

Lawrence Technological University

College of Management

A Study of Publicly-Held U.S. Corporations on the Effects
of Sustainability Measures on Financial Performance,
Utilizing a Modified Regression Discontinuity Model

Presented in partial fulfillment of the requirements for the degree of
Doctor of Business Administration

Kirk A. Welter



2011

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LAWRENCE TECHNOLOGICAL UNIVERSITY
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A STUDY OF PUBLICLY-HELD U.S. CORPORATIONS ON THE EFFECTS OF
SUSTAINABILITY MEASURES ON FINANCIAL PERFORMANCE UTILIZING A
MODIFIED REGRESSION DISCONTINUITY MODEL

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Dissertation Submitted to the
Graduate Faculty of the College of Management
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DOCTOR OF BUSINESS ADMINISTRATION

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ABSTRACT

Research into the relationship between sustainability and corporate financial performance has had mixed results in the past. This study was designed to determine the impact of a sustainability program on corporate financial performance from a different perspective. It was hypothesized that within an industry: a firm's overall sustainability score would positively correlate with financial performance, a firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance, a firm with exceptional profitability associated with a sustainability program also had relatively exceptional profit before implementation, and a firm's increase in relative financial performance would have cumulative effects.

Nineteen years of data was analyzed, utilizing a modified regression discontinuity model to determine significant shifts in sustainability scores. These shifts were projected to correlate with effective influence date of activities within the corporations. Then, the financial data was reviewed for 11 study companies, within seven industries, to see if the shifts in sustainability performance correlated to shifts in financial performance. Finally, three of the study companies were interviewed to determine if the observed shifts in sustainability performance corresponded to actual activities within the firms. None of the hypotheses were supported globally, as the nature of the sustainability to corporate financial performance relationship was determined to be industry specific. The method for selecting the study companies yielded good results, and the modified regression discontinuity model was determined to have been an effective predictor for sustainability program activities.

DEDICATION

To my wife, Brenda, for her encouragement and support during my pursuit of this life-long goal. To my parents, Gene and Caryn, for instilling the value of education in me. To my brother, Tim, who thoroughly enjoyed nature during his all too short life. Most importantly, to our children, Shayna, Amanda, James, and Kelsey because they, and their children after them, deserve the same quality planet that we have been able to enjoy.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	10
PREFACE	12
CHAPTER 1 – INTRODUCTION	
Introduction	15
Background to Study	16
Problem Statement	18
Purpose of Study	20
Research Questions	21
Significance of the Study	25
Methodology Overview	26
Contributions of Dissertation to Academic and Practitioner Audiences	28
Limitations	29
Definitions of Key Terms	31
Summary	32
CHAPTER 2 - LITERATURE REVIEW	
Introduction	33
Sustainability	34
The History of Sustainability	34
Sustainability Defined	38
Sustainability versus Other Terms	41
Sustainability and Corporations	44
Corporate Motives for Sustainability	53
Corporate Approaches to Sustainability	57
Sustainability Indexes	59
Sustainability and Financial Performance of Corporations	64
Theoretical Results	65
Empirical Results	70

Analysis Methods Used to Determine the Impact to Performance	74
Analysis Methods Used to Determine Other Impacts to Performance	77
Future Direction of Literature Review	80
CHAPTER 3 - RESEARCH METHODOLOGY	
Introduction	81
Research Perspective	81
Research Design	82
Methodology	82
Operational Definitions	84
Research Question and Hypotheses	86
Unit of Analysis	87
Research Variables and Models	88
Proposed Models	88
Model Specifications	90
Data Collection Methodology	94
Data Analysis	96
Null Hypotheses	101
Validity	103
Conclusion Validity	103
Internal Validity	103
Construct Validity	104
External Validity	106
Summary	107
CHAPTER 4 - RESULTS	
Introduction	108
Results of the Company Selection Study	108
Results of Industry Determination	112
Results of Model One	131
Hypothesis One	134

Results of Model Two	135
Hypothesis Two	138
Hypothesis Three	139
Results of Model Three	140
Hypothesis Four	143
Results of Model Four	144
Variation Based on Industry Selection	147
Results of Company Interviews for Construct Validity	149
Summary	152

CHAPTER 5 – DISCUSSION AND RECOMMENDATIONS

Introduction	153
Summary of the Results	153
Implications for Future Research	156
Modifications to Current Study	157
Expanded Areas for Study	159
Implications for Practice and Recommendations	162
Industry Specific Relationship	162
Study Company Selection Methodology	164
Regression Discontinuity Model	164
Limitations	166
Anticipated Limitations	166
Discovered Limitations	169
Summary	172
REFERENCES	175

APPENDICES

Appendix A	Definition of Terms and Acronyms	181
Appendix B	Listing of Select SIC Codes	185
Appendix C	Guide to Variables included in KLD STATs Database	191
Appendix D	Companies with at Least Seven Years of Data	195
Appendix E	Tabular Summary of Results from Regression Analyses	198

LIST OF TABLES

1.1	Business risks	19
2.1	Explanations of corporate social engagement	45
2.2	Triple bottom line impacts	50
2.3	Dimensions of a sustainable future	55
2.4	Description of the SRI-Equity Indices	61
2.5	The relationship between social performance and financial performance	66
2.6	Methods to show the impact of sustainability on financial performance	75
3.1	Strengths and concerns for each of the seven KLD qualitative areas	95
3.2	Numbers of strengths and concerns for each of the KLD areas	98
3.3	Questions for the study company interviews	105
4.1	Number of sustainability scores available, by firm and number of years	109
4.2	Range of sustainability scores for the companies	113
4.3	Comparison of all sustainability scores for 2004 and 2005	127
4.4	Study companies and their associated industry selection	130
4.5	Summary data from the results of the regressions of Model One	132
4.6	Summary data from the results of the regressions of Model Two	136
4.7	Summary data from the results of the regressions of Model Three	141
4.8	Summary data from the results of the regressions of Model Four	145
5.1	Summary data from the results of the forty regressions	155

LIST OF FIGURES

2.1	Key drivers of competitive advantage	37
2.2	Sustainable value framework	39
2.3	The capital model and the triple bottom line	42
2.4	The seven levels of corporate consciousness	47
2.5	Channels of interaction between CSR and economic performance	49
2.6	Framework for the financial analysis of sustainability	52
2.7	Sustainability portfolio assessment framework questions	58
2.8	Illustration of the regression discontinuity design	78
3.1	Illustration of the regression discontinuity design	92
4.1	Histogram of companies by number of years of sustainability data	110
4.2	Histogram of data points by number of years of sustainability data	112
4.3	Histogram of the range of sustainability scores by company	114
4.4	Regression discontinuity graph for Agilent Technologies	116
4.5	Regression discontinuity graph for Applied Materials	117
4.6	Regression discontinuity graph for Advanced Micro Devices	118
4.7	Regression discontinuity graph for General Mills	119
4.8	Regression discontinuity graph for Green Mountain Coffee Roasters	120
4.9	Regression discontinuity graph for Hewlett-Packard	121
4.10	Regression discontinuity graph for Intel	122
4.11	Regression discontinuity graph for Nike	123
4.12	Regression discontinuity graph for Starbucks	124
4.13	Regression discontinuity graph for Timberland	125

4.14	Regression discontinuity graph for Texas Instruments	126
4.15	ROA trend charts by SIC code	128

EXECUTIVE SUMMARY

Research Purpose: The purpose of this study is to determine the impact of a sustainability program on a firm's financial performance.

Research Questions: What is the impact of a sustainability program on corporate financial performance? If there is a difference in financial performance after implementation of a sustainability program, did the difference also exist before the implementation? Are the effects of a sustainability program cumulative?

Hypotheses:

H₁: A firm's overall sustainability score will positively correlate with financial performance within their industry.

H₂: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

H₃: A firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation.

H₄: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program, will have cumulative effects.

Data Collection: Sustainability scores came from Kinder, Lydenberg, and Domini (KLD) STATS (statistical tool for the analysis of trends in social and environmental performance). The data is a snapshot of KLD's ratings at the end of each calendar year. KLD ratings are in seven major qualitative issue areas: environment, community, corporate governance, diversity, employee relations, human rights, and product quality

and safety. Analysts then assign strengths and concerns associated with these issues to determine a social and environmental profile. The overall sustainability performance score that was utilized was the number of sustainability strengths less the number of sustainability concerns: an aggregate method suggested by KLD.

Model: Return on assets (ROA) was utilized as the measure of corporate financial performance. Size was included as a control, utilizing the natural logarithm of total assets. Analyses were completed within SIC codes to eliminate industry to industry variation. Performance within an industry was normalized by subtracting the industry average ROA from the firm ROA to eliminate year to year macroeconomic factors. Variables were also included for the time since sustainability was effectively implemented and dummy variables for pre and post implementation.

Data Analysis: During the first phase, source data were consolidated into Microsoft Office Excel 2007, compiled into variable formats, and verified for completeness. In the second phase, Excel was utilized to graphically analyze the overall sustainability score trend information. Transition points were visually selected and then validated utilizing a modified regression discontinuity model. The results were entered into Excel. In the third phase, Minitab was utilized to run the linear regression analyses for the various model and industry combinations. During the fourth phase, the results were tabulated and summarized for analysis. Finally, select companies were interviewed to determine how the actual implementation of the sustainability program corresponded to the calculated effective influence date, to test the validity of the models.

PREFACE

As someone who grew up during the sixties and seventies, I had the pleasure of living in times of great individual passion. Many of the characters I recall from an early age were people who had deep convictions about something in their lives that served as a sort of compass for how they lived. The first time anything akin to sustainability hit my young brain was probably around the age of six or seven, when a lady wore a t-shirt to church that showed an image of earth covered with the widely used commercial labeling “fragile: handle with care”. The juxtaposition of our planet and business was so foreign that it made a lasting impression on me. I developed a respect for the people who took up some cause due to their passion.

My respect for people and their causes waned around the time I graduated college with the goal of becoming a leader of industry. People with causes were now limiting economic development. As someone who wanted to run one of these mammoth corporations, I began to resent people who felt entitled to tell businesses how they had to conduct themselves. I could not understand how someone could rationally feel they should have a say about how a business utilized the resources that they had legally obtained, for example land. My impression was that anything close to corporate social responsibility was just a result of companies who were doing well feeling guilty, and therefore giving back to the communities around them.

I aged, and similar to others in our country, began to see the harm our unconstrained growth was having on the earth. I again modified my beliefs to include the qualifier that companies had a duty not to do harmful things to persons or our planet. With the nuance that all companies would need to be held to the same standards to keep

the playing field level. I still viewed things beyond this to be more philanthropic and not truly a part of business. Had I not pursued further education, it is likely that I still would have been predominantly standing in Friedman's corner, viewing social activities as being at the expense of shareholders.

When I entered the doctoral program at LTU, certainly it was for the degree, but almost as importantly, to get back into learning at a level that would again challenge my views. That moment came when I was introduced to the concept of sustainability. Friedman's position, along with mine, came tumbling down – the flaw in the logic was that socially responsible behavior came at a cost. Suddenly and to my surprise, I became one of those people from my childhood with a "cause". My cause was specific: to show that doing socially responsible things was good for everyone, including the business. At work, I started investigating capital projects that would show how much return the business could get from doing things which were environmentally favorable. The results were remarkable – the more "green" things we did, the more "green" we were dropping to the bottom line. Several of the projects returned savings greater than the investment within the same year, and the savings were ongoing.

Despite my commitment and belief in sustainability, I feel the literature has oversold the impact on a company. I think that any great company needs to have a sustainability program. Just implementing a sustainability program will not, in itself, make yours a great company. In my mind, most similar business process is lean manufacturing. A company cannot be great without lean manufacturing, but will not be great solely due to implementing a program. I have had firsthand experience of the benefits, but want to study the impact on companies beyond my experience. I believe

that I will find that the best companies are those who quickly adopt programs that will make themselves better, so the relationships may be more of a correlation nature than causation one. I think it is important to show the exact mechanism, so that expectations are in line with results that can be achieved.

I hope my research will eventually lead towards a more prescriptive approach for corporate adoption of sustainability. I am excited about the prospect of helping companies succeed, while simultaneously helping to improve the world for future generations.

CHAPTER ONE: INTRODUCTION

Introduction

The speed with which sustainability has emerged as a key business strategy has been remarkable. Almost as remarkable, has been the variety of approaches that companies have adopted to try to capitalize on this relative new initiative. Some companies have embraced sustainability only from a marketing standpoint, looking to present themselves as a sustainable company, without changing anything else. Other companies have made significant efforts at changing their policies and behaviors towards greater sustainability. These companies have seen a wide variety of results; some of them even experienced negative impacts to their firm's financial performance. Other companies have decided to wait until the sustainability path is less ambiguous.

If one turns to the business literature for guidance, little clarity is provided. The studies that have been conducted on the relationship between sustainability and corporate financial performance (CFP) have not been conclusive. There have been a number of researchers who found a positive relationship, and there have been almost as many that found a negative relationship. There have also been a number of researchers who concluded that either there isn't a relationship, or that the observed relationship is actual the result of confounding variables. There have been others which found a curvilinear relationship which changed direction over time. Due to the newness of the field, the data available for research is limited. Many of the existing studies relied on socially responsible investment (SRI) indexes as a measure of sustainability.

For businesses to continue to increase their sustainability efforts, clarification of the sustainability to CFP relationship is required. In order to improve upon the research

that has been completed to date, the research should be conducted less at the macro level and more at the micro (or firm) level. Also, it should be recognized that much of the value of sustainability to a firm is generated through its stakeholders. Since different industries have different stakeholders, the relationship is likely to vary from industry to industry. Therefore, another improvement to previous research would be in conducting the research within industries to eliminate industry to industry variation.

This study is focused on improving the understanding of the relationship between sustainability and CFP. The relationship will be studied at the firm level, within an industry, to improve upon previous studies. It will also strive to understand the influence of time (since sustainability program implementation) on the relationship. The optimal outcome would be to help firms better understand the sustainability to CFP relationship more clearly, to afford them the ability to most strategically undertake their own sustainability initiatives.

Background to Study

McDonough and Braungart (2002) reflected that in 1789, Thomas Jefferson wrote a letter to James Madison stating:

The earth belongs ... to the living ... No man can by natural right oblige the lands he occupied, or the persons who succeeded him in that occupation, to the payment of debts contracted by him. For if he could, he might, during his own life, eat up the usufruct of the lands for several generations to come, and then the lands would belong to the dead, and not the living. (p. 185)

Our forefathers recognized that capitalism which made our country so strong could become over-focused on growth and consumption to the detriment of future generations.

What we have seen in addition, is that the prosperity is not all inclusive. The very existence of the term ‘third world’ demonstrates this, as the original usage referred to the one-third of the world’s population who did not know if they would eat the next day (Bebbington, 2001). The presence of inequities within generations and between generations, brought about the need to look at growth through more holistic lenses. This need resulted in creation of the term “sustainable development”, which Bebbington indicated was meant to address the question, “What kind of economic system would lead to everyone’s needs being met in an environmentally sustainable and socially just manner?” (p. 128).

Sustainable development was defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs, in the *Brundtland Report* (United Nations World Commission on Environment and Development, 1987). Sustainable development was such a high level concept that it seem to apply more to governments and other structural organizations than to corporations, therefore, terminology such as corporate social responsibility (CSR) started to come onto the scene. CSR was framed such that it bordered on being philanthropic and focused on corporations ‘giving back’, almost to make up for the profits they were realizing. As a result, it received resistance from economists, most notably Friedman (1970), for straying from the stated sole purpose of business – to make a profit. In essence, he argued that CSR was an unauthorized ‘tax’ on shareholders.

Taking the approach that profit itself was not bad, but focusing exclusively on profit was, John Elkington first coined the term “sustainability” and propagated it across the world in a bid to educate the people about the necessity of three-way reporting

(Choudhuri & Chakraborty, 2009). This provided organizations a framework to contribute to sustainable development by simultaneously delivering economic, social, and environmental benefits – the triple bottom line. More recently, Savitz and Weber (2006) stated that sustainability in practice can be seen as the art of doing business in an interdependent world. Sustainability as a whole, is a noble endeavor, due to its contribution to sustainable development; what has accelerated its adoption is the recognition that it can be beneficial to businesses as well.

Problem Statement

One of the simplest ways that a sustainability program has been shown to benefit business is in the reduction of risk. Table 1.1 lists the various types of risks businesses face. Due to the high cost of compliance issues with organizations such as the Environmental Protection Agency (EPA), risk reduction associated with sustainability is probably most commonly associated with commercial risk. Upon closer review, sustainability could be argued to have the potential to reduce risks in all of the major categories, especially due to the wide and rapid coverage of business issues in today's interconnected world.

Table 1.1

Business Risks

Risk	Definition	Examples
Strategic risk	Risk of planning failure	Poor marketing strategy Poor acquisition strategy Unexpected changes in consumer behaviors Political and regulatory changes
Financial risk	Risk of failure of financial control	Treasury operations Lack of counterparty and credit assessment Fraud and its control Systemic failure Poor receivables and inventory management
Operational risk	Risk of human actions	System mistakes Unsafe practices Employee routines Willful destruction
Commercial risk	Risk of business interruption	Loss of key personnel Supplier failure Legal issues and compliance
Technical risk	Risk of failure of physical assets	Equipment failure Infrastructure breakdown Fire and physical impact Explosion and/or sabotage Pollution Natural events

Note. Adapted from Bowden, Lane, & Martin (2001)

In addition to the reduction in business risk, other benefits have been shown to derive from the expansion of a company's focus from shareholders to stakeholders. This can result in value creation and potentially, in competitive advantage. Hart and Milstein

(2003) assert that the opportunity to create sustainable value – shareholder wealth that simultaneously drives us toward a more sustainable world – is huge.

The assertion that there are benefits to businesses for adopting a sustainability program is largely uncontested. What is contested is the mechanism through which businesses receive benefits, which elements of a sustainability program have the greatest benefits to the business, and whether those benefits translate into CFP. Assuming that there is a relationship between sustainable practices and improved financial performance, as a number of studies would suggest (Byus, Deis, & Ouyang, 2010; Chang & Kuo, 2008; Hull & Rothenberg, 2008; Kiernan, 2001; Mishra & Suar, 2010; Moneva, Rivera-Lirio, & Munoz-Torres, 2007; Peters & Mullen, 2007; Surroca, Tribo, & Waddock, 2009; Wagner, 2010), then the question is, what is the nature of the relationship? Therefore, the problem statement for this dissertation is: The relationship between sustainability and financial performance is not understood – firms need to understand the direction of the relationship and the nature of the relationship in order to optimally implement a successful sustainability program.

Purpose of Study

As detailed in the previous section, there have been many high-level studies with the aim of assigning at least a direction to the relationship between sustainability and CFP. The results have been mixed, probably due to the methodologies used. In the literature review is a summary of these studies, and the methodologies utilized to show the impact of a sustainability program on financial performance. The majority of the studies are at an aggregate level, not a firm level, with the use of sustainable indexes or

SRIs the leading independent variable. One of reasons that this may lead to poor results is the fact that the indexes are only partially based on sustainability measures. In fact, frequently the position of the firm within its industry is weighted more heavily, biasing the index financial performance (Lopez, Garcia, & Rodriguez, 2007). Another critique of the SRIs is given by Hayward (2003), who explains that the frequent changing of the firms included in such indexes prohibits meaningful comparisons over time. Other critiques include the influence of macroeconomic variables on the indices, bringing into question studies that do not control for those variables (Nikolaos, Ioannis, Nikos, & George, 2007).

A more practical issue with the majority of studies conducted to-date on the relationship between a sustainability program and CFP is that an aggregated approach affords little application at the firm level. In order for a firm level sustainability program to be meaningfully undertaken, research at that level would be more beneficial. A thorough understanding of the expected value of a sustainability program would facilitate the business case development for a strategic adoption of a sustainability initiative. As a result, this study will continue the analysis of the impact of a sustainability program; it will do so from the perspective of specific firms, and extend to the firm within an industry. Therefore, the purpose of this study is to determine the impact of a sustainability program on a firm's financial performance within their industry.

Research Questions

The analysis of the impact of a sustainability program has several components. First, is the verification of the existence of a sustainability to CFP relationship. Next, the

relationship can be described in direction and in magnitude: whether a sustainability program has a positive or negative effect, and how large the influence is on firm profitability. Finally, the nature of the relationship needs to be studied. The existence of a statistically significant relationship does not necessarily imply a causal relationship. Therefore, the research questions are: 1) What is the impact of a sustainability program on CFP? 2) If there is a difference in financial performance after implementation of a sustainability program, did the difference also exist before the implementation? and 3) Are the effects of a sustainability program cumulative? The second question addresses the difference between correlation and causation. If the answer to the second part of the question is yes, then the sustainability program alone cannot be the cause.

To start the study, the verification of a relationship between sustainability and CFP was confirmed. To do this, firms within specific industries were studied, and their overall sustainability scores were correlated to their overall financial performance within the industry. Sustainability is built on the premise of a triple bottom line with economic, social, and environmental components. From the perspective of social performance, it has the benefits of improved community, customer, and employee relations (Moneva, Rivera-Lirio, & Munoz-Torres, 2007). Since each of these has the potential to lower the cost of doing business, and establishing a relative competitive advantage, superior social performance scores within an industry would seem to indicate an associated relatively positive economic performance. From the perspective of environmental performance, it can have direct impacts, such as cost reductions due to decreased waste disposal, paint usage, and resource reclamation through programs such as recycling. It can also have indirect impacts, which are usually associated with risk. These risks typically fall into

regulatory or compliance issues. The direct impacts compounded with the indirect impacts should have a positive influence on the firm (Hoti, McAleer, & Pauwels, 2007). Given all of the theoretical benefits from a sustainability program, positive results should be expected.

H₁: A firm's overall sustainability score will positively correlate with financial performance within their industry.

While the first hypothesis dealt with the sustainability scores, the other three will deal with the implementation of a sustainability program. To determine a meaningful date as the start of a firm's sustainability program would be quite challenging. When it is framed as being the date it started to become an effective program, the problem becomes more analytical. The approach is adapted from the work done by Goeke and Faley (2009) on performance improvement after adoption of a Systems Application Products (SAP) program. This study will treat the effective date as when a change in overall sustainability scores occurs. This recognizes that no firms are operating without any sustainable activities. If a sustainability program has the predicted benefits, which should transfer to the bottom line, then an improvement in the rate of sustainability adoption should translate into an acceleration of economic improvements.

H₂: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

The first two hypotheses operated under the assumption of a causal relationship between sustainability and CFP. Still, the correlation needs to be investigated to determine if a causal relationship assumption is valid. This hypothesis and methodology for testing are adapted from the work York and Miree (2004) did on studying the impact

of total quality management (TQM) on CFP. Due to the newness of significant undertakings of sustainability programs, one would expect those most advanced to be the earliest adopters. The first firms to undertake a sustainability program were most likely able to do so as a result of already having exceptional performance, so they could try a new program without substantial fear of financial failure, or they were the most strategic thinkers looking for the next competitive advantage. Either way, it is a reasonable extension that the highest sustainability performers are companies with superior management, and therefore most likely already had exceptional economic performance.

H₃: A firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation.

When studying the potential sources of benefit to a corporation due to implementing a sustainability program, many of the sources would seem to have benefits which would take a while to fully develop. Whether it is based on the social side involving relationships or the environmental side involving risk reductions, the effects would seem to build on themselves, having influence that would increase with time.

H₄: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program will have cumulative effects.

The research questions listed above were answered in phases. The first phase, covered by Hypothesis One, looked at relative financial performance within an industry and correlated it to a measure of overall sustainability. For Hypotheses Two through Four, first the overall sustainability scores were analyzed to determine when the start of a statistically significant sustainability program was put into place: a calculated variable termed the “effective influence date”. Then they were addressed through analysis of a

change in economic performance associated with the change in sustainability performance. Hypotheses Two and Three were investigated through pre and post relative performance analysis, which in turn will help to answer the question of causality. If superior relative financial performance existed before the effective implementation of a sustainability program, then it cannot be the sole cause of the superior performance after. Hypothesis Four was addressed through the analysis of time-based cumulative variable analysis.

Significance of the Study

When a firm is considering implementing a sustainability program for the first time, or expanding an existing program, it is important for them to understand the business case: the estimated costs versus the expected returns (Holliday, Schmidhieny, & Watts, 2002). Leaders, for the most part value the concept but struggle to put together the business case for action (Byus, Deis, & Ouyang, 2010). This is due in part to the predominance of studies that have been studied at a macro-level. The majority of the studies only indicate that if you are able to get your firm to the elite level, as defined by inclusion in an SRI index, there are benefits (Becchetti, Di Giacomo, & Pinacchio, 2008; Byus, Deis, & Onyang, 2010; Consolandi, Jaisal-Dale, Poggiani, & Vercelli, 2009; Lopez, Garcia, & Rodriguez, 2007; Rossi, 2009). These benefits are difficult to translate to executable levels within a firm, or relative to their specific industry.

This study aims to close this gap. First, by verifying the existence of a financial benefit to a firm for improving their overall sustainability performance. Second, by looking at the actual impact of a successfully implemented sustainability program on a

firm's relative financial performance, within their industry. This was done by showing the time-based accumulative impact of program implementation, allowing for a better business case payback analysis to support the direction. Finally, it investigated the assertion of many critics of the sustainability to financial performance link that the presence of a strong proactive sustainability program is an indicator of superior management, and that superior performance would have already been present.

Adam and Shavit (2007) warn of the issues associated with the current reliance on sustainability indexes as the most widely recognized delineation for a firm being identified as sustainable, because it eliminates the incentive for sustainability focused investment if that company is excluded. Hayward (2003) confirms the concern due to the weighting of the economic component in most indexes, giving a bias toward industry leaders and virtually eliminating companies in the lower half, according to size. Therefore, the significance of this study is in the potential to demonstrate to firms that are not on the cusp of sustainability index inclusion, that there still is value to the pursuit of sustainability initiatives. Coupled with that, if overall sustainability scores could be shown to be statistically significant in contributing to economic performance, there could be an interest in a more visible sustainability rating for all companies. The value of this would be in providing increased incentives to all companies to include social and environmental initiatives in their strategic plans.

Methodology Overview

The study looks at the impact of a sustainability program on corporate financial performance. This was done in a study of historical sustainable scores and financial

performance data, within specific industry codes. In an effort to control as many variables as possible, the data utilized were limited to publicly-held U.S. corporations. Keeping the study to U.S. corporations eliminates factors such as government influence, regulations, tax benefits, and culture. Including only public companies serves several purposes. First, it is much more difficult to get accurate and thorough financial performance data on privately held companies. Second, private and public corporations have other differences which could have influence over the relationship, including different governance and different rules for disclosure.

As a result of limiting the study to publicly-held U.S. corporations, the financial data becomes readily accessible through a variety of databases. The only question then becomes which measures are the most meaningful for comparison purposes. This selection is discussed completely in Chapter Three. To further eliminate variation that is not germane to the relationship being investigated, analyses were completed within industries, as specified by SIC code. Hemming, Pugh, Williams, and Blackburn (2004) found significant differences between industries in the degree of implementation and the value of implementing sustainability program elements. Then the variable size, with previously established high levels of correlation to financial performance, was added into the model to control for its influence on the relationship.

The first part of the study was associated with correlations between sustainability scores and financial performance metrics. This was done within individual industries and summarized for potential extrapolation to aggregate relationships. The second part of the study adds in the time-series influence to determine the effects of effectively implementing a sustainability program, and to enable the study of relative firm

performance before and after the effective implementation of a sustainability program. The latter part shows how much of the difference can be attributed to the sustainability program. Finally, select companies were interviewed to determine how the actual implementation of the sustainability program corresponded to the calculated effective influence date.

Contributions of Dissertation to Academic and Practitioner Audiences

From an academic perspective, this dissertation built on the substantial body of research that has been done in an attempt to define a relationship between sustainability and CFP. This study differs from the majority of the studies by examining the relationship based on a sustainability score versus the more easily obtainable inclusion in a sustainability index. It also differs from the majority of the existing research by performing the analysis within industries to eliminate the confounding influence of industry differences.

Another important contribution of this research is in addressing how much the implementation of a sustainability program contributes to differences in financial performance. In order to address this question, there was the addition of a time-based variable. So far, the majority of research to include time-based analyses of sustainability and financial performance have been based externally on the inclusion (or exclusion) of a firm in a sustainability index. Peters and Mullen (2007) did the most significant work on inclusion of cumulative effects of sustainability scores; without the ability to establish a transitional point in the firm's sustainability behavior, the level of contribution from the sustainability program cannot be addressed.

Due to the limited research thus far in the area of firm level impacts from implementation of a sustainability program, a literature review of methodologies was conducted that focused on the impact of implementation of other various programs that may impact CFP. These other programs included MRP systems, leveraged buyouts, employee ownership, initial public offerings, and employee stock options. Statistical techniques were utilized to determine the effective influence date of a sustainability program for a given firm by looking for a change in the overall sustainability performance score. Once this transition point was established, the research (such as Goeke & Faley, 2009) on time-based cumulative effects could be built upon. Also, pre and post studies (such as York & Miree, 2004) were built upon, with a change from sustainability index inclusion to effective influence date. This is the area that allows any CFP differences to be attributed to the implementation of the sustainability program.

Limitations

The first area of limitation is due to the variables that were eliminated in an effort to avoid effects not relative to the relationship being studied. Limiting the study to U.S. corporations eliminated a lot of variables that would have been tough to control for; it also limited the applicability of the research globally. It also is limited in the fact that some of the most sustainable companies in the world are located in Europe, in essence potentially cutting off some of the right hand tail of the global sustainability distribution. Another limitation in this same category is the elimination of private companies. This is partially necessitated due to data availability; it raises similar questions of further applicability and changing the overall distribution of sustainability.

The next, and probably most significant, area of limitation is in the measurement of sustainability. There are several companies which have measures, and they are different. They have aggregate scoring methods that have their own limitations. As such, there are questions about the right components being included, proper weighting, and whether some categories should have a minimum score without which the whole score should be lowered (Hayward, 2003). In the future, perhaps there will be sustainability measures that are as globally accepted as the current financial measures. For the purposes of this study, the sustainable scoring system was selected through a literature review of existing studies, and the system deemed to be most objective and meaningful. A further discussion of this decision is included in Chapter Three.

Another limitation is in not controlling for some variables that previous research has shown to have an influence on the relationship between sustainability and CFP. These variables include innovation and industry differentiation (Hull & Rothenberg, 2008), corporate governance (Pitelis, 2004), and research and development (R&D) intensity (Padgett & Galan, 2010). Moneva, Rivera-Lirio, and Munoz-Torres (2007) even found that a significant relationship was found when the variables were reversed and CFP was used as the input and sustainability performance was utilized as the output. This direction was not explicitly studied, though the correlations were tested. The possibility of a synergistic relationship, where both contribute to growth in the other, was also not examined.

Another limitation is in not including the impact of organizational change. The acquisition and/or divestiture of organizational units are confounding variables which are

not included in the models. To a lesser extent, even smaller scale changes such as reorganizations might have influence that is not controlled for within this study.

The final limitation is in the uniqueness of the approach. Although this is what makes the study of such interest for future application, it also has limitations due to the lack of previous research utilizing this particular method and the variety of different types of studies that needed to have elements included.

Definition of Key Terms

Chapter Two has a more in-depth review of the history and terminology. The three most important terms progressing from global initiatives to firm initiatives are: ***Sustainable development***, defined by the Brundtland Report (United Nations World Commission on Environment and Development, 1987) as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (as cited in Bebbington, 2001, p.132).

Corporate social responsibility has been defined as one aspect of sustainable development that is “voluntary firm actions designed to improve social or environmental conditions” (Byus, Deis, & Ouyang, 2010, p. 44). Alternatively, CSR can be defined as a move from the shareholders wealth to a multi-stakeholders welfare target (Becchetti, Di Giacomo, & Pinnacchio, 2008).

Sustainability is the term that was emphasized in this dissertation, and the definition that was utilized is an aggregation of the most salient components of a wide range of definitions (including, those from DJSI and Elkington): *a business approach that creates long-term shareholder value by optimizing their business across economic, environmental, and social dimensions.*

Summary

This chapter has introduced the importance of sustainability generally to society and specifically to individual firms. The relationship between sustainability and CFP needs to be better understood in order to determine its role in the strategic initiatives of the corporation. Significant research exists on a macro level to show the benefits of achieving a level of sustainability to obtain inclusion in an SRI index. However, the applicability to individual firms and firms not economically positioned to be included in an index is limited. Therefore, this study started with analyzing the relationship of firms within their specific industry level. Then, statistical techniques were utilized to determine the effective start date of sustainability programs for various firms. This allowed for time-based cumulative effects to be analyzed and the presence of a predicted causal relationship to be tested. The results will allow firms to formulate business plans to adopt more specific strategic approaches to sustainability. Also, future academic research will have a new framework to evaluate sustainability.

CHAPTER 2: LITERATURE REVIEW

Introduction

The research questions are: 1) What is the impact of a sustainability program on corporate financial performance? 2) If there is a difference in financial performance after implementation of a sustainability program, did the difference also exist before the implementation? and 3) Are the effects of a sustainability program cumulative? In order to adequately address the research questions, the literature review must address each of the component elements. The first area addressed is the actual term “sustainability”. The literature discussed outlines the history of sustainability, defines the term sustainability as it is used in this dissertation, and finally addresses the differences between sustainability and other commonly used terms. The second area addressed is sustainability and corporations. The literature discussed will cover corporate motives for adopting a sustainability program, the various approaches corporations have to sustainability, and one of the most influential areas on the corporation adoption of a sustainability program – sustainability indexes or socially responsible investing (SRI) indexes. The third area addressed is the impact of a sustainability program on the financial performance of corporations. The literature discussed analyzed the theoretical results and the empirical results from studies on the financial impact of corporate sustainability. It also analyzed the methods utilized in studies to determine the impacts. Finally it analyzed the analysis methods utilized in studies to determine the impact of other various program implementations on corporate financial performance (CFP).

Sustainability

Sustainability is a term that is widely utilized, yet not thoroughly understood. Part of the confusion comes from the variety of terms used: sustainability, sustainable value, and sustainable development. Also, it is used interchangeably with a number of other terms, such as: corporate social responsibility, going green, doing good, and triple bottom line management. Sustainability is defined by the U.K. government as “ensuring a better quality of life for everyone now and for generations to come” (as cited in Hemming, Pugh, Williams, & Blackburn, 2004, p. 104). Whereas, attributes of progress toward sustainable development are defined as: compliance management, environmental management systems, performance improvement, environmental and sustainability reporting, stakeholder dialogue, product stewardship, supply chain management, eco-innovation, contribution to quality of life and community involvement, and employer of choice (Hemming, Pugh, Williams, & Blackburn, 2004). A more pragmatic or economic view is that given scarcity, rationality, and the need for economizing, the economic aim becomes one of achieving an efficient allocation of scarce resources. For sustainable value creation, corporate governance needs to be aligned to national and global governance (Pitelis, 2004). To help clarify the term “sustainability”, the next several subsections will outline the history of sustainability, define the term sustainability as it is used in this dissertation, and address the differences between sustainability and other commonly used terms

The history of sustainability. Before *The Wealth of Nations*, Adam Smith wrote *The Theory of the Moral Sentiments* (1759), which states that a capitalist system must be

based on honesty and integrity, otherwise it would be destroyed (as cited in Lo & Sheu, 2007). It is apparent that Adam Smith understood that self-interest should be moderated by ethics, so that purely selfish or exploitative behavior would be the exception, and not the rule in our society. Therefore, the recognition of the impossibility of unchecked materialistic capitalist growth is over 250 years old. It took centuries, however, to materialize into tangible policies. The publication of the Brundtland Report (United Nations World Commission on Environment and Development, 1987) is often cited as the place where sustainable development entered the policy arena. In actuality, there were precursors in the conservation philosophy of Theodore Roosevelt and the 1949 United Nations Scientific Conference on the Conservation and Utilization of Resources held at Lake Success, New York. The social element that was introduced as sustainable development was originally thought to address the question: What kind of economic system would lead to everyone's needs being met in an environmentally sustainable and socially just manner (Bebbington, 2001)?

The idealistic policy for sustainable development has to translate into executable strategy for the hugely influential business community. Global society should expect business to the things it is most skilled at: to pursue traditional modes of efficiency, to seek market-lead innovations, and to respond rapidly and successfully to changes in the 'playing field' – changes in markets, prices, incentives, tastes, and so on. It is not clear whether business can be expected to provide, on its own initiative, the innovative ways of thinking, the drastic re-design of lifestyles, the costly structural re-adjustments, and the major redistribution of wealth which are patently essential for a sustainable future. Making efforts towards sustainability is more the focus of corporations, as an integral

part in the global initiative toward sustainable development. Bebbington (2001, p. 142) stated: “What is important for business is to recognize the importance of the kind of growth... exponential and indefinite material growth is not sustainable, but ‘growth’ in technological expertise, education, or community health certainly may be.” To that end, the consumption and use of environmental resources need to be accounted for as part of the full cost of production and reflected in market prices. Contributing to the environment issues of today, is that the total costs of a natural resource are not accurately calculated – business needs to switch thinking to the total impact on the eco-system (Dr. Don Richards in the lecture “What Economics Gets Wrong about Sustainability” at Saint Mary of the Woods College on 9/6/10).

Acceleration in the need for sustainability has been caused by the globalization of economies. Four sets of drivers related to global sustainability are: 1) increasing industrialization and its associated material consumption, pollution, and waste generation, 2) the proliferation and interconnection of civil society stakeholders, 3) emerging technologies that could render the basis of many of today’s energy and material intensive industries obsolete, and 4) the increase in population, poverty, and inequity association with globalization (Hart & Milstein, 2003). As a result, we are seeing an eco-industrial revolution: an industrial and socio-political paradigm shift that is making the “eco-value” or “sustainability” of companies far more central to their global competitiveness, profitability, and share price performance than ever before.

In the future, macro-level structural forces will give an even larger eco-value premium, including: tightening global and domestic regulatory pressures, the globalization and intensification of industry competition, and changing consumer and

investor demographics to younger and “greener”. Also the growing eco-value premium will include: institutional shareholder activism, executive awareness of the competitive and financial benefits of superior environmental performance, global population and resource consumption pressures, the increased transparency and velocity of information, and pressure from nongovernment organizations. This is demonstrated in Figure 2.1, which shows the key drivers of competitive advantage.

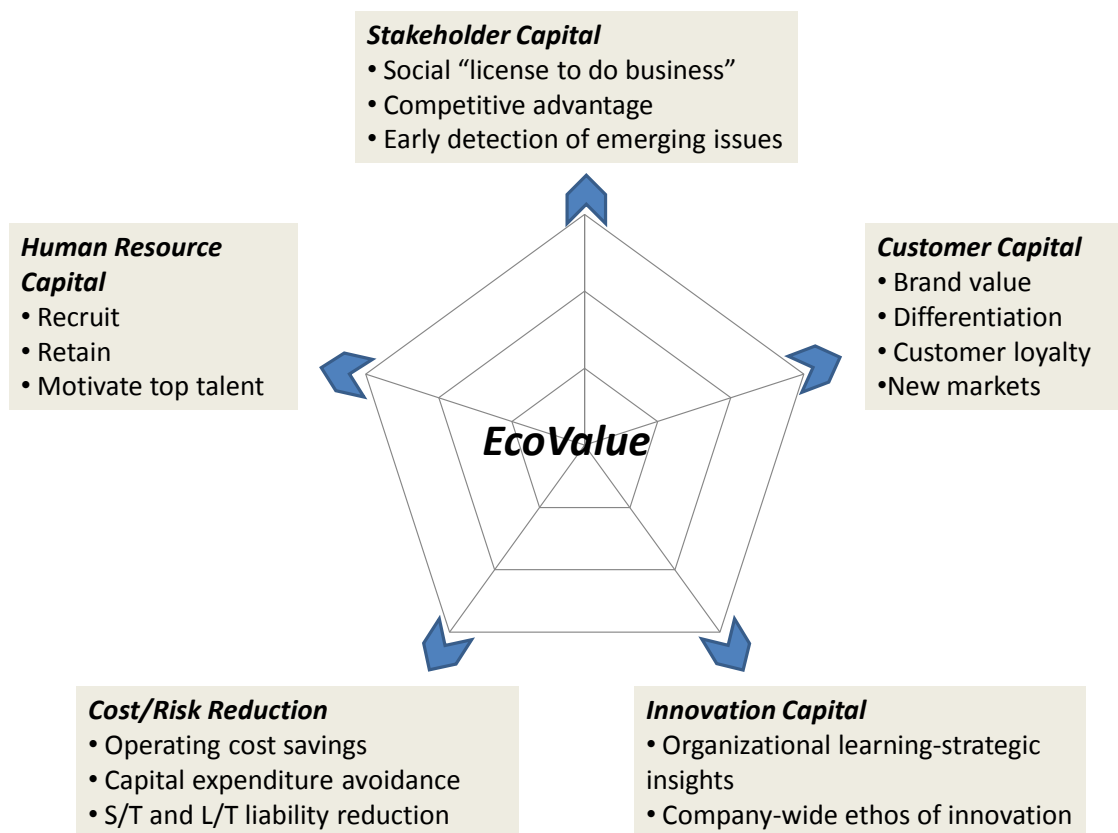


Figure 2.1. Key drivers of competitive advantage.

Note. Adapted from Kiernan (2001)

The implications to sustainability are huge, as a successful sustainability program has the ability to influence each of the five main drivers. The influence to stakeholder capital and customer capital are intuitive, with the associated change to include external priorities. Risk reduction is also commonly associated with sustainability. Human capital and innovation capital are benefits that are beginning to be identified and quantified. The power of the ability to positively influence each of the five main drivers of competitive advantage has resulted in a state where fiduciaries are now derelict in their duties if they do not consider environmental factors (Kiernan, 2001).

The history of sustainability has seen quite a transition in its relatively short-lived existence. It has gone from a 250 year old recognition of the limitations of self-interested growth, through a recognition of the value of conservation, to the societal objective of sustainable development, to a global economy driven need for sustainability by business, and finally to a market-driven fiduciary responsibility for corporations to adopt sustainable practices.

Sustainability defined. As indicated above, sustainability is basically the part of sustainable development that a business enterprise can meaningfully contribute. John Elkington first coined the term “sustainability” and propagated it across the world in a bid to educate the people about the necessity of the three-way reporting framework (Choudhuri & Chakraborty, 2009). As such, a sustainable enterprise is one that contributes to sustainable development by delivering simultaneously economic, social, and environmental benefits: the so called triple bottom line (Hart & Milstein, 2003). Still, too much emphasis on sustainable development opens up the infamous debate

surrounding corporate social responsibility (CSR). If the efforts are exclusively for societal aims, then they can be viewed as philanthropic and not in the best interest of the business; therefore, many definitions have evolved to indicate business as well as societal benefits.

The Dow Jones asserts that corporate sustainability is a business approach to create long-term shareholder value (Byus, Deis, & Ouyang, 2010). More specifically, corporate sustainability can be defined as a business approach that creates long-term shareholder value by embracing opportunities and managing risk from economic, environmental, and social dimensions (Lo & Sheu, 2007). A framework for sustainable value is presented in Figure 2.2.

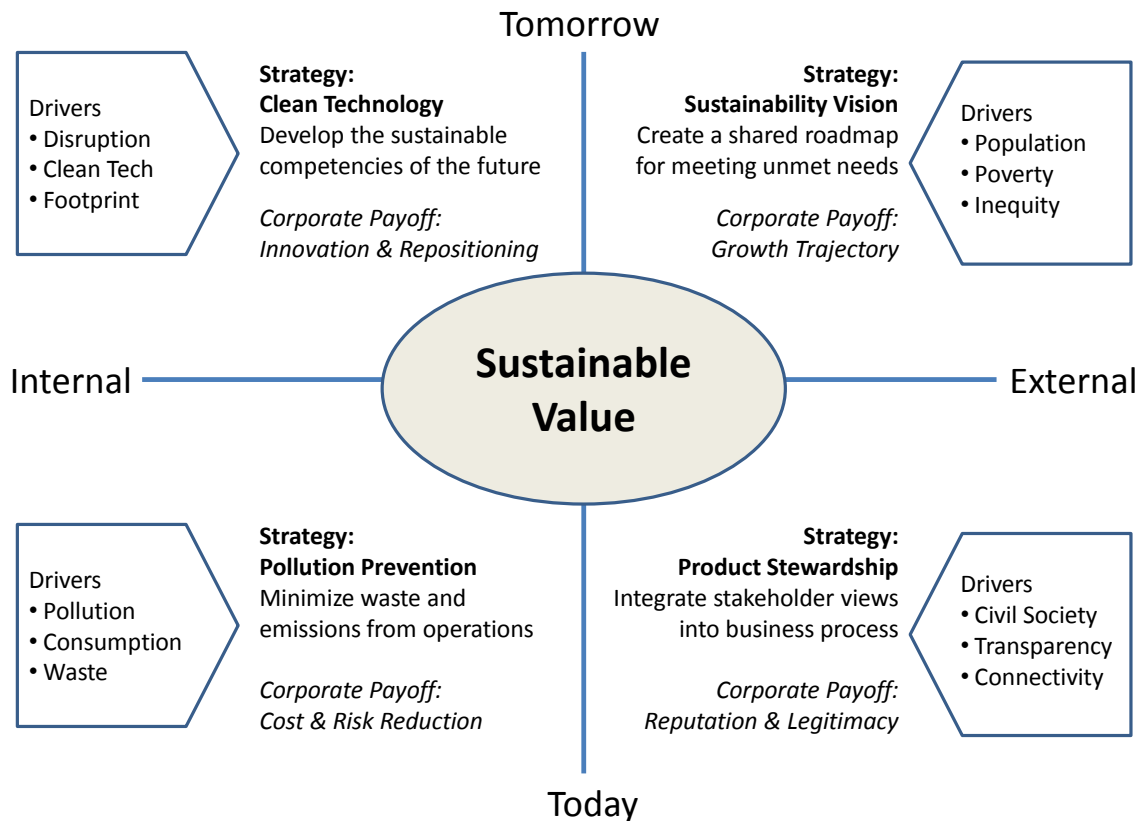


Figure 2.2. Sustainable value framework.

Note: Adapted from Hart & Milstein (2003)

The framework highlights another needed change: the change of focus from short-termed thinking to more long-termed strategic thinking. Long-term thinking should be inherent in sustainability, due to the word itself. Businesses today are valued in the stock market for today's activities, so it takes the commitment of business leaders to work on a longer-term planning horizon to create the maximum sustainable value.

Perhaps the simplest definition of sustainability is provided by Werbach (2009) – “Thriving in perpetuity” (p. 9). Although he later expands upon the definition by indicating the presence of four coequal components: social, economic, environmental, and cultural sustainability. Anderson (2009) also has a simple definition, “The continued, healthy, balanced coexistence of the techno-sphere and the biosphere for the indefinite future” (p. 64).

In order to implement a sustainability program as a company, there are three elements needed as a starting point. They are: a need to embed environmental considerations in the economic policy making process, an inescapable commitment to equity (both between and within generations), and a reconsideration of the meaning of development that recognizes the concept as being wider than economic growth (Bebbington, 2001).

The best operational definition of sustainability, as it applies to a corporation, has to include value creation and a holistic approach to decision making. Kuosmanen and Kuosmanen (2009, p. 236) suggest that a company has to consider questions such as: “Do the economic benefits of the activity outweigh the external environmental and social costs?” and “Where should the resources be allocated to achieve maximum economic benefits?” So the definition for sustainability that was utilized in this dissertation is “a

business approach that creates long-term shareholder value by optimizing their business across economic, environmental, and social dimensions”.

Sustainability versus other terms. In the section discussing the history of sustainability, the most important difference of terms was defined: sustainability versus sustainable development. Where sustainable development has the context of overall societal goals, sustainability is the business institution’s operational contribution toward sustainable development. The next most significant term to compare to sustainability is CSR. In this section, the terms sustainable value, stakeholder value, green/environmentalism, and corporate governance are also addressed.

CSR is still perhaps more widely known than sustainability. In part, due to the length of time it has been around, but probably more significantly due to the infamous opposition to CSR by the Nobel economist Milton Friedman. It was his view, as stated in his 1970 article *The Social Responsibility of Business*, that it is a company’s sole purpose to maximize profit and any activities to the contrary were, in essence, unauthorized taxes on the shareholders. CSR has a connotation of being an obligation to give back to society. CSR has been defined as one aspect of sustainability that can be defined as voluntary firm actions designed to improve social or environmental conditions (Byus, Deis, & Ouyang, 2010). Therefore, CSR can be defined as a move from the shareholders wealth to a multi-stakeholders welfare target (Becchetti, Di Giacomo, & Pinnacchio, 2008). Implicit in this definition is a belief that business is not only accountable to its shareholders, but should also consider stakeholder interests which may be affected by the operations or objectives of a business (Lo & Sheu, 2007). Linking the sustainable

development higher objective with the change to include stakeholders can evolve to a new definition of CSR: a firm's contribution to sustainable development that is associated with the analysis of the organization's relations with its stakeholders (Moneva, Rivera-Lirio, & Munoz-Torres, 2007).

Another term that is frequently used is sustainable value. In the section on defining sustainability, a component of value creation was added. Sustainable value is a way of measuring or quantifying sustainability. A firm is said to create sustainable value whenever it uses its resources more efficiently than another firm would have used them. It is a relative efficiency indicator (Kuosmanen & Kuosmanen, 2009). This efficiency can translate into firm performance through six financial drivers: customer attraction, brand value and reputation, license to operate, human and intellectual capital, innovation, and risk profile. One way eco-efficiency ratios may be defined is as value per environmental influence (Castro & Chousa, 2006). Another closely related term is the triple bottom line. This is sustainability, but with a practical framework. The value created is in three main areas, and is illustrated in Figure 2.3.

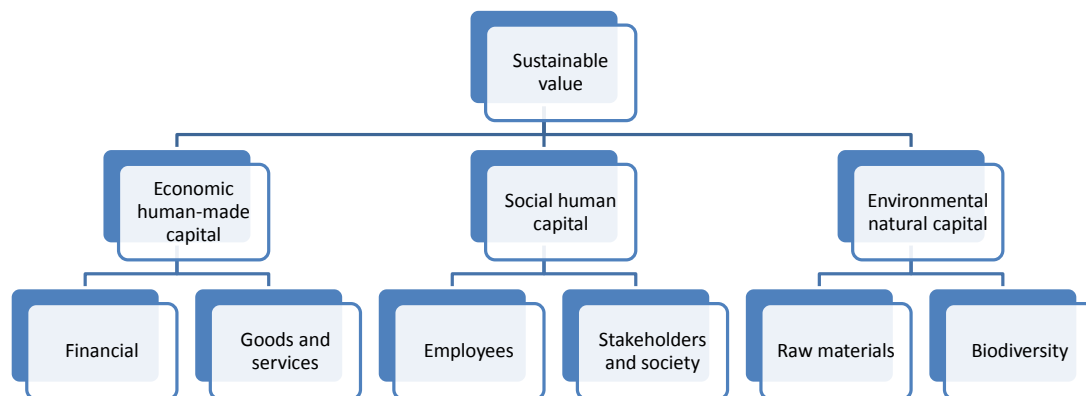


Figure 2.3. The capital model and the triple bottom line.

Note. Adapted from Henriques & Richardson (2004)

The economic capital has always been associated with businesses. The social human capital and the environmental natural capital are the areas that the triple bottom line recognizes as adding to the value of the corporation. Understanding that each of these areas creates value for the organization is fundamental in the decision of business leaders to undertake sustainable initiatives within the organization.

A closely related term to sustainable value, however more externally focused, is stakeholder value. The concept of stakeholder value recognizes that corporate activity may create negative externalities that need to be counterbalanced, either by institutional rules or by corporations themselves (Becchetti, Di Giacomo, & Pinnacchio, 2008). The stakeholder value creation refers to both achieving sufficient profit and to satisfying the requests of a diverse group of stakeholders (Lopez, Garcia, & Rodriguez, 2007).

Green or environmentalism are terms that have been around for a long time. They are certainly related to sustainability, but they are a subset dealing only with the environmental dimension, without regard to the social and economic implications. A more useful term is eco-efficiency which is simply a contraction of ecological and economic efficiency. It is defined by Willard (2002, p. 5) as “achieving ever more efficiency while preventing pollution through good housekeeping, materials substitution, cleaner technologies, and cleaner products striving for more efficient use and recovery of resources”.

Corporate governance system is terminology that has also been appearing in literature about sustainability. It mainly deals with the administrative approach to the sustainability initiatives and has been analyzed with four main approaches: agency

theory, legalistic perspective, resource dependence, and class hegemony (Ricart, Rodriguez, & Sanchez, 2005).

Sustainability is similar, but different from the other popular terms. Sustainability is the operational level that a corporation can contribute to the higher societal goal of sustainable development. CSR is a similar term that does not require benefit or value creation by the firm. Sustainable value is what makes sustainability an attractive proposition for firms. Stakeholder value is, therefore, recognition of the ability to create value within the firm via creating value external to the firm. “Green” only addresses one of the three dimensions of the triple bottom line of sustainability. Corporate governance deals with the administration of corporate sustainability related policy.

Sustainability and Corporations

Corporate sustainable development has been frequently quoted as an ultimate vision of firms (Chang & Kuo, 2008). There has been a lot of research into the relationship between corporations and sustainability. The relationship begins with recognition that there is an ethical side and a profit side to any business, and the two factors have to be balanced (Lo & Sheu, 2007). More pointedly, the exclusive focus on monetary results (especially short-term shareholder value) of the currently prevailing competitive model is detrimental for nature, society, future generations, and finally for business itself (Tencati & Zsolnai, 2009). Social performance and economic performance should not be separated, since in order to determine whether a firm is “good”, it has to perform well in both (Padgett & Galan, 2010). The survival and continuing profitability of the corporation depends upon its ability to fulfill its economic and social purpose,

which is to create and distribute wealth or value sufficient to ensure that each primary stakeholder group continues as a part of the corporation's stakeholder system (Moneva, Rivera-Lirio, & Munoz-Torres, 2007). An explanation of corporate social engagement is listed in Table 2.1.

Table 2.1

Explanations of Corporate Social Engagement

	<i>Structure</i>	<i>Actors</i>
<i>External</i>	Competitive landscape National institutions Global institutions Public norms	Pressure from NGOs Pressure from IOs Actions of competitors and business partners
<i>Internal</i>	Organizational structure Corporate culture Nature of the firm's business	Managers' values/beliefs Managers' leadership abilities Employees

Note. Adapted from Brown, Vetterlein, & Roemer-Mahler (2010)

The table highlights how the strategic landscape of organizations have changed with the increasing influence external organizations have on businesses. Non-government organizations (NGOs) and industrial organizations (IOs) now are able to exert tremendous pressure on organizations to adopt sustainable initiatives.

There are five basic corporate sustainability principles: innovative technology, corporate governance, shareholder relations, industrial leadership, and social well-being (Cerin & Dobers, 2001). The strength and sustainability of enterprises come from their ability to fit into the environmental, social, and cultural context in which they function

(Tencati & Zsolnai, 2009). To date, sustainability is predominantly considered a western phenomenon due to strong institutions, standards, and appeal systems which are weak in developing countries. However, liberalization and globalization, entry of Multi-National Corporations (MNCs), rising consumer expectations toward business, and the emergence of pressure groups have made the case for sustainability stronger in developing countries (Mishra & Suar, 2010). Despite the gains, there is a lot of room for improvement. At a minimum, a sustainable business is one which leaves the environment no worse off at the end of each accounting period than it was at the beginning of that period.

For full sustainability, the sustainable business would also re-dress some of the excesses of current nonsustainability and consider the intragenerational inequalities. Enhanced corporate sustainability performance requires sustainability practices and policies that are an integral component of corporate strategy. It also requires that sustainability decisions be supported with specific management controls, performance measures, and performance reward measures. It must also pass prudent financial value analysis and produce positive economic impact (Byus, Deis, & Ouyang, 2010).

The progression an organization, and the individuals in the organization, may go through during their sustainability maturation are shown in Figure 2.4.

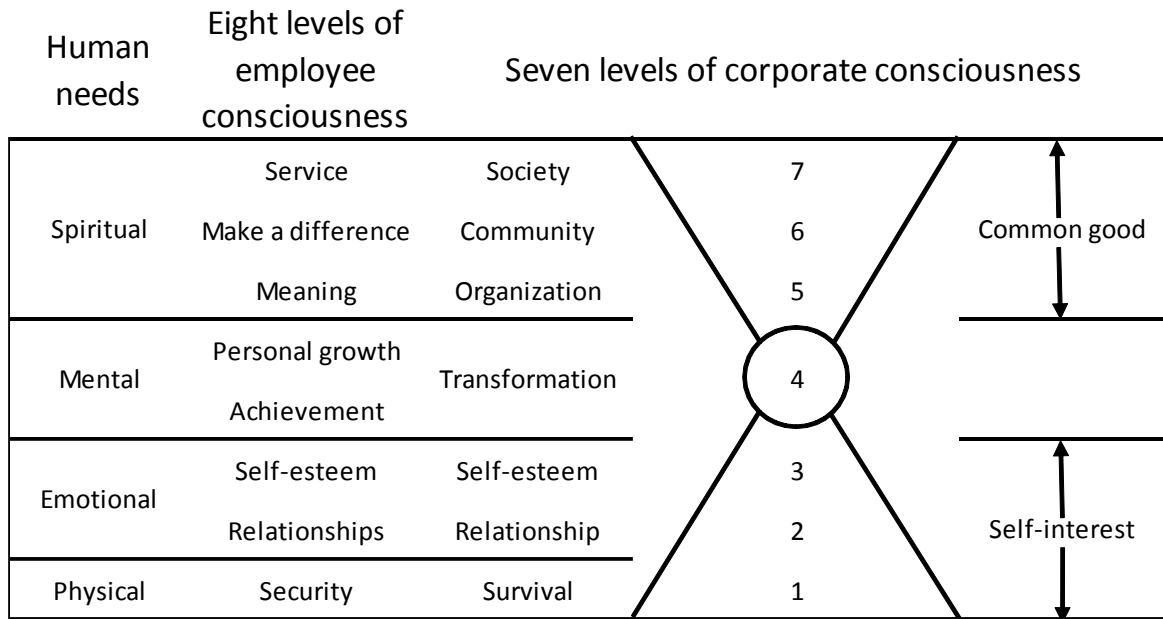


Figure 2.4. The seven levels of corporate consciousness.

Note. Adapted from Elkington (2001). In Elkington's version, eight levels of employee consciousness were listed: the heading said only seven, like the levels of corporate consciousness.

The levels of consciousness recognize that for an organization to successfully mature through the levels, the employees have to make a similar progression through the levels of employee consciousness. The progression the employees must make has a tie to human needs, which corresponds well with Maslow's hierarchy of needs. This figure provides a very holistic framework where the organization can only reach its ideal state when its employees reach theirs.

Neoclassical economic theory, with its assumption of rational action and profit-maximizing motivations, require return to the firm for sustainability. Other theorists view corporations as quasi-public institutions with responsibilities to stakeholders

(Brown, Vetterlein, & Roemer-Mahler, 2010). That is perhaps why stock-listed firms show responsible business practices and better financial performance than the non-stock-listed firms (Mishra & Suar, 2010). The interaction between CSR and stock market performance is shown in Figure 2.5.

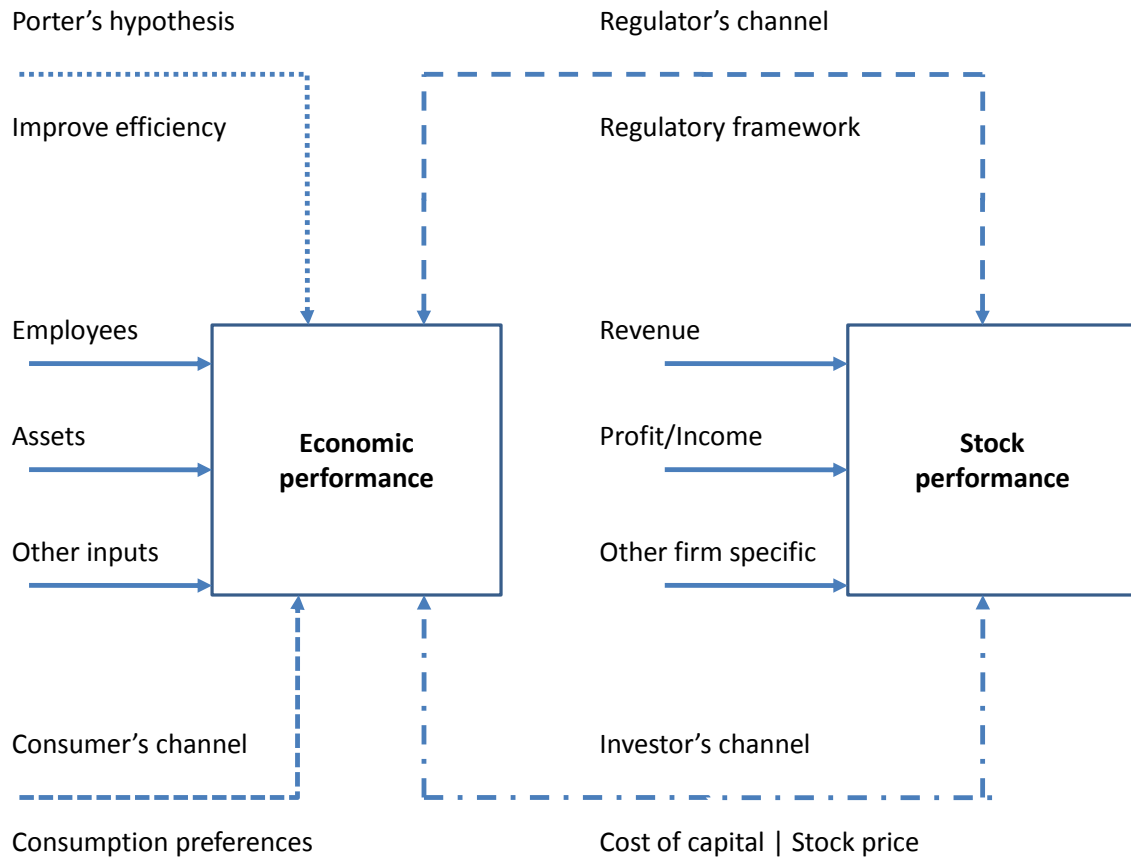


Figure 2.5. Channels of interaction between CSR and economic performance.

Note. Adapted from Belu (2009)

The channels of interaction demonstrate the fact that the influences on a business and its resultant behaviors are not independent. Porter's theory is that most of the operational improvements from sustainability are a result of the improvement in

efficiency. That explains the supply side, but sustainable behaviors also can impact the demand side with a material impact to the consumer behaviors. The stock performance also has direct and indirect influences with regulatory activities that have a direct impact. Analogous to the consumer influences, the presence or lack thereof, of sustainable initiatives also can influence the investors with resultant impact to the stock market performance.

The ability to potentially influence stock market performance is certainly not the only factor in the decision to adopt sustainable behaviors. It has also been shown that firms act more socially responsible to enhance their competitive advantages when the market competitiveness is more intense. In addition, firms in countries with stronger levels of legal enforcement engage in more sustainability activities; firms in countries with stronger shareholder rights engage in less sustainability (Chih, Chih, & Chen, 2010).

The relationship between entrepreneurship and ethics has largely been characterized as antithetical (Surie & Ashley, 2008). Recently, ethics has started to move from a perceived limitation to entrepreneurship to a requirement for it. Mishra and Suar (2010) even take it to the extent to which they feel that the survival and success of a firm depends on the ability of its managers to create sufficient wealth and satisfaction for its primary stakeholders. Some of the ways that firms can impact stakeholders are highlighted as impacts to the triple bottom line, in Table 2.2.

Table 2.2

Triple Bottom Line Impacts

Triple Bottom Line Impacts (Environmental and Societal)	
Environmental Impacts	Social Impacts
<ul style="list-style-type: none"> • Company's Effect on Air Quality and/or Water Quality: Does the company have smokestacks, belching toxic fumes into the air? Does the manufacture of its products create hazardous waste? • Energy Use: What is the carbon footprint of the company? How much electricity does it use to power its offices and factories? How much fuel does it use for its vehicles? • Product Life Cycle: What happens when consumers are done with a company's products? Do the materials break down over time, or can they be recycled? Does disposal of a product pose a significant threat to the environment? 	<ul style="list-style-type: none"> • Labor Practices: How does a company treat its employees? How do the suppliers and vendors that the company hires treat their employees (i.e. are they using sweatshops)? • Human Rights: Is the company involved in practices – directly or indirectly (via relationships with governments) – that result in political oppression, torture, or other human rights violations?

Note. Adapted from Choudhuri & Chakraborty (2009)

Environmental impacts have been understood for a while, but the breadth of environmental impacts has changed greatly. The progression has been from trying to reduce pollution or harmful environmental accidents, to looking proactively at end of life impacts for materials and the true manufacturing costs in terms of resources. The social impacts have grown tremendously in recent years, but still are significantly lacking, from a global perspective.

This focus on stakeholders, not just shareholders, can have an impact on financial performance. In a qualitative study, examining firm utility as a function of firm profit and firm social responsibility, it was determined that profit is maximized at low and high levels of sustainability: moderate levels actually lowered profit (Adam & Shavit, 2008). If corporate leaders feel there are financial gains to be realized, the desire for increased sustainability becomes one with returns. Once the desire is there, the implementation path becomes the question. A qualitative study of sustainability “champions” found that in order to successfully implement sustainability, it is necessary to make a business case for sustainability, and it must overcome the short-termism. Greater government intervention is also required to avoid competitive incentive to avoid costs associated with the initial adoption of sustainability (Lewis & Juravle, 2010).

To better understand the potential financial impacts of sustainability on an organization, it is important to understand the relationships between the sustainable activities and the specific drivers of financial performance. The model of the financial analysis of sustainability is shown in Figure 2.6.

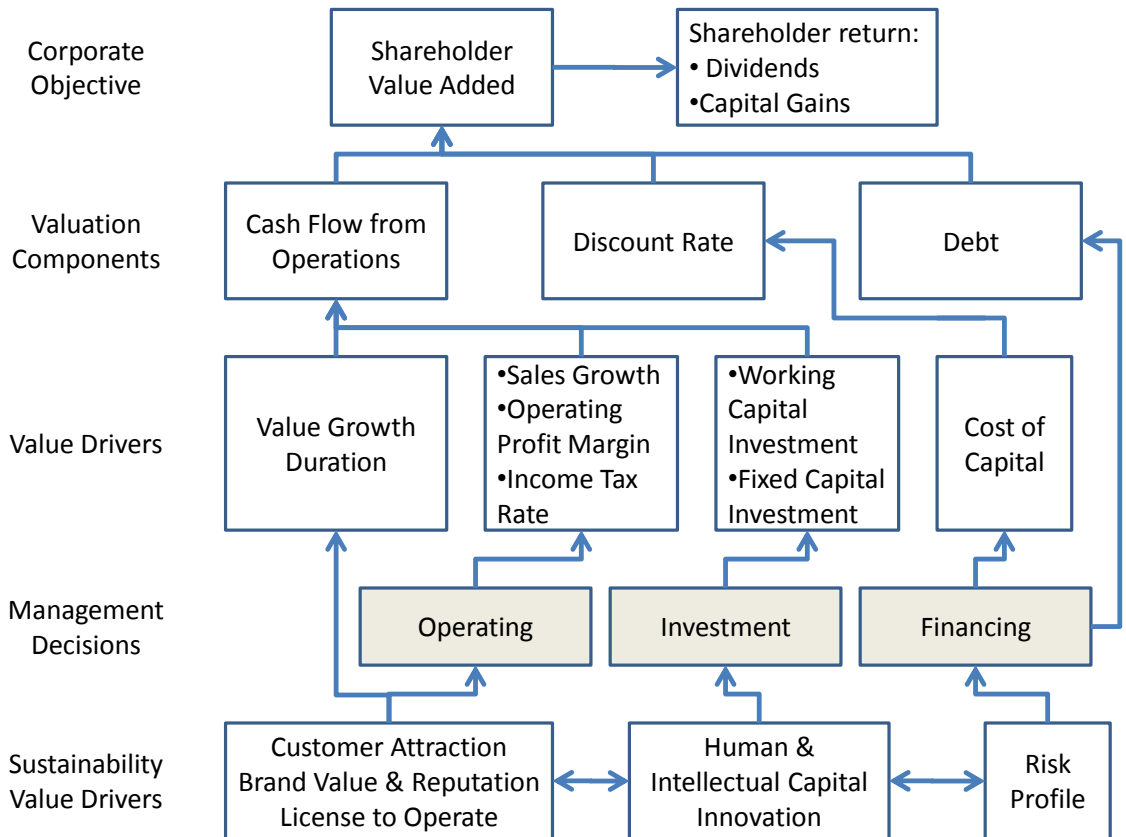


Figure 2.6. Framework for the financial analysis of sustainability.

Note. Adapted from Castro & Chousa (2006)

In this framework, the three major sustainable value drivers are the company's risk profile, human capital, and customer attraction. These drivers in turn influence the managerial decisions for everything from financing decisions, to operating decisions, to investing decisions. Those decisions impact the value drivers of the corporation. The value drivers then have resultant valuation drivers. The valuation drivers ultimately decide whether the corporate objective of shareholder returns and shareholder value creation are met. The implications to sustainability and CFP are significant.

Recognizing the chain of influences would make one expect to see that the results of the

relationship may be long-term, and therefore may not show up immediately after implementation.

After a brief introduction to corporations and sustainability, the next several subsections will dive deeper into the relationship between sustainability and CFP. The discussions will include the corporate motives for adopting sustainability, the various approaches corporations have to sustainability, and sustainability or SRI indexes.

Corporate motives for sustainability. Perhaps the simplest description of an altruistic motivation for sustainability is provided by Lo and Sheu (2007, p. 356) where they recall that Adam Smith, in his *The Theory of Moral Sentiments*, suggests:

How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it.

A more modern and practical description of how a company may be motivated toward sustainability is provided by Anderson (2009, p. 7):

I stood indicted as a plunderer, a destroyer of the earth, a thief of my grandchildren's future. And I thought, My God, someday what I do here will be illegal. Someday, they'll send people like me to jail.

In this section, although none as altruistic as Smith envisioned, the motives for corporations to adopt sustainable practices are summarized. They are grouped into the categories of philosophical purposes, financial reasons, and competitive advantages.

Philosophically, according to legitimization theory, it is necessary to achieve society's approval in order for the company to survive (Lopez, Garcia, & Rodriguez, 2007). Rubenstein (2004) indicates that good corporate citizenship, through creating value in the act and process of giving, allows a company to influence the competitive context of their home and market communities. There is no inherent contradiction between improving competitive context and making a sincere commitment to society (Prahalad, Hammond, Porter, Kramer, Handy, Martin, et al, 2003). However, it still seems to be a paradoxical phenomenon that people can often promote their own narrow end more effectively by abandoning the direct pursuit of self-interest (Tencati & Zsolnai, 2009). Therefore, the corporate strategy should focus on value creation, not value capture (Pitelis, 2009).

In the current "three-pillar" (institutions, corporations, and the civil society) system, what is observed is stakeholders creating bottom-up pressures on corporations in order to compensate for institutional weaknesses in designing rules that should align firm behaviors to the goal of socially and environmentally sustainable development (Becchetti, Di Giacomo, & Pinnacchio, 2008). There is a significant difference between how organizations in different industries report on sustainability, consistent with a stakeholder view of sustainability. A primary stakeholder is one without whose continuing participation, the corporation cannot survive. Companies dealing directly with individual consumers are motivated to focus attention on this particular stakeholder (Sweeney & Coughlan, 2008). The more a firm relies on a particular stakeholder group, the more that firm stands to gain by investing in the creation and maintenance of trusting

relations with that group (Barnett & Salomon, 2006). To round out the philosophical motives, Table 2.3 outlines seven dimensions of a sustainable future.

Table 2.3

Dimensions of a Sustainable Future

Revolution	Focus	Old Paradigm	New Paradigm
1	Markets	Compliance	Competition
2	Values	Hard	Soft
3	Transparency	Closed	Open
4	Life-cycle technology	Product	Function
5	Partnerships	Subversion	Symbiosis
6	Time	Wider	Longer
7	Corporate governance	Exclusive	Inclusive

Note. Adapted from Elkington (1997)

The change in paradigms is significant, with some of the more salient impacts being sustainability initiatives treated as transparent and long-term focused. In general, more proactive than reactive approaches are required to achieve sustainability.

Financially, there are many benefits to a sustainability program. Benefits can include enhancement in the relationship between firm and customers, in employee recruitment and retention, in revenue growth, improvement in risk management, and reduction in different kinds of costs. Socially responsible firms can realize greater profitability through sales to what can be called “morally conscious customers” (Byus,

Deis, & Ouyang, 2010). A relationship also exists between risk management and sustainability (Rossi, 2009). Lower risk should result in a lower cost of capital. When all firms are publically ranked according to sustainability parameters, it can create a market incentive for increased investment by firms in improving their performance in the area of social responsibility, although, the incentive tapers off as the amount of investment required exceeds a certain threshold (Adam & Shavit, 2008). More practically, a firm with a favorable work environment can: decrease its hiring costs and increase its employee retention rate, decrease community opposition and legal costs when opening a new factory, and more easily lobby for tax breaks from local governments (Barnett & Salomon, 2006). Holliday, Schmidheiny, and Watts (2002) give an excellent example of financial benefits from DuPont. In the past, they were paid by the gallon for paint that was utilized for painting automobiles. This gave the incentive for them to maximize paint per vehicle to maximize revenues. With a change to a more sustainable viewpoint, they are now paid a fixed amount per vehicle painted. This now allows them to maximize profit by minimizing the amount of paint per vehicle. Their customers receive secondary benefits of lower emissions and waste.

From a competitive advantage perspective, sustainability has been shown to be a source (Barnett & Salomon, 2006). Some of the measures demanded of companies in the name of corporate responsibility are incompatible with current business models and markets. The challenge is not so much to 'find' profitable opportunities in today's markets, as to create markets that systemically reward responsible practices (Tencati & Zsolnai, 2009). Not every company can build its entire value proposition around social issues, but adding a social dimension to the value proposition offers a new frontier in

competitive positioning. Five distinct ways organizations are rewarded for the higher cost of caring are: opportunistic behavior can be avoided between owners and managers, moral satisfaction induces employees to work more for lower salaries, high quality new employees can be recruited, customers' loyalty can be gained, and the trust of subcontractors can be established (Tencati & Zsolnai, 2009). Both research and development (R&D) and sustainability activities can create assets that provide firms with competitive advantages, mainly in manufacturing industries (Padgett & Galan, 2010). Sustainability can also result in the creation of reputational capital which may help the company to obtain more favorable terms of trade when negotiating with various stakeholders (Becchetti, Di Giacomo, & Pinnacchio, 2008). Additionally, strong social performance is an indicator that a firm possesses superior management talent (Barnett & Salomon, 2006). Sustainability reporting guidelines gradually have become more popular and as widespread as financial reporting. Sustainability reporting has also revealed its potential as an investment tool in enhancing a company's value (Choudhuri & Chakraborty, 2009).

Motivations come basically from two directions: inside-out motivations are triggered by specific internal processes within a corporation that radiate outward, and outside-in motivations are driven by regulations and standards (Cerin & Dobers, 2001). Regardless of the direction, motivations can be classified as philosophically, financially, or competitive advantage driven.

Corporate approaches to sustainability. Sustainability is not one comprehensive activity, but rather a collective name for many different activities (Byus,

Deis, & Ouyang, 2010). This makes the approaches tough to distinguish. They can be generalized into three types: sustainability leaders (strong commitment to sustainable development), environmentalists (feel some ecological responsibility, act out of image reasons or aim at cost savings), and traditionalists (motivated by traditional business objectives) (Hahn & Scheermesser, 2006). Regardless of the approach, a description of the four quadrants of a sustainability portfolio is presented in Figure 2.7.

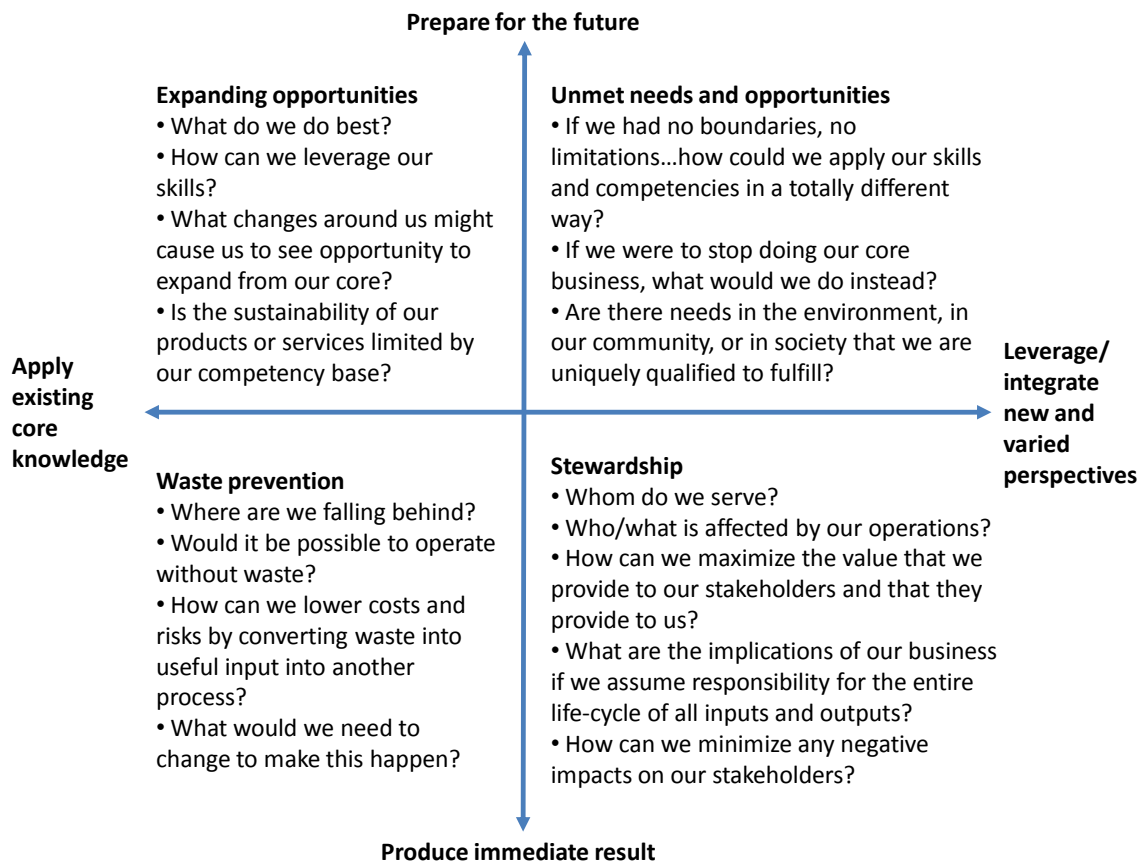


Figure 2.7. Sustainability portfolio assessment framework questions.

Note. Adapted from Graham & Bertels (2008)

The sustainable portfolio is characterized as having four quadrants: waste prevention, broadening the notion of stewardship, expanding opportunities, and unmet needs and opportunities. The dimensions of the axes are immediate results versus future results and current technology versus new perspectives. The least innovative would be the waste prevention, which is focused on current technology implementation today. This would be the most difficult quadrant to create a competitive advantage. Conversely, the unmet needs and opportunities require a focus on the future with new perspectives to address the issues. This is where corporations have the greatest opportunity to create a sustainable competitive advantage.

In assessing sustainability, it is found to be positively correlated with R&D intensity. This is intuitively correct because both are associated with product and process innovation (Padgett & Galan, 2010). Dupont has a three-pronged strategy of integrating science, knowledge intensity, and productivity improvement (Chang & Kuo, 2008). Industry sectors that are less scrutinized by the public (i.e. banking) are found to be less competitive in terms of sustainable practices (Belu, 2009). The approach a given corporation takes toward sustainability is driven by a number of factors: inside factors (such as leadership philosophy and culture), external factors (such as regulations), industry, and primary stakeholders.

Sustainability indexes. SRIs have been growing at a faster pace than any other assets in the U.S. (Rossi, 2009). They combine investors' financial objectives with their concerns about social, environmental, and ethical issues. Other terms include: social investing, socially aware investing, ethical investing, mission-based investing, double-

bottom line investing, green investment, and sustainable investment (Nikolaos, Ioannis, Nikos, & George, 2007). Sustainability or SRI indexes are what are utilized to determine the inclusion or exclusion of firms in SRI funds. Therefore, the SRI indexes can have a tremendous influence on stock purchase and resulting corporate value. This is why the discussion of sustainability is germane to the relationship between sustainability and firms. The discussion of SRI indexes will include descriptions, performance, and finally the future of SRI indexes.

The origin of SRI is placed in the 1940s when unions and government agencies avoided investments with companies perceived to be engaged in unfair labor practices (Nikolaos, Ioannis, Nikos, & George, 2007). In general, SRI indexes screen out firms connected with specific industries, such as: tobacco, alcohol, adult entertainment, firearms, gambling, nuclear power, and military weapons (Adam & Shavit, 2008). However, both positive and negative screening methods may be utilized for inclusion in an SRI index (Hoti, McAleer, & Pauwels, 2007). Results show that as the number of social screens used by an SRI fund increases, financial returns decline at first (due to poor diversification), but rebound as the number of screens reach a maximum (because better managed and more stable firms are selected) in a curvilinear relationship (Barnett & Salomon, 2006). Sustainability looks at this from the viewpoint of companies; SRI indexes from the viewpoint of the investors in those companies (Nikolaos, Ioannis, Nikos, & George, 2007).

The Dow Jones Sustainability Index (DJSI) selects companies that not only meet criteria for sustainability, but also are leaders within their respective industries. It has general and industry criteria accounting for fifty percent, while environmental and social

criteria only total to a weight of 33 percent (Nikolaos, Ioannis, Nikos, & George, 2007). The DJSI adds and deletes companies more frequently than most indexes, reducing its usefulness as a consistent comparative tool with the broad market (Hayward, 2003). The Domini Index has social criteria which are divided into eight domains: community, corporate governance, diversity, employee relations, environment, human rights, product quality, and controversial business issues (Becchetti, Di Giacomo, & Pinnacchio, 2008).

The large number of SRI indexes, the geographic dispersion, and the fact that the majority of them have come into existence within the last decade shows how important they are becoming for determining investment strategies. Table 2.4 summarizes a number of the sustainability or SRI indexes.

Table 2.4

Description of the SRI-Equity Indices

Index Name	Abbrev.	Region	Start Date	Benchmark
ASPI	Aspi	Eurozone	7/2001	DJ EUROSTOXX
Calvert Social Index	Calv	U.S.	6/2000	Russell 1000
DJSI World	DJSI1	World	9/1999	DJ World
DJSI World ex AGTF	DJSI2	World	9/1999	DJ World
DJSI STOXX	DJSI3	Europe	10/2001	DJ STOXX
DJSI STOXX ex AGTF	DJSI4	Europe	10/2001	DJ STOXX
DJSI EUROSTOXX	DJSI5	Eurozone	10/2001	DJ EUROSTOXX
DJSI EUROSTOXX ex AGTF	DJSI6	Eurozone	10/2001	DJ EUROSTOXX
Ethical Index Euro	Eth1	Eurozone	10/2000	DJ EUROSTOXX

Index Name	Abbrev.	Region	Start Date	Benchmark
Ethical Index Global	Eth2	World	1/2001	MSCI World
FTSE4Good Europe 50	FT1	Europe	7/2001	FTSE AW Europe
FTSE4Good Europe	FT2	Europe	7/2001	FTSE AW Europe
FTSE4Good Global 100	FT3	World	7/2001	FTSE Developed World
FTSE4Good Global	FT4	World	7/2001	FTSE Developed World
FTSE4Good UK 50	FT5	U.K.	7/2001	FT All Share
FTSE4Good UK	FT6	U.K.	7/2001	FT All Share
FTSE4Good US 100	FT7	U.S.	7/2001	FTSE Local USA
FTSE4Good US	FT8	U.S.	7/2001	FTSE Local USA
Humanix 175 Europe	Hu1	Europe	6/2001	DJ STOXX
Humanix 175 US	Hu2	U.S.	6/2001	S&P 500
Humanix 200 Global	Hu3	World	6/2001	MSCI World
Humanix 50 Sweden	Hu4	Sweden	6/2001	MSCI Sweden
Jantzi Social Index	Jantzi	Canada	1/2000	S&P/ TSE60
Kempen SNS Smaller European SRI Index	Ke	Europe	10/2003	HSBC Smaller European Index
KLD Domini 400 Social Index	KLD1	U.S.	5/1990	S&P 500
KLD Broad Market Social Index	KLD2	U.S.	1/2001	Russell 3000
KLD Large Cap Social Index	KLD3	U.S.	1/2001	Russell 1000
Naturaktienindex	NAI	World	4/1997	MSCI World
Westpac-Monash Eco-Index	West	Australia	1/1999	S&P/ASX200

Note. Adapted from Schroder (2007)

The inclusion or exclusion from an index has been shown to have significant impact on a firm's financial performance in a number of studies (Becchetti, Di Giacomo, & Pinacchio, 2008; Byus, Deis, & Onyang, 2010; Consolandi, Jaisal-Dale, Poggiani, & Vercelli, 2009; Lopez, Garcia, & Rodriguez, 2007; and Rossi, 2009). This makes the indices germane to decisions regarding a corporation's strategic sustainability initiatives.

Empirical analyses of SRI funds date back to 1972 (Schroder, 2007). Empirical analyses support the conclusion that differences in performance exist between firms that belong to the DJSI and the Dow Jones Global Index (DJGI), and that these differences are related to sustainability practices (Lopez, Garcia, & Rodriguez, 2007). Permanence in the Domini Index (DI) is associated with 13% higher total sales per employee.

Doubling the years after DI exit reduces total sales per employee by 23% (Becchetti, Di Giacomo, & Pinacchio, 2008). Community relations screening increased financial performance, but environmental and labor relations screening decreased financial performance (Barnett & Salomon, 2006).

Technology and energy have been over-weighted in the Dow Jones Sustainability Global Index's (DJSI's) nine economic sectors. Better performance may originate from the relatively high market distribution toward sectors with higher growth (Cerin & Dobers, 2001). SRIs contain the dominant stocks of the benchmark index, resulting in significant correlation, making comparisons flawed (Schroder, 2007). Does the superior performance of the DJSI reflect the greater efforts DJSI companies put into sustainability, or a dependence on asymmetric distributions in company sectors, world regions, or market capitalization (Cerin & Dobers, 2001)? Tradable indices and their equivalent benchmarks are almost identical in their correlation (Hoti, McAleer, &

Pauwels, 2007). Further confusion over the worth of the SRI, is the finding that the macroeconomic impact of the ten year bond value affects the value of the DJSI-World positively (Nikolaos, Ioannis, Nikos, & George, 2007).

SRI is no longer an option for institutional investors, but an imperative, as it decreases the long-term level of risk (Adam & Shavit, 2008). The choice is not as simple as either being an SRI fund or not, but rather, just how socially responsible to be (Barnett & Salomon, 2006). There is proof of a non-altruistic motive for investing in SRI, as consumers who perceive that financial return of SRI is equal to or better than “regular” mutual funds, invested a greater proportion of their portfolio in SRI profiled funds. Furthermore, the results showed that women and better-educated investors were more likely to invest a greater proportion of their investment portfolio in SRI (Nilsson, 2008).

No matter what the cause, sustainability or SRI indexes are currently the hottest growth investment area. This fact alone causes them to be of significance to today’s corporations. The leadership of these corporations must determine how large of a role they will play in setting the strategic path.

Sustainability and Financial Performance of Corporations

Sustainability is certainly a noble endeavor. Yet, the tremendous growth of it as an element in corporate strategy cannot be explained by that alone: there has to be a significant faction that feels there are associated financial benefits. The advocates of the benefits of a sustainability program would agree that at the very least, it may be seen as a sign of good management to be able to mediate between the interests of different stakeholders in a long-term perspective (Consolandi, Jaiswal-Dale, Paggiani, & Vercilli,

2009). Superior management should translate into superior performance. Studies, such as Cochran and Wood (1984), have found other interesting relationships. They found the average age of corporate assets to be highly correlated with social responsibility ranking. In the next several sections only the impact on financial performance will be discussed. The upcoming subsection will cover: first, the theoretical impact a sustainability program should have on financial performance; second, the empirical results of a sustainability program's impact on financial performance; third, the analysis methods used to determine the impact of a sustainability program; and fourth, the methods utilized to determine the impact of other programs on CFP.

Theoretical results. The theoretic impacts of a sustainability program are greatly varied, both from the theoretical basis and the projected results. The relationship between sustainability and financial performance is explored in Table 2.5.

Table 2.5

The Relationship Between Social Performance (SP) and Financial Performance (FP)

	Direction of the Relationship		
Causal sequence	Positive link	Neutral link	Negative link
SP leads to FP	Social impact hypothesis	Econometric	Trade-off hypothesis
FP leads to SP	Available funds hypothesis or slack resources theory		Managerial opportunism hypothesis
FP and SP are synergistic	Positive synergy "Virtuous Circle"		Negative synergy

Note. Adapted from Moneva, Rivera-Lirio, & Munoz-Torres (2007)

The significance of the potential relationships is that the relationship this paper is aimed at exploring, is the one where social performance leads to financial performance. This is due to the objective to help firms make informed strategic decisions on the implementation of a sustainability program. The other two relationships are discussed in the sections for limitations and areas for future study.

In order to facilitate easy referencing between the theoretical and empirical section, both were organized by performance. First, the theories that would project a negative impact to financial performance are discussed. Second, the theories that predict a neutral or ambiguous impact are outlined. Finally, the theories that support an improvement in financial performance are covered.

Negative impact hypothesized. The work supporting a negative impact of a sustainability program on financial performance was the least populous. Perhaps this is not only due to the current predominance of the view that a sustainability program has a positive impact, but also due to the fact that Friedman had made such a simple and compelling argument against CSR decades ago. Therefore, the theoretical discussion of impact would be incomplete without reflecting on Friedman's position, despite its being 30 years old. His basic premise was that any activities that were not aimed directly at profit maximization were going to have a negative impact on the financial performance of the company, and as such, would serve as a tax on shareholders. This sentiment is more currently indicated as an additional cost incurred to improve social or environmental performance, which does not contribute to enhancing shareholder value (Lee, Faff, & Langfield-Smith, 2009). This perspective translated to the market says: doing well (higher returns) while doing "good" only works in the market if a sufficient number of investors systematically underestimate the benefits of being a leading firm, or systematically overestimate the costs associated with being a lagging firm. This argument is supported by taking the converse and recognizing that many firms are able to generate substantial profits by engaging in socially unacceptable business activities (Lee, Faff, & Langfield-Smith, 2009).

Neutral or indeterminate impact hypothesized. The theories that a sustainability program's impact on financial performance is either neutral or undeterminable focus on the number of influencing variables, the interaction of those variables, or the market forces that would prevent long-term differences from existing. The most basic of these

theories is simply that such a large number of variables intervene between the social responsibility performance and the financial performance of companies, there is no reason to assume that a direct relation should exist (Lee, Faff, & Langfield-Smith, 2009). One of the conflicting relationships is that stakeholder management should enhance a firm's financial performance, whereas the social participation in activities not related to the firm's primary stakeholders, would negatively affect its financial performance (Chang & Kuo, 2008). Another conflict comes from the discussion of sustainability or SRI indexes, whereas screening for an SRI has the intention of lowering risk. However, the screening limits the ability to diversify, actually increasing the risk. This makes the market rewards for index appropriate behavior ambiguous (Schroder, 2007). Finally, the presence of a free market argues against sustainable differences, as firms that exhibit persistently poor accounting performance arising from their sustainability profile would either be taken over by their more financially successful counterparts, become insolvent, or rationally seek to maximize economic profit by changing to the more profitable sustainability portfolio strategy (Lee, Faff, & Langfield-Smith, 2009).

Positive impact hypothesized. By far, the preponderance of theoretical analyses performed in recent years was to support the positive impact of a sustainability program on CFP. The source of the positive impact is usually assigned to either creation of a competitive advantage within the industry, improved customer relations, or lower operating cost resulting from the other two. Sustainability drives strategy, which then leads to increased firm performance. From this strategic perspective, firms that plan to

allocate resources in order to achieve long term social objectives can create competitive advantage (Peters & Mullen, 2007).

Intangible resources are traditionally perceived to be the basis of a firm's competitive advantage (Surroca, Tribo, & Waddock, 2009). Three sustainability competencies that logically lead to competitive advantages are: acquisition of quality employees, enhancement of firm reputation, and decrease in firm specific financial risk (Peters & Mullen, 2007). A sustainability program also enhances financial performance by allowing the firm to differentiate; yet the effect may be moderated both by innovation and the level of differentiation in the industry (Hull & Rothenberg, 2008). Regarding customers, sustainability initiatives lead to positive cognitive, affective, and behavioral responses (Peters & Mullen, 2007). Good stakeholder relations not only enable a firm with superior financial performance to sustain its competitive advantage for a longer period of time, but also helps poorly performing firms to recover from disadvantageous positions more quickly (Choi & Wang, 2009).

From a higher level, a good sustainability program enables a company to improve its stakeholder relations, thereby ensuring a firm's future success (Lee, Faff, & Langfield-Smith, 2009). From the behavioral sciences side, consumer inference theory suggests that if a consumer knows that the manufacturer of the product is a responsible firm, they can infer positively about the product. Signaling theory suggests that in situations where there is information asymmetry between buyers and sellers, consumers look for information (signals) that distinguish companies performing well on attributes of interest. Social identity theory emphasizes that one's self-concept is influenced by membership in different social organizations, including the company for which an individual works

(Mishra & Suar, 2010). Each of the competitive advantage and customer relation impacts of a sustainability program has the potential to translate into tangible operational cost improvements. For example, improved labor recruiting and retention lower labor costs, and the decrease in firm specific risk will lower the cost of capital. Increased consumer loyalty will result in a higher market value of products.

The theoretical results for the projected impact of a sustainability program on CFP indicate the complete range of expectations from a negative impact to a neutral impact to a positive impact. The negative impact is mainly based on extra costs to the firm with a lack of perceived offsetting benefits. The neutral impact is based on having too many influencing variables or too many interacting variables, to be able to ascertain a direct relationship. The positive impacts are mainly attributed to firms being able to establish a competitive advantage, to improve customer relations, and to recognize resulting improvements in the firm's cost structure.

Empirical results. Ideally, the empirical results of the impact of sustainability on CFP would help clarify which of the theoretical grouping was directionally correct. Unfortunately, the empirical results fall into the same three classifications of the impact of a sustainability program on CFP: negative, neutral or undeterminable, and positive. For the purposes of classification, mixed results, such as curvilinear relationships, are included in the neutral or undeterminable subsection.

Negative impact observed. As with the theoretical analyses, the empirical results for the existence of a negative financial impact to corporations based on the adoption of a

sustainability program is the least populous of the categories. This does not, by itself, necessarily refute the possibility of a negative relationship. The next section discusses a number of neutral or undeterminable results due to the structure of hypothesis testing. If positive impacts are hypothesized, a negative impact would result in the inability to refute the null hypothesis of no positive impact. Therefore, the classification of these results as neutral may be incorrect. Lee, Faff, and Langfield-Smith (2009) found results that showed in market-based tests, a negative association between a sustainability program and CFP, whereas, accounting-based tests showed no relationship. Even the negative results may still have value as they suggest that leading sustainability firms trade at a price premium, indicating that financial markets value a sustainability program and are prepared to realize lower returns (resulting in a lower cost of equity capital).

Neutral or indeterminate impact observed. The empirical studies that returned a neutral or indeterminate relationship between a sustainability program and CFP were the most numerous. As stated in the previous section, this area may be overstated with the inclusion of many studies with a positive impact hypothesized whose null hypothesis could not be rejected. Accounting for this, positive results very well may be the actual highest occurrence. Much of the neutral impact is where conflicts are uncovered; studies where one group finds a positive relationship, one finds no links, and a third documents a negative relationship (Becchetti, Di Giacomo, & Pinnacchio, 2008). There are studies that show a program such as ISO 14000 can be an effective strategy for manufacturing firms to improve their managerial efficiencies, overall technical efficiency (OTE), and maintain competitiveness, although, profit margin, sales growth, return on equity (ROE),

and earnings per share (EPS) became worse (Lee, Hu, & Ko, 2008). Other studies' results are more pointed, such as where no direct relationship between CSR and CFP is found; only an indirect relationship that relies on the mediating effect of a firm's intangible resources (Surroca, Tribo, & Waddock, 2009). Yet other studies found different variables to be the most significant, like when technical knowledge and other firm resources are found to have a strong positive effect on the persistence of superior performance. These are the only factors that promise to help a firm recover from inferior performance (Choi & Wang, 2009).

Some studies, such as Hull and Rothenberg (2008) showed a relationship, but it disappeared upon inclusion of another variable. They found that when innovation is included in the independent variables, this causes the significance of the sustainability and CFP relationship to disappear. Other studies, such as Chang and Kuo (2008), show a changing relationship that is dependent on firm characteristics. They found that high sustainability performers have a positive influence on firm profitability, and a positive reciprocal causality exists between a sustainability program and profitability among the higher sustainability performers. Conversely, they also found that a sustainability program influences firm profitability negatively in the lower sustainability performers. Chih, Chih, and Chen (2010) conducted a study that shows CFP and a sustainability program are not related and that firms act more socially responsible to enhance their competitive advantages when the market competitiveness is more intense, in countries with stronger levels of legal enforcement, and in countries with weak shareholder rights. Also, neutral results are seen when risk is included. This shows that risk-adjusted returns

of a sustainable portfolio are not significantly different from those of the control sample (Becchetti, Di Giacomo, & Pinnacchio, 2008).

Positive impact observed. Positive empirical results for the impact of a sustainability program on CFP are both numerous and various. Approaches range from utilizing overall sustainability scores, to component level sustainability scores, to inclusion in sustainability indexes. For example, Byus, Deis, and Ouyang (2010) showed that DJSI firms have higher gross profit margins and higher return on assets (ROA) than non-DJSI firms with both income statement (short-term) and balance sheet (long-term) effects. Wagner (2010) deconstructed the indexes and found that using separate measures for social and environmental performance reveals that the latter only has a direct effect, and the former only a fully moderated effect on economic performance. Kiernan (2001) showed that superior eco-efficiency is associated with superior financial performance throughout a range of industries. Peters and Mullen (2007) included time in their study and found the timed-based, cumulative effects of a sustainability program on CFP are shown to be positive and strengthen over time. Chang and Kuo (2008) included firm size and determined both large and small firms are shown to benefit (profitability) from a sustainability program.

Surroca, Tribo, and Waddock (2009) studied a variety of inputs and outputs, determining that sustainability positively influenced innovation, human capital, reputation, and culture; so does CFP. Other interesting variables uncovered included the favorable perception of managers towards sustainability, which was found to be associated with an increase in both the financial and non-financial performance of firms

(Mishra & Suar, 2010). Covariance of variables was also uncovered, as positive interaction between advertising and corporate sustainability was shown. This partially explains the increase in firm value (Tobin's Q) (Wagner, 2010). Mediating variables were found, such as the strategic commitment of the company to its stakeholder is positively related to both its social and financial performance (Moneva, Rivera-Lirio, & Munoz-Torres, 2007). Mitigating variables were also found, showing that a sustainability program most strongly affects performance in low-innovation firms and in industries with little differentiation (Hull & Rothenberg, 2008). Perhaps the most interesting relationship that empirical results revealed, was the so-called "virtuous circle". It is a result of the positive synergies between the measurements of social and financial performance: in analyzing sustainability and CFP both causality and positive direction of the relationship was shown regardless of which was utilized as the dependent and which the independent variable (Moneva, Rivera-Lirio, & Munoz-Torres, 2007).

The empirical results for the impact of a sustainability program on CFP varied from negative, to neutral, to positive. The negative results were not a significant portion of the population. The neutral results varied from: no relationship observed, to conflicting relationships, to other variables being able to better explain the variation, to positive impacts that were offset by a higher level of risk. The positive results were numerous and more consistent than the neutral results.

Analysis methods used to determine the impact to performance. Part of the reason for the disparity in empirical results stems from the differences in the analysis methods utilized to try to determine the impact of a sustainability program on CFP. To

most succinctly demonstrate the variety of methods, Table 2.6 summarizes the most salient studies.

Table 2.6

Methods to Show the Impact of Sustainability on Financial Performance

Dependent Variable(s)	Independent Variable(s)	Analysis Method	Reference
Sales per employee Return on equity Conditional volatility	Inclusion in the Domini Index	Econometric analysis GARCH	Becchetti, Di Giacomo, & Pinacchio, 2008
Sustainability scores	Return on assets Return on equity Yearly stock return	Data envelopment analysis (DEA)	Belu, 2009
Gross profit margin Return on assets	Inclusion in the DJSI	Matched set samples in a regression analysis	Byus, Deis, & Onyang, 2010
Return on assets Return on equity Return on sales	Second order factor analysis for the measures of sustainability	Structural equation model (SEM)	Chang & Kuo, 2008
Persistence of financial performance (superior or inferior) Return on assets Return on sales Excess market valuation	Firms' relationship with non-financial stakeholders Reputation index	A series of first-order autoregressive models After testing for covariance, linear regression	Choi & Wang, 2007 Cochran & Wood, 1984
Cumulative average abnormal returns	Inclusion (deletion) in the DJSSI	Use of an SCI in an event study approach	Consolandi, Jaisal-Dale, Poggiani, & Vercelli, 2009

Dependent Variable(s)	Independent Variable(s)	Analysis Method	Reference
Return on assets Return on equity Return on sales Total raw returns One-factor alphas Six-factor alphas	Best of sector (BOS) sustainability companies index	Matched portfolio formation process, then a probit regression model	Lee, Faff, & Langfield-Smith, 2009
Growth of profit before taxes Revenue	Inclusion in the DJSI	Linear regression analysis	Lopez, Garcia, & Rodriguez, 2007
Financial performance Non-financial performance	Corporate social responsibility	Confirmatory factor analysis (CFA)	Mishra & Suar, 2010
Return on assets	Corporate social performance	Time-series cumulative approach	Peters & Mullen, 2007
Firm value (Tobin's Q)	Inclusion in the Bovespa Corporate Sustainability Index	Propensity score matching	Rossi, 2009
Economic performance	Social performance Environmental performance	Correlation analysis, testing for sample selectivity affect	Wagner, 2010

The table highlights the dependent and independent variables utilized, the analysis methods, and the researchers. The variety of methods utilized shows that there is not a unified direction for analysis that is being refined from study to study. The newness of the analyses makes for a large width, but little depth to the study methodology approaches. The firm-level analysis is certainly an area that could utilize more study and is why this study has selected that approach.

Analysis methods used to determine other impacts to performance. Although there were a great number of approaches to analyze the impact of a sustainability program on CFP, very few of them were at the firm level, such as Wagner (2010). Since the strategic decision to implement a sustainability program occurs at the firm level, that is the level at which the implications must be understood. Therefore, in order to get more research on firm-level analysis, the literature review was expanded to include methods of analysis that have been utilized to determine the impact on CFP of initiatives other than sustainability.

One of the challenges in determining the impact is the fact that there should be a change in performance that makes standard tools more challenging to apply. Regression discontinuity is used when an event takes place that changes the intercept and/or slope of a regression line. This technique is widely utilized in economics to examine the effects of new policies on important outcome variables (Goetze & Faley, 2009). This technique can be seen graphically in Figure 2.8, and was utilized to determine the impact of implementing a material requirements planning (MRP) system in their study.

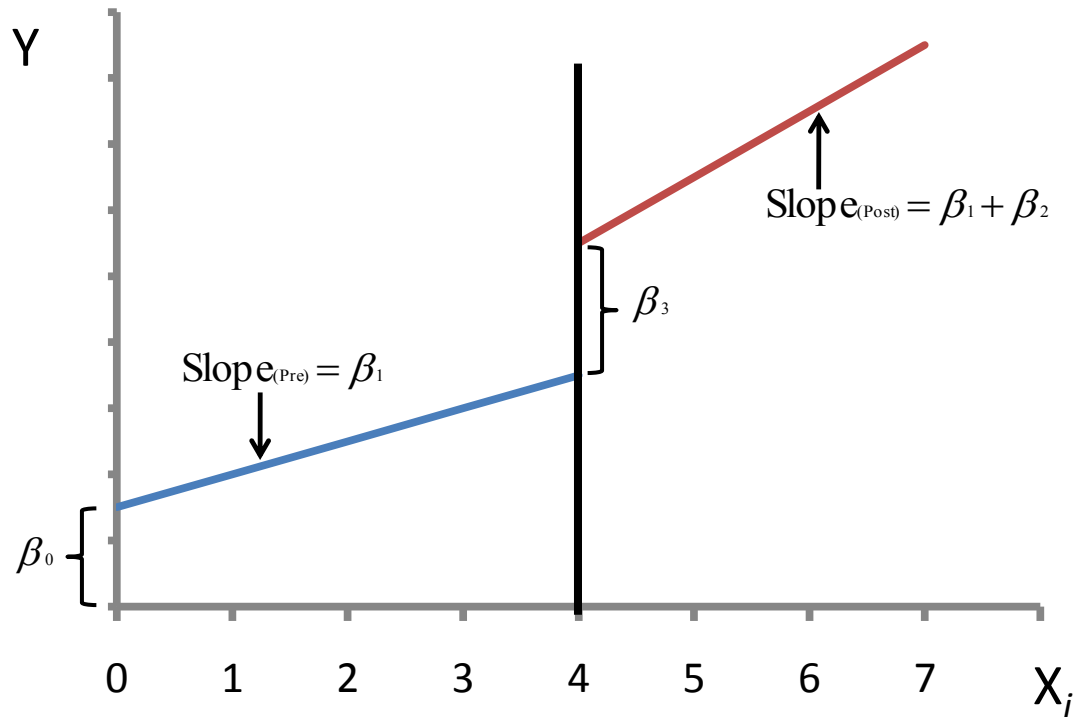


Figure 2.8. Illustration of the regression discontinuity design.

Note. Adapted from Goeke & Faley (2009)

The data is broken into two sets; those before and after the event. The data for each of the sets is analyzed for a best fit line. Then, the data is tested to determine if the slope before and after the event is significantly different. Also, the data is tested to determine if there was a mean-shift in the data at the point of the event's occurrence. When data is of continuous availability, the analysis can approach the event from both sides. If the data is more discrete, it may be necessary to leave the data associated with the event timing out of the analysis.

Another challenge is to answer the question whether or not the relationships uncovered were present prior to the event being studied. In a study by York and Miree

(2004), multivariate ANOVA (MANOVA) was used to show that firms generally had better financial performance than their peers after winning a quality award, but they also had superior performance before the award. In a study by Phan and Hill (1995), an ex post study of the effects of leveraged buyouts (LBOs) upon the performance of firms was conducted. The study compared the situation one year prior to the event, to one year after the event. The results showed an improvement in financial performance, hypothesized to be due to the reduction in diversification scope.

Time frame analysis becomes very important in determining impacts of programs or policies. One study utilized four time frames (pre announcement, announcement, post announcement, and post-effective) to evaluate the impact of inclusion/exclusion in the DJSI (Consolandi, Jaiswal-Dale, Paggiani, & Vercilli, 2009). Another challenge is in the isolation of the impact a researcher wishes to study. One method used is matched industry pairs, to show that employee stock option (ESO) firms have a higher mean return and lower volatility than do their pre-ESO peers. Matched pairs eliminated the firm size factor which is shown to be highly relevant in ESO's performance (Bacha, Zain, Rasid, & Mohamad, 2009). A similar study made use of a dual cross-sectional and longitudinal (pre-post) design that compares profit sharing plan (PSP) adopters with a control group of PSP non-adopters firms. Results showed that firms adopting a PSP enhance their profitability in comparison to both their own prior performance and to firms that are not adopting a PSP (Magnan & St-Onge, 2005). The final concern is in the ability to compare numbers. In order to study profit level and profit drivers over time, profits, costs, etc. were deflated by the annual average assets in order to obtain

percentages that were both comparable over time and across firms (Magnan & St-Onge, 2005).

Although not directly related to sustainability, the literature reviewed in this section was all concerned with determining the impact of something on the CFP. Due to the lack of firm level literature on sustainability impacts, this is highly useful in the research methodology development.

Future Direction of Literature Review

As indicated above, the vast majority of the literature regarding sustainability and CFP has relied on the usage of sustainability or SRI indexes and comparison of firms included versus not included in the indexes. This is useful perhaps directionally, however, as the leadership of a firm has to make policy decisions for itself individually, firm-level analysis would seem to be much more applicable. This is especially salient given the considerable critiques surrounding methods of index selection. The ability to isolate firm-level impacts would open the door to also analyze the components of a sustainability program that have the greatest value to a firm within a given industry.

Chapter 3: Research Methodology

Introduction

This chapter describes the research methodology, methods, and materials for this study. The chapter indicates data sources that were selected and the reasoning. The chapter develops several models that were tested and the rationale for the variables that have been included. This chapter also includes: research perspective, research design, research question and hypotheses, unit of analysis, research variables and models, data collection methodology, data analysis, validity, and a summary.

Research Perspective

This study is primarily a quantitative analysis from a positivist research perspective. Orlikowski and Baroudi (1991) stated:

The Positivists generally assume that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments. Positivist studies generally attempt to test theory, in an attempt to increase the predictive understanding of phenomena. In line with this, one may classify IS research as positivist if there was evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences about a phenomenon from the sample to a stated population. (p. 5)

Despite the mostly quantitative nature of the study, it is appropriate to note that some elements of the sustainability ratings, which are treated as hard data, could be argued to

be more qualitative in nature. This is not explored in this study; however, it is a source of potential error. This is an important limitation to understand, due to the models this study is testing and the inferences that are being made about other companies and industries.

The perspective also addresses the scope to which the research was limited. In an effort to limit the variables, the data utilized were limited to publicly-held U.S. corporations. Keeping the study to U.S. corporations eliminates factors such as government influence, regulations, tax benefits, and culture. Including only public companies serves several purposes. It is much more difficult to get accurate and thorough financial performance data on privately-held companies. Private and public corporations have other differences which could have influence over the relationship, including different governance and different rules for disclosure. Also, the research was limited by data availability. Since the studies were done within selected industries, several companies were not included, as sufficient data was not available for a statistically significant analysis.

Research Design

The research design is broken up into two main areas; the methodology and the operational definitions. The methodology will develop the major frameworks and steps within those frameworks to complete the study. The operational definitions will define the variables, which are included in the models.

Methodology. The methodology used to determine the impact of a sustainability program on corporate financial performance (CFP) will include six steps, grouped into

two major frameworks. Both frameworks will involve a study of historical sustainable scores and financial performance data, within specific industry codes.

The first framework is the basic correlation analysis conducted within a variety of industries. The first correlation study compared corporate overall sustainability performance (COSP) scores with CFP. The correlation study within the first framework established the presence of a relationship between a sustainability program performance and CFP. The first correlation study correspondingly addressed the first hypothesis. In addition to the overall results, variations between industries were studied.

The second framework expanded upon the first framework by including a time-series influence to determine the effects of effectively implementing a sustainability program, and to enable the study of relative firm performance before the substantial inclusion of sustainability. The first step in the second framework was to utilize statistical techniques to determine the meaningful implementation date of a sustainability program for a given firm, by looking for a change in the COSP. Once this transition point was established, the cumulative effects starting from implementation were added, and the models from the first framework were rerun. The next step involved inclusion of a time period variable so that pre and post implementation relative performance could be evaluated. This step was to determine the level of contribution of the sustainability program to the differences in financial performance.

As addressed later in the validity section, a final step was to select a number of companies to interview, to determine how the actual implementation of the sustainability program corresponded to the calculated effective influence date. Questions included topics such as: the company's stated implementation date, milestones from the

implementation process, the elements of the sustainability program which were perceived (or shown) to have had a positive, neutral, or negative impact on CFP, the strategy, and the major elements of the company's sustainability program (including whether they have changed significantly over time). Also, questions were aimed at determining if there were other significant events within the company that would have had an impact on the relative financial performance of the firm.

Operational definitions. The main variables of importance in this study are: overall sustainability performance, financial performance, effective influence date, time since implementation, pre implementation, post implementation, size, and industry. Each of these are discussed in greater detail below.

The first variable is overall sustainability performance. Due to the variety of scores that are available, and the fact that there are no universally accepted measures, selection of this variable was critical to the validity of this study. Fortunately, there are a number of companies and non-governmental organizations (NGOs) that have such scores. For the purposes of this study, data was procured from Kinder, Lydenberg, and Domini (KLD) to be utilized as the sustainability scores. The data from KLD and the calculations that were utilized are developed in the section on model specification.

The next variable, CFP, is also critical. Peters and Mullen (2007) showed that results were affected depending on whether market or accounting measures of firm performance are used. Mishra and Suar FP (2010) even go further and recommend utilizing non-financial measures. Their logic is that financial measures are lag indicators and capture historical performance arising from mostly tangible assets; non-financial

measures are considered lead indicators. They also recognize that most non-financial measures are subjective in nature, and that is why they are not included in this study.

The effective influence date was defined as the transition point where there is a change in the rate of change of the overall sustainability performance score. This is analogous to the method utilized by Goeke and Faley (2009), but it was reversed. They had a date and statistically tested for a difference, whereas this study looked for differences to establish a date, to the year. Time since implementation was then defined as how many years have passed since the transition, with no values for time before. Pre and post implementation were binary variables passed on whether the year is before or after the implementation year.

Size is primarily measured by one of two methods. One method is internally focused and is simply the total assets of the firm. The other is more externally focused and is defined as the market capitalization of the firm. The external focus makes this measure much more variable, and as a result is less desirable for long-term comparisons. Therefore, in this study, size was calculated as a function of total assets. Size was utilized only as a control variable to eliminate previously established influences of firm size on financial performance.

The last variable considered was industry. Although it was not utilized in any of the actual models, it was utilized to subdivide the companies into categories which should have very similar benefits from sustainability. The most common method for separating into industry is with the standard industry classification (SIC) code.

Research Question and Hypotheses

The analysis of the impact of a sustainability program had several components. First, was the verification of the existence of a relationship between sustainability and CFP. Then the nature of the relationship was studied. The existence of a statistically significant relationship does not necessarily imply a causal relationship. Therefore, the research questions were: 1) What is the impact of a sustainability program on CFP? 2) If there is a difference in financial performance after implementation of a sustainability program, did the difference also exist before the implementation? and 3) Are the effects of a sustainability program cumulative? The second question addresses the difference between correlation and causation. If the answer to the second part of the question is yes, then the sustainability program alone cannot be the cause.

To effectively answer the research questions, it is necessary to study the impact of a sustainability program on a firm's financial performance through a progression of research hypotheses. The hypotheses tested during this study were:

H1: A firm's overall sustainability score will positively correlate with financial performance within their industry.

H2: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

H3: A firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation.

H4: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program, will have cumulative effects.

To start the study, the verification of a relationship was confirmed. To do this, firms within specific industries were studied, and their overall sustainability scores were tested for correlation to their overall financial performance within their industry. CFP was the dependent variable and sustainability scores were the independent variables. The first hypothesis was tested with overall sustainability scores.

While the first hypothesis dealt with the sustainability scores, the next three deal with the actual implementation of a sustainability program. If a sustainability program has the hypothesized benefits which should transfer to the bottom line, then an improvement in the rate of sustainability adoption should translate into an improvement in CFP. For the second and third hypotheses, correlation was tested to determine if a causal relationship assumption is valid. Therefore, binary variables for pre and post implementation were added to test whether a firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation. The fourth hypothesis was tested by adding in the variable to account for time since implementation. After determining the validity of the four hypotheses, the research questions above were answered.

Unit of Analysis

The goal of this dissertation was to determine the impact of a sustainability program on the firm level. Therefore, data collection and analyses were conducted at the firm level, and the unit of analysis for this study is the U.S. publicly-held corporation. To remove macroeconomic factors over time and also industry specific variation, the firm

data were calculated relative to the other firms within the same SIC code. This methodology was utilized by Kiernan (2001).

Research Variables and Models

The research variable and models were discussed jointly in two subsections: the proposed models and the model specification. The proposed models simply define the models and the variables which are included in each of them. The model specification indicates the source of the data utilized for each of the variables and draws on the literature review for the basis for these decisions.

Proposed models. The first model utilizes overall sustainability performance. Other variables are added to take out effects that are not directly related to the relationship between a sustainability program and CFP. The first of these variables is size, as it is known to heavily impact a firm's market performance and risk (Lee, Faff, & Langfield-Smith, 2009). Another control variable takes into consideration firm variations, by introducing firm specific intercepts to separate the impact of a sustainability program from time invariant, firm idiosyncratic characteristics, as is suggested by Becchetti, Di Giacomo, and Pinnacchio (2008). Peters and Mullen assert (2007) that if accounting-based measures of firm financial performance are used, then industry effects must correspondingly be considered. In this study, they were not included in the models; however, the analyses were done on an industry by industry basis to eliminate the effects. Therefore, Model One is as follows:

$$CFP_i = B_0 + B_1 * COSP_i + B_2 * SIZE_i + B_3 * FIRM_i$$

Where:

CFP is corporate financial performance

COSP is corporate overall sustainability performance

SIZE is the size of the firm

FIRM is the firm specific intercept

The second model adds in two binary variables to indicate whether the time frame is pre or post the implementation. Therefore, Model Two is as follows:

$$CFP_i = B_0 + B_1 * COSP_i + B_2 * SIZE_i + B_3 * FIRM_i + B_4 * PRE_i + B_5 * POST_i$$

Where:

PRE is binary, taking a value of 1 if year is pre implementation, 0 otherwise

POST is binary, taking a value of 1 if year is post implementation, 0 otherwise

The third model instead adds in the element of time, more specifically the time since implementation of the sustainability program. As Peters and Mullen (2007) suggest, incorporating time into the study allows for consideration of both short-term and long-term benefits, and it treats a sustainability program as a continuing process with cumulative effects. Therefore, Model Three is as follows:

$$CFP_i = B_0 + B_1 * COSP_i + B_2 * SIZE_i + B_3 * FIRM_i + B_4 * TIME_i$$

Where:

TIME is the time since effective implementation of the sustainability program

The fourth model is aimed at checking for both pre and post effects, as well as the time-based cumulative effects, and is basically a combination of the second and third models. Therefore, the Model Four is as follows:

$$CFP_i = B_0 + B_1 * COSP_i + B_2 * SIZE_i + B_3 * FIRM_i + B_4 * PRE_i + B_5 * POST_i + B_6 * TIME_i$$

Model specifications. The most objective variable in the model is the measure of overall sustainability. The selection of the source for this information was critical to the validity of this study. The preponderance of literature which used actual scores (versus index exclusion or inclusion) utilized data from KLD. Hull and Rothenberg (2008) explained their selection by indicating their belief that KLD ratings are well-suited to sustainability research, as they are calculated by disinterested researchers using all available data on multiple aspects of sustainability. KLD rates companies in seven major qualitative areas: environment, community, corporate governance, diversity, employee relations, human rights, and product quality and safety. Analysts then assign strengths and concerns associated with these issues to determine a social and environmental profile (information retrieved from their website, KLD.com, on 11/05/10). This study also utilized the KLD database for the overall sustainability variable.

The selection of a measure for financial performance began with the decision of whether to utilize accounting or market measures. Both accounting and marketing measures of performance were used by Lee, Faff, and Langfield-Smith (2009) to overcome the limitations of reliance on only one metric. For a marketing measure, the market return is the obvious measure. A number of studies, including Becchetti, Di Giacomo, and Pinnacchio (2008) question whether this is appropriate without a provision to account for risk. Another critique of market measures is that they encompass responses to performance versus expectations, expected future internal returns, the risks

of investing in that firm, and the impact of supply and demand of a firm's stock (Lee, Faff, & Langfield-Smith, 2009). This study, therefore, only utilized the accounting measure of CFP.

For an accounting measure, many studies have utilized Tobin's Q, which is approximated by dividing the sum of firm equity value, book value of long-term debt, and net current liabilities by the book value of inventories and property, plant and equipment (Surroca, Tribo, & Waddock, 2009). Peters and Mullen (2007) indicate that the most commonly utilized accounting measure of firm financial performance in previous sustainability studies is return on assets (ROA). This is also what was used in this study. Utilizing more than one financial performance measure at a time is not advised by York and Miree (2004) because, given the nature of the measures, it is expected to find a number of inter-correlations among the financial performance measures (York & Miree, 2004).

Regression discontinuity design (Goeke & Faley, 2009), as previously discussed in Chapter Two, is presented in Figure 3.1.

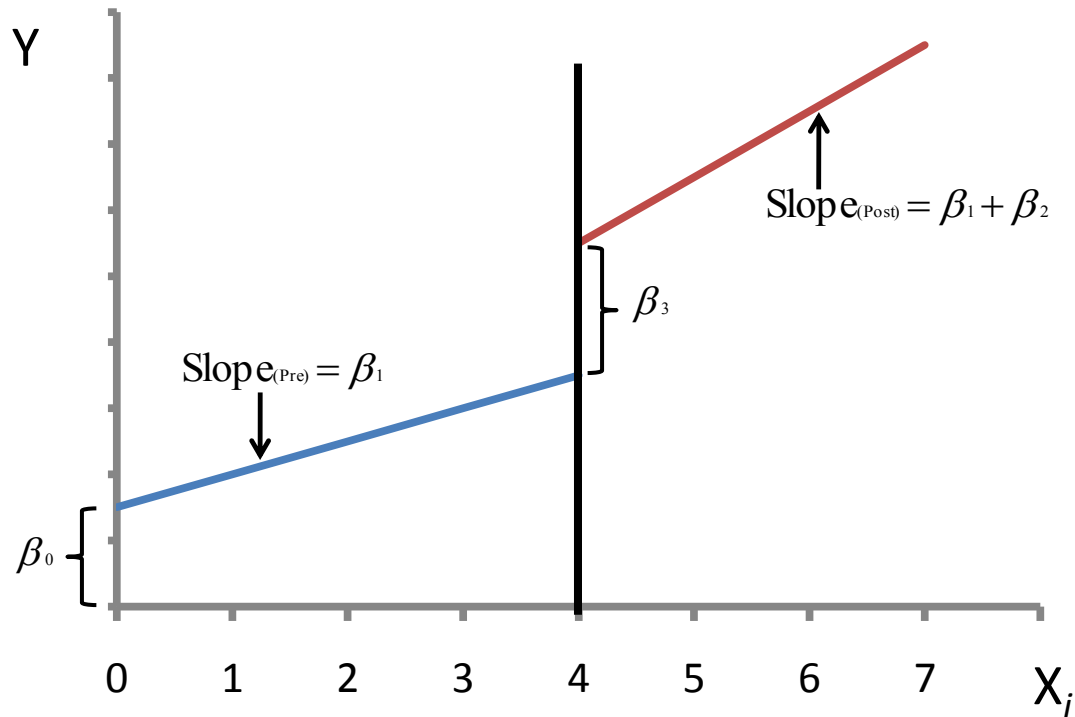


Figure 3.1. Illustration of the regression discontinuity design.

Note. Adapted from Goeke & Faley (2009)

Regression discontinuity design was utilized to confirm change in sustainability performance to determine the effective influence date of a company's sustainability program. Due to the data only being available on an annual basis, the ability to approach the event timing from both sides (pre and post) is limited. Therefore, in determining the effect implementation date, various years were tested. The data pre and post the assumed date were tested for differences. The point which provides the biggest difference between the two data sets is what was utilized as the effective influence date. The dummy variables that were utilized to account for the pre and post sustainability program implementation effects were analogous to the variables included in many of the studies

about the impact of inclusion (exclusion) from a sustainability index. Becchetti, Di Giacomo, and Pinnacchio (2008) used such variables in their study of the financial impact for inclusion in the Domini Index.

Firm size is almost universally utilized as a control variable because most of the previous studies showed a correlation between size and CFP. What varied greatly is the method utilized for controlling for size. Size can be viewed as: the total assets (Byus, Deis, & Ouyang, 2010), the number of firm employees (Becchetti, Di Giacomo, & Pinnacchio, 2008), or the logarithm of total sales for size (Choi & Wang, 2009). Lee, Faff, and Langfield-Smith (2009) seemed to have the best approach. For the accounting tests they used the natural logarithm of total assets, while for the market based tests they used the natural logarithm of a firm's market capitalization. This is the approach that this study took. However, since this study only did the accounting test, the natural logarithm of total assets is what was utilized.

Hull and Rothenberg (2008) studied the influence of a sustainability program on CFP, and recommended for future studies, a longitudinal study of the interaction of the variables in a single industry. York and Miree (2004) controlled for the effect of industry by calculating percent change by SIC code and comparing each company to the percent change for all companies in its SIC. This relative scoring not only eliminates the industry to industry variation, but it also removes macro-economic influences for the economy as a whole. Bad economic years would not preclude demonstration of continuous improvement on a relative basis. This study ran the models within a number of industries, to eliminate the industry effect.

Data Collection Methodology

The sustainability scores came from KLD STATS (statistical tool for the analysis of trends in social and environmental performance). The data is a snapshot of KLD's ratings at the end of each calendar year. The companies covered in STATS are:

- For 1991 – 2000, companies from the S&P 500 and the KLD's Domini 400 Social Index
- For 2001 – 2002, the 1,000 largest U.S. publicly traded companies by market capitalization
- Since 2003, the 3,000 largest U.S. publicly traded companies by market capitalization

In the interest of including the most data points over time, the data was studied including all firms which have data since 1991. The raw data was a number of positive and negative indicators which are typically translated into an aggregate score by: taking a sum of the indicators, summing the average of indicator scores within an issue area, or normalizing the issue area scores and then taking the sum (source KLD.com, retrieved on 11/05/10). For this study the seven qualitative areas were utilized. All of the strengths were added up, and then the concerns were subtracted. Table 3.1 lists the seven qualitative areas and the positive (strengths) and negative (concerns) indicators.

Table 3.1

Strengths and Concerns for Each of the Seven KLD Qualitative Areas

Area	Strengths	Concerns
Community	Charitable giving Innovative giving Non-U.S. charitable giving Support for housing Support for education Indigenous peoples relations Volunteer programs Other	Investment controversies Negative economic impact Indigenous peoples relations Tax disputes Other
Corporate Governance	Limited compensation Ownership Transparency Political accountability Other	High compensation Ownership Accounting Transparency Political accounting Other
Diversity	CEO Promotion Board of directors Work/life benefits Women & minority contracting Employment of the disabled Gay & lesbian policies Other	Controversies Non-representation Other
Employee Relations	Union relations No-layoff policy Cash profit sharing Employee involvement Retirement benefits Health and safety Other	Union relations Health and safety Workforce reductions Retirement benefits Other
Environment	Beneficial products and services Pollution prevention Recycling Clean energy Communications Property, plant, and equipment Management systems	Hazardous waste Regulatory problems Ozone depleting chemicals Substantial emissions Agricultural chemicals Climate change Other

Area	Strengths	Concerns
Human Rights	Positive record in South Africa Indigenous peoples relations Labor rights Other	South Africa Northern Ireland Burma concern Mexico Labor rights Indigenous peoples relations Other
Product	Quality R&D/innovation Benefits to economically disadvantaged Other	Product safety Marketing/contracting Antitrust Other

Note. Adapted from RiskMetrics (2011)

For the financial performance, accounting measures were utilized. These measures are widely available for large publicly traded U.S. companies, such as those included in this study. Specifically, ROA was calculated and utilized for the measure of CFP in this study.

Data Analysis

Data analysis for this project occurred over five phases. During the first phase, source data were consolidated into Microsoft Office Excel 2007, changed into variable formats and verified for completeness. During the second phase, Excel was utilized to graphically analyze the overall sustainability score trend information. Transition points were visually selected and then validated via changes in intercept and/or slope. The results were entered into the Excel file. During the third phase, Minitab was utilized to run the regression analyses for the various model and industry combinations. During the

fourth phase, the results were tabulated, summarized, and graphically expressed in Excel for inclusion into the dissertation. During the fifth phase, data were analyzed from each of the firms whose managers were interviewed. This analysis was looking for elements of the stages of implementation for each firm that would correspond to the calculated effective influence date from the previous research. Each phase is elaborated on in the following sections.

In the first phase, the source data procured from KLD was provided in 19 Excel files, corresponding to the years 1991 through 2009. Each of these files contained data on the sustainability scoring for as many as 3,000 companies for that year. The data provided for each year had up to 123 scores. The seven main qualitative areas, as previously detailed in Table 3.1, each had strengths and concerns. The total number of strengths and concerns possible for each area are listed in Table 3.2, with a total potential of 81 scores.

Table 3.2

Numbers of Strengths and Concerns for Each of the KLD Areas

Area	Strengths	Concerns	Included
Community	7	4	Yes
Corporate Governance	6	8	Yes
Diversity	8	3	Yes
Employee Relations	7	5	Yes
Environment	7	7	Yes
Human Rights	4	7	Yes
Product	4	4	Yes
Alcohol	--	7	No
Firearms	--	4	No
Gambling	--	7	No
Military	--	7	No
Nuclear	--	10	No
Tobacco	--	7	No

In addition, KLD also provides data on six controversial business issues: alcohol, gambling, firearms, military, nuclear power, and tobacco, with the potential of 42 additional scores. The six controversial business issues only have the possibility for concerns, not strengths. Appendix C has a complete listing of all variables from KLD. For this study, only scores from the seven main qualitative issues areas were utilized. The total number of strengths minus the total number of concerns gives the resultant sustainability score for

each of the seven areas. To obtain the overall sustainability score for a given year, all seven areas were totaled. The concerns from the six controversial business issues were not included for several reasons. The main reason is that they tend to be industry related, while the majority of this research was done within industries. Hence, the relative sustainability from industry to industry will not be significant for this study. Secondly, it would potentially eliminate a company that is very sustainable, although within a controversial business sector, from being a study company.

Once an overall sustainability score was calculated for each company, in each of the 19 yearly files, they were combined into a single file. Next, the data was sorted by ticker and then by name to try to get all of a given company's data into a single line with up to 19 data points (one for each year 1991 through 2009). This was made somewhat challenging by the large numbers of companies that changed names and/or stock tickers during this time frame. Next, the number of years of data were counted and added to the file. This information was converted into a histogram for use in determining which companies had sufficient data points to be included in the analysis. The results are presented in Chapter Four. After companies with insufficient data were eliminated, SIC codes were added for each of the remaining companies. The codes were obtained from Mergent On-Line Database through the Lawrence Technological University on-line Library.

In the second phase of the data analysis, the remaining companies were analyzed to determine candidates for the "study" companies. To accomplish this, the range of sustainability scores (the maximum score minus the minimum score) was determined for each of the companies. Companies were eliminated that didn't have at least a range of five, with the logic being that a company with a lower range would not have shown

substantial improvements in sustainability over time. Next, companies were eliminated that did not show a positive trend in their sustainability scores. Since the study is focused on successful implementation of a sustainability program, there is no need to include companies with a neutral or negative slope to their trend chart. Next, companies were eliminated which had discontinuity in the data points. They didn't need to have all 19 data points, but the data points which they did have had to be contiguous. Then, companies were eliminated which had dual peaks (bimodal shape) in their trend charts. This was due the premise is that sustainability scores of the study companies were significantly improved due to the implementation of a sustainability program, which is not consistent with two peaks. Finally, companies were eliminated that never achieved a sustainability score of at least eight. This allowed for separation of the companies that have taken positive steps toward sustainability, not just companies who have stopped doing sustainably negative activities. The resultant companies were deemed to be the study companies. Their data were then plotted utilizing the regression discontinuity design. The best fit line was determined for both segments, and difference in the intercept and/or slope was confirmed. The results of the selection process, and the study company trend charts are included in Chapter Four.

During the third phase of data analysis, each study company was grouped with the other companies in the same SIC code. For each of the companies within an SIC, Mergent On-Line was utilized to gather the Total Assets and Net Income for each year. Companies with incomplete financial data were excluded from the study. From this, size (natural logarithm of total assets) and ROA (net income divided by total assets) were calculated for each year. Then, the industry (SIC) average ROA was calculated for each

year. The firm's financial performance for a given year was calculated as its ROA for that year, minus the average ROA for the SIC for that year. Next, a linear regression analysis was run on MiniTab for each of the four models for each SIC. Some of the SICs included such a large number of companies at the two digit SIC code level that the three, or even four digit SIC code level was utilized. Appendix B contains a listing of the SIC codes salient to this research.

During the fourth phase, the results from running each of the industry/model combinations were tabulated, summarized, and graphically expressed in Excel for inclusion into the dissertation. The results of this are included in Chapter Four. Finally, the data were utilized to test the hypotheses. As statistical methods suggest, the hypotheses were not tested directly. Instead, null (or alternative) hypotheses were developed, and then the data indicated whether to reject or accept the null hypotheses. The subsection below indicates the null hypotheses which were utilized.

Null hypotheses. Since all of the hypotheses assume a relationship of some sort, the null hypotheses will assume no such relationship exists. Below, the hypotheses are restated, followed by their respective null hypotheses. The null hypotheses are the labeled the same, except with a subscript zero inserted.

H1: A firm's overall sustainability score will positively correlate with financial performance within their industry.

H₀₁: A firm's overall sustainability score will not correlate with financial performance within their industry.

H2: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

H₀2: A firm's effective implementation of a sustainability program will not correlate with an increase in relative financial performance within their industry.

H3: A firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation.

H₀3: A firm with exceptional profitability associated with implementation of a sustainability program did not have relatively exceptional profit before implementation.

H4: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program will have cumulative effects.

H₀4: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program will not have cumulative effects.

During the fifth phase, data were analyzed from each of the firms that were interviewed. Requests were sent to each of the 11 study companies to participate in a phone interview. Only three of the firms consented, and the results are summarized in Chapter Four. This analysis was looking for elements of the stages of implementation for

each firm that would correspond to the calculated effective influence date from the previous research.

Validity

Calabrese (2006) cites four types of validity appropriate for inclusion in a dissertation: conclusion validity, internal validity, construct validity, and external validity. Each of these are discussed in the following subsections.

Conclusion validity. Mitchell and Jolley (2001) define statistical conclusion validity as the degree to which conclusions reached about relationships between variables are justified. Conclusion validity is only concerned with whether there is any kind of relationship between the variables being studied, or if it is only a correlation. This conclusion validity testing is the predominant reasoning for the analysis regarding Model Two. If the financial performance, regardless of direction, existed within the industry before and after the effective influence date of the sustainability program, then cause cannot be completely attributed to the program.

Internal validity. Mitchell and Jolley (2001) indicate that internal validity is an inductive estimate of the degree to which predictions about causal relationships can be made, based on: the measures used, the research setting, and the whole research design. Good experimental techniques, in which the effect of an independent variable on a dependent variable is studied under highly controlled conditions, usually allows for higher degrees of internal validity. To aid in the internal validity, the study was limited

to U.S. corporations to eliminate governmental policies, regulations, and culture as potential confounding variables. Also, the study is limited to publicly-held corporations to eliminate the substantial differences in reporting requirements, shareholder influence, and governance. Analyses were also conducted within SIC codes to eliminate impacts to particular industries, and were done relative to other firms within the SIC to eliminate year to year macroeconomic effects. Control variables have been added to the models where substantial research has shown a material effect on the financial performance.

Construct validity. Mitchell and Jolley (2001) assert that construct validity refers to the extent to which the practical tests (developed from a theory) of a construct, actually measure what the theory says they do. Such lines of evidence include statistical analyses of the internal structure of the test, including the relationships between responses to different test items. They also include relationships between the test and measures of other constructs. As currently understood, construct validity is not distinct from the support for the substantive theory of the construct that the test is designed to measure. Experiments designed to reveal aspects of the causal role of the construct also contribute to construct validity evidence. The determination of the variable “the effective influence date” is the element of this study which has the least amount of basis in previous research. After completion of the statistical analysis portions of the study, a number of firm’s managers were interviewed to determine how well the effective influence date correlates with actual implementation activities and/or results, in order to test the validity of the created measure. The interview questions are in Table 3.3.

Table 3.3

*Questions for the Study Company Interviews***Background**

Name?

Company?

Title?

Length of time in position?

Length of time with company?

After reviewing the questions, do you feel that you are the right person for me to be asking these questions?

Was the consent form clear?

Do you have any questions about the purpose of this study?

Company

Does your company have a formal sustainability program?

Is that what it is called? If not, what is it called?

When was that program initiated?

What are the major areas of emphasis of the program?

Has the program undergone any significant changes? If so, what changes and when?

The sustainability data from KLD showed a significant increase in overall sustainability score for your company between the years of 20XX and 20XX. Does this seem to correspond with any internal activities or changes to the sustainability initiative in your company?

I am also studying the impact of changes in sustainability with changes in financial performance. Were there any significant events during this time which would have potentially impacted the company's financial performance, not related to sustainability?

Industry

Is sustainability expected within your industry?

Is your company viewed as a leader of sustainability within your industry?

Is your company's sustainability program considered a strategic competitive advantage?

Despite there being a defined set of questions, the interviews were conducted conversationally, allowing the answers to occur in a natural flow. The interviewees were selected from the eleven study companies. A total of three company's representatives were interviewed. The interviews were taped, so that accurate transcription would be possible. Transcripts of the interviews were then created. As part of the consent form, the interviewees were told that they would not be specifically revealed in the paper. As a result, references to the person's name, their company's name, or their industry are not included. Their responses are summarized Chapter Four.

External validity. Mitchell and Jolley (2001) define external validity as the extent to which the results of a study can be held to be true for other cases, for example, to different people, places or times. In other words, it is about whether or not findings can be validly generalized. If the same research study was conducted in those other cases, would it get the same results? A major factor in this is whether the study sample is representative of the general population along relevant dimensions. Part of the study was to determine if the relationships are the same directionally, and in magnitude from industry to industry. However, as indicated in the section on limitations of the study, there is the potential for limited ability to generalize the results outside of the scope. Specifically, extrapolation to private companies or companies in other parts of the world might yield significantly different results. This will be included in the section on potential areas for future study.

Summary

The desire to understand the impact of a sustainability program on CFP is not new. The majority of the research has been done on the macro level. This research studied the impact within given industries to eliminate the macro level effects. It also utilized accounting measures for financial performance. After confirming the existence of a relationship, the direction of the relationship, and the magnitude of the relationship, then the nature of the relationship was investigated. Due to the lack of previous research in this area, this study drew from research conducted to determine the impacts of other initiatives on CFP. Statistical analysis was utilized to determine the effective influence date of the sustainability initiative. This effective influence date was validated by personal interviews with three company's representatives about the actual implementation of their sustainability program. The pre and post implementation data were analyzed to determine whether the relationship is causal in nature, or simply correlation. Also, the implementation date was then utilized to ascertain the benefit a firm could realize by undertaking their own strategic initiative.

This area of research was selected due to the vastly different results previous studies have obtained when analyzing the value of a sustainability program. A goal of this research was to help corporations better understand the relationship between sustainability activities and CFP. The results should help firms in developing a more clear business case for such activities.

Chapter 4: Results

Introduction

The results will follow the same order in which the research was conducted. The first section begins with the sustainability scores compiled for each company, and the analysis of the scores completed to determine the target study companies. The next section will deal with the expansion of the study companies into the appropriate industries for the regression analyses. The next four sections address the results for each of the four models presented in Chapter Three. Presented as subsections at the end of each of the model sections are the hypotheses addressed by the respective model. More specifically, Hypothesis One will be addressed at the end of the section on Model One, Hypotheses Two and Three will be addressed at the end of the section on Model Two, and Hypothesis Four will be addressed at the end of the section on Model Three. Model Four did not have any hypothesis tied directly to it; it was just to study any potential interaction between the variables previously unique to Models Two and Three. The chapter concludes with a discussion about the results from the company interview, variation due to industry selection, and an overall results summary.

Results of the Company Selection Study

This section starts with the selection of companies for potential inclusion in the study, based on data availability. Next, the results of each filtering criteria will be discussed, leading to the selection of the 11 study companies. Finally, the sustainability

performance for each of the study companies will be discussed, with emphasis on the identification of the variable “the effective influence date”.

After compiling all of the overall sustainability scores, and matching up the yearly scores by company name and/or stock ticker, the number of scores available for each company was determined. With a minimum of one year of data and a maximum of nineteen (years 1991 through 2009), Table 4.1 shows how much data was available. The data indicates how many companies have each of the possible number of years of sustainability data.

Table 4.1

Number of Sustainability Scores Available, by Firm and Number of Years

Years	Companies	Sum of Companies	% Companies	Entries	Sum of Entries	% Entries
1	691	691	14%	691	691	2%
2	574	1,265	25%	1,148	1,839	6%
3	579	1,844	37%	1,737	3,576	12%
4	473	2,317	46%	1,892	5,468	19%
5	358	2,675	53%	1,790	7,258	25%
6	363	3,038	60%	2,178	9,436	32%
7	898	3,936	78%	6,286	15,722	53%
8	211	4,147	82%	1,688	17,410	59%
9	318	4,465	88%	2,862	20,272	69%
10	66	4,531	90%	660	20,932	71%
11	60	4,591	91%	660	21,592	73%
12	30	4,621	91%	360	21,952	74%
13	31	4,652	92%	403	22,355	76%
14	37	4,689	93%	518	22,873	78%
15	30	4,719	93%	450	23,323	79%
16	25	4,744	94%	400	23,723	80%
17	26	4,770	94%	442	24,165	82%
18	26	4,796	95%	468	24,633	84%
19	255	5,050	100%	4,845	29,478	100%

From inspection of the Table 4.1, it can be seen that over the 19 years of data recording, there have been 29,478 entries of sustainability data. These points of data represent 5,050 different companies. The companies with more data points are of more value in doing time based analysis because the regression discontinuity design requires adequate data on both sides of the effective influence date. For the next step, a histogram was constructed from the data in Table 4.1, and Figure 4.1 was created.

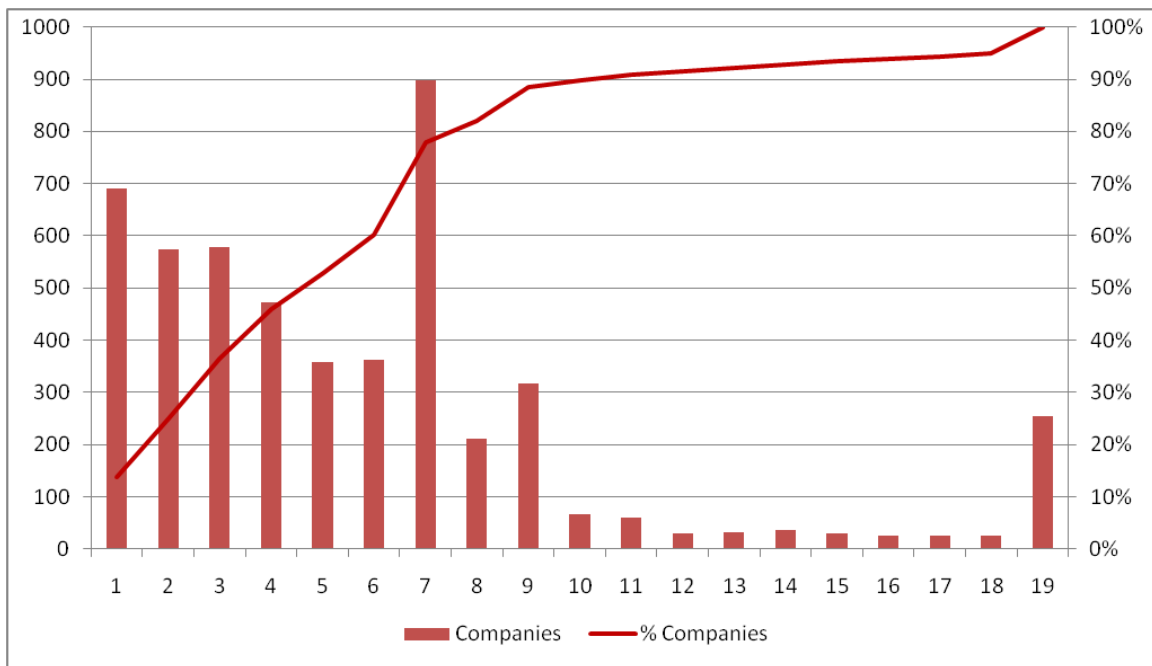


Figure 4.1. Histogram of companies by number of years of sustainability data.

The required number of data points on each side of the regression discontinuity design is not specified. The number of points on each side determine the quality of the data for the line. A minimum number of three data points on each side would require a minimum of six total data points. Therefore, it was logical to eliminate any companies

with less than six data points. Next, a higher cutoff point was evaluated. If the cutoff was moved to less than seven data points, it would eliminate an additional 363 companies. If the cutoff was further moved to less than eight data points an additional 898 companies would be eliminated. The extra step of eliminating those companies with seven data points would, in fact, eliminate the largest number of companies from the histogram. This makes sense intuitively because 2003 is when Kinder, Lydenberg, and Domini (KLD) changed their criteria to include the largest 3,000 companies as opposed to the previous limit of the largest 1,000 companies. This cutoff point seems to make sense, but referring back to Table 4.1, it does result in a loss of 60 percent of the companies from the study.

In order to completely understand the impact of the cutoff point, a histogram was also constructed that shows the number of entries versus the number of years of data. This was a simple mathematical computation of the number of companies that had a specific number of years of data, multiplied by the number of years of data. This allowed the understanding of how many data points would be lost with the proposed cutoff of any companies with less than seven data points. The histogram is shown below in Figure 4.2.

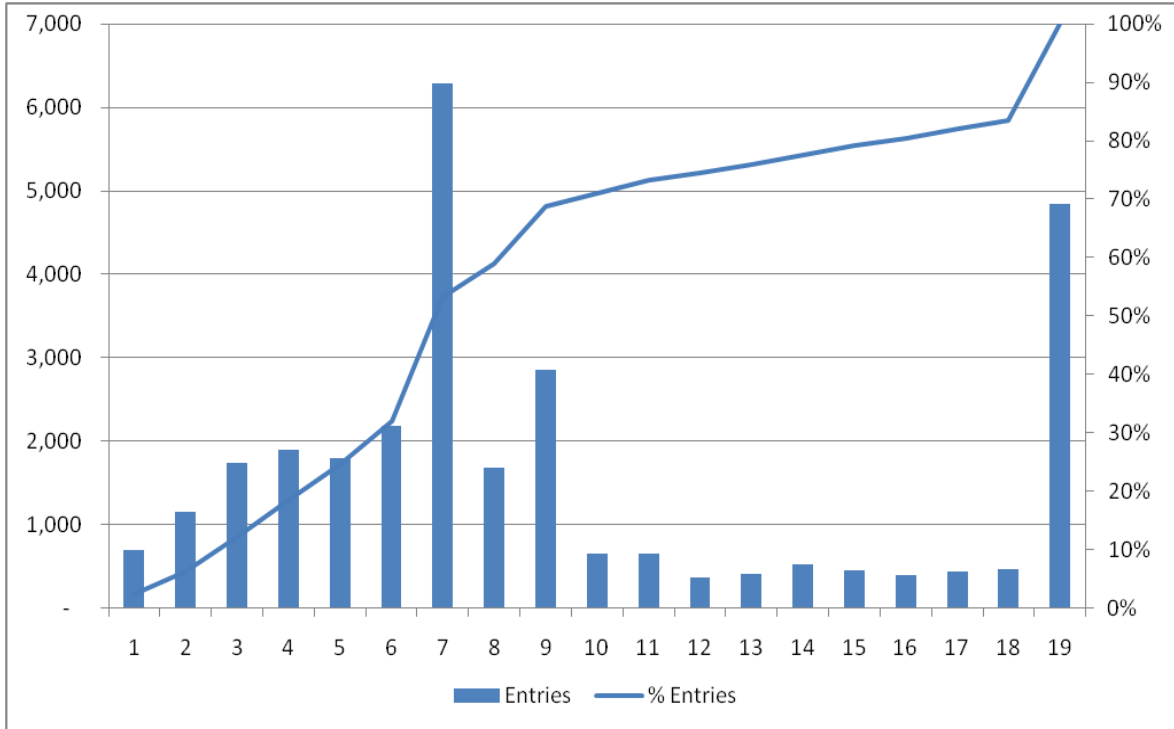


Figure 4.2. Histogram of data points (entries) by number of years of sustainability data.

A review of Figure 4.2 shows clearly that the cutoff point needs to remain below the level of seven data points. As with the histogram of the number of companies, the value of seven, accounts for the largest number of data points. It also shows that the loss of data is not as great as the percent of companies would suggest. Although using a cutoff of seven eliminates 60 percent of the companies, it only eliminates 32 percent of the available data points.

Results of Industry Determination

The study is aimed at evaluating the impact of the effective implementation of a sustainability program on the financial performance of a company within its specific

industry. To facilitate this, certain companies must be selected to be studied, and then the appropriate industry for each is determined. The number of companies was already reduced from 5,050 to 2,012 by the requirement of having at least seven data points. Since the study is focused on an improvement in sustainability scores, the next reduction was done based on the range of sustainability scores each company had. Table 4.2 shows the number of companies for each range.

Table 4.2

Range of Sustainability Scores for the Companies

Range	Companies	Sum of Companies	% of Companies
0	57	57	3%
1	352	409	20%
2	552	961	48%
3	393	1354	67%
4	251	1605	80%
5	159	1764	88%
6	99	1863	93%
7	57	1920	95%
8	37	1957	97%
9	18	1975	98%
10	21	1996	99%
11	5	2001	99%
12	5	2006	100%
13	3	2009	100%
14	2	2011	100%
15	1	2012	100%

The data from Table 4.2 can also be viewed graphically as shown below in Figure 4.3. This allows for the effect of a given cutoff point to be easily seen.

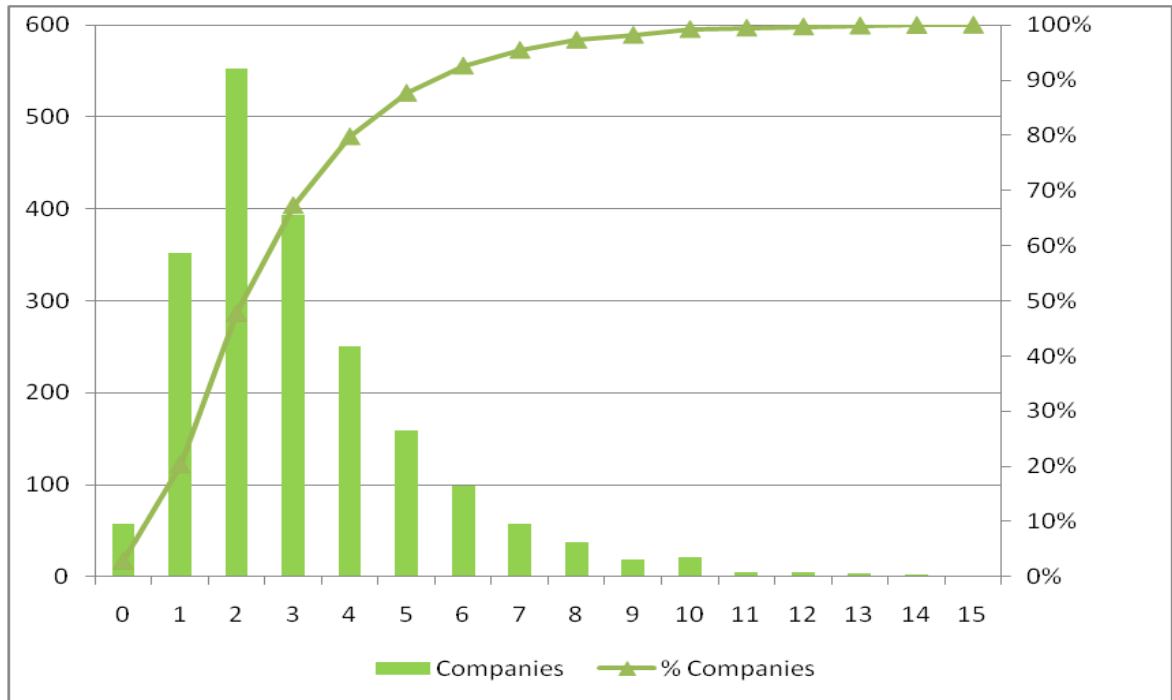


Figure 4.3. Histogram of the range of sustainability scores by company.

Somewhat surprising, is the fact that almost ten percent of the companies had no variation in their sustainability scores, even though they had at least seven different years of scores included. With no prescriptive approach to establish the cutoff, the author chose to use the infamous 80-20 rule and eliminate 80 percent of the companies by selecting a minimum range of five for the sustainability scores. Recalling Table 4.2, this takes the number of potential study companies down from 2,012 to 407. Next, the data was visually inspected to check for a positive trend to the sustainability scores. Effective

implementation of a sustainability program by definition would require an improvement in sustainability scores. Only 81 of the remaining companies had positive trends.

In order to further narrow the study companies, four other criteria were added. First, since the purpose of the study companies is to include them in the discontinuity regression model, the two companies with gaps in their sustainability data were excluded. This took the number of candidate companies down to 79. Second, since the study was looking for a single significant change in sustainability, companies were eliminated whose data were bimodal (showing a dual peak). This eliminated six more companies, reducing the candidates to 73. Third, since the study is focused on strong sustainability performers, rather than weak sustainability performers who were improving, companies were eliminated that never reached a minimum sustainability score of at least eight (the range of all sustainability scores went from a low of -11 to a high of 15). This proved to be the greatest filter, eliminating 43 more companies and taking the remaining number down to 30. The final criterion was that there was a jump in the data which should correlate with the theoretical meaningful implementation of a sustainability program. For this filter, a jump of at least three points was required. This took the number of study companies down to 12. Later, when looking up the financial performance measures for each of the companies, it was determined that the data source for one of the companies did not have complete financial information due to its dropping out of the database years before. That resulted in the number of actual study companies being 11.

The next step was to confirm that each study company indeed demonstrated the phenomenon the study was hypothesized to reveal. Each company's sustainability data

were, therefore, input into the discontinuity regression format and graphed. Figures 4.4 through 4.14 are the results.

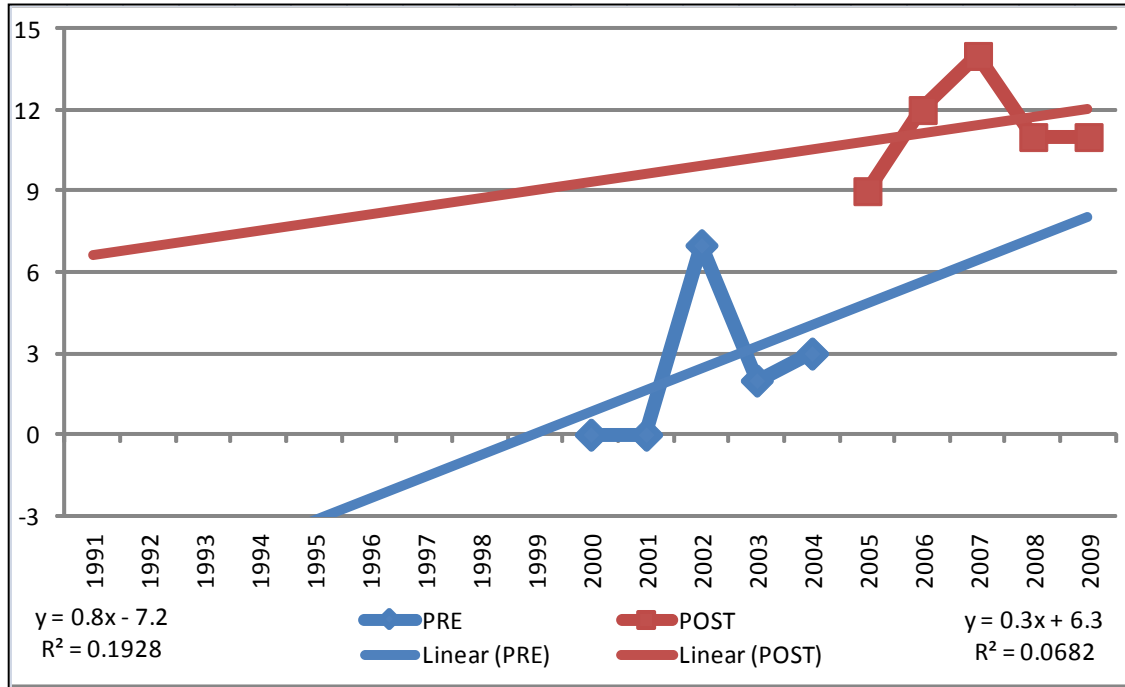


Figure 4.4. Regression discontinuity graph for Agilent Technologies.

In Figure 4.4, the sustainability scores for Agilent Technologies are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement decreases from 0.8 to 0.3. Also in this time frame, the lines show a mean shift of about 6 points in corporate overall sustainability performance (COSP). With r-squared values of 0.19 and 0.07 respectively, neither the pre nor the post trend lines appear to be significant. Despite the poor r-squared values, visual inspection of the graph would indicate that something did occur in this time frame.

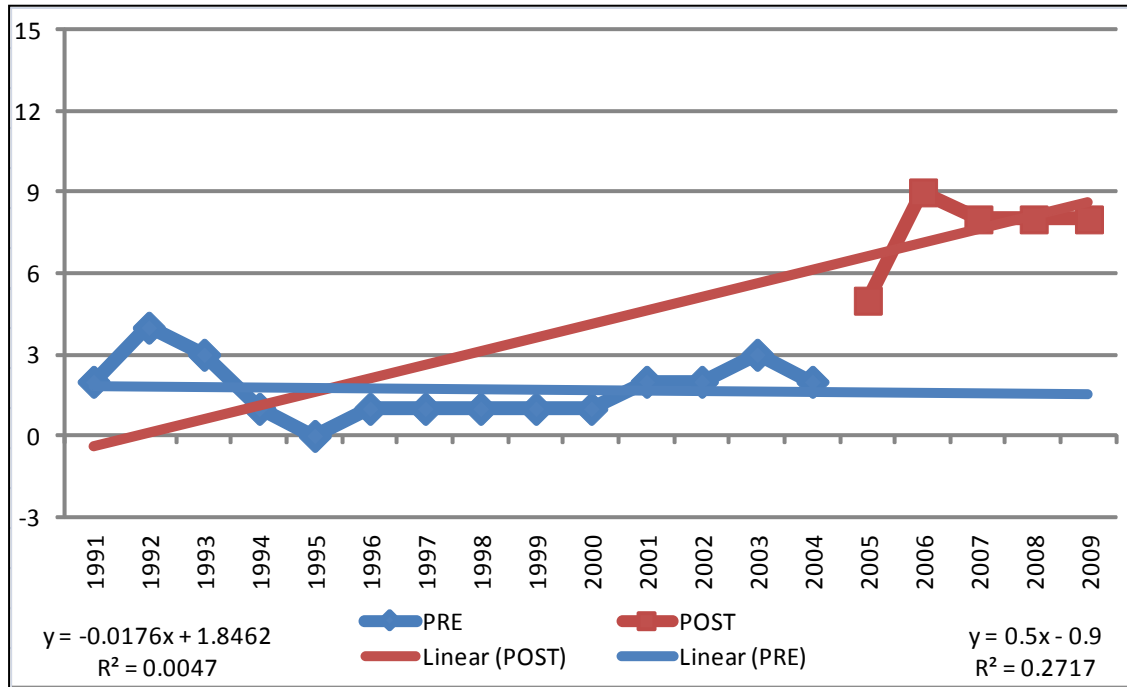


Figure 4.5. Regression discontinuity graph for Applied Materials.

In Figure 4.5, the sustainability scores for Applied Materials are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.0 to 0.5. Also in this time frame, the lines show a mean shift of almost 5 points in COSP. With r-squared values of 0.00 and 0.27 respectively, neither the pre nor the post trend lines appear to be significant. Despite the poor r-squared values, visual inspection of the graph would indicate that something did occur in this time frame.

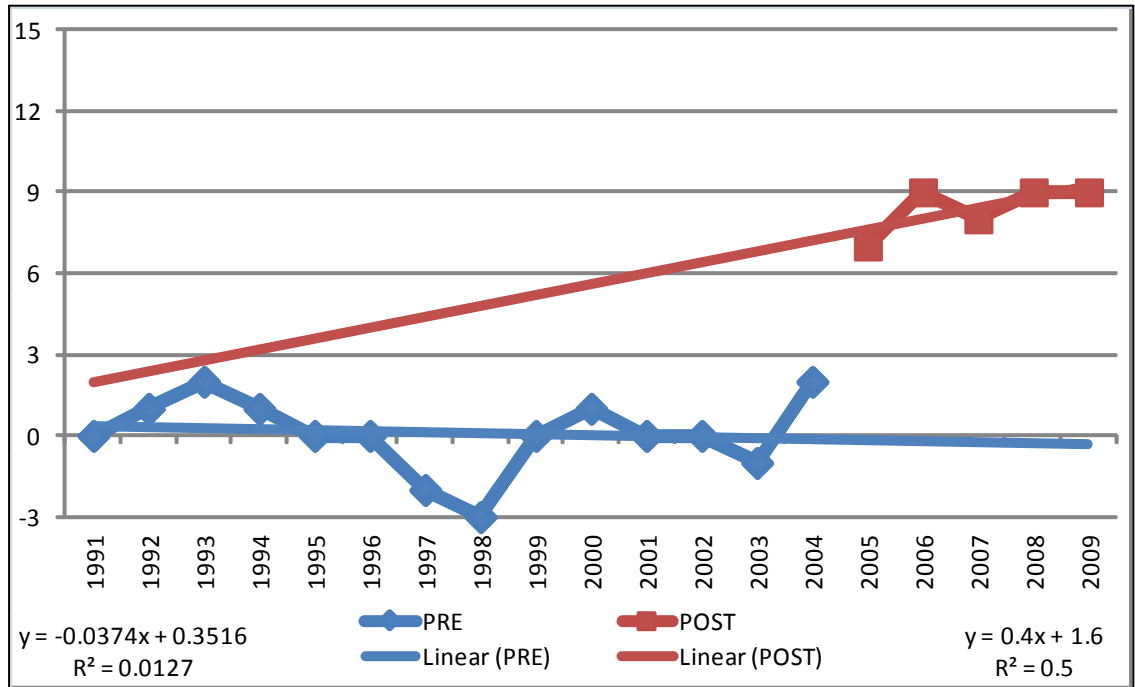


Figure 4.6. Regression discontinuity graph for Advanced Micro Devices.

In Figure 4.6, the sustainability scores for Advanced Micro Devices are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.0 to 0.4. Also in this time frame, the lines show a mean shift of about 7 points in COSP. With r-squared values of 0.01 and 0.50 respectively, neither the pre nor the post trend lines appear to be significant. Despite the poor r-squared values, visual inspection of the graph would indicate that something did occur in this time frame.

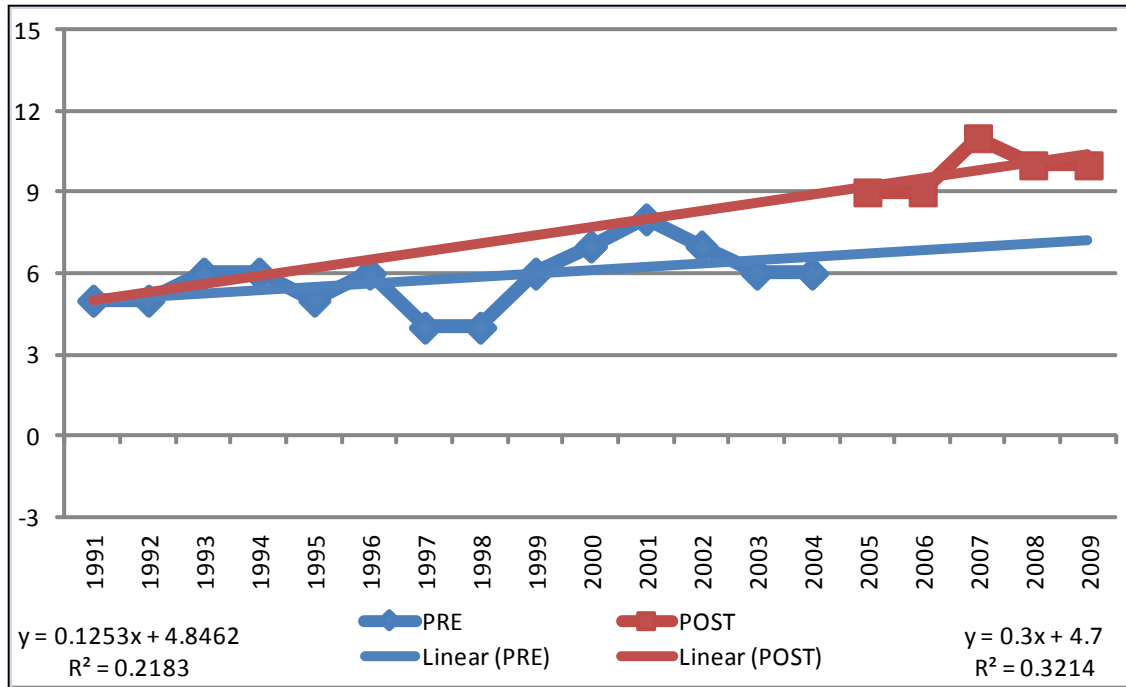


Figure 4.7. Regression discontinuity graph for General Mills.

In Figure 4.7, the sustainability scores for General Mills are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.1 to 0.3. Also in this time frame, the lines show a mean shift of about 2 points in COSP. With r-squared values of 0.22 and 0.21 respectively, neither the pre nor the post trend lines appear to be significant. Upon visual inspection of the graph, the two parts of the graph do not appear to be substantially different, perhaps making this a weak study company.

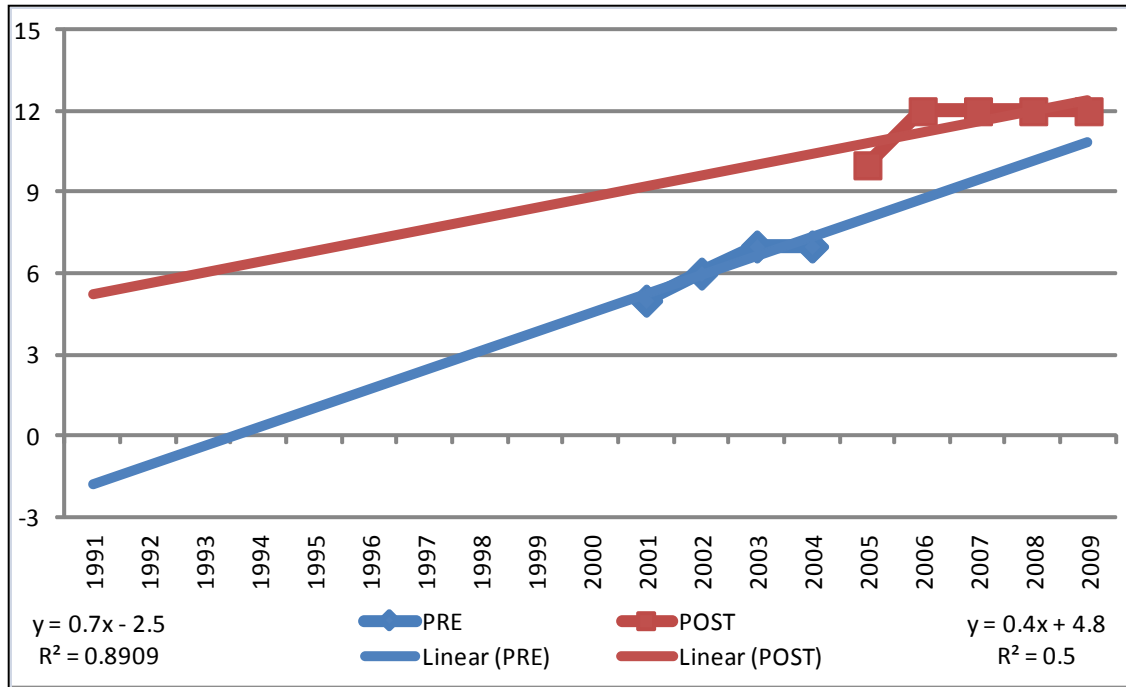


Figure 4.8. Regression discontinuity graph for Green Mountain Coffee Roasters.

In Figure 4.8, the sustainability scores for Green Mountain Coffee Roasters are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement decreases from 0.7 to 0.4. Also in this time frame, the lines show a mean shift of about 3 points in COSP. With r-squared values of 0.89 and 0.50 respectively, only the pre trend line appear to be significant. Despite only having one strong r-squared value, visual inspection of the graph would indicate that something did occur in this time frame.

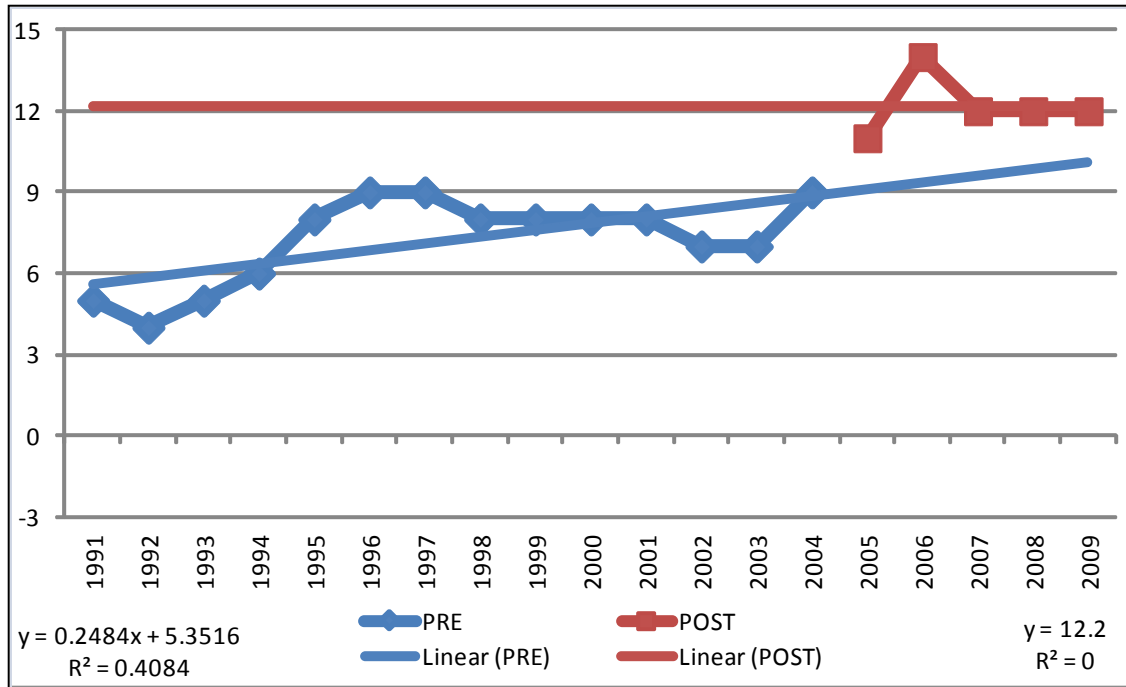


Figure 4.9. Regression discontinuity graph for Hewlett-Packard.

In Figure 4.9, the sustainability scores for Hewlett-Packard are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement decreases from 0.2 to 0.0. Also in this time frame, the lines show a mean shift of about 3 points in COSP. With r-squared values of 0.41 and 0.00 respectively, neither the pre nor the post trend lines appear to be significant. Upon visual inspection of the graph, the two parts of the graph do not appear to be substantially different, perhaps making this a weak study company.

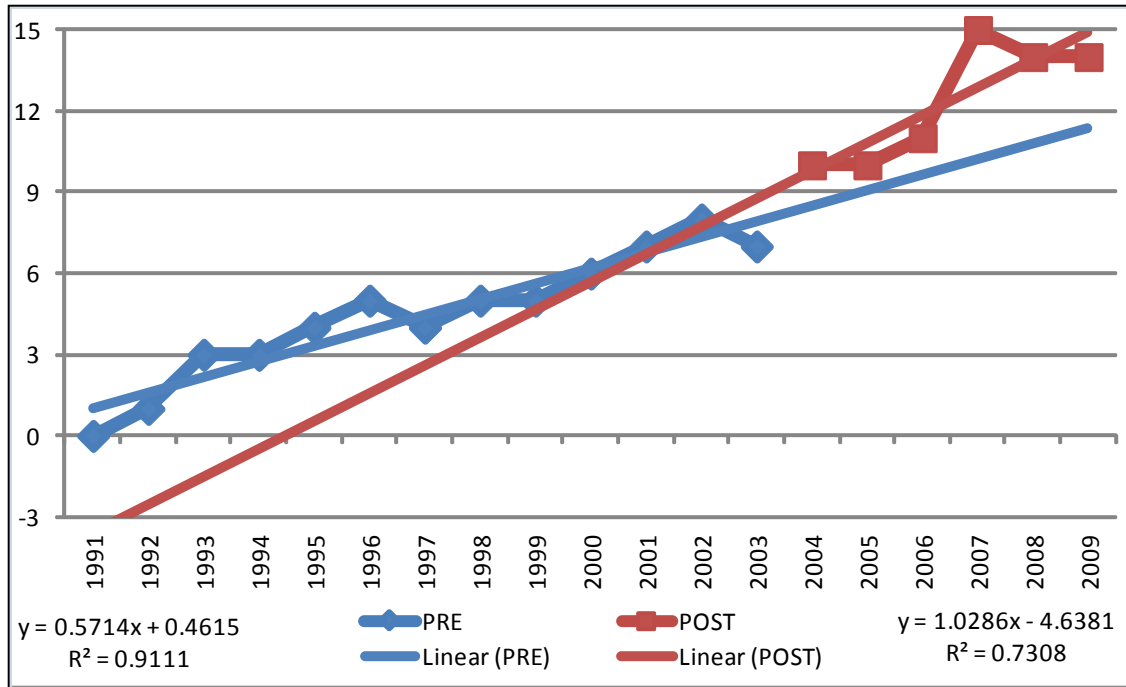


Figure 4.10. Regression discontinuity graph for Intel.

In Figure 4.10, the sustainability scores for Intel are graphed in the regression discontinuity format, with the point of transition being between the years of 2003 and 2004. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.6 to 1.0. Also in this time frame, the lines show a mean shift of about 1 point in COSP. With r-squared values of 0.91 and 0.73 respectively, both the pre and the post trend lines appear to be significant.

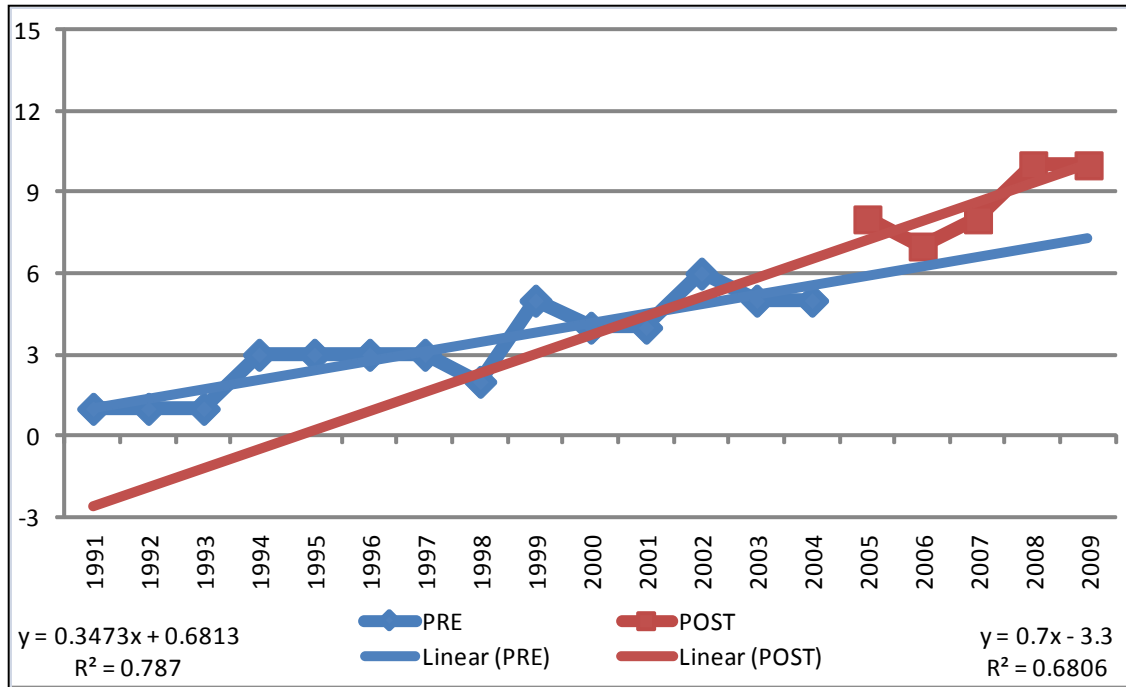


Figure 4.11. Regression discontinuity graph for Nike.

In Figure 4.11, the sustainability scores for Nike are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.3 to 0.7. Also in this time frame, the lines show a mean shift of about 1 point in COSP. With r-squared values of 0.79 and 0.68 respectively, both the pre and the post trend lines appear to be significant.

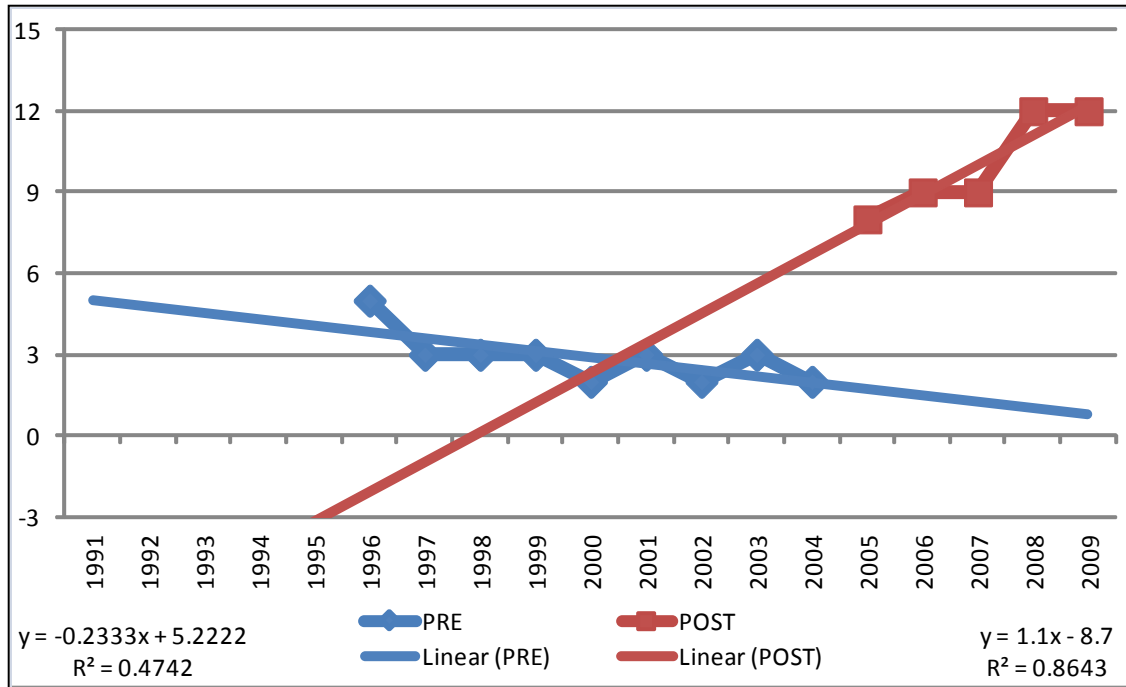


Figure 4.12. Regression discontinuity graph for Starbucks.

In Figure 4.12, the sustainability scores for Starbucks are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from -0.2 to 1.1. Also in this time frame, the lines show a mean shift of about 6 points in COSP. With r-squared values of 0.47 and 0.86 respectively, only the post trend line appears to be significant. Despite only having one strong r-squared value, visual inspection of the graph would indicate that something did occur in this time frame. In fact, visually Starbucks would appear to be the strongest of the study companies.

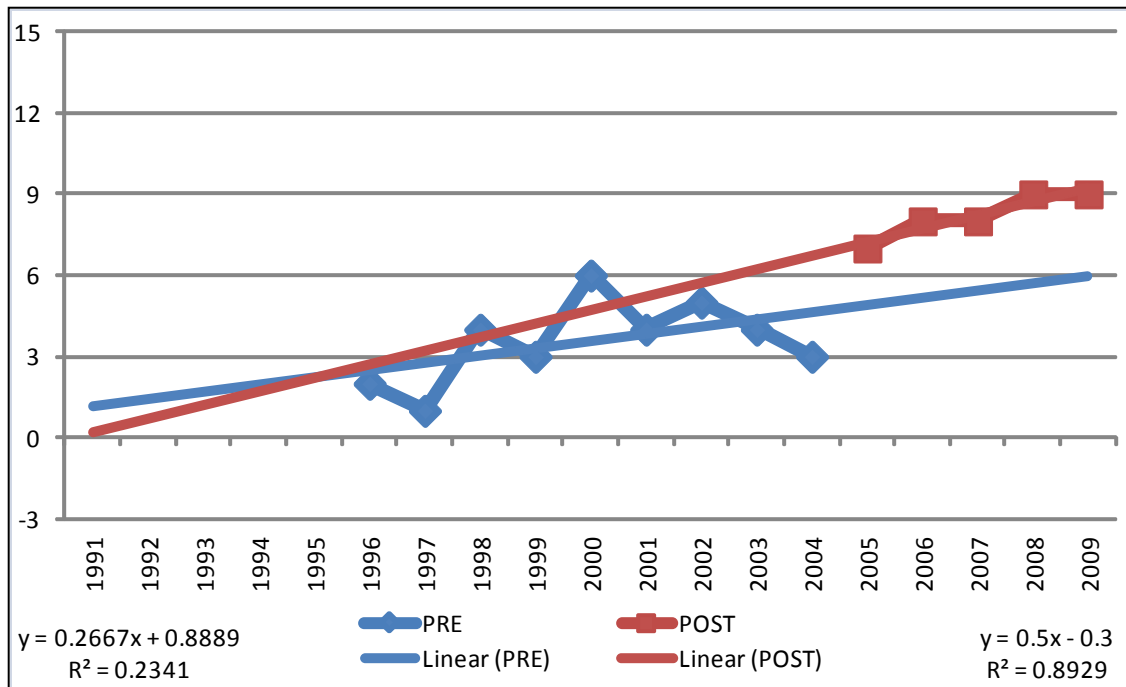


Figure 4.13. Regression discontinuity graph for Timberland.

In Figure 4.13, the sustainability scores for Timberland are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement increases from 0.3 to 0.5. Also in this time frame, the lines show a mean shift of about 2 points in COSP. With r-squared values of 0.23 and 0.89 respectively, only the post trend line appears to be significant. Despite only having one strong r-squared value, visual inspection of the graph would indicate that something did occur in this time frame.

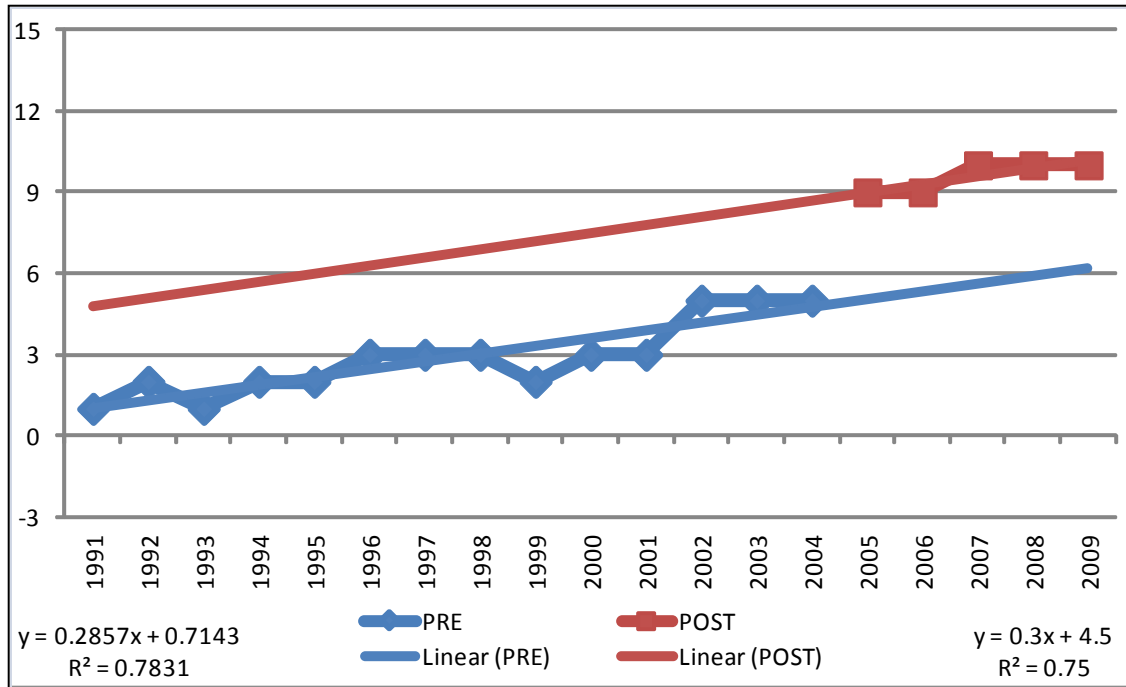


Figure 4.14. Regression discontinuity graph for Texas Instruments.

In Figure 4.14, the sustainability scores for Texas Instruments are graphed in the regression discontinuity format, with the point of transition being between the years of 2004 and 2005. In comparing the lines pre and post the transition, the slope of sustainability improvement stays relatively constant at 0.3. Also in this time frame, the lines show a mean shift of about 4 points in COSP. With r-squared values of 0.78 and 0.75 respectively, both the pre and post trend lines appear to be significant.

After studying the regression discontinuity graphs for all 11 study companies, it was noted that 10 of the 11 demonstrated their shift between the same years – 2004 and 2005. The immediate concern was that there was a change in the scoring methodology which would compromise any ability to draw conclusions from data over time. The first things evaluated were available strengths and concerns. There were only two changes for 2005. The first was minor, changing a potential strength in the area of corporate

governance from “environmental communication” to “transparency”. This should not have a material impact, as it appears to mainly be a labeling change. The other more significant change, was in the addition of a new potential strength in the area of community, for “volunteer program”. If companies already had a strong volunteer program prior to 2005, they may have received an increase in their overall sustainability score of one point without having made any changes. The raw data were referenced, and only three of the ten companies showing a jump between 2004 and 2005 received a strength for their volunteer programs. Therefore, the potential systemic increase in sustainability scores due to KLD adding a potential strength (in effect increasing the maximum potential overall score by one) could only be a factor in 30 percent of the study companies.

Another potential for a systemic change which could affect a jump in sustainability scores, is if there had been a change in scoring methodology. This could be due to a change in personnel assigning scores or criteria for a given score. To test for a change of this nature, all of the available data for 2004 and 2005 were analyzed and are presented below in Table 4.3.

Table 4.3

Comparison of All Sustainability Scores for 2004 and 2005

	2004	2005
Number of Entries	1829	1813
Average	0.47075	0.45284
Standard Deviation	2.10601	2.27900

The results from comparing 2004 and 2005 show that there was actually a decrease in overall sustainability scores of about four percent. This would seem to rule out a systemic change causing the jump in scores. Having ruled out specific scoring and systemic scoring influences, the next possibility to be explored was macroeconomic influences. To check for influences which could have impacted companies across multiple industries, the return on assets (ROA) for each industry was plotted for 1991 through 2009 on the same graph. The results are shown below in Figure 4.15.

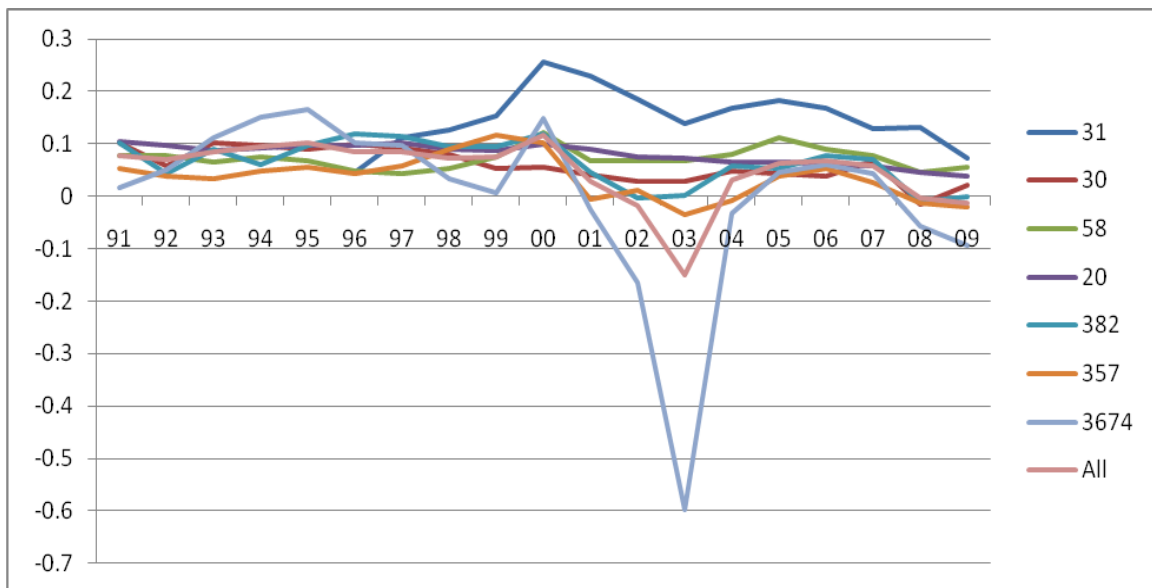


Figure 4.15. ROA trend charts by SIC code.

Upon examining the graph, all of the industries predominantly show a substantial reduction in ROA for 2002 and 2003, followed by a noticeable increase in 2004 and 2005. Recalling back to potential macroeconomic factors from that time frame, the 9/11 attacks on the U.S. happened late in 2001 and had a devastating impact on the national economy. This impact lasted a couple of years. It is not unreasonable to assume that

companies would have restricted expenditures in new areas. This is also a time frame when sustainability was gaining momentum in business literature. It would seem to make sense that companies would begin to substantially invest in sustainable activities only after returns resumed to positive levels. Therefore, with investments returning in 2004, a jump between 2004 and 2005 in sustainability scores would make sense. This is validated by the observations of Tyler Elm, Senior Director, Corporate Strategy & Finance, Wal-Mart Stores, Inc. in Laszlo's *Sustainable Value* (2008, p. 15):

These business leaders are learning their way into a new mode of operation, tapping new sources of value, and, through the journey of business sustainability, developing new sources of inimitable competitive advantage. In my case, I had not detected this change as a competitive force outside of the natural resource industries and industrial products companies until 2003. By 2004, it was an emerging strategy among a few mainstream consumer businesses. By 2005, I found myself in the middle of an effort with the world's largest company as it applied the principles of sustainability to its core business in its quest to become an even better company.

After each study company was graphically confirmed to demonstrate the criteria previously determined, the next task was to assign them to industries in order to run the various models. Mergent On-Line was queried via the Lawrence Technological University (LTU) on-line library for SIC codes for 2,012 companies. Each of the study companies' SIC codes were noted, and they were grouped with other companies with the same SIC code. Then the size of each industry was evaluated, starting with the two digit SIC codes. Some industries seemed to be appropriately sized as a two digit code, for

example SIC code 31 included five companies, one of which was a study company. Others seemed to be quite large relative to the number of study companies contained within the sample. For these industries, three or even four digit SIC codes were evaluated. Below, Table 4.4 shows the various SIC codes, and whether the industry was deemed “OK” or if it was subdivided by adding more digits to the SIC code.

Table 4.4

Study Companies and their Associated Industry Selection

SIC	Description	Cos.	Study Cos.	Actions	Cos.	Study Cos.
20	Food and Kindred Products	37	2	OK	37	2
30	Rubber and Miscellaneous Plastic Products	9	1	OK	9	1
31	Leather and Leather Products	5	1	OK	5	1
35	Industrial and Commercial Machinery and Computer Equipment	83	1	Subdivide		
	357 COMPUTER AND OFFICE EQUIPMENT			OK, large	21	1
	3571 ELECTRONIC COMPUTERS			OK, small	4	1
36	Electronic, Elctrcl Eqmnt & Cmpnts, Excpt Computer Eqmnt	109	4	Subdivide		
	3674 SEMICONDUCTORS AND RELATED DEVICES			OK	52	4
38	Mesr/Anlyz/Cntrl Instrmnts; Photo/Med/Opt Gds; Watches/Clocks	71	1	Subdivide		
	382 LABORATORY APPARATUS AND ANALYTICAL, OPTICAL, MEASURING, AND CONTR			OK, large	32	1
	3825 INSTRUMENTS FOR MEASURING AND TESTING OF ELECTRICITY AND ELECTRIC			OK, small	6	1
58	Eating and Drinking Places	21	1	OK	21	1
	TOTAL	335	11			

As can be seen in Table 4.4, four of the seven industries were deemed to be appropriately sized at the two digit level, and three were subdivided. Of the three that were subdivided, one had an obvious sizing at the four digit level. For the other two, it was not obvious whether to subdivide by going to the three or four digit level, so both were run through the models.

Results of Model One

Model One was run 10 times, each for a different SIC selection. The results of the regressions are shown below, in Table 4.5. The results will be discussed on an individual basis, and then from an overall viewpoint.

Table 4.5

Summary Data from the Results of the Regressions of Model One

SIC		R-sq	Adj. R-sq	COSP	SIZE
31	Coef.	74.86%	70.79%	-0.01690	0.07789
	T			-3.89486	4.42511
	P			0.000	0.000
30	Coef.	51.50%	46.96%	0.00138	0.00361
	T			0.63175	0.37906
	P			0.529	0.705
58	Coef.	28.89%	21.11%	0.00589	-0.02082
	T			2.03776	-1.84905
	P			0.043	0.066
20	Coef.	40.43%	34.70%	0.00188	0.00864
	T			1.05035	1.20131
	P			0.294	0.230
382	Coef.	43.03%	35.48%	0.01716	0.03863
	T			4.16665	2.20414
	P			0.000	0.028
3825	Coef.	37.57%	26.64%	0.01190	-0.02573
	T			1.76986	-0.54420
	P			0.084	0.589
357	Coef.	51.48%	46.25%	-0.00099	0.04098
	T			-0.27572	3.04320
	P			0.783	0.003
3571	Coef.	58.52%	54.29%	-0.00810	0.06067
	T			-1.37142	3.04053
	P			0.176	0.004
3674	Coef.	14.77%	4.83%	0.02115	0.12214
	T			0.68961	1.64370
	P			0.491	0.245
All	Coef.	15.56%	6.45%	0.00899	0.05784
	T			1.05648	1.77329
	P			0.291	0.076

For SIC 31 (Leather Products), Model One shows a negative correlation of COSP and a positive correlation of SIZE (size of the firm, calculated as the natural log of the total assets) to CFP (Corporate Financial Performance, calculated as the ROA of the firm less the average ROA of the industry). Both are significant at the $p \leq .05$ level. Based on the value of the coefficients, SIZE has almost a five times greater influence than CFP.

For SIC 30 (Rubber and Plastic Products), Model One shows a positive correlation of COSP and a positive correlation of SIZE to CFP. Neither is statistically significant, even at the $p \leq .20$ level.

For SIC 58 (Eating and Drinking Places), Model One shows a positive correlation of COSP and a negative correlation of SIZE to CFP. COSP is significant at the $p \leq .05$ level, and SIZE is significant at the $p \leq .10$ level.

For SIC 20 (Food Products), Model One shows a positive correlation of COSP and a positive correlation of SIZE to CFP. Neither is statistically significant, even at the $p \leq .20$ level.

For SIC 382 (Laboratory Apparatus), Model One shows a positive correlation of COSP and a positive correlation of SIZE to CFP. Both are statistically significant, at the $p \leq .05$ level. Based on the value of the coefficients, SIZE has more than twice the influence of CFP.

For SIC 3825 (Instruments for Measuring Electricity), Model One shows a positive correlation of COSP and a negative correlation of SIZE to CFP. COSP is significant at the $p \leq .10$ level, and SIZE is not significant even at the $p \leq .20$ level.

For SIC 357 (Computer and Office Equipment), Model One shows a negative correlation of COSP and a positive correlation of SIZE to CFP. COSP is not significant even at the $p \leq .20$ level, and SIZE is significant at the $p \leq .05$ level.

For SIC 3571 (Computers), Model One shows a negative correlation of COSP and a positive correlation of SIZE to CFP. COSP is significant only at the $p \leq .20$ level, and SIZE is significant at the $p \leq .05$ level.

For SIC 3674 (Semiconductors), Model One shows a positive correlation of COSP and a positive correlation of SIZE to CFP. Neither is statistically significant, even at the $p \leq .20$ level.

For SIC All (Combination of all other SICs), Model One shows a positive correlation of COSP and a positive correlation of SIZE to CFP. COSP is not significant even at the $p \leq .20$ level, and SIZE is significant at the $p \leq .10$ level.

SIZE was included as a control variable because of the predominance of research which has shown it to be highly correlated with financial performance. For this model, the relationship held. SIZE was positively correlated with financial performance in eight of the ten runs. If only results with $p \leq .05$ are included, then the correlation between SIZE and CFP was statistically significant in four of the ten runs. It is interesting to note that the SIC selection process was germane to the results. Counter intuitively, SIC 382 had more statistically significant results than the more focused SIC 3825. Also of note, the sign of the coefficient on SIZE went from positive to negative upon the narrowing of companies.

Hypothesis One. The results for the relationship between sustainability performance (COSP) and financial performance (CFP) were quite varied. Six of the ten showed a positive correlation, and four showed a negative correlation. At the $p \leq .05$ level, there are two SICs with a positive correlation and one with a negative. If the significance is reduced to the $p \leq .20$ level, it adds on another positive and another negative. Five of the ten runs do not show a significant relationship, even at the $p \leq .20$ level. Remembering the hypothesis and its associated null hypothesis:

H1: A firm's overall sustainability score will positively correlate with financial performance within their industry.

H₀1: A firm's overall sustainability score will not correlate with financial performance within their industry.

The null hypothesis would be rejected on three of the SIC selections, and not rejected on seven, at the $p \leq .05$ level. Overall, with the few number of SIC selections that would reject the null hypothesis, and the difference in direction between the three which would, the null hypothesis should not be rejected globally. Therefore, the hypothesis is not supported.

Results of Model Two

Model Two was run ten times, each for a different SIC selection. The results of the regressions are shown below in Table 4.6. The results will be discussed on an individual basis, and then from an overall viewpoint.

Table 4.6

Summary Data from the Results of the Regressions of Model Two

SIC		R-sq	Adj. R-sq	COSP	SIZE	PRE
31	Coef.	74.86%	69.98%	-0.01659	0.07797	0.00251
	T			-2.54433	4.35909	0.06468
	P			0.015	0.000	0.949
30	Coef.	53.97%	49.19%	-0.00121	-0.00412	-0.06344
	T			-0.50341	-0.41821	-2.38658
	P			0.616	0.677	0.019
58	Coef.	28.89%	20.71%	0.00569	-0.02052	0.00216
	T			1.59645	-1.56877	0.04421
	P			0.112	0.118	0.965
20	Coef.	40.75%	34.89%	0.00272	0.01282	0.04312
	T			1.45250	1.65760	1.46067
	P			0.147	0.098	0.145
382	Coef.	43.29%	35.52%	0.01425	0.03644	-0.08597
	T			2.88821	2.06581	-1.06951
	P			0.004	0.040	0.286
3825	Coef.	39.58%	27.18%	0.00228	-0.01678	-0.14141
	T			0.21149	-0.35143	-1.13838
	P			0.834	0.727	0.262
357	Coef.	51.51%	46.02%	-0.00060	0.04211	0.01949
	T			-0.15837	3.03371	0.34807
	P			0.874	0.003	0.728
3571	Coef.	59.37%	54.29%	-0.00477	0.06755	0.06590
	T			-0.70539	3.20238	1.00493
	P			0.484	0.002	0.320
3674	Coef.	15.08%	4.96%	0.06123	0.14203	0.56113
	T			1.39906	1.34041	1.28283
	P			0.162	0.181	0.200
All	Coef.	15.64%	6.48%	0.01536	0.06863	0.15037
	T			1.54187	2.03206	1.22831
	P			0.123	0.042	0.220

For SIC 31 (Leather Products), Model Two shows a negative correlation of COSP, and a positive correlation of SIZE and PRE (binary variable, with value of one prior to the effective influence data) to CFP. Both COSP and SIZE are significant at the $p \leq .05$ level. PRE is not significant, even at the $p \leq .20$ level.

For SIC 30 (Rubber and Plastic Products), Model Two shows a negative correlation of COSP, SIZE, and PRE to CFP. PRE is significant at the $p \leq .05$ level, however, neither COSP nor SIZE is statistically significant, even at the $p \leq .20$ level.

For SIC 58 (Eating and Drinking Places), Model Two shows a positive correlation of COSP and PRE, and a negative correlation of SIZE to CFP. COSP and SIZE are only significant at the $p \leq .20$ level, however, PRE is not statistically significant, even at that level.

For SIC 20 (Food Products), Model Two shows a positive correlation of COSP, SIZE, and PRE to CFP. COSP and PRE are only significant at the $p \leq .20$ level, however, SIZE is significant at the $p \leq .10$ level.

For SIC 382 (Laboratory Apparatus), Model Two shows a positive correlation of COSP and SIZE, and a negative correlation of PRE to CFP. Both COSP and SIZE are statistically significant, at the $p \leq .05$ level, however, PRE is not statistically significant, even at the $p \leq .20$ level.

For SIC 3825 (Instruments for Measuring Electricity), Model Two shows a positive correlation of COSP, and a negative correlation of SIZE and PRE to CFP. None of the three relationships are significant, even at the $p \leq .20$ level.

For SIC 357 (Computer and Office Equipment), Model Two shows a negative correlation of COSP and a positive correlation of SIZE and PRE to CFP. SIZE is significant at the $p \leq .05$ level, however, neither COSP nor PRE is significant, even at the $p \leq .20$ level.

For SIC 3571 (Computers), Model Two shows a negative correlation of COSP, and a positive correlation of SIZE and PRE to CFP. SIZE is significant at the $p \leq .05$ level, however, neither COSP nor PRE is significant, even at the $p \leq .20$ level.

For SIC 3674 (Semiconductors), Model Two shows a positive correlation of COSP, PRE, and SIZE. All three of the relationships are significant, however, only at the $p \leq .20$ level.

For SIC All (Combination of all other SICs), Model Two shows a positive correlation of COSP, PRE, and SIZE to CFP. SIZE is significant at the $p \leq .05$ level, COSP is significant at the $p \leq .20$ level, and PRE is not significant, even at the $p \leq .20$ level.

As in Model One, overall the relationship with COSP was weak. Six of the ten runs showed a positive relationship, however, one was statistically insignificant and four of the other five were only significant at the $p \leq .20$ level. At the preferred $p \leq .05$ level, only two of the runs were significant: one was positive and one was negative. Also consistent with Model One, the correlation with SIZE was strong. Fully half of the runs showed a positive relationship at the $p \leq .05$ level, with a sixth run at the $p \leq .10$ level.

Hypothesis Two. The variable that was included in the model to address Hypothesis Two was the variable POST. POST was set up as a binary variable, with the value of one after the effective influence date, and the value of zero for dates prior to the effective influence date. Also included in the model was the variable PRE, which was precisely the complementary variable of POST. With the data available, POST could not be estimated and was removed from the resultant regression equation. Since it was set up as a complementary variable, some information may be gleaned from the variable PRE. Review of Table 4.6, however, shows that PRE did not return conclusive results either. Three of the ten runs had a negative correlation, and seven had a positive correlation. Of

those ten runs, only one was significant at the preferred $p \leq 0.05$ level, and only two more are added if the criterion is expanded to the $p \leq 0.20$ level. Of the three runs of any significance, two were positive and one was negative, making any inferences to the variable PRE impossible. Recalling the hypothesis and its associated null hypothesis:

H2: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

H₀2: A firm's effective implementation of a sustainability program will not correlate with an increase in relative financial performance within their industry.

With no results for POST, and no inferences from the complementary variable PRE, there can be no conclusions regarding Hypothesis Two. The results for Hypothesis Two and its associated null hypothesis are inconclusive, and as such, cannot be supported. Opportunities to improve upon this result, in future research, are included in Chapter Five.

Hypothesis Three. The variable included in Model Two in order to address Hypothesis Three, was the variable PRE. It was a binary variable with values of one for the dates prior to the effective influence date, and values of zero otherwise. Unlike the variable POST from the previous hypothesis, each of the regression runs did return values for PRE. Recalling Hypothesis Three and its associated null hypothesis:

H3: A firm with exceptional profitability associated with implementation of a sustainability program, also had relatively exceptional profit before implementation.

H₀₃: A firm with exceptional profitability associated with implementation of a sustainability program, did not have relatively exceptional profit before implementation.

The overall results for the variable PRE were quite weak. Seven of the ten models did show a positive relationship, but the significance of the relationships was weak. Only three of the ten runs were significant even at the $p \leq .20$ level: of those, two were positive and one was negative. The only run which was significant at the preferred $p \leq .05$ level, was for SIC 30, and it showed a negative relationship. The lack of significance of the variable PRE, coupled with the variation in the direction of the relationship, does not allow for the rejection of the null hypothesis associated with Hypothesis Three. As a result, Hypothesis Three cannot be supported.

Results of Model Three

Model Three was run ten times, each for a different SIC selection. The results of the regressions are shown below, in Table 4.7. The results will be discussed on an individual basis, and then from an overall viewpoint.

Table 4.7

Summary Data from the Results of the Regressions of Model Three

SIC		R-sq	Adj. R-sq	COSP	SIZE	TIME
31	Coef.	74.90%	70.02%	-0.01588	0.07802	-0.00244
	T			-2.55284	4.37330	-0.23159
	P			0.015	0.000	0.818
30	Coef.	53.72%	48.92%	-0.00101	-0.00328	0.01735
	T			-0.42131	-0.33411	2.25593
	P			0.674	0.739	0.026
58	Coef.	28.93%	20.76%	0.00639	-0.01857	-0.00497
	T			1.80537	-1.43957	-0.35946
	P			0.073	0.153	0.720
20	Coef.	40.61%	34.73%	0.00246	0.01185	-0.00912
	T			1.31850	1.52470	-1.08996
	P			0.188	0.128	0.276
382	Coef.	43.05%	35.24%	0.01664	0.03820	0.00493
	T			3.53606	2.16365	0.23189
	P			0.000	0.031	0.817
3825	Coef.	38.01%	25.29%	0.00860	-0.02325	0.01553
	T			0.93510	-0.48507	0.52591
	P			0.358	0.630	0.602
357	Coef.	51.48%	45.99%	-0.00103	0.04084	0.00073
	T			-0.27743	2.94656	0.04511
	P			0.782	0.004	0.964
3571	Coef.	58.86%	53.72%	-0.00638	0.06482	-0.01162
	T			-0.97768	3.06966	-0.63446
	P			0.333	0.004	0.529
3674	Coef.	14.99%	4.86%	0.05151	0.13331	-0.12320
	T			1.23750	1.26497	-1.07861
	P			0.217	0.207	0.281
All	Coef.	15.63%	6.46%	0.01432	0.06673	-0.03764
	T			1.46781	1.98770	-1.11640
	P			0.142	0.047	0.264

For SIC 31 (Leather Products), Model Three shows a negative correlation of COSP, a positive correlation of SIZE, and a negative correlation of TIME (Time, in years, since the effective influence data) to CFP. Both COSP and SIZE are significant at the $p \leq .05$ level. TIME is not significant, even at the $p \leq .20$ level.

For SIC 30 (Rubber and Plastic Products), Model Three shows a negative correlation of COSP and SIZE, but a positive correlation of TIME to CFP. TIME is significant at the $p \leq .05$ level, but neither COSP nor SIZE is statistically significant, even at the $p \leq .20$ level.

For SIC 58 (Eating and Drinking Places), Model Three shows a positive correlation of COSP and a negative correlation of SIZE and TIME to CFP. COSP is significant at the $p \leq .10$ level, SIZE is significant at the $p \leq .20$ level, but TIME is not statistically significant, even at the $p \leq .20$ level.

For SIC 20 (Food Products), Model Three shows a positive correlation of COSP and SIZE, and a negative correlation of TIME to CFP. COSP and SIZE are significant only at the $p \leq .20$ level, although TIME is not statistically significant, even at the $p \leq .20$ level.

For SIC 382 (Laboratory Apparatus), Model Three shows a positive correlation of COSP, SIZE, and TIME to CFP. Both COSP and SIZE are statistically significant, at the $p \leq .05$ level, and again TIME is not statistically significant, even at the $p \leq .20$ level.

For SIC 3825 (Instruments for Measuring Electricity), Model Three shows a positive correlation of COSP and TIME, and a negative correlation of SIZE to CFP. None of the three relationships are significant, even at the $p \leq .20$ level.

For SIC 357 (Computer and Office Equipment), Model Three shows a negative correlation of COSP and a positive correlation of SIZE and TIME to CFP. SIZE is significant at the $p \leq .05$ level, yet neither COSP nor TIME is significant, even at the $p \leq .20$ level.

For SIC 3571 (Computers), Model Three shows a negative correlation of COSP and TIME, and a positive correlation of SIZE to CFP. SIZE is significant at the $p \leq .05$ level, however, neither COSP nor TIME is significant, even at the $p \leq .20$ level.

For SIC 3674 (Semiconductors), Model Three shows a positive correlation of COSP and SIZE, and a negative correlation of TIME to CFP. None of the three relationships are significant, even at the $p \leq .20$ level.

For SIC All (Combination of all other SICs), Model Three shows a positive correlation of COSP and SIZE, and a negative correlation of TIME to CFP. SIZE is significant at the $p \leq .05$ level, COSP is significant at the $p \leq .20$ level, and TIME is not significant, even at the $p \leq .20$ level.

The results for COSP and SIZE were quite similar to those of Models One and Two. COSP had mixed results, with half of the runs showing a positive relationship and half showing a negative result. Still, half of the results were not even significant at the $p \leq .20$ level. Taking the preferred $p \leq .05$ level, there were only 2 SIC selections that were significant: one was positive and one was negative. The SIZE results were much more meaningful, with half of the SIC selections being significant at the $p \leq .05$ level, and all of them showing a positive relationship.

Hypothesis Four. The variable aimed at ascertaining whether Hypothesis Four is true, is the variable TIME. TIME was shown to correlate positively in four of the ten SIC selections, and negatively in six of the ten. Nine of the ten SIC selections did not have any significance, even at the $p \leq .20$ level. The remaining selection, SIC 30, was significant at the $p \leq .05$ level. Recalling the hypothesis, and its associated null hypothesis:

H4: A firm's increase in relative financial performance within their industry due to the implementation of a sustainability program will have cumulative effects.

H₀4: A firm's increase in relative financial performance within their industry due to the implementation of a sustainability program will not have cumulative effects.

The null hypothesis can only be rejected for one of the ten SIC selections. Thus, globally for this study, the null hypothesis cannot be rejected and as a result, the hypothesis cannot be supported.

Results of Model Four

Model Four was run ten times, each for a different SIC selection. The results of the regressions are shown below, in Table 4.8. The results will be discussed on an individual basis, and then from an overall viewpoint.

Table 4.8

Summary Data from the Results of the Regressions of Model Four

SIC		R-sq	Adj. R-sq	COSP	SIZE	TIME	PRE
31	Coef.	74.91%	69.18%	-0.01620	0.07787	-0.00371	-0.00686
	T			-2.38775	4.29546	-0.25348	-0.12711
	P			0.022	0.000	0.801	0.900
30	Coef.	54.10%	48.85%	-0.00137	-0.00450	0.00721	-0.04304
	T			-0.56394	-0.45369	0.54039	-0.93109
	P			0.574	0.651	0.590	0.354
58	Coef.	28.97%	20.41%	0.00609	-0.01953	-0.00985	-0.02339
	T			1.66110	-1.47242	-0.48134	-0.32403
	P			0.098	0.142	0.631	0.746
20	Coef.	40.76%	34.73%	0.003	0.01264	0.00234	0.04982
	T			1.43946	1.61822	0.16286	0.98331
	P			0.15100	0.106	0.871	0.326
382	Coef.	43.50%	35.49%	0.01447	0.03682	-0.03171	-0.17915
	T			2.92882	2.08644	-0.94438	-1.40756
	P			0.004	0.038	0.346	0.161
3825	Coef.	39.70%	25.42%	0.00252	-0.01658	-0.01113	-0.17263
	T			0.23047	-0.34314	-0.28415	-1.03393
	P			0.819	0.733	0.778	0.308
357	Coef.	51.62%	45.87%	-0.00058	0.04165	0.02060	0.08086
	T			-0.15378	2.99278	0.66182	0.74619
	P			0.878	0.003	0.509	0.456
3571	Coef.	59.46%	53.42%	-0.00476	0.06705	0.01019	0.09594
	T			-0.69705	3.13982	0.31823	0.83203
	P			0.489	0.003	0.752	0.410
3674	Coef.	15.09%	4.76%	0.06277	0.14172	-0.03392	0.46565
	T			1.41140	1.33594	-0.20138	0.72149
	P			0.159	0.182	0.840	0.471
All	Coef.	15.64%	6.42%	0.01558	0.06896	-0.01228	0.11450
	T			1.55540	2.03914	-0.21658	0.55585
	P			0.120	0.042	0.829	0.578

For SIC 31 (Leather Products), Model Four shows a negative correlation of COSP, TIME, and PRE to CFP, but a positive correlation of SIZE (Size of the firm, calculated as the natural log of the total assets) to CFP. Both COSP and SIZE are significant at the $p \leq .05$ level. TIME and PRE are not significant, even at the $p \leq .20$ level.

For SIC 30 (Rubber and Plastic Products), Model Four shows a negative correlation of COSP, PRE, and SIZE, but a positive correlation of TIME to CFP. None of the four variables were statistically significant, even at the $p \leq .20$ level.

For SIC 58 (Eating and Drinking Places), Model Four shows a positive correlation of COSP and a negative correlation of SIZE, PRE, and TIME to CFP. COSP is significant at the $p \leq .10$ level, SIZE is significant at the $p \leq .20$ level, though, TIME and PRE are not statistically significant, even at the $p \leq .20$ level.

For SIC 20 (Food Products), Model Four shows a positive correlation of COSP, SIZE, TIME, and PRE. COSP and SIZE are significant only at the $p \leq .20$ level, yet TIME and PRE are not statistically significant, even at the $p \leq .20$ level.

For SIC 382 (Laboratory Apparatus), Model Four shows a positive correlation of COSP and SIZE, but a negative correlation of PRE and TIME to CFP. Both COSP and TIME are statistically significant at the $p \leq .05$ level. PRE is significant only at the $p \leq .20$ level, and TIME is not statistically significant, even at the $p \leq .20$ level.

For SIC 3825 (Instruments for Measuring Electricity), Model Four shows a positive correlation of COSP, and a negative correlation of SIZE, TIME, and PRE to CFP. None of the four relationships are significant, even at the $p \leq .20$ level.

For SIC 357 (Computer and Office Equipment), Model Four shows a negative correlation of COSP and a positive correlation of SIZE, PRE, and TIME to CFP. SIZE is significant at the $p \leq .05$ level, but none of the other three variables are significant, even at the $p \leq .20$ level.

For SIC 3571 (Computers), Model Four shows a negative correlation of COSP, and a positive correlation of SIZE, TIME, and PRE to CFP. SIZE is significant at the $p \leq .05$ level, however, none of the other three variables are significant, even at the $p \leq .20$ level.

For SIC 3674 (Semiconductors), Model Four shows a positive correlation of COSP, SIZE, and PRE, and a negative correlation of TIME to CFP. COSP and SIZE are statistically significant only at the $p \leq .20$ level. Neither TIME nor PRE were significant, even at the $p \leq .20$ level.

For SIC All (Combination of all other SICs), Model Four shows a positive correlation of COSP, SIZE, and PRE, and a negative correlation of TIME to CFP. SIZE is significant at the $p \leq .05$ level, COSP is significant at the $p \leq .20$ level, and TIME and PRE are not significant, even at the $p \leq .20$ level.

Consistent with Models One through Three, COSP had mixed results and SIZE had strong results. Consistent with Model Two, PRE had weak results and POST had no results returned. Consistent with Model Three, TIME had very weak results: this time, not even one of the ten runs was statistically significant. Model Four did not have any specific hypotheses associated with it. The intent of Model Four was simply to check for any difference in results from the combining of all of the variables from the first three models. There were no significant differences in the results for the variables, whether they were tested individually or as a group.

Variation Based on Industry Selection

The industry selections were fairly straightforward, as was previously demonstrated in Table 4.4. For five of the seven industries, the conclusion was easily made, based on the number of companies included within each of the various SIC splits. For the other two industries, the choice was not obvious. Specifically, it was not clear whether to opt for SIC 38 (Measurement Instrument) to be taken to the three-digit 382

level (Laboratory Apparatus with 32 companies) or the four-digit 3825 level (Instruments for Measuring Electricity with 6 companies). It was also unclear whether to take SIC 35 (Industrial and Commercial Machinery) to the three-digit 357 level (Computer and Office Equipment with 21 companies) or the four-digit 3571 level (Computers with 4 companies). Since there was not a clear direction, it was decided to run both levels of each of the two SICs through the four models. This would allow some insight into the impact of SIC selection on the regression results.

Overall, the difference in results due to the SIC selection was not substantial. Within SIC 38, the largest difference between the two subsets was in the significance of each of the variables within each of the models. Counterintuitively, the more focused SIC selection resulted in a lower statistical significance almost across the board. Although there were some changes in the direction of the relationship (four of twelve), in each of those cases, the variable on the 3825 selection was not statistically significant, making it inappropriate to draw any conclusions. Within the SIC 35, the results were much more consistent. Here, the direction of the relationship remained the same for eleven of the twelve model/variable combinations. The statistical significance of the relationships were also much more consistent, with eleven of the twelve having the same $p \leq$ level grouping.

The two industries with multiple selection choices both showed consistency in results, regardless of how the industry was subdivided. They did so for different reasons. In SIC 38, there was no difference due to the lack of statistically significant results on one of the two subsets. Within SIC 35, the results were almost identical, regardless of the

grouping. For these reasons, it is the conclusion of the author that the industry selection process did not substantially influence the outcome of the analyses.

Results of Company Interviews for Construct Validity

All 11 study companies were contacted and requested to participate in a brief telephone interview. Four of the companies specifically declined the request, citing too many requests of this nature, resulting in a policy of non participation. Four of the companies never acknowledged the request, despite numerous contact attempts. Three of the companies did consent.

This research utilized a modified regression discontinuity model, where jumps in the sustainability data were assumed to have correlated with significant activities within the organization. The purpose of the interviews was to determine if indeed, there was a correlation. The interview questions were detailed in Chapter Three. The results were very positive. A general discussion of each of the questions and a summary of the responses will be presented below.

The first section addressed the background of the interviewees. The interviewees' names and companies were confirmed simply in order to be able to tie the responses back to the proper companies. Each person was asked their title to ensure that they were of a high enough level within the company to know that macro level activities and strategies. The three persons were: a Director of Sustainability Stakeholder Relations, a Vice President of Corporate Social Responsibility, and a Director of Corporate Citizenship. The next two questions asked for the amount of time in their current position and their length of service with the company. This was to confirm that they would be able to speak

knowledgeably about the activities, given the time frame of the sustainability data shifts. They had all been in their current positions for at least four years, and with their company for at least eleven. The last three questions just confirmed that they were the proper individual to be interviewed, that they understood the consent form, and that they didn't have any questions about the purpose of the research.

The next section of questions dealt with the companies and their sustainability programs. All three interviewees indicated that their companies had some form of a sustainability program. The names of the programs varied, with one using corporate citizenship and the other two corporate social responsibility (CSR). When asked about when their respective programs were initiated, they all had difficulty listing a single date. Instead, they had a progression of significant milestones in the evolution of their programs. When asked about the major elements of their programs, the responses were quite similar. They all listed elements which included numerous environmental and social initiatives, along with stakeholder relation activities. The biggest difference was that one of the programs specifically excluded anything to do with corporate governance, because that company felt that it was an area that only the legal staff had responsibility for.

The last two questions in the company section, were focused specifically on the elements for the construct validity testing. They were each asked whether or not there were activities going on within their companies that could have resulted in the observed jumps in sustainability performance. They each felt strongly that there were internal events that correlated with the shift in sustainability scores. One primarily correlated with the creation of a CSR department and the hiring of a Vice President to lead it.

Another correlated with the company's early adoption of the global reporting initiative (GRI) for their reporting. The third correlated with an internally established challenge to the organization to change how operational costs were viewed. Supporting the construct validity was their consistent conviction that there were significant milestone events within their companies that corresponded with the observed phenomenon from the regression discontinuity graphs. They were also asked if they felt that there were other factors within their company during this time frame that had the potential to significantly change the CFP. None of them felt that there were.

The last section of questions addressed the industries that each of their companies compete within. They all felt that sustainability was expected within their respective industries. In addition, all felt that they were recognized as the sustainability leader within their industry, and that this position was a competitive advantage. The only substantial difference was that one of the interviewees felt that their company was competing in three distinct industries. Of interest, is that he felt that the expectations for sustainability varied greatly between these three industries. One of the industries had sustainability as a requirement to compete, one recognized the value of sustainability but it was still optional, and the third industry placed no value on sustainability. This did not contribute much to the construct validity testing, although, it did support another finding of this research: that the relationship between sustainability and CFP appears to be very industry specific.

Summary

This chapter first went through the results of the multi-step process used to determine the study companies to be utilized for the research. Next, the study company's respective trend charts for overall sustainability performance were compared to the theoretical model to determine the projected strength of fit. Then, the results were analyzed for each of the ten different runs for each of the four models. Within these analyses, the four hypotheses were tested, as the relevant data was described. The control variable SIZE showed the most consistent and strongest results throughout the study.

Hypothesis One was not supported on a global basis, yet individual industries did show strong relationships between COSP and CFP. Hypotheses Two, Three, and Four were also not supported. Selection methodology within a specific industry was not shown to significantly influence the results. Perhaps the most interesting results came out of the study of information for Hypothesis One. Despite not being able to uphold the hypothesis, the huge difference in results between industries suggests that the nature of the relationship between sustainability and financial performance is very industry dependent. This may be part of the reason that the analyses yielded poor results, when analyzed globally. The implication of the potential for an industry-dependent relationship will be further developed in Chapter Five.

Chapter 5: Discussion and Recommendations

Introduction

The discussion and recommendations here build on Chapter Four's explanation of the results of the study. Hence, this chapter will start with a summary of the results of the study. The implications for future research will be discussed in two sections; one which would involve minor modifications to the current study, and one which would require expansion of the study. The following section will discuss the implications for practice and recommendations. This section will also be subdivided into the two most salient implications. The first implication being the industry specific nature of the relationship between sustainability and financial performance, and the second being the analysis methodology of utilizing a modified regression discontinuity model. Another section will deal with the limitations of the study: both the anticipated limitations, and those that were discovered during the process of the research. Finally, the chapter will conclude with a summary of the chapter and the research overall.

Summary of the Results

The results, in general, were not supportive of the four hypotheses. The four hypotheses were:

H₁: A firm's overall sustainability score will positively correlate with financial performance within their industry.

H₂: A firm's effective implementation of a sustainability program will positively correlate with an increase in relative financial performance within their industry.

H₃: A firm with exceptional profitability associated with implementation of a sustainability program also had relatively exceptional profit before implementation.

H₄: A firm's increase in relative financial performance within their industry, due to the implementation of a sustainability program, will have cumulative effects.

Hypothesis Two could not be addressed due to the nature of the data, resulting in the variable POST not being estimated during the regression analyses. The other three hypotheses were not able to be statistically supported on a global basis. Still, there were statistically significant relationships observed within specific industries. A summary of the results of the regressions for the four models and ten industry groupings is listed in Table 5.1.

Table 5.1

Summary Data from the Results of the 40 Regressions

SIC	COSP	SIZE	TIME	PRE
31	Negative *	Positive *	-	-
30	-	-	Positive *	Negative *
58	Positive *	Negative **	-	-
20	Positive ***	Positive **	-	Positive ***
382	Positive *	Positive *	-	Negative ***
3825	Positive **	-	-	-
357	-	Positive *	-	-
3571	Negative ***	Positive *	-	-
3674	Positive ***	Positive ***	-	Positive ***
All	Positive ***	Positive *	-	-

* At $p \leq .05$ ** At $p \leq .10$ *** At $p \leq .20$

The variable corporate overall sustainability performance (COSP) has some degree of relationship to corporate financial performance (CFP) in most of the 10 SIC groupings, yet the direction and significance varies greatly. Utilizing the preferred $p \leq .05$, only three of the industry groupings are significant, and there is still a variation in the direction of the relationship. The control variable SIZE also has some degree of relationship to CFP, but it is much more consistent in direction and is more statistically significant. It shows a positive relationship at the preferred level of significance in half of the SIC groupings. The variables TIME and PRE were only significant at the

preferred level for one of the industries; SIC 30. Surprisingly, SIC 30 (Rubber Products) is the only industry which showed no relationship to COSP or SIZE, even at the $p \leq .20$ level.

SIZE being positively correlated with CFP is consistent with the preponderance of literature that has found this relationship. This is why the variable was included as a control variable. The huge variation in the relationship between COSP and CFP, depending on the industry, may be the reason that there are such inconsistencies in the findings in previous studies. The difference might be as a result of industry differences in implementation methods or efficiencies. The literature review included studies which showed a negative relationship, a positive relationship, a neutral relationship, and even a curvilinear relationship. The results of this study would seem to indicate that each of those relationships would be a potential outcome, given that the right subset of industries were included in the study. In that sense, this study's lack of consistent relationship across industries is quite consistent with the previous literature having such a high degree of variation in its findings.

Implications for Future Research

The implications for future research are divided into two subsections: modifications to current study and expanded areas for study. The first addresses primarily modifications which the author might consider for using the current study and improving upon it for future research. The second would be large areas of change, primarily in the area of scope, which the author or other researchers might choose to

pursue to further add to the body of knowledge regarding the relationship between sustainability and financial performance.

Modifications to current study. The first potential modification to the study for future research would be easily accomplished and could yield powerful results. This modification would be to change the scoring technique utilized for obtaining the COSP score. The method of subtracting the number of concerns from the number of strengths is perhaps too simple, despite being one of the computational methods Kinder, Lydenberg, and Domini (KLD) recommends in their database information. It assumes that each strength or concern is equally important. As an example of the potential flaw is this logic: non-U.S. charitable giving is certainly a noble and valuable strength, but it seems difficult to say that it should be able to offset product safety concerns. Research could be conducted that studies a number of approaches to the COSP score. The research could take place at the industry level or across industries. The scoring strategy could be substantially modified by varying the components that are included in the aggregate, a weighting of the components, or even a protocol where the presence of some components (concerns) alone would prevent a positive COSP score. Numerous approaches could be trialed to determine which would lead to the most statistically significant relationship for the given domain.

The next modification to the current study which could benefit future research is in the available number of companies with sustainability data to include in the analyses. KLD was very limiting in their inclusion criteria, especially in earlier years. For the first ten years of the study, only slightly more than 500 companies (maximum of 900 if the

S&P 500 and the KLD's Domini 400 Social Index were mutually exclusive) were included. For years 11 and 12, there were 1,000 companies included. For the last seven years of the study, there were 3,000 companies included. Certainly, more meaningful results would be obtained if every company within a given industry was included. In order to accomplish this, the database provided for some of the companies would need to be created through sources other than KLD. It would be rigorous to obtain the 115 individual scores (or best presumption), but much of the information would be accessible through research on the company, its industry, its customers, and its suppliers. This would be most useful if it was the goal of a research initiative to thoroughly understand the relationship within a particular industry. To provide for the greatest consistency of information, even the companies with data available from KLD should be researched with the same methodology as the other companies.

The next potential modification to the study for future research would not lead to improved results, but rather, it would improve the readability of the results and make them more intuitive. This modification would be to eliminate the variable PRE, and only include the variable POST. Including these two complementary variables within the same model resulted in POST not being determinable, due to the nature of the data. Since the point of interest is the effective influence date of a sustainability program, POST is a much more intuitively correct variable than PRE.

Another potential modification to the study for future research comes out of the interviews completed for the construct validity. In determining the cutoff qualitatively, it was based on when the sustainability scores moved, not necessarily when there was activity within the specific firm. It would be much more beneficial to companies to

understand which events lead to changes in CFP and in what time frame to expect the impacts. Utilizing the score changes adds variation to the analysis. It also adds a quantum effect to the analysis, as the sustainability scores are only completed annually, but the company's activities and CFP are available on a much more frequent time frame. Therefore, utilizing company provided cutoff points might provide more meaningful, or at least more useful, results.

The final modification to the study for future research, is in modifying the method utilized to determine study companies. The protocol utilized was aimed at finding the ideal study companies, although, it may not have yielded the greatest learning. Several companies were eliminated through one or more of the criteria which may have offered significant information. For example, companies regarded as highly sustainable companies such as Xerox, IBM, Motorola, and Proctor & Gamble were all eliminated. The first three were eliminated due to bimodal distributions, and the last one due a negative trend in recent years. Most of the companies that were eliminated were because of a poor trend. Yet the impact of a negative change in sustainability may provide just as much insight into the relationship between COSP and CFP as the positive changes. The bimodal results could be tested with each of the two transition points to determine which one yielded the greatest correlations, or the company could be interviewed to determine which peak was most likely tied to the implementation of a sustainability program (or major modification).

Expanded areas for study. The greatest areas for expanding research into the COSP to CFP relationship are centered on eliminating limitations that are detailed in a

later section. The first area to expand the research is removing the limitation of only utilizing U.S. firms. This makes sense from the standpoint of potentially trying to determine something, such as which sustainability policy element has the greatest impact on CFP. Limiting it to only U.S. firms could leave out some of the best activities. Specifically, a number of European countries, such as Sweden, are generally accepted as being much more advanced in the implementation of sustainability activities. European countries are responsible for initiatives such as car manufacturers being required to take back automobiles at the end of their useful life, which has resulted in much more recyclable materials being utilized. Therefore, omitting them would risk leaving out companies with the most history of sustainability practices. On the other end of the spectrum, only including U.S. companies also leaves out developing countries like China and India. Despite their reputation of valuing growth over sustainability concerns, countries like China have challenges, such as population density and huge sections of the population at the poverty level, that might result in creative approaches which would have implications globally. The expansion of the research to include global companies also helps the fact that most of the large U.S. companies included in this research are already operating globally, and therefore have global influences on their CFP. Unfortunately, the extra learning available by expanding the companies in the study to include companies outside of the U.S., is somewhat mitigated by also adding in other influences such as government and market differences.

Another expanded area for research would be achieved by including private companies. The stereotype is that private companies have greater freedom to try new ideas and can do so at greater speeds. Certainly, the opportunity for learning about the

influence of sustainability is enhanced by adding additional companies into the research. This, however, introduces another level of complexity. The biggest complexity is simply in information availability. Private companies are typically much harder to obtain information about, in order to formulate the database for analysis, especially financial data. Another problem is in the availability of sustainability data. KLD, who was utilized for this research, selects their companies to rank based on the respective companies' market capitalization. This results in no private companies being included in the scoring.

Yet another area to expand the research, would be to include a different scoring system. KLD is just one of the available sources for sustainability scoring. The addition of another scoring system, or at least components of it, might lead to greater strength of observed relationships. The more available components there are, the more opportunity to optimize a scoring system which has the greatest correlation with CFP.

The final area for expanding the research is similar to the last, but it involves creating a new scoring system. Based on this research, some of the desirable characteristics that might be included in such a new system would be fewer variables. These are variables which are much more quantitative than qualitative, variables whose values are easily accessible, and variables that have values more than once a year. Ideally, this would result in a variable that would be something analogous to return on assets (ROA): something which can be easily calculated just by accessing the Income Statement and Balance Sheet. Although currently it does not seem likely that such information is readily available, with the changes in reporting and the increased emphasis on transparency and corporate citizenship, the day may not be too far away when

something will be available. This is also analogous to when the large push for quality hit U.S. firms; many of them adopted measures such as the cost of quality. Perhaps there will be something like a ratio of total cost that is spent on sustainability.

Both modifying the research and expanding the research yielded a number of areas for future research to explore. This is not surprising, as sustainability is such a broad concept, and it has still only been lightly explored. Those areas involving modification are areas which have great potential for future research. The areas for expansion seem to have great potential for increasing the body of knowledge; with such expansion, there is also the introduction of increased variables to control during the research.

Implications for Practice and Recommendations

Through the research process, three of the learning points stand above the rest as having implications for practice. The first is that the relationship between sustainability and CFP varies greatly from industry to industry. The second is that the methodology utilized for selecting the study companies yielded a good set for research. The third is that the modified regression discontinuity method, although unique in its approach, yielded strong enough results to warrant application to both more in-depth analysis of this relationship, and in studying other relationships. All three of these implications are discussed in more detail in the following subsections.

Industry specific relationship. The literature review showed tremendous disparity in the results of previous studies of the relationship between sustainability and

CFP. The results were so varied that they were presented in three different sections: one for positive correlation, one for negative, and one for neutral or indeterminate relationship. This variation is part of what drove the decision to research this topic. Now, after this research, it seems that a logical explanation is that the relationship is dependent on the industry. This is supported by the fact that of the seven industries, some had positive correlation, some had negative, one had a time-based relationship, and others showed no significant relationship. Even though none of the hypotheses were supported, the research did support the varied results shown in previous studies.

This makes sense, intuitively, when viewed from the stakeholder perspective on sustainability. With each industry having different stakeholders, the expectations for the industry can be expected to vary as well. Sustainability initiatives that have a tangible financial benefit should translate into CFP in any industry. Although, initiatives with an intangible benefit may only translate into CFP if the initiative is valued by the major stakeholders of the industry. If it is not valued, it may translate into a competitive cost disadvantage. This may even explain why some of the research demonstrated a curvilinear relationship. When the first company in an industry undertakes a sustainability initiative, it may be a cost penalty for preceding the demand. Once the stakeholders understand the initiative, it may become an expectation for the industry and then the early adopter will achieve returns for their early initiative. In the study company interviews, described in Chapter Four, one of the interviewees identified an industry that they were competing in which did seem to reward the early adopters.

The implications for practice then become to study the relationship on an industry basis, recognizing that it is likely to change over time. Studies that attempt to globalize

the relationship are likely to yield unsupported hypotheses, as in this study. In the section on implications for future research, it was recommended that the various components of sustainability be studied to determine which have the greatest influence on CFP. Coupled with this implication for practice, that should be done on an industry by industry basis and then comparison between industries could be made.

Study company selection methodology. The second major implication for practice is in the methodology utilized for the selection of the study companies. The process involved a rigorous series of mathematical tests designed to yield study companies that would have the most useful results. Part of the confirmation of the process is in the 11 companies that were selected. Looking at the group, it contains a number of companies that are generally accepted as high sustainability performers. It would be difficult to argue against the inclusion of any of the study companies. If there were any question about the results, it would be in the exclusion of some other highly regarded companies. The approach was so prescriptively defined that it would be easily reproducible in another study, or could be refined through a sensitivity analysis on the criterion utilized.

Regression discontinuity model. The third major implication for practice is in the analysis methodology. The use of a regression discontinuity model is not uncommon. In this research, it was used in a modified manner. Typically, the date of an event is utilized to separate the data, and then the difference in the two regression lines (before and after the event) is compared to look at the influence of the event. In this modified

approach, the data were studied to look for the biggest shift in the before and after regression lines. Instead of the output being the difference between the two regressions, the output is the date to maximize the difference.

The benefits of such an approach were that the effective influence date was able to be determined from the sustainability data, not from company provided data. Initially, the value of this was in being able to accomplish the research in the time frame allotted, yet during the construct validity testing it became obvious that it was much more important. Only three of the eleven study companies were even willing to discuss their sustainability programs. If the research depended on company provided information, the research would have been much more limited. It would have also introduced another variable, as the date selection would have been quite subjective and dependent on the person being interviewed.

As previously discussed in the section on the results of the construct validity testing, the dates extracted from the modified regression discontinuity model did, in fact, have an excellent correlation with actual events within the respective organizations. Accordingly, one implication for practice is that the sustainability scores do appear to correlate with actual organizational activities, making this a useful tool in further studies into the relationship between sustainability and CFP. Another implication is that the modified regression discontinuity model method should be considered when studying other relationships that have known outputs, but difficult to determine significant events.

Limitations

The limitations of this research will be divided up into two main categories. The first category of limitations will be those which were anticipated and therefore covered in the introduction chapter. For this reason, these limitations will not be discussed in great depth. The second category will be the limitations which were discovered during the research process. These will be discussed in more depth. A number of these discovered limitations were already assimilated into the earlier section on implications for future research.

Anticipated limitations. The first of the anticipated limitations was in the inclusion of only U.S. firms. This simplification removed much of the governmental, political, and geographical variation. It also eliminated a number of sustainable companies in other countries, most notably within Europe. By eliminating Europe, the study eliminates companies such as Nokia, who was named the world's most sustainable technology company, according to the 2009-2010 edition of the Dow Jones Sustainability Index (DJSI). It also eliminated a number of developing economies, such as India, China, and Korea that would have, perhaps, brought very different results to the research. These are countries which face very different challenges, especially with the high proportion of their populations that are below the poverty level, and their unparalleled economic growth potential. The limitation of not having them included in the study, not only limits the knowledge gained, but also greatly reduces the ability to extrapolate conclusions and apply them outside of the U.S.

The second anticipated limitation was the limiting of the study to public companies. Private companies have a lot of similarities to public companies, but also they have significant differences. By their very nature, they have huge differences in corporate governance that could certainly translate into differences in sustainability approaches. Another significant difference is in the reporting requirements, as required by the government. This results in public companies providing much greater access to information, especially financial information. This difference is what led to the study only including public companies. Still, leaving out private companies also excludes significant companies, such as Cargil, who was listed as the largest U.S. private company at an estimated \$110 billion in annual sales, by *Forbes* in 2008.

The next anticipated limitation of the research was in the scoring of companies' COSP. The simple aggregation of strengths less the concerns, although computationally direct, inherently assigns equal weighting to all categories, and strengths and weaknesses within those categories. Perhaps much better results would be obtained if a subset of those was utilized, or if a weighting of components were included. For example, a company can have a concern for a tax dispute that may turn out to be legitimate, and another company could have a product safety issue with widespread injuries to children and the two, theoretically, would score the same. As previously indicated in the section on implications for future research, it would be interesting to test for which components have the greatest correlation with financial performance, and rerun the study utilizing that subset.

Another anticipated limitation of the research was in not including variables as controls that previous studies from the literature review had demonstrated to have

correlation with CFP. The most consistently utilized control variable from previous studies, size, was included in this study. Other variables such as the level of innovation, degree of differentiation, and research and development (R&D) intensity were all shown to have an influence on the relationship between sustainability and CFP. These variables were not included due to the limited number of studies which had shown them as significant variables, and the huge increase in computational complexity to calculate those variables for all of the companies and industries across the 19 years of the study. Although this does not intuitively seem to be a significant limitation, it could have been a factor in the relatively weak results. The addition of some of these mitigating variables may have improved the study.

The next anticipated limitation of the research was in not including any way to account for organizational change. Mergers, acquisitions, and divestitures all have the ability to significantly impact both sides of the relationship being studied. The potential for this limitation became obvious as the individual files for sustainability scores for each year were combined into a single file, showing the trend of sustainability scores over the 19 years included in the study. It was challenging, as companies would change names or stock tickers from year to year. Many of those changes were probably accompanying a significant organizational change. Any change of this nature has the potential of materially changing the sustainability performance, and certainly, the financial performance of the company. This risk, although acknowledged, was not addressed in any of the models, so most likely had an adverse effect on the results by trying to account for organizational change in sustainability related variables.

The final anticipated limitation of the research was in the uniqueness of the approach. Regression discontinuity models are not uncommon, though the typical use of them is quite different. As previously indicated in the section on implications for practice, the uniqueness of the approach is not only a limitation, but also perhaps, the most significant element to come out of the research. This is listed as a limitation due to the lack of previous literature utilizing the methodology. As previously indicated, the construct validity testing done through the interviews of study companies would seem to indicate that although the approach is new, it is not without merit.

Discovered limitations. The first of the limitations discovered during the research process was the companies that were excluded. This occurred first through the KLD selection process. Especially in the early years of their database, they were very limited in the number of companies that they studied and published scoring for. The number of companies included in the study were further limited by eliminating those that did not have at least seven years of sustainability data from KLD. This cut the companies down from over 5,000 to just over 2,000. Although 2,000 seems like a lot of companies, it is excluding a lot more companies that existed during the 19 years of study. It would be preferable if all companies had standard measures which would indicate sustainability performance from easily obtainable company data, analogous to the financial data which is readily available for all public companies. With the increased emphasis on transparency and reporting, this may be a reality in the future, but it seems clear that databases like KLD are the only feasible option for obtaining information from prior decades.

The next limitation discovered during the research process was how few industries were included. This, to an extent, is a continuation of the previous limitation since once the companies were pared down significantly, the resultant industries were pared down even more. This was done through the study company selection process, detailed in the methodology chapter. The result was 11 study companies in seven industries. Each of these seven industries was studied in depth. Even with strong results, the ability to extrapolate the results from these industries to all industries would have been tenuous.

Another limitation discovered during the research process was the industry definition. SIC classification was utilized because it was in use when the earliest data was available, and also because the industry size could be easily varied simply by changing between the first two, three, or four numbers of the code. Unfortunately, the methodology only allowed for one industry to be selected for each of the companies. With the large number of conglomerates, this made it difficult to select between sometimes as many as a dozen SIC codes listed as being associated with a given company on Mergent On-line. Since this was mainly an issue with the largest, best known companies, many of the industry selections were based on how the company has positioned itself in the marketplace, though it remains a limitation. Also, within the industries there were sometimes huge differences in businesses. For example, SIC 20 (Food Products) includes meat packagers, distillers, and cereal producers, all of which seem to be quite different, despite their shared classification. These differences could make industry-wide conclusions more difficult within some industries.

The next limitation determined during the research process was the study company selection. Although the process was clearly defined in the chapter on methodology, the resultant study companies may not have been optimal. Because of the use of a modified regression discontinuity model, study companies had to have a significant shift in their sustainability scores and could not have a bi-modal trend chart. This ruled out companies that could have had consistently improving sustainability scores, but no shifts in the data. The selection process not only determined which company(s) to emphasize within the industries, but perhaps more significantly, it determined which industries would be studied. This process excluded the study of some of the companies with very strong sustainability reputations, for example, Interface. Whereas the author is comfortable with the logic utilized in the study company selection, minor changes in the procedure would have resulted in substantial differences in the companies and industries focused on during the research.

The final limitation which was determined during the process of the research is the differences in timing of information. KLD would publish their information on sustainability scores annually. Public companies have to publish their financial information annually as well, but they have leeway to establish their own fiscal year, on which the financial information is based. Therefore, while each company has the same timing of sustainability information, the financial information could be offset by months in either direction. This limitation makes it much more challenging to see a consistent lag or lead time in the influence of sustainability changes on the financial performance. For this reason, lag and/or lead times were not specifically studied. This limitation could be somewhat mitigated, in a smaller study, by extracting quarterly information and

summing it up to come up with more consistent timing. This would theoretically take the maximum variation in timing from twelve months down to three.

Both the anticipated limitations and those discovered during the research process could have significant impact on the results of the research. For this reason, the majority of them were addressed in the previous sections on implications for future research and implications for practice. Many of the limitations were included to contain the scope of the research so it was achievable in the research time frame allowed. Most of the others are opportunities to improve upon the research in future endeavors.

Summary

The results of this research are mixed. Viewed from the standpoint of the hypotheses tested, the results did not support the hypotheses. Despite this, three results that were byproducts of the research were important, and should have implications in practice. These three findings were: 1) that the sustainability to CFP relationship is industry dependent, 2) that the study company selection process was effective, and 3) that the modified regression discontinuity model was a strong predictor of actual sustainability activities.

The industry specific nature of the sustainability to CFP relationship is significant for two reasons. The first reason is in partially explaining the huge discrepancies in previous research, as outlined in the literature review. The second reason is in guiding future research to not oversimplify the relationship by looking for models that would fit all industries. This was further validated during the study company interviews, as the third interviewee attested. His company is viewed to be in three main industries, and

each of those industries has different expectations for the sustainability of its companies. For one of the industries he viewed sustainability as required, another he felt sustainability was preferred but not required, and the third industry he felt sustainability had no value to the customers.

While the industry specific nature of the sustainability to CFP relationship was an important finding, it only has implications specific to this topic. The validation of the modified regression discontinuity model has implications in both this area and potentially other areas of study. The ability to take externally available outputs and extrapolate to internal activities has tremendous implications to practice, particularly when it was shown during this research how challenging it can be to obtain information from within the companies. The strong results from the study company selection process also have application beyond this area of study, although the criteria would need to be tailored to the research.

Sustainability, in this research, was framed as activities that corporations can engage in toward the higher goal of sustainable development. Through the research, it was found that in some industries, sustainability is already a requirement to successfully compete. In all industries, it appears that the sustainability expectations of the stakeholders are growing. One of the largest areas of influence that seems to be growing is from the non-government organizations (NGOs). The pressure that they are able to apply to an organization is driving companies to be more proactive in addressing stakeholder needs. This makes this field of study exciting, dynamic, and important. In the *Sustainable Enterprise Fieldbook* (Wirtenberg, Russell, & Lipsky, 2009), Stuart Hart is quoted as saying:

The roots of the problem – explosive population growth and rapid economic development in the emerging economies – are political and social issues that exceed the mandate and the capabilities of any corporation. At the same time, corporations are the only organizations with the resources, the technology, the global reach, and, ultimately, the motivation to achieve sustainability. (p. 89)

The companies which have already embraced sustainability are going to impact the stakeholder expectations, provided the motivation Hart referenced. This should result in the relationship between sustainability and CFP continuing to be dynamic in the upcoming years. Ongoing research into the activities that have the greatest leverage on CFP will be particularly useful in guiding companies that are just beginning their sustainability journey. The author hopes that this research and future research expanding upon it will help to solidify the business case for expanded sustainability initiatives.

References

- Adam, A.M., & Shavit, T. (2008). How can a ratings-based method for assessing corporate social responsibility (CSR) provide an incentive to firms excluded from social responsible investment indices to invest in CSR? *Journal of Business Ethics* 82, 899-905.
- Anderson, R.C., & White, R. (2009). *Confessions of a radical industrialist: Profits, people, purpose – doing business by respecting the earth*. New York: St. Martin's Press.
- Bacha, O.I., Zain, S.R.S.M., Rasid, M.E.S.M., & Mohamad, A. (2009). Granting employee stock options (ESOs), market reaction and financial performance. *Asian Academy of Management Journal of Accounting and Finance* 5(1), 117-138.
- Barnett, M.L., & Salomon, R.M. (2006). Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance. *Strategic Management Journal* 27, 1101-1122.
- Bebbington, J. (2001). Sustainable development: A review of the international development, business and accounting literature. *Accounting Forum* 25(2), 128-157.
- Becchetti, L., Di Giacomo, S., & Pinnacchio, D. (2008). Corporate social responsibility and corporate performance: Evidence from a panel of US listed companies. *Applied Economics* 40, 541-567.
- Belu, C. (2009). Ranking corporations based on sustainable and socially responsible practices: A data envelopment analysis (DEA) approach. *Sustainable Development* 17, 257-268.
- Bowden, A.R., Lane, M.R., & Martin, J.H. (2001). *Triple bottom line risk management: Enhancing profit, environmental performance, and community benefit*. New York: John Wiley and Sons.
- Brown, D.L., Vetterlein, A., & Roemer-Mahler, A. (2010). Theorizing transnational corporations as social actors: An analysis of corporate motivations. *Business and Politics* 12(1), Art. 1.
- Byus, K., Deis, D., & Ouyang, B. (2010). Doing well by doing good: Corporate social responsibility and profitability. *Society for the Advancement of Management's Advanced Management Journal* Winter 2010, 44-55.

- Calabrese, R.L. (2006). *The elements of an effective dissertation & theses: A step-by-step guide to getting it right the first time*. Lanham, Maryland: Rowland & Littlefield Education.
- Castro, N.R., & Chousa, J.P. (2006). An integrated framework for the financial analysis of sustainability. *Business Strategy and the Environment* 15, 322-333.
- Cerin, P., & Dobers P. (2001). What does the performance of the Dow Jones Sustainability Group Index tell us? *Eco-Management and Auditing* 8, 123-133.
- Chang, D., & Kuo, L.R. (2008). The effects of sustainable development on firms' financial performance: An empirical approach. *Sustainable Development* 16, 365-380.
- Chih, H., Chih, H., & Chen T. (2010). On the determinants of corporate social responsibility: International evidence on the financial industry. *Journal of Business Ethics* 93, 115-135.
- Choi, J., & Wang, H. (2009). Stakeholder relations and the persistence of corporate financial performance. *Strategic Management Journal* 30, 895-907.
- Choudhuri, A., & Chakraborty, J. (2009). An insight into sustainability reporting. *The Icfai Journal of Management Research* 8(4), 46-53.
- Cochran, P.L., & Wood, R.A. (1984). Corporate social responsibility and financial performance. *Academy of Management Journal* 27(1), 42-56.
- Consolandi, C., Jaiswal-Dale, A., Paggiani, E., & Vercilli, A. (2009). Global standards and ethical stock indexes: The case of the Dow Jones Sustainability Stoxx Index. *Journal of Business Ethics* 87, 185-197.
- Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Oxford, UK: Capstone Publishing.
- Elkington, J. (2001). *The chrysalis economy: How citizen CEOs and corporations can fuse values and value creation*. Oxford, UK: Capstone Publishing.
- Friedman, M. (1970). The social responsibility of business is to increase its profits, *New York Times Magazine Section*, New York: New York Times Company.
- Goeke, R.J., & Faley, R.H. (2009). Do SAP successes outperform themselves and their competitors? *Communications of the Association for Computing Machinery* 52(10), 113-117.
- Graham, R., & Bertels, S. (2008). Achieving sustainable value: Sustainability portfolio assessment. *Greener Management International* 54, 57-67.

- Hahn, T., & Scheermesser, M. (2006). Approaches to corporate sustainability among German companies. *Corporate Social Responsibility and Environmental Management* 13, 150-165.
- Hart, S., & Milstein, M. (2003). Creating sustainable value. *Academy of Management Executive* 17(2), 56-67.
- Hayward, S. (2003, March 17). The triple bottom line. *Forbes* 171(6), 142.
- Hemming, C., Pugh, S., Williams, G., & Blackburn D. (2004). Strategies for sustainable development: Use of a benchmarking tool to understand relative strengths and weaknesses and identify best practice. *Corporate Social Responsibility and Environmental Management* 11, 103-113.
- Henriques, A., & Richardson, J. (Eds). (2004). *The triple bottom line, does it all add up: Assessing the sustainability of business and CSR*. London: Earthscan.
- Holliday, C.O., Schmidhieny, S., & Watts, P. (2002). *Walking the talk: The business case for sustainable development*. San Francisco: Berrett-Koehler Publishers.
- Hoti, S., McAleer, M., & Pauwels, L.L. (2007). Measuring risk in environmental finance. *Journal of Economic Surveys* 21(5), 970-998.
- Hull, C.E., & Rothenberg, S. (2008). Firm performance: The interactions of corporate social performance with innovation and industry differentiation. *Strategic Management Journal* 29, 781-789.
- Kiernan, M.J. (2001). Eco-value, sustainability, and shareholder value: Driving environmental performance to the bottom line. *Environmental Quality Management*, Summer, 1-12.
- Kuosmanen, T., & Kuosmanen, N. (2009). How not to measure sustainable value (and how one might). *Ecological Economics* 69, 235-243.
- Laszlo, C. (2008). *Sustainable Value: How the world's companies are doing well by doing good*. Stanford: Stanford University Press.
- Lee, D.D., Faff, R.W., & Langfield-Smith, K. (2009). Revisiting the vexing question: Does superior corporate social performance lead to improved financial performance? *Australian Journal of Management* 34(1), 21-49.
- Lee, Y., Hu, J., Ko, J. (2008). The effect of ISO certification on managerial efficiency and financial performance: An empirical study of manufacturing firms. *International Journal of Management* 25(1), 166-174.

- Lewis, A., & Juravle, C. (2010). Morals, markets and sustainable investments: A qualitative study of “champions”. *Journal of Business Ethics* 93, 483-494.
- Lo, S., & Sheu, H. (2007). Is corporate sustainability a value-increasing strategy for business? *Corporate Governance* 15(2), 345-358.
- Lopez, M.V., Garcia, A., & Rodriguez, L. (2007). Sustainable development and corporate performance: A study based on the Dow Jones Sustainability Index. *Journal of Business Ethics* 75, 285-300.
- Magnan, M. & St-Onge, S. (2005). The impact of profit sharing on the performance of financial services firms. *Journal of Management Studies* 42(4), 761-791.
- McDonough, W., & Braungart, M. (2002). *Cradle to cradle: Remaking the way we make things*. New York: North Point Press.
- Mishra, S., & Suar, D. (2010). Does corporate social responsibility influence firm performance of Indian companies? *Journal of Business Ethics* 95, 571-601.
- Mitchell, M. & Jolley, J. (2001). *Research Design Explained* (4th Ed). New York: Harcourt.
- Moneva, J.M., Rivera-Lirio, J.M., & Munoz-Torres, M.J. (2007). The corporate stakeholder commitment and social and financial performance. *Industrial Management & Data Systems* 107(1), 84-102.
- Nikolaos, S., Ioannis, K., Nikos, K. & George, K. (2007). Macroeconomic effects on D.J.S.I.-World returns. *International Journal of Economic Sciences and Applied Research* 2(2), 95-110.
- Nilsson, J. (2008). Investment with a conscience: Examining the impact of pro-social attitudes and perceived financial performance on socially responsible investment behavior. *Journal of Business Ethics* 83, 307-325.
- Orlikowski, W.J. & Baroudi, J.J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research* (2), 1-28.
- Padgett, C.R., & Galan, J.I. (2010). The effect of R&D intensity on corporate social responsibility. *Journal of Business Ethics* 93, 407-418.
- Peters, R., & Mullen, M.R. (2007). Some evidence of the cumulative effects of corporate social responsibility on financial performance. *The Journal of Global Business Issues* 3(1), 1-14.

- Phan, P.H., & Hill, C.W.L. (1995). Organizational restructuring and economic performance in leveraged buyouts: An ex post study. *Academy of Management Journal* 38(3), 704-739.
- Pitelis, C.N. (2004). (Corporate) governance, (shareholder) value and (sustainable) economic performance. *Corporate Governance* 12(2), 210-223.
- Pitelis, C.N. (2009). The co-evolution of organizational value capture, value creation and sustainable advantage. *Organizational Studies* 30(10), 1115-1139.
- Prahalad, C.K., Hammond, A., Porter, M.E., Kramer, M.R., Handy, C., Martin, R.L., et al. (2003). *Harvard business review on corporate responsibility*. Boston: Harvard Business School Publishing.
- Ricart, J.E., Rodriguez, M.A., & Sanchez, P. (2005). Sustainability in the boardroom: An empirical examination of Dow Jones Sustainability World Index leaders. *Corporate Governance* 5(3), 24-41.
- RiskMetrics Group (2011, January 28). How to use KLD STATS & ESG ratings definitions. Retrieved from www.riskmetrics.com.
- Rossi, J.L. (2009). What is the value of corporate social responsibility? An answer from Brazilian Sustainability Index. *Journal of International Business and Economics* 9(3), 169-178.
- Rubenstein, D. (2004). *The good corporate citizen: A practical guide*. Hoboken, New Jersey: John Wiley and Sons.
- Savitz, A. W., & Weber, K. (2006). *The triple bottom line*. San Francisco: Jossey-Bass.
- Schroder, M. (2007). Is there a difference? The performance characteristics of SRI equity indices. *Journal of Business Finance & Accounting* 34(1) & (2), 331-348.
- Surie, G., & Ashley, A. (2008). Integrating pragmatism and ethics in entrepreneurial leadership for sustainable value creation. *Journal of Business Ethics* 81, 235-246.
- Surroca, J., Tribo, J.A., & Waddock, S. (2009). Corporate responsibility and financial performance: The role of intangible resources. *Strategic Management Journal* 31, 463-490.
- Sweeney, L., & Coughlan, J. (2008). Do different industries report corporate social responsibility differently? An investigation through the lens of stakeholder theory. *Journal of Marketing Communications* 14(2), 113-124.
- Tencati, A., & Zsolnai, L. (2009). The collaborative enterprise. *Journal of Business Ethics* 85, 367-376.

- United Nations World Commission on Environment and Development (1987). *Our common future (The Brundtland Report)*. Oxford: Oxford University Press.
- Wagner, M. (2010). The role of corporate sustainability performance for economic performance: A firm-level analysis of moderation effects. *Ecological Economics* 69, 1553-1560.
- Werbach, A. (2009). *Strategy for sustainability: A business manifesto*. Boston: Harvard Business School Publishing.
- Willard, B. (2002). *The sustainability advantage: Seven business case benefits of a triple bottom line*. Gabriola Island, British Columbia: New Society Publishers.
- Wirtenberg, J., Russell, W.G., & Lipsky, D. (2009). *The sustainable enterprise fieldbook: When it all comes together*. New York: AMACOM Books.
- York, K.M., & Miree, C.E. (2004). Causation or covariation: An empirical re-examination of the link between TQM and financial performance. *Journal of Operations Management* 22, 291-311.

Appendices

Appendix A

Definition of Terms and Acronyms

ANOVA – analysis of variation

B2B – business to business

BOS – best of sector

CFA – confirmatory factor analysis

CFP – corporate financial performance

CGC – corporate governance code

COSP – corporate overall sustainability performance

CR – current ratio

CRP – corporate responsibility performance

CSP – corporate social performance

CSR – corporate social responsibility

DEA – data envelopment analysis

DI – Domini Index

DJGI – Dow Jones Global Index

DJSGI – Dow Jones Sustainability Global Index

DJSI – Dow Jones Sustainability Index

EI – ethical investing

EPA – environmental protection agency

EPS – earnings per share

ESO – employee stock options

Firm sustainability – firm financial performance over time

FCF – free cash flow

FLR – financial leverage ratio

FP – financial performance

GARCH – generalized autoregressive conditional heteroscedasticity

GRI – global reporting initiative

IO – industrial organization

IS – information systems

ISO14000 – International Organization for Standards' issued set of environmental standards

intended to assess a company's performance in terms of environmental responsibility

Intangibles – intangible resources including innovation, human resources, reputation, and organizational culture (Surroca, Tribo, & Waddock, 2009)

KLD – Kinder, Lydenberg, and Domini

LBO – leveraged buyout

LEED – leadership in energy and environmental design

MANOVA – multivariate analysis of variation

MNC – multi-national corporations

MRP – material requirements planning

MVA – market value added

NFP – non-financial performance – measures focus on a firm's long-term success factors

such as research and development, customer satisfaction, internal business process

efficiency, innovation, and employee satisfaction, and capture performance

improvements from intangible assets (Mishra & Suar, 2010)

NGO – non-government organization

OTE – overall technical efficiency – $OTE = PTE \times SE$ (Lee, Hu, & Ko, 2008)

P/E – price to earnings ratio

PPPs – public-private partnerships

PSP – profit-sharing plan

PTE – pure technical efficiency

R&D – research and development

RAP – risk-adjusted performance – the average return adjusted by the fund's specific beta (Barnett & Salomon, 2006)

RBV – resource-based view of the firm

ROA – return on assets

ROE – return on equity

ROS – return on sales

SAM – Sustainable Asset Management

SAP – Systems Application Products

SD – sustainable development

SE – scale efficiency

SEM – structural equation model

SCI – surrogate complementary index

SI – sustainable investment

SRI – socially responsible investing

SV – sustainable value

TQM – total quality management

Tobin's Q – ratio of the firm's market value to the replacement cost of assets (Rossi, 2009)

Appendix B

Listing of Select SIC Codes

(retrieved from <http://www.ehso.com/siccodes.php>)

20 FOOD AND KINDRED PRODUCTS

201 MEAT PRODUCTS

2011 MEAT PACKING PLANTS

2013 SAUSAGES AND OTHER PREPARED MEAT PRODUCTS

2015 POULTRY SLAUGHTERING AND PROCESSING

202 DAIRY PRODUCTS

2021 CREAMERY BUTTER

2022 NATURAL, PROCESSED, AND IMITATION CHEESE

2023 DRY, CONDENSED, AND EVAPORATED DAIRY PRODUCTS

2024 ICE CREAM AND FROZEN DESSERTS

2026 FLUID MILK

203 CANNED, FROZEN, AND PRESERVED FRUITS, VEGETABLES, AND FOOD SPECIAL

2032 CANNED SPECIALTIES

2033 CANNED FRUITS, VEGETABLES, PRESERVES, JAMS, AND JELLIES

2034 DRIED AND DEHYDRATED FRUITS, VEGETABLES, AND SOUP MIXES

2035 PICKLED FRUITS AND VEGETABLES, VEGETABLE SAUCES AND SEASONINGS

2037 FROZEN FRUITS, FRUIT JUICES, AND VEGETABLES

2038 FROZEN SPECIALTIES, NOT ELSEWHERE CLASSIFIED

204 GRAIN MILL PRODUCTS

2041 FLOUR AND OTHER GRAIN MILL PRODUCTS

2043 CEREAL BREAKFAST FOODS

2044 RICE MILLING

2045 PREPARED FLOUR MIXES AND DOUGHS

2046 WET CORN MILLING

2047 DOG AND CAT FOOD

2048 PREPARED FEEDS AND FEED INGREDIENTS FOR ANIMALS AND FOWLS

205 BAKERY PRODUCTS

2051 BREAD AND OTHER BAKERY PRODUCTS, EXCEPT COOKIES AND CRACKERS

2052 COOKIES AND CRACKERS

2053 FROZEN BAKERY PRODUCTS, EXCEPT BREAD

206 SUGAR AND CONFECTIONERY PRODUCTS

2061 CANE SUGAR, EXCEPT REFINING

2062 CANE SUGAR REFINING

2063 BEET SUGAR

2064 CANDY AND OTHER CONFECTIONERY PRODUCTS

2066 CHOCOLATE AND COCOA PRODUCTS

2067 CHEWING GUM

2068 SALTED AND ROASTED NUTS AND SEEDS

207 FATS AND OILS

2074 COTTONSEED OIL MILLS

2075 SOYBEAN OIL MILLS
2076 VEGETABLE OIL MILLS, EXCEPT CORN, COTTONSEED, AND SOYBEAN
2077 ANIMAL AND MARINE FATS AND OILS
2079 SHORTENING, TABLE OILS, MARGARINE, AND OTHER EDIBLE FATS AND OILS

208 BEVERAGES

2082 MALT BEVERAGES
2083 MALT
2084 WINES, BRANDY, AND BRANDY SPIRITS
2085 DISTILLED AND BLENDED LIQUORS
2086 BOTTLED AND CANNED SOFT DRINKS AND CARBONATED WATERS
2087 FLAVORING EXTRACTS AND FLAVORING SYRUPS, NOT ELSEWHERE

209 MISCELLANEOUS FOOD PREPARATIONS AND KINDRED PRODUCTS

2091 CANNED AND CURED FISH AND SEAFOODS
2092 PREPARED FRESH OR FROZEN FISH AND SEAFOODS
2095 ROASTED COFFEE
2096 POTATO CHIPS, CORN CHIPS, AND SIMILAR SNACKS
2097 MANUFACTURED ICE
2098 MACARONI, SPAGHETTI, VERMICELLI, AND NOODLES
2099 FOOD PREPARATIONS, NOT ELSEWHERE CLASSIFIED

30 RUBBER AND MISCELLANEOUS PLASTICS PRODUCTS

301 TIRES AND INNER TUBES

3011 TIRES AND INNER TUBES

302 RUBBER AND PLASTICS FOOTWEAR

3021 RUBBER AND PLASTICS FOOTWEAR

305 GASKETS, PACKING, AND SEALING DEVICES AND RUBBER AND PLASTICS HOSE

3052 RUBBER AND PLASTICS HOSE AND BELTING
3053 GASKETS, PACKING, AND SEALING DEVICES

306 FABRICATED RUBBER PRODUCTS, NOT ELSEWHERE CLASSIFIED

3061 MOLDED, EXTRUDED, AND LATHE-CUT MECHANICAL RUBBER GOODS
3069 FABRICATED RUBBER PRODUCTS, NOT ELSEWHERE CLASSIFIED

308 MISCELLANEOUS PLASTICS PRODUCTS

3081 UNSUPPORTED PLASTICS FILM AND SHEET
3082 UNSUPPORTED PLASTICS PROFILE SHAPES
3083 LAMINATED PLASTICS PLATE, SHEET, AND PROFILE SHAPES
3084 PLASTICS PIPE
3085 PLASTICS BOTTLES
3086 PLASTICS FOAM PRODUCTS
3087 CUSTOM COMPOUNDING OF PURCHASED PLASTICS RESINS
3088 PLASTICS PLUMBING FIXTURES
3089 PLASTICS PRODUCTS, NOT ELSEWHERE CLASSIFIED

31 LEATHER AND LEATHER PRODUCTS

311 LEATHER TANNING AND FINISHING

3111 LEATHER TANNING AND FINISHING

313 BOOT AND SHOE CUT STOCK AND FINDINGS

3131 BOOT AND SHOE CUT STOCK AND FINDINGS

- 314 FOOTWEAR, EXCEPT RUBBER
 - 3142 HOUSE SLIPPERS
 - 3143 MEN'S FOOTWEAR, EXCEPT ATHLETIC
 - 3144 WOMEN'S FOOTWEAR, EXCEPT ATHLETIC
 - 3149 FOOTWEAR, EXCEPT RUBBER, NOT ELSEWHERE CLASSIFIED
- 315 LEATHER GLOVES AND MITTENS
 - 3151 LEATHER GLOVES AND MITTENS
- 316 LUGGAGE
 - 3161 LUGGAGE
- 317 HANDBAGS AND OTHER PERSONAL LEATHER GOODS
 - 3171 WOMEN'S HANDBAGS AND PURSES
 - 3172 PERSONAL LEATHER GOODS, EXCEPT WOMEN'S HANDBAGS AND PURSES
- 319 LEATHER GOODS, NOT ELSEWHERE CLASSIFIED
 - 3199 LEATHER GOODS, NOT ELSEWHERE CLASSIFIED
- 35 INDUSTRIAL AND COMMERCIAL MACHINERY AND COMPUTER EQUIPMENT
 - 351 ENGINES AND TURBINES
 - 3511 STEAM, GAS, AND HYDRAULIC TURBINES, AND TURBINE GENERATOR SET
 - 3519 INTERNAL COMBUSTION ENGINES, NOT ELSEWHERE CLASSIFIED
 - 352 FARM AND GARDEN MACHINERY AND EQUIPMENT
 - 3523 FARM MACHINERY AND EQUIPMENT
 - 3524 LAWN AND GARDEN TRACTORS AND HOME LAWN AND GARDEN EQUIPMENT
 - 3524 BLOWERS, RESIDENTIAL LAWN
 - 353 CONSTRUCTION, MINING, AND MATERIALS HANDLING MACHINERY AND EQUIPMENT
 - 3531 CONSTRUCTION MACHINERY AND EQUIPMENT
 - 3532 MINING MACHINERY AND EQUIPMENT, EXCEPT OIL AND GAS FIELD
 - 3533 OIL AND GAS FIELD MACHINERY AND EQUIPMENT
 - 3534 ELEVATORS AND MOVING STAIRWAYS
 - 3535 CONVEYORS AND CONVEYING EQUIPMENT
 - 3536 OVERHEAD TRAVELING CRANES, HOISTS, AND MONORAIL SYSTEMS
 - 3537 INDUSTRIAL TRUCKS, TRACTORS, TRAILERS, AND STACKERS
 - 354 METALWORKING MACHINERY AND EQUIPMENT
 - 3541 MACHINE TOOLS, METAL CUTTING TYPES
 - 3542 MACHINE TOOLS, METAL FORMING TYPES
 - 3543 INDUSTRIAL PATTERNS
 - 3544 SPECIAL DIES AND TOOLS, DIE SETS, JIGS AND FIXTURES, AND INDUSTRIAL
 - 3545 CUTTING TOOLS, MACHINE TOOL ACCESSORIES, AND MACHINISTS' PRECISION
 - 3546 POWER-DRIVEN HANDTOOLS
 - 3547 ROLLING MILL MACHINERY AND EQUIPMENT
 - 3548 ELECTRIC AND GAS WELDING AND SOLDERING EQUIPMENT
 - 3549 METALWORKING MACHINERY, NOT ELSEWHERE CLASSIFIED
 - 355 SPECIAL INDUSTRY MACHINERY, EXCEPT METALWORKING MACHINERY
 - 3552 TEXTILE MACHINERY
 - 3553 WOODWORKING MACHINERY
 - 3554 PAPER INDUSTRIES MACHINERY
 - 3555 PRINTING TRADES MACHINERY AND EQUIPMENT

- 3556 FOOD PRODUCTS MACHINERY
- 3559 SPECIAL INDUSTRY MACHINERY, NOT ELSEWHERE CLASSIFIED
- 356 GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT
 - 3561 PUMPS AND PUMPING EQUIPMENT
 - 3562 BALL AND ROLLER BEARINGS
 - 3563 AIR AND GAS COMPRESSORS
 - 3564 INDUSTRIAL AND COMMERCIAL FANS AND BLOWERS AND AIR PURIFICATION
 - 3565 PACKAGING MACHINERY
 - 3566 SPEED CHANGERS, INDUSTRIAL HIGH-SPEED DRIVES, AND GEARS
 - 3567 INDUSTRIAL PROCESS FURNACES AND OVENS
 - 3568 MECHANICAL POWER TRANSMISSION EQUIPMENT, NOT ELSEWHERE CLASS
 - 3569 GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT, NOT ELSEWHERE CLAS
- 357 COMPUTER AND OFFICE EQUIPMENT
 - 3571 ELECTRONIC COMPUTERS
 - 3572 COMPUTER STORAGE DEVICES
 - 3575 COMPUTER TERMINALS
 - 3577 COMPUTER PERIPHERAL EQUIPMENT, NOT ELSEWHERE CLASSIFIED
 - 3578 CALCULATING AND ACCOUNTING MACHINES, EXCEPT COMPUTERS
 - 3579 OFFICE MACHINES, NOT ELSEWHERE CLASSIFIED
- 358 REFRIGERATION AND SERVICE INDUSTRY MACHINERY
 - 3581 AUTOMATIC VENDING MACHINES
 - 3582 COMMERCIAL LAUNDRY, DRYCLEANING, AND PRESSING MACHINES
 - 3585 AIR-CONDITIONING AND WARM AIR HEATING EQUIPMENT AND COMMERCIAL
 - 3586 MEASURING AND DISPENSING PUMPS
 - 3589 SERVICE INDUSTRY MACHINERY, NOT ELSEWHERE CLASSIFIED
- 359 MISCELLANEOUS INDUSTRIAL AND COMMERCIAL MACHINERY AND EQUIPMENT
 - 3592 CARBURETORS, PISTONS, PISTON RINGS, AND VALVES
 - 3593 FLUID POWER CYLINDERS AND ACTUATORS
 - 3594 FLUID POWER PUMPS AND MOTORS
 - 3596 SCALES AND BALANCES, EXCEPT LABORATORY
 - 3599 INDUSTRIAL AND COMMERCIAL MACHINERY AND EQUIPMENT, NOT ELSE
- 36 ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT AND COMPONENTS, EXCEPT C
 - 361 ELECTRIC TRANSMISSION AND DISTRIBUTION EQUIPMENT
 - 3612 POWER, DISTRIBUTION, AND SPECIALTY TRANSFORMERS
 - 3613 SWITCHGEAR AND SWITCHBOARD APPARATUS
 - 362 ELECTRICAL INDUSTRIAL APPARATUS
 - 3621 MOTORS AND GENERATORS
 - 3624 CARBON AND GRAPHITE PRODUCTS
 - 3625 RELAYS AND INDUSTRIAL CONTROLS
 - 3629 ELECTRICAL INDUSTRIAL APPARATUS, NOT ELSEWHERE CLASSIFIED
 - 363 HOUSEHOLD APPLIANCES
 - 3631 HOUSEHOLD COOKING EQUIPMENT
 - 3632 HOUSEHOLD REFRIGERATORS AND HOME AND FARM FREEZERS
 - 3633 HOUSEHOLD LAUNDRY EQUIPMENT
 - 3634 ELECTRIC HOUSEWARES AND FANS
 - 3635 HOUSEHOLD VACUUM CLEANERS
 - 3639 HOUSEHOLD APPLIANCES, NOT ELSEWHERE CLASSIFIED

- 364 ELECTRIC LIGHTING AND WIRING EQUIPMENT
 - 3641 ELECTRIC LAMP BULBS AND TUBES
 - 3643 CURRENT-CARRYING WIRING DEVICES
 - 3644 NONCURRENT-CARRYING WIRING DEVICES
 - 3645 RESIDENTIAL ELECTRIC LIGHTING FIXTURES
 - 3646 COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL ELECTRIC LIGHTING FIXTURES
 - 3647 VEHICULAR LIGHTING EQUIPMENT
 - 3648 LIGHTING EQUIPMENT, NOT ELSEWHERE CLASSIFIED

- 365 HOUSEHOLD AUDIO AND VIDEO EQUIPMENT, AND AUDIO RECORDINGS
 - 3651 HOUSEHOLD AUDIO AND VIDEO EQUIPMENT
 - 3652 PHONOGRAPH RECORDS AND PRERECORDED AUDIO TAPES AND DISKS

- 366 COMMUNICATIONS EQUIPMENT
 - 3661 TELEPHONE AND TELEGRAPH APPARATUS
 - 3663 RADIO AND TELEVISION BROADCASTING AND COMMUNICATIONS EQUIPMENT
 - 3669 COMMUNICATIONS EQUIPMENT, NOT ELSEWHERE CLASSIFIED

- 367 ELECTRONIC COMPONENTS AND ACCESSORIES
 - 3671 ELECTRON TUBES
 - 3672 PRINTED CIRCUIT BOARDS
 - 3674 SEMICONDUCTORS AND RELATED DEVICES
 - 3675 ELECTRONIC CAPACITORS
 - 3676 ELECTRONIC RESISTORS
 - 3677 ELECTRONIC COILS, TRANSFORMERS, AND OTHER INDUCTORS
 - 3678 ELECTRONIC CONNECTORS
 - 3679 ELECTRONIC COMPONENTS, NOT ELSEWHERE CLASSIFIED

- 369 MISCELLANEOUS ELECTRICAL MACHINERY, EQUIPMENT, AND SUPPLIES
 - 3691 STORAGE BATTERIES
 - 3692 PRIMARY BATTERIES, DRY AND WET
 - 3694 ELECTRICAL EQUIPMENT FOR INTERNAL COMBUSTION ENGINES
 - 3695 MAGNETIC AND OPTICAL RECORDING MEDIA
 - 3699 ELECTRICAL MACHINERY, EQUIPMENT, AND SUPPLIES, NOT ELSEWHERE CLASSIFIED

- 38 MEASURING, ANALYZING AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL, AND SURGICAL
 - 381 SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL, AND NAUTICAL
 - 3812 SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL, AND NAUTICAL

 - 382 LABORATORY APPARATUS AND ANALYTICAL, OPTICAL, MEASURING, AND CONTROLLING INSTRUMENTS
 - 3821 LABORATORY APPARATUS AND FURNITURE
 - 3822 AUTOMATIC CONTROLS FOR REGULATING RESIDENTIAL AND COMMERCIAL EQUIPMENT
 - 3823 INDUSTRIAL INSTRUMENTS FOR MEASUREMENT, DISPLAY, AND CONTROL OF PROCESS
 - 3824 TOTALIZING FLUID METERS AND COUNTING DEVICES
 - 3825 INSTRUMENTS FOR MEASURING AND TESTING OF ELECTRICITY AND ELECTRONICS
 - 3826 LABORATORY ANALYTICAL INSTRUMENTS
 - 3827 OPTICAL INSTRUMENTS AND LENSES
 - 3829 MEASURING AND CONTROLLING DEVICES, NOT ELSEWHERE CLASSIFIED

 - 384 SURGICAL, MEDICAL, AND DENTAL INSTRUMENTS AND SUPPLIES
 - 3841 SURGICAL AND MEDICAL INSTRUMENTS AND APPARATUS
 - 3842 ORTHOPEDIC, PROSTHETIC, AND SURGICAL APPLIANCES AND SUPPLIES
 - 3843 DENTAL EQUIPMENT AND SUPPLIES
 - 3844 X-RAY APPARATUS AND TUBES AND RELATED IRRADIATION APPARATUS
 - 3845 ELECTROMEDICAL AND ELECTROTHERAPEUTIC APPARATUS

385 OPHTHALMIC GOODS
3851 OPHTHALMIC GOODS

386 PHOTOGRAPHIC EQUIPMENT AND SUPPLIES
3861 PHOTOGRAPHIC EQUIPMENT AND SUPPLIES

387 WATCHES, CLOCKS, CLOCKWORK OPERATED DEVICES, AND PARTS
3873 WATCHES, CLOCKS, CLOCKWORK OPERATED DEVICES, AND PARTS

58 EATING AND DRINKING PLACES

581 EATING AND DRINKING PLACES
5812 EATING PLACES
5813 DRINKING PLACES (ALCOHOLIC BEVERAGES)

Appendix C

Guide to Variables included in KLD STATs Database

Field Name	Short Text
Universe A	Unique KLD composite made up of KLD's DS400 and the SP500
Universe B	Largest 1000 companies by market cap as calculated by KLD
Universe C	Unique KLD composite made up of KLD's DS400, the largest 1000 companies by market cap as calculated by KLD, and the SP500
Universe D	Largest 3000 companies by market cap as calculated by KLD
Name	Company Name
CUSIP	CUSIP # (Not available 1991-1994)
Ticker	Company Ticker (U.S.-based exchange)
ALC-con-#	Total Number of Alcohol Concerns
ALC-con-A	Manufacturers
ALC-con-A	Retailers
ALC-con-A	Manufacturers of Products Necessary for Production of Alcoholic Beverages
ALC-con-A	Ownership by an Alcohol Company
ALC-con-A	Licensing
ALC-con-A	Ownership of an Alcohol Company
ALC-con-X	Other Concern (through 2002)
CGOV-con-#	Total Number of Corporate Governance Concerns
CGOV-con-B	High Compensation
CGOV-con-E	Tax Disputes (moved to Community 2005)
CGOV-con-F	Ownership Concern
CGOV-con-G	Accounting Concern (added 2005)
CGOV-con-H	Transparency Concern (added 2005)
CGOV-con-I	Political Accountability Concern (added 2005) (through 2007 July)
CGOV-con-J	Public Policy Concern (added 2007 Aug)
CGOV-con-X	Other Concern
CGOV-str-#	Total Number of Corporate Governance Strengths
CGOV-str-A	Limited Compensation
CGOV-str-C	Ownership Strength
CGOV-str-D	From 1996 thru 2004 - Environment: Communication Strength ; From 2005 to present - Transparency Strength
CGOV-str-E	Political Accountability Strength (added 2005)
CGOV-str-F	Public Policy Strength (added 2007 Aug)
CGOV-str-X	Other Strength
COM-con-#	Total Number of Community Concerns
COM-con-A	Investment Controversies
COM-con-B	Negative Economic Impact
COM-con-D	Tax Disputes (added 2005 from Corporate Governance)
COM-con-X	Other Concern
CompanyID	Unique KLD Identifier
COM-str-#	Total Number of Community Strengths
COM-str-A	Generous Giving
COM-str-B	Innovative Giving

COM-str-C	Support for Housing
COM-str-D	Support for Education (added in 1994)
COM-str-F	Non-U.S. Charitable Giving
COM-str-G	Volunteer Programs Strength (added 2005)
COM-str-X	Other Strength
DIV-con-#	Total Number of Diversity Concerns
DIV-con-A	Employee Discrimination (renamed from Controversies 2007 Aug)
DIV-con-B	Non-Representation
DIV-con-X	Other Concern
DIV-str-#	Total Number of Diversity Strengths
DIV-str-A	CEO
DIV-str-B	Promotion
DIV-str-C	Board of Directors
DIV-str-D	Work/Life Benefits (renamed in 2005, from Family Benefits)
DIV-str-E	Women/Minority Contracting
DIV-str-F	Employment of the Disabled
DIV-str-G	Progressive Gay/Lesbian Policies (added in 1995)
DIV-str-X	Other Strength
EMP-con-#	Total Number of Employee Relations Concerns
EMP-con-A	Union Relations Concern
EMP-con-B	Health and Safety Concern (renamed from Safety Controversies in 2003)
EMP-con-C	Workforce Reductions
EMP-con-D	Pension/Benefits Concern (added in 1992)
EMP-con-X	Other Concern
EMP-str-#	Total Number of Employee Relations Strengths
EMP-str-A	Union Relations Strength
EMP-str-B	No Layoff Policy (through 1994)
EMP-str-C	Cash Profit Sharing
EMP-str-D	Involvement
EMP-str-F	Strong Retirement Benefits
EMP-str-G	Health and Safety Strength (added in 2003)
EMP-str-X	Other Strength
ENV-con-#	Total Number of Environment Concerns
ENV-con-A	Hazardous Waste
ENV-con-B	Regulatory Problems
ENV-con-C	Ozone Depleting Chemicals
ENV-con-D	Substantial Emissions
ENV-con-E	Agricultural Chemicals
ENV-con-F	Climate Change (added in 1999)
ENV-con-X	Other Concern
ENV-str-#	Total Number of Environment Strengths
ENV-str-A	Beneficial Products & Services
ENV-str-B	Pollution Prevention
ENV-str-C	Recycling
ENV-str-D	Alternative Fuels
ENV-str-F	Property, Plant, and Equipment (through 1995)
ENV-str-G	Management Systems (added 2006)
ENV-str-X	Other Strength
FIR-con-#	Total Number of Firearms Concerns

FIR-con-A	Ownership by a Firearms Company (added 1999)
FIR-con-A	Manufacturers (added 1999)
FIR-con-A	Ownership of a Firearms Company (added 1999)
FIR-con-A	Retailers (added 1999)
GAM-con-#	Total Number of Gambling Concerns
GAM-con-A	Owners and Operators
GAM-con-A	Manufacturers
GAM-con-A	Ownership by a Gambling Company
GAM-con-A	Supporting Products or Services
GAM-con-A	Ownership of a Gambling Company
GAM-con-A	Licensing
GAM-con-X	Other Concern (through 2002)
HUM-con-#	Total Number of Human Rights Concerns
HUM-con-A	South Africa Concern (through 1994)
HUM-con-B	Northern Ireland Concern (through 1994)
HUM-con-C	Burma (added in 1995)
HUM-con-D	Mexico (1995 - 2002)
HUM-con-F	International Labor Concern (added in 1998)
HUM-con-G	Indigenous Peoples Relations (added in 2000)
HUM-con-X	Other Concern
HUM-str-#	Total Number of Human Rights Strengths
HUM-str-A	Positive Operations in South Africa (1994 - 1995)
HUM-str-D	Indigenous Peoples Relations (added in 2000)
HUM-str-G	Labor Rights Strength (added in 2002)
HUM-str-X	Other Strength
MIL-con-#	Total Number of Military Concerns
MIL-con-A	Ownership by a Military Company
MIL-con-A	Manufacturers of Weapons or Weapons Systems
MIL-con-A	Manufacturers of Components for Weapons or Weapons Systems
MIL-con-A	Ownership of a Military Company
MIL-con-B	Minor Involvement (through 2002)
MIL-con-C	Major Supplies (through 2002)
MIL-con-X	Other Concern (through 2002)
NUC-con-#	Total Number of Nuclear Concerns
NUC-con-A	Ownership by a Nuclear Power Company
NUC-con-A	Ownership of a Nuclear Power Company
NUC-con-A	Ownership of Nuclear Power Plants
NUC-con-A	Construction & Design of Nuclear Power Plants (1991 - 2002 and 2005 forward)
NUC-con-A	Nuclear Power Fuel and Key Parts (1991 - 2002 and 2005 forward)
NUC-con-A	Nuclear Power Service Providers (added 2005)
NUC-con-A	Ownership by Nuclear Power Related Products and Services (added 2007 Aug)
NUC-con-A	Ownership of Nuclear Power Related Products and Services (added 2007 Aug)
NUC-con-D	Nuclear Power Fuel and Key Parts (1991 - 2002); See NUC-CON-A beginning 2005
NUC-con-X	Other Concern (through 2002)
PRO-con-#	Total Number of Product Concerns

PRO-con-A	Product Safety
PRO-con-D	Marketing/Contracting Controversy
PRO-con-E	Antitrust
PRO-con-X	Other Concern
PRO-str-#	Total Number of Product Strengths
PRO-str-A	Quality
PRO-str-B	R&D/Innovation
PRO-str-C	Benefits to Economically Disadvantaged
PRO-str-X	Other Strength
TOB-con-#	Total Number of Tobacco Concerns
TOB-con-A	Licensing
TOB-con-A	Ownership by a Tobacco Company
TOB-con-A	Ownership of a Tobacco Company
TOB-con-A	Manufacturers of Products Necessary for Production of Tobacco Products
TOB-con-A	Manufacturers
TOB-con-A	Retailers
TOB-con-X	Other Concern (through 2002)

Appendix D

Companies with at Least Seven Years of Data

SIC	Classification	Count
1	Agricultural Production - Crops	1
2	Agricultural Production - Livestock and Animal Specialties	0
7	Agricultural Services	1
8	Forestry	0
9	Fishing, Hunting and Trapping	1
10	Metal Mining	10
12	Coal Mining	7
13	Oil and Gas Extraction	57
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels	9
15	Building Cnstrctn - General Contractors & Operative Builders	16
16	Heavy Cnstrctn, Except Building Construction - Contractors	9
17	Construction - Special Trade Contractors	7
20	Food and Kindred Products	51
21	Tobacco Products	4
22	Textile Mill Products	4
23	Apparel, Finished Prdcts from Fabrics & Similar Materials	11
24	Lumber and Wood Products, Except Furniture	11
25	Furniture and Fixtures	12
26	Paper and Allied Products	21
27	Printing, Publishing and Allied Industries	34
28	Chemicals and Allied Products	128
29	Petroleum Refining and Related Industries	12
30	Rubber and Miscellaneous Plastic Products	12
31	Leather and Leather Products	5
32	Stone, Clay, Glass, and Concrete Products	7
33	Primary Metal Industries	30
34	Fabricated Metal Prdcts, Except Machinery & Transport Eqmnt	22
35	Industrial and Commercial Machinery and Computer Equipment	104
36	Electronic, Elctrcl Eqmnt & Cmpnts, Excpt Computer Eqmnt	142
37	Transportation Equipment	50
38	Mesr/Anlyz/Cntrl Instrmnts; Photo/Med/Opt Gds; Watches/Clocks	81
39	Miscellaneous Manufacturing Industries	18
40	Railroad Transportation	6
41	Local, Suburban Transit & Interurbn Hgwy Passenger Transport	0

42	Motor Freight Transportation	14
43	United States Postal Service	0
44	Water Transportation	6
45	Transportation by Air	13
46	Pipelines, Except Natural Gas	0
47	Transportation Services	7
48	Communications	58
49	Electric, Gas and Sanitary Services	110
50	Wholesale Trade - Durable Goods	32
51	Wholesale Trade - Nondurable Goods Building Materials, Hrdwr, Garden Supply & Mobile Home	28
52	Deals	5
53	General Merchandise Stores	20
54	Food Stores	14
55	Automotive Dealers and Gasoline Service Stations	14
56	Apparel and Accessory Stores	42
57	Home Furniture, Furnishings and Equipment Stores	12
58	Eating and Drinking Places	27
59	Miscellaneous Retail	35
60	Depository Institutions	171
61	Nondepository Credit Institutions Security & Commodity Brokers, Dealers, Exchanges &	19
62	Services	35
63	Insurance Carriers	80
64	Insurance Agents, Brokers and Service	10
65	Real Estate	11
67	Holding and Other Investment Offices	87
70	Hotels, Rooming Houses, Camps, and Other Lodging Places	10
72	Personal Services	14
73	Business Services	164
75	Automotive Repair, Services and Parking	2
76	Miscellaneous Repair Services	0
78	Motion Pictures	6
79	Amusement and Recreation Services	14
80	Health Services	23
81	Legal Services	1
82	Educational Services	8
83	Social Services Museums, Art Galleries and Botanical and Zoological	0
84	Gardens	0
86	Membership Organizations Engineering, Accounting, Research, Management & Related	0
87	Svcs	35
89	Services, Not Elsewhere Classified Executive, Legislative & General Government, Except	0
91	Finance	0

92	Justice, Public Order and Safety	0
93	Public Finance, Taxation and Monetary Policy	0
94	Administration of Human Resource Programs Administration of Environmental Quality and Housing	0
95	Programs	1
96	Administration of Economic Programs	0
97	National Security and International Affairs	0
99	Non-classifiable Establishments	1
		2012

Appendix E

Tabular Summary of Results from Regression Analyses

SIC			Model 1	Model 2	Model 3	Model 4
31	R-sq		74.86%	74.90%	74.86%	74.91%
	Adj. R-sq		70.79%	70.02%	69.98%	69.18%
	COSP	Coef.	-0.01690	-0.01588	-0.01659	-0.01620
		T	-3.89486	-2.55284	-2.54433	-2.38775
		P	0.000	0.015	0.015	0.022
	Size	Coef.	0.07789	0.07802	0.07797	0.07787
		T	4.42511	4.37330	4.35909	4.29546
		P	0.000	0.000	0.000	0.000
	Time	Coef.	-	-0.00244	-	-0.00371
		T	-	-0.23159	-	-0.25348
		P	-	0.818	-	0.801
	Pre	Coef.	-	-	0.00251	-0.00686
		T	-	-	0.06468	-0.12711
		P	-	-	0.949	0.900
	Post	Coef.	-	-	-	-
		T	-	-	-	-
		P	-	-	-	-

SIC			Model 1	Model 2	Model 3	Model 4	
30	R-sq		51.50%	53.72%	53.97%	54.10%	
	Adj. R-sq		46.96%	48.92%	49.19%	48.85%	
	COSP	Coef.	0.00138	-0.00101	-0.00121	-0.00137	
		T	0.63175	-0.42131	-0.50341	-0.56394	
		P	0.529	0.674	0.616	0.574	
	Size	Coef.	0.00361	-0.00328	-0.00412	-0.00450	
		T	0.37906	-0.33411	-0.41821	-0.45369	
		P	0.705	0.739	0.677	0.651	
	Time	Coef.	-	0.01735	-	0.00721	
		T	-	2.25593	-	0.54039	
		P	-	0.026	-	0.590	
	Pre	Coef.	-	-	-0.06344	-0.04304	
		T	-	-	-2.38658	-0.93109	
		P	-	-	0.019	0.354	
	Post	Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	
	58	R-sq		28.89%	28.93%	28.89%	28.97%
		Adj. R-sq		21.11%	20.76%	20.71%	20.41%
		COSP	Coef.	0.00589	0.00639	0.00569	0.00609
T			2.03776	1.80537	1.59645	1.66110	
P			0.043	0.073	0.112	0.098	
Size		Coef.	-0.02082	-0.01857	-0.02052	-0.01953	
		T	-1.84905	-1.43957	-1.56877	-1.47242	
		P	0.066	0.153	0.118	0.142	
Time		Coef.	-	-0.00497	-	-0.00985	
		T	-	-0.35946	-	-0.48134	
		P	-	0.720	-	0.631	
Pre		Coef.	-	-	0.00216	-0.02339	
		T	-	-	0.04421	-0.32403	
		P	-	-	0.965	0.746	
Post		Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	

SIC			Model 1	Model 2	Model 3	Model 4	
20	R-sq		40.43%	40.61%	40.75%	40.76%	
	Adj. R-sq		34.70%	34.73%	34.89%	34.73%	
	COSP	Coef.	0.00188	0.00246	0.00272	0.003	
		T	1.05035	1.31850	1.45250	1.43946	
		P	0.294	0.188	0.147	0.15100	
	Size	Coef.	0.00864	0.01185	0.01282	0.01264	
		T	1.20131	1.52470	1.65760	1.61822	
		P	0.230	0.128	0.098	0.106	
	Time	Coef.	-	-0.00912	-	0.00234	
		T	-	-1.08996	-	0.16286	
		P	-	0.276	-	0.871	
	Pre	Coef.	-	-	0.04312	0.04982	
		T	-	-	1.46067	0.98331	
		P	-	-	0.145	0.326	
	Post	Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	
	382	R-sq		43.03%	43.05%	43.29%	43.50%
		Adj. R-sq		35.48%	35.24%	35.52%	35.49%
		COSP	Coef.	0.01716	0.01664	0.01425	0.01447
T			4.16665	3.53606	2.88821	2.92882	
P			0.000	0.000	0.004	0.004	
Size		Coef.	0.03863	0.03820	0.03644	0.03682	
		T	2.20414	2.16365	2.06581	2.08644	
		P	0.028	0.031	0.040	0.038	
Time		Coef.	-	0.00493	-	-0.03171	
		T	-	0.23189	-	-0.94438	
		P	-	0.817	-	0.346	
Pre		Coef.	-	-	-0.08597	-0.17915	
		T	-	-	-1.06951	-1.40756	
		P	-	-	0.286	0.161	
Post		Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	

SIC			Model 1	Model 2	Model 3	Model 4
3825	R-sq		37.57%	38.01%	39.58%	39.70%
	Adj. R-sq		26.64%	25.29%	27.18%	25.42%
	COSP	Coef.	0.01190	0.00860	0.00228	0.00252
		T	1.76986	0.93510	0.21149	0.23047
		P	0.084	0.358	0.834	0.819
	Size	Coef.	-0.02573	-0.02325	-0.01678	-0.01658
		T	-0.54420	-0.48507	-0.35143	-0.34314
		P	0.589	0.630	0.727	0.733
	Time	Coef.	-	0.01553	-	-0.01113
		T	-	0.52591	-	-0.28415
		P	-	0.602	-	0.778
	Pre	Coef.	-	-	-0.14141	-0.17263
		T	-	-	-1.13838	-1.03393
		P	-	-	0.262	0.308
	Post	Coef.	-	-	-	-
		T	-	-	-	-
		P	-	-	-	-
	357	R-sq		51.48%	51.48%	51.51%
Adj. R-sq			46.25%	45.99%	46.02%	45.87%
COSP		Coef.	-0.00099	-0.00103	-0.00060	-0.00058
		T	-0.27572	-0.27743	-0.15837	-0.15378
		P	0.783	0.782	0.874	0.878
Size		Coef.	0.04098	0.04084	0.04211	0.04165
		T	3.04320	2.94656	3.03371	2.99278
		P	0.003	0.004	0.003	0.003
Time		Coef.	-	0.00073	-	0.02060
		T	-	0.04511	-	0.66182
		P	-	0.964	-	0.509
Pre		Coef.	-	-	0.01949	0.08086
		T	-	-	0.34807	0.74619
		P	-	-	0.728	0.456
Post		Coef.	-	-	-	-
		T	-	-	-	-
		P	-	-	-	-

SIC			Model 1	Model 2	Model 3	Model 4	
3571	R-sq		58.52%	58.86%	59.37%	59.46%	
	Adj. R-sq		54.29%	53.72%	54.29%	53.42%	
	COSP	Coef.	-0.00810	-0.00638	-0.00477	-0.00476	
		T	-1.37142	-0.97768	-0.70539	-0.69705	
		P	0.176	0.333	0.484	0.489	
	Size	Coef.	0.06067	0.06482	0.06755	0.06705	
		T	3.04053	3.06966	3.20238	3.13982	
		P	0.004	0.004	0.002	0.003	
	Time	Coef.	-	-0.01162	-	0.01019	
		T	-	-0.63446	-	0.31823	
		P	-	0.529	-	0.752	
	Pre	Coef.	-	-	0.06590	0.09594	
		T	-	-	1.00493	0.83203	
		P	-	-	0.320	0.410	
	Post	Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	
	3674	R-sq		14.77%	14.99%	15.08%	15.09%
		Adj. R-sq		4.83%	4.86%	4.96%	4.76%
		COSP	Coef.	0.02115	0.05151	0.06123	0.06277
			T	0.68961	1.23750	1.39906	1.41140
P			0.491	0.217	0.162	0.159	
Size		Coef.	0.12214	0.13331	0.14203	0.14172	
		T	1.64370	1.26497	1.34041	1.33594	
		P	0.245	0.207	0.181	0.182	
Time		Coef.	-	-0.12320	-	-0.03392	
		T	-	-1.07861	-	-0.20138	
		P	-	0.281	-	0.840	
Pre		Coef.	-	-	0.56113	0.46565	
		T	-	-	1.28283	0.72149	
		P	-	-	0.200	0.471	
Post		Coef.	-	-	-	-	
		T	-	-	-	-	
		P	-	-	-	-	

SIC			Model 1	Model 2	Model 3	Model 4
All	R-sq		15.56%	15.63%	15.64%	15.64%
	Adj. R-sq		6.45%	6.46%	6.48%	6.42%
	COSP	Coef.	0.00899	0.01432	0.01536	0.01558
		T	1.05648	1.46781	1.54187	1.55540
		P	0.291	0.142	0.123	0.120
	Size	Coef.	0.05784	0.06673	0.06863	0.06896
		T	1.77329	1.98770	2.03206	2.03914
		P	0.076	0.047	0.042	0.042
	Time	Coef.	-	-0.03764	-	-0.01228
		T	-	-1.11640	-	-0.21658
		P	-	0.264	-	0.829
	Pre	Coef.	-	-	0.15037	0.11450
		T	-	-	1.22831	0.55585
		P	-	-	0.220	0.578
	Post	Coef.	-	-	-	-
		T	-	-	-	-
		P	-	-	-	-