	Longitudinal	Cross-sectional
Using DJSI	No	No	No	No
Account for Recession[2]	Not applicable	Not applicable	Not applicable	Not applicable
Method	OLS	Pooled times series model and two-step GLS	Trend analysis, T-tests	OLS
The detected Relationship	Positive	Positive	Positive	Neutral
Findings	Sustainable performance leads to better financial performance	Financial performance is positively affected with consumers and employees	Increasing positive relationship between financial performance and sustainable practices	The effect on financial performance changes as specifications of the model change

[1] (Garcia-Castro et al. 2010)

[2] Applicable when the study time frame covered 2008-2009

Table 2-1. Continued

Study	Hillman and Keim (2001)[3]	López et al. (2007)	Garcia-Castro et al. (2010)[3]	Artiach et al. (2010)
Year	1994, 1995, 1995	1998-2004	1991-2005	2002–2006
Sample	308 American Fortune 1000 and Standard and Poor's 500 companies belonging to different industries	Two groups of European firms: 55 firms included in the DJSI, and 55 European firms belonging to the DJGI	658 companies in KLD and Datastream	26 firms from the S&P 500 are included in the index every year for the sample period, whilst 81 firms are occasionally included
Financial Performance	MVA	Profit before tax	Tobin's Q, MVA, ROA,ROE	CSR (Dummy variable)
Data	Cross-sectional	Panel	Longitudinal/ Panel	Panel
Using DJSI	No	Yes	No	Yes
Account for Recession	Not applicable	Not applicable	Not applicable	Not applicable
Method	OLS	Regression analysis and hypotheses testing	OLS, fixed effect and random effects estimations	T-test and Wilcoxon-signed ranks test, the fixed effects model
The detected Relationship	Positive	Negative	Biased by unobserved firm-specific variables	Positive
Findings	The association between stakeholder management and shareholder value creation (MVA) is positive	Differences in performance exist between firms that belong to the DJSI and to the DJGI and these differences are related to CSR practices. A short-term negative impact on performance	Positive relationship between social performance and financial performance, but estimations were non-significant	Leading firms that are significantly larger have higher levels of growth and a higher return on equity than conventional firms

Table 2-1. Continued

Study	Cheung (2011)	Lourenc et al. (2012)	This study (2014)
Year	2002–2008	2007-2010	2000-2012
Sample	139 firms that were added to or deleted from the DJSI during the period of 2002–2008	A sample of 600 Canadian and American firms from 2007 until 2010	A sample of 493 firms in the U.S. during the period 2000 to 2012
Financial Performance	Stock return, risk and liquidity. Liquidity: measured by trading volume and proportional bid–ask spread	Market value of Equity (MVE)	(Tobin's q) and ROA
Data	Time series	Panel	Panel
Using DJSI	Yes	Yes	Yes
Account for Recession	No	No	Yes
Method	Event study methodology	OLS and Breusch-Pagan LM test	Propensity Score Matching Method and quantile DID model
The detected Relationship	No clear relationship	Positive	Negative
Findings	No significant impact on stock return and risk. Liquidity deteriorates	There is association between Market value of Equity and CSP, this relationship is affected by the size and profitability of the firm	Decreasing association between CS and CFP. Firms' performance is sensitive to the level of CS applied in some industries. Recession has no influence on such associations