Chapter 14
Market Value Implications of Voluntary Corporate Environmental Initiatives (CEIs)

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Firms engage in a variety of practices to manage their internal environmental performance as well as those of their supply chains, and they promote those efforts to concerned stakeholders (e.g., employees, suppliers, consumers, NGOs, and shareholders). Montabon et al. (2007) categorize such practices at the operational, tactical, and strategic levels. Examples of operational practices include recycling, waste reduction, returnable packaging, etc. At the tactical level, practices include applying environmental standards to supplier selection, participating in environmental awards programs, and employing life cycle analyses. Strategic practices include incorporating environmental impacts into the corporate mission and strategic planning process.

In addition to improving performance in the environmental dimension, environmental initiatives can result in increased sales, reduced costs, and mitigated risks, thereby improving the market value of a firm and/or its supply chain partners. However, the empirical evidence in the academic literature regarding the effects of environmental initiatives is mixed. In this chapter, we address the following questions:

- Do environmental initiatives of the firm improve its market value?
- Does the impact on market value depend upon the specific type of environmental initiative?
- Does the impact on market value depend upon the context or conditions surrounding the environmental initiative?

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For managers, these are key questions to consider not only when deciding whether to undertake environmental initiatives, but also how to manage them and communicate their progress.

14.1 Relationship Between Environmental Initiatives and Market Value

The relationship between environmental initiatives and financial performance or market value is under debate in both the business and academic communities. For example, Skapinker (2008) highlighted the proactive sustainability initiatives of Unilever and Wal-Mart to frame the ongoing debate over whether such initiatives are merely window dressing. Even though Wal-Mart's energy conservation and recycling initiatives, and Unilever's forays into low-cost water purification and eco-friendly detergents, were well-received by the popular press, the question remains as to whether the market perceives the returns on such initiatives to be as attractive as returns on alternative investment opportunities. In other words, can a firm increase market value through its environmental initiatives? Proponents claim that direct economic benefits from environmental initiatives improve return on investment and market value. Benefits include energy, raw material, and abatement cost reductions, as well as intangible advantages of improved consumer perception, community relations, employee morale, and access to new markets. Skepticism remains, however, due to the perceived high costs of improving environmental performance and the uncertain and longer-term payoffs from such efforts (Engardio et al. 2007).

Academics have studied the relationship between environmental performance and financial performance, both theoretically (Walley and Whitehead 1994; Hart 1995; Porter and van der Linde 1995) and empirically (Ullman 1985; King and Lenox 2002; Margolis and Walsh 2003). Friedman (1970) argued that any environmental expenses beyond those required for regulatory compliance were not in the best interest of shareholders and would result in degradation of firm performance and value. However, Barnett and Salomon (2006, 2012) suggested that good corporate social performance, of which environmental performance is a subset, attracted resources to the firm, including better quality employees and expanded market opportunities. Also, since proactive approaches to environmental performance require greater intangible skills (e.g., cross-disciplinary activity and problem solving) than do reactive approaches, related efforts created more valuable resources and could be a source of competitive advantage (Hart 1995; Russo and Fouts 1997). In contrast, Walley and Whitehead (1994) proposed that instances where environmental initiatives can improve firm performance were rare.

Although the dominant view today is that good environmental performance results in improved financial performance and market value, empirical results have been inconclusive and even conflicting, which highlights the complex nature of the link between environmental and financial performance (Corbett and Klassen 2006).

Related empirical studies that use secondary data are of three types: portfolio studies, regression studies, and event studies (King and Lenox 2001; Guenster et al. 2006). Portfolio studies determine whether the return on a portfolio of firms with comparatively better environmental performance outperforms the market. Regression analyses determine the long-term relationships between environmental performance and accounting-based measures of firm performance. These two types of studies require careful matching of the firms under study with control firms to estimate any departures from "normal" financial performance during the study period. Due to the relatively long time periods over which such studies are conducted, they are sensitive to the host of other possible explanatory factors of firm performance.

Event studies estimate market value impacts of firms using announcements of environmental events. A statistically significant market reaction to announcements of environmental events would indicate a causal link. Event studies have been used in the literature to determine the impacts of both positive and negative environmental events, e.g., product and process-related initiatives (Gilley et al. 2000), environmental awards and crises (Klassen and McLaughlin 1996), and lawsuits (Karpoff et al. 2005). Klassen and McLaughlin (1996) documented the market reaction to independent, third-party awards for environmental performance. Using a sample of 140 announcements during the period 1986–1991, they found that environmental awards were associated with a statistically significant average market reaction of 0.63 %. Gilley et al. (2000) studied the market reaction to environmental activities that improve processes and products. Based on a sample of 71 announcements from *The Wall Street Journal* during 1983–1996, they found that process-related announcements resulted in a statistically significant average market reaction of –0.45 %, but the market did not react significantly to product-related announcements.

We use the framework in Fig. 14.1 to consider the impact of environmental initiatives on financial performance and market value. Researchers have proposed different mechanisms by which environmental initiatives influence revenue gains and cost reductions. An examination of these mechanisms illustrates how environmental initiatives can impact market value.

14.1.1 Revenue Effects

Revenue growth can be achieved either through gains in existing markets or access to new markets. Klassen and McLaughlin (1996) proposed that gains in existing markets could be realized through the reputational benefits of positive environmental performance. They argued that demonstration of reduced environmental impacts of products and processes and the establishment of an environmental management system (EMS) improved brand reputation. Dowell et al. (2000) also noted that the development and maintenance of stringent environmental management standards could have positive reputational effects. Corbett and Muthulingam (2007) proposed that a primary reason for firms to pursue Leadership in Energy

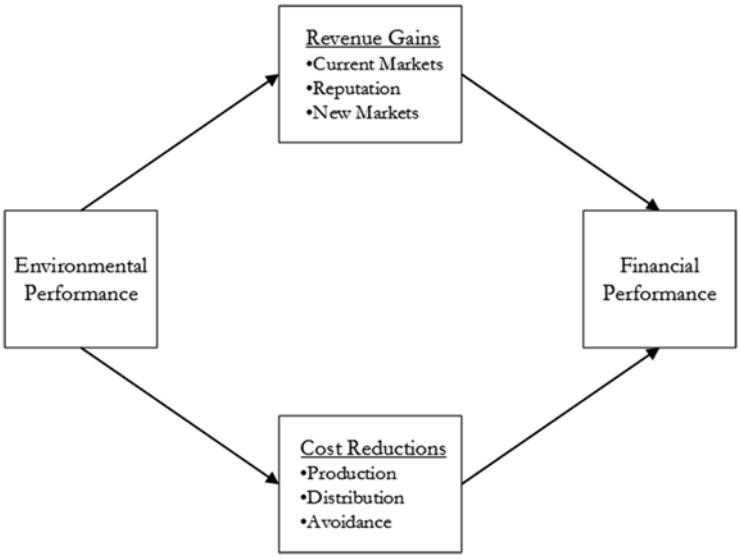

Fig. 14.1 Conceptual model linking environmental performance and financial performance

and Environmental Design (LEED) certification for building construction was to signal environmental concern to regulators, employees, and the public. Brand recognition and corporate reputation can also be enhanced through "strategic philanthropy" to support environmental causes (Seifert et al. 2003). Similarly, other environmentally conscious initiatives, such as alternative energy purchases or investments to reduce emissions below regulatory requirements, can signal a firm's concern for the environment and can have a positive impact on corporate reputation. For example, Cummins Inc. received a high ranking in the inaugural Newsweek "green" survey due to its GHG reduction efforts (*Business Wire*, 2009). Khanna and Damon (1999) found that desire for public recognition was a significant motivator for firms to voluntarily join the EPA Industrial Toxics Project aimed at reducing hazardous chemical emissions. Improved recognition and reputation could potentially lead to increased sales. In support, McGuire et al. (1988) demonstrated that sales growth was positively and significantly related to corporate reputations for corporate social performance.

Improved environmental performance can also provide access to new markets. Evolving environmentally conscious markets with their increasing desire for eco-friendly products can lead to new sales opportunities (Porter and van der Linde 1995). Examples range from high-fashion clothing produced with organic materials (Binkley 2007), to hybrid vehicles and data centers that consume less energy (Bulkeley 2007). US federal agencies, with $350 billion in annual purchases, are mandated to consider environmental criteria in their purchasing decisions (EPA 2008).

14.1.2 Cost Effects

In addition to its effects on revenues, environmental initiatives can impact costs in a variety of ways. Environmental practices reduce the amount of waste, the consumption of various production inputs including energy and materials (Rothenberg et al. 2001; Sroufe 2003), and the number of components in products (Ashley 1993). Given that emissions could represent inefficiencies and waste of material or energy, their reduction can also save input material and energy costs (Porter and van der Linde 1995). For example, Union Pacific's 15 % reduction in diesel emissions from 2000 to 2005 at their Davis, California, rail yard was achieved by reducing fuel usage (*PR Newswire*, 2005). From a supply chain perspective, both inbound and outbound logistics benefit from reduced product weights and packaging (Rao and Holt 2005). Dowell et al. (2000) note that stringent environmental standards can lower the cost to develop, maintain, and enforce policies and procedures, thus allowing easy transfer of accrued knowledge and increasing employee morale and productivity. Similarly, von Paumgartten (2003) argues that LEED-certified buildings can improve worker productivity and retention. Of course, not all environmental improvements are cost-saving. If substitute input materials are more expensive, costs would increase. As evidence, Kroes et al. (2012) find that sulfur dioxide emission reductions in utilities result in decreased financial performance due to the use of lower-sulfur but higher-cost coal. Further, if pollution prevention methods have been exhausted and abatement must additionally be employed, costs will likely increase.

Pollution prevention may not only reduce disposal and mitigation costs, but may also avoid the cost of installing and operating pollution control devices (Hart 1995; Hart and Ahuja 1996). Such pollution control devices can be costly, as evidenced by Reliant Energy's $50 million investment to reduce mercury emissions at its Pennsylvania coal-fired power plants (*Business Wire*, 2008). Other cost avoidance benefits of effective environmental management include mitigation of risks of losses from crises or regulation (Reinhardt 1999) and preventing expenses associated with lawsuits and legal settlements (Karpoff et al. 2005). Risks of adverse events can be decreased either by lowering the probability of occurrence, lessening the cost impact of an event, or shifting responsibility to another party, usually via insurance. By reducing or eliminating emissions, firms reduce the probability of environmental crises such as spills, leaks, or contamination. As an example, after suffering several expensive settlements and fines, DuPont pledged to eliminate the use of perfluorooctanoic acid (*Dow Jones News Service*, 2007).

14.1.3 Competitive Effects

Researchers argue that firm resources employed to achieve environmental initiatives exhibit value, rarity, inimitability, or non-substitutability, the so-called "VRIN" characteristics of the Resource Based View (RBV) outlined by Barney (1991). As such, environmental initiatives can potentially create competitive advantage.

Researchers have often attributed imperfect imitability to resources required for improved environmental performance (e.g., Hart 1995; Russo and Fouts 1997). Environmental initiatives resemble Total Quality Management (TQM) efforts in that they are often accomplished via people-intensive, continuous improvement processes. These resources are causally ambiguous and consistent with inimitability. Russo and Fouts (1997) argued that the culture and organization required for environmental performance were also socially complex. New processes or technologies often required for initiatives either might not be available to other firms due to their proprietary nature, or they might require special skills to effectively implement. A firm's announcement of an environmental initiative could be perceived as evidence that it possesses such valuable resources, helping it outperform its competition.

14.2 Empirical Approach to Test the Relationship Between Environmental Initiatives and Market Value

We employed event study methodology to estimate the market value impacts to announcements of environmental initiatives. This methodology offers an approach to estimate stock market returns associated with specific events, while controlling for market-wide influences on stock prices (see Brown and Warner 1985, for a review of this methodology). The "adjusted" or "abnormal" returns provide an estimate of the percent change in stock price associated with an event. In an efficient market, the stock market reaction immediately reflects the effects of any new information, including the announcement of an environmental initiative, on both current and future financial performance. Thus, an estimate of financial performance impact can be obtained from changes in market value (stock prices) over a relatively short interval of time.

14.2.1 Data and Categorization of Environmental Practices

To develop a comprehensive list of environmental practices commonly employed in business, we searched the business press for announcements related to Corporate environmental initiatives (CEIs) and empirically determined the most frequently occurring types. To generate our sample, we used a preliminary set of keywords to collect a small set of announcements concerning environmental practices from different publications. We read these announcements to identify additional phrases and words that are commonly used in announcements of environmental initiatives. We then used those keywords to search the headlines and lead paragraphs of announcements in the three major business wire services, the ten most widely circulated US daily newspapers, and the leading European business daily during the period 2004–2006. We preserved all announcements that met the search criteria in these publications and read the full text of each announcement. We excluded announcements that were very minor in nature or duplicates of the same activity.

Our final sample comprised 780 announcements spanning 340 unique firms. The sample had variation in firm characteristics, but was generally weighted toward larger firms. The sample included firms from 63 unique three-digit NAICS codes, thus representing a wide range of industries.

The first obvious categorization was to separate out the self-reported corporate efforts to avoid, mitigate, or offset the environmental impacts of the firm's products, services, or processes. We refer to such announcements as Corporate environmental initiatives (CEIs) (CEIs). The remaining second category is announcements about recognition granted by third parties specifically for environmental performance. We refer to such announcements as Environmental Awards and Certifications (EACs).

14.2.2 Corporate Environmental Initiatives (CEIs): Subcategories

Considering our CEI sample more deeply, we identified the following seven subcategories based on announcement content:

- *Environmental Business Strategies*: Acquisitions of environmental-friendly capabilities, joint ventures or alliances, and new corporate environmental policies or standards.
- *Environmental Philanthropy*: Substantial gifts for environmental causes, such as conservation efforts; the majority of such announcements are cash gifts although some are in kind.
- *Voluntary Emission Reductions*: Pledges, investments, or achievements related to reducing emissions levels beyond those required by regulation.
- *Eco-Friendly Products*: Introductions of eco-friendly products, environmental enhancements to existing products, or the incorporation of future regulatory requirements into existing products.
- *Renewable Energy*: Supply or purchase of power from alternative energy sources.
- *Recycling*: Recycling of post-consumer waste and recycling to reduce raw material consumption.
- *Miscellaneous*: All remaining CEI announcements, including joining environmental groups or councils, engaging in energy conservation efforts, and developing eco-friendly technologies.

14.2.3 Environmental Awards and Certifications: Subcategories

We separated our EAC announcements into two certification subcategories, namely, ISO 14001 and LEED, and three award subcategories, namely, federal, state or local government, and non-government. The awards mentioned in EAC announcements

Table 14.1 Examples of press announcements

Panel A: Examples of CEI Announcements
"Caterpillar Sets Aggressive Greenhouse Gas Reduction Target, Goal is Part of EPA's Climate Leaders program", PR Newswire (US), 18 January 2005. Caterpillar pledged to reduce its greenhouse gas emissions by 20 % from 2002 levels, by 2010
"Liz Claiborne Inc. Adopts prAna Natural Power Initiative", PR Newswire (US), 3 November 2005. Liz Claiborne Inc. announced that it would purchase only wind power for its New Jersey headquarters
"Abitibi-Consolidated Launches its largest Recycling Expansion; Paper Retriever begins collection in seven additional US markets", PR Newswire (US), 15 November 2005. Abitibi announced an expansion of its paper recycling program from 16 to 23 US cities
Panel B: Examples of EAC Announcements
"Smithfield Achieves International 'Gold Standard' for its Environmental Management Practices", PR Newswire (US), 27 April 2005. Smithfield attained ISO 14001 certification for the EMS used at its US-based hog production and processing facilities
"Corning's Wilmington, N.C., Optical Fiber Manufacturing Facility To Be Recognized as an Environmental Steward", Business Wire, 2 March 2005. A Corning plant was recognized as an "Environmental Steward" by the North Carolina Department of Environment and Natural Resources for its environmental performance

are specifically those given to recognize environmental performance, including pollution prevention, energy conservation, and habitat conservation. Table 14.1 presents some examples of CEI and EAC announcements.

14.2.4 Relevance to Operations and Supply Chain Management

Our analyses of the text of CEI and EAC announcements clearly highlighted the operations and supply chain issues involved in implementing environmental initiatives and improving environmental performance. Using words from the text of the announcements, we recorded phrases representative of the issues being faced. We grouped these issues into 13 operations and supply chain-related categories; we note that an announcement may have multiple issues falling into different categories. Table 14.2 lists the operations and supply chain-related categories. Supply chain-related categories include forward and reverse logistics, designing incentives and contracts for supply chain alignment, and managing supply and demand. The table also indicates the number of CEI and EAC announcements that fall into a particular issue category.

14.3 Findings

For the full sample of 417 CEI announcements, we examined the abnormal stock market returns for the day preceding the announcement, the day of the announcement, and the 2 days combined. The results indicated that the market reaction to

Table 14.2 Operations and supply chain-related issues for CEIs and EACs

Category	Number of announcements			Description
	CEIs	EACs	Total	
Implementing Environmental Management Systems and Practices	52	139	191	Developing and Implementing Environmental Management Systems (including ISO 14001), Practices, and Policies
Product Design and Development	101	57	158	Product or Service Design and Development (Improvements, Testing, and Commercialization)
R&D and Technology Management	92	58	150	R&D and Technology Assessment, Adoption, Development, and Transfer
Improving Resource Efficiency	63	83	146	Reduction, Reuse, and Recycling of Materials or Energy through Improvements in Products, Processes, or Practices
Facilities Management	53	87	140	Facilities Location, Design, and Management
Process Design and Management	57	64	121	Process Design, Improvement, and Testing; Process Metrics and Process Control
Forward and Reverse Logistics and Transportation	90	45	135	Materials Handling, Transportation, and Logistics; Reverse Logistics Network Design and Management
Pollution Prevention and Control	63	44	107	Pollution Prevention, Control, and Offsetting
Improving Operational Performance	27	46	73	Improving Cost, Efficiency, Productivity, Quality, Delivery, and Reliability
Designing Incentives and Contracts	51	8	59	Incentive Alignment and Design (across Employees, Suppliers, and Customers); Contracts and Vertical Integration
Input Choice	40	10	50	Input Choice or Mix (based on Availability, Cost, Regulatory Incentives, Risk, and Constraints)
Managing Supply and Demand	37	11	48	Increasing or Sustaining Supply, Reducing Demand, Managing Capacity (Utilization, Expansion, and Shut-Downs)
Operations Financing and Project Management	26	13	39	Financing Operations, Projects, and Suppliers; Project Management

CEI announcements is marginally positive but insignificant. Similarly, for the full sample of 363 EAC announcements, the evidence suggested that the market does not react significantly to the entire category of EAC announcements. We also analyzed the post-announcement abnormal returns of our sample firms to determine whether a significant market reaction occurred subsequent to our announcement date. We estimated abnormal returns over a 3-month period after the announcement.

Again, the results indicate that the market reaction to announcements of environmental initiatives is marginally positive but insignificant.

It appears that, as a broad and general category, environmental initiatives do not necessarily translate into improved market performance. While the lack of a significantly positive result might be disappointing to environmental advocates, it is worth noting that the result is not significantly negative. In other words, decisions to undertake environmental initiatives do not harm market value as some naysayers may claim. Further, it is plausible that the market may not perceive all types of environmental initiatives to be equally value creating. The market might react positively, or not at all, depending on the initiative type. By aggregating environmental initiatives of different types, the average reaction could well be insignificant. Accordingly, we next examined the relationship between specific types of environmental initiatives and market performance.

14.3.1 Relationships Between Specific CEI Types and Market Value

We subdivided our CEI and EAC samples into the specific initiative types outlined in Sects. 14.2.2 and 14.2.3. We provide results for each of the seven CEI types in Table 14.3 Panel A. For the environmental business strategies type, the mean abnormal return was positive and statistically significant. However, the median and percent positive abnormal returns were insignificant. Taken together, the evidence suggests that the market did not significantly react to environmental business strategy announcements.

Our review of the literature suggests that the empirical evidence on the impact of corporate philanthropy on financial performance is mixed. Orlitzky et al. (2003) found that corporate philanthropy had a positive relationship with accounting-based measures of financial performance, while Wang et al. (2008) found that financial performance and market value were increasing in only low-to-moderate levels of philanthropy. In contrast, Griffin and Mahon (1997), Berman et al. (1999), and Seifert et al. (2004) did not find a significant relationship between the two. In our analyses, we found that the mean, median, and percent positive abnormal returns for environmental philanthropy were all positive and statistically significant. The positive market reaction to environmental philanthropy could be because such actions involve modest investments, but generate significant customer goodwill and enhance corporate reputation, thus contributing to future profitability.

With regard to announcements of voluntary emission reductions, we found that the mean, median, and percent positive abnormal returns were all *negative* and statistically significant. In other words, announcements of voluntary emission reductions were viewed negatively by the market. This finding has some support in the literature. In addition to the theoretical arguments of Friedman (1970) discussed earlier, Hart and Ahuja (1996) suggested that while initial emission reductions

Table 14.3 Stock market abnormal returns for CEI and EAC types for the day preceding and the day of the announcement

	N	Mean abnormal return (%)	*t* Statistic	Median abnormal return (%)	Wilcoxon signed-rank *Z*	% Positive	Generalized sign *Z*
Panel A: CEI type results							
Environmental Business Strategies	53	0.63	2.77***	–0.01	0.36	49.10	0.44
Environmental Philanthropy	30	0.46	1.41*	0.36	1.74**	66.70	2.07**
Voluntary Emission Reductions	39	–0.95	–2.96***	–0.72	–2.63***	30.80	–2.17**
Eco-Friendly Products	60	0.01	0.04	0.07	0.05	5.17	0.48
Renewable Energy	40	0.13	0.28	0.07	0.86	55.00	0.94
Recycling	64	0.33	1.14	0.05	0.46	51.60	0.54
Miscellaneous	131	0.05	0.13	0.07	0.09	52.70	1.02
Panel A: EAC type results							
ISO 14001 Certifications	50	0.35	0.84	0.77	1.56*	60.00	1.80**
LEED Certifications	21	0.02	0.62	0.39	0.84	61.90	1.26
Federal Awards	96	–0.03	–0.07	–0.11	–0.17	44.80	–0.60
State/Local Government Awards	65	–0.21	–0.59	–0.10	–0.66	49.20	0.11
Non-Government Awards	131	–0.26	–1.51*	–0.21	–1.59*	39.70	–1.97**

Note: All tests are one-tailed: *$p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$

might improve financial performance, subsequent reductions were more likely to result from costly pollution control. Fisher-Vanden and Thorburn (2011) found that membership in the EPA Climate Leaders program yielded a negative abnormal return of –0.90 %; the negative abnormal returns were even stronger when specific pledges are made for greenhouse gas reductions. The Climate Leaders program was referred to in 12 of the 39 announcements in our voluntary emissions reductions subcategory; the remainder of the announcements within the subcategory related to other air emissions or hazardous waste reductions. To further explore this negative market reaction, we conducted additional analyses as described in Sect. 14.3.4.

The market reactions for the four remaining CEI subcategories—eco-friendly products, renewable energy, recycling, and miscellaneous—were statistically insignificant.

14.3.2 Relationships Between Specific EAC Types and Market Value

As seen from the results for each of the five EAC types in Table 14.3 Panel B, the market reaction was moderately positive to announcements of ISO 14001 certifications. The median and percent positive abnormal returns were significantly positive. The literature offers some support for the positive impact of ISO 14001 in particular and EMSs in general on firm performance, using survey data (Delmas 2001; Melnyk et al. 2003).

Although our three measures of market reaction to LEED certifications were all positive, they were statistically insignificant. Thus, despite the benefits of LEED certification cited in the literature (e.g., von Paumgartten 2003; Corbett and Muthulingam 2007), the market reaction was insignificant. We conjecture that since LEED certifications are awarded for individual buildings, their relatively narrow scope may contribute to the lack of market reaction, particularly when compared with ISO 14001 certifications that typically span different geographic locations or even the entire firm.

While the average market reactions for both federal and state/local government awards were statistically insignificant, the market reacted somewhat negatively to non-government awards. The mean, median, and percent positive abnormal returns were all significantly negative. We found no substantive differences in the types of behavior recognized by government versus non-government awards. Our findings of negative abnormal returns for non-government awards compared to government awards seem consistent with findings in the literature that less prestigious and potentially less objective awards were valued less positively (Klassen and McLaughlin 1996; Hendricks and Singhal 1996). An online search for award criteria provided information for federal awards, but not for non-government awards, suggesting that non-government award criteria are perhaps less transparent and less formal. The negative market reaction could be because the market may

perceive the efforts associated with such awards as unnecessary relative to the value they provide.

14.3.3 Managerial Implications of Findings

Our findings have a number of interesting managerial implications. First, the market was selective in reacting to types of environmental initiatives. Of the seven CEI types considered in our analyses, the stock market reaction was largely insignificant for the following four categories: environmental business strategies, eco-friendly products, renewable energy, and recycling. The evidence suggests that while the majority of CEI types were value-neutral, there were certain types for which the market reaction was positive and certain types for which it was negative, at least in the short term. Our results for CEIs are important as managers often face pressures from various stakeholders to give consideration for environmental issues. Managers responding to such pressures can benefit from empirical evidence of what types of CEIs improve or at least do not negatively impact market value.

Second, environmental philanthropy was viewed positively by the market. Such philanthropy can generate positive publicity and goodwill among various stakeholders and can also create value through more loyal customers and highly motivated employees. Referring to Fig. 14.1, environmental philanthropy is likely to improve financial performance via the revenue gains from enhanced reputation. Given that the median value of philanthropic contributions by firms in our sample is $2.0 million, the positive market reaction to environmental philanthropy suggests that such initiatives can yield high returns.

Third, the market reacted negatively to voluntary emission reductions. These results are consistent with earlier results that membership in the EPA Climate Leaders program was associated with negative market reaction (Fisher-Vanden and Thorburn 2011). Despite the benefit in terms of mitigating future regulatory risks or positively impacting reputation, the market remains concerned about announcements of voluntary emissions reductions. Referring to Fig. 14.1, it is possible that the market negatively values voluntary efforts at reducing emissions because of the visibility of direct, assignable costs, while the revenue impacts of such efforts are uncertain. Therefore, announcements of voluntary emissions reductions efforts should be accompanied by formal justifications as to why these efforts are being conducted (for example, preparing for future legislation, competitive lobbying, or anticipated carbon trading) and what the expected value from these efforts is likely to be. We discuss this finding further in Sect. 14.3.4.

Fourth, with respect to EACs, we found that ISO 14001 certifications were associated with positive market reaction. This is validation of the value in achieving a level of environmental commitment that is based on a widely recognized and accepted international standard, and more so when the standard is sometimes

considered as a prerequisite for trade. Thus, our results suggest that managers could potentially use the ISO 14001 framework for developing an EMS.

Finally, the market reaction to environmental awards in our study is different than in Klassen and McLaughlin (1996), who found significant and positive market reaction. Given that our sample is not an exact replication of Klassen and McLaughlin (1996), the difference in results could be due to sampling variances and/or the different time periods. Our evidence indicates that LEED certifications and government awards are value-neutral, but non-governmental awards have a negative market reaction. While awards and certifications can serve as catalysts for organizational change and innovative business practices, a key implication for managers seeking to influence shareholder value through awards and certifications is to be judicious in pursuing them.

In summary, although we find that the market does not react to announcements in the broad, aggregate categories of CEIs and EACs, we do find significant market reactions for certain initiative types. Thus, it is important for managers to appropriately implement and communicate environmental strategies, as the effects on shareholder value can vary by type. Together with the communication of a sound, economic rationale based on cost reductions, revenue gains, or reputational benefits, certain environmental initiative types can positively impact shareholder value.

14.3.4 Contingencies Affecting the Relationship Between Environmental Initiatives and Market Value

In this section, we consider whether the contexts or conditions surrounding the environmental initiative impacted the corresponding changes in market value. As previously discussed, the literature reports mixed impacts of environmental initiatives on financial performance and market value. The mixed empirical evidence motivates us to examine specific contingency factors that might be causing this ambiguity.

14.3.4.1 Achievements Versus Intents

Since self-disclosed initiatives may not necessarily serve as measures of actual environmental performance, we considered whether the market reacts differently to environmental initiatives that are "achievements" as opposed to "intents". Since announcements of environmental initiatives are signals of firms' environmental concerns, we consider their impact through the lens of signaling theory. A basic tenet is that signal cost is an important influence on efficacy; costly signals decrease the likelihood of false signaling (Connelly et al. 2011). Since announcements of achievement are actual realizations rather than plans, they are a higher cost signal and, hence, more likely to be true and of greater reputational benefit than announcements of intent. Hart and Ahuja (1996), King and Lenox (2001, 2002), and

Matsumara et al. (2014), among others, use actual emissions data (i.e., achievements) to demonstrate mostly positive effects of emissions reduction on financial performance and market value. However, Fisher-Vanden and Thorburn (2011) examine pledges made (i.e., intents) when joining EPA Climate Leaders or the Coalition for Environmentally Responsible Economies (CERES) and find a negative stock market reaction.

We note that EACs are recognitions of achievement by definition. Hence, the comparison between achievements and intents is not pertinent to EACs. Accordingly, we only considered our CEI sample. We read the text of each CEI announcement to separate out achievements of environmental performance from intents. For example, the launch of an eco-friendly product is an achievement, whereas a plan to design or produce such a product is an intent. We compared the mean and median abnormal stock market returns for achievements and intents. The results showed a moderately significant and positive market reaction to achievements, but the reaction to intents was insignificant. Since achievements may more clearly signal either realized or future cost reductions and/or revenue gains as compared to intents, a greater focus in outward communications on achievements as opposed to intents may be warranted.

As we saw in Sects. 14.3 and 14.4, the market value impacts of CEIs can vary substantially by specific initiative type. Accordingly, we consider one specific type of CEI, voluntary emission reductions, to further examine the effects of achievements versus intents. Recall that overall market reaction to voluntary emission reductions was significantly negative. Thus, if achievements are indeed clearer signals, an achievement of voluntary emission reduction should have a greater *negative* impact than an intent to reduce emissions. Using the same process described in Sect. 14.1, we greatly expanded the sample of voluntary emission reduction announcements by collecting data over a 20-year period (1990–2009). The resulting sample comprised 450 announcements. As we found in our initial analysis (see Table 14.3), our analysis of the expanded sample indicated that announcements were again valued negatively. However, and as predicted by signaling theory, announcements of intent were valued more positively than announcements of achievement.

14.3.4.2 Time Dependence

Given that researchers using data from the 1980s and 1990s (e.g., Hart and Ahuja 1996; King and Lenox 2002) found mostly positive effects of environmental performance on accounting-based measures of financial performance, and that researchers using data from the 2000s (e.g., Jacobs et al. 2010; Fisher-Vanden and Thorburn 2011) found more mixed results, we were prompted to consider whether the magnitude and/or direction of financial performance effects of environmental initiatives have changed over time, contributing to the equivocal findings in the literature. To do so, we used the 20-year sample of voluntary emission reduction announcements described above.

Hart (1995) noted that during initial stages of emissions reduction, much "low hanging fruit"—emissions that can be reduced easily and inexpensively—are generally available but further reductions are subject to diminishing returns. Given that firms have been reducing toxic emissions steadily since the initial release of TRI data in 1986 and continuing through the 2000s (EPA 2011), much of the low hanging fruit has probably already been harvested. More recent environmental initiatives are likely accomplished at increased marginal costs since advanced stages of emissions reduction often require more costly control or abatement techniques rather than prevention. In support, the EPA (2008, p. 5) found that the greatest barrier to voluntary emission reductions was "the perceived cost of emission reduction."

In addition to fewer cost opportunities to exploit, emission reduction might have also changed in value as a risk management strategy. If the regulatory environment for emissions is toughening, the expectation of future liabilities associated with emissions taxes, cap and trade systems, and/or stringent enforcement should increase along with the risk management value of reducing emissions. However, as per the World Economic Forum, the stringency of US environmental regulations trended downward during the 2001–2008 period (Wijen and van Tulder 2011). Marcus et al. (2011) argued that regulatory uncertainty continues to grow, increasing difficulties in appropriate corporate planning. Such continued regulatory ambivalence in the US with respect to emissions has likely reduced the risk management value of emission reduction.

Using abnormal stock market reactions to announcements of voluntary emission reductions as our dependent variable, we employed stepwise WLS regressions to assess the effects of time. The statistical tests demonstrate that stock market reaction to voluntary emission reduction is negatively associated with time (see Fig. 14.2). As depicted in Fig. 14.2, this effect applies similarly to GHG and non-GHG emissions, and it persists despite controlling for energy prices and other factors.

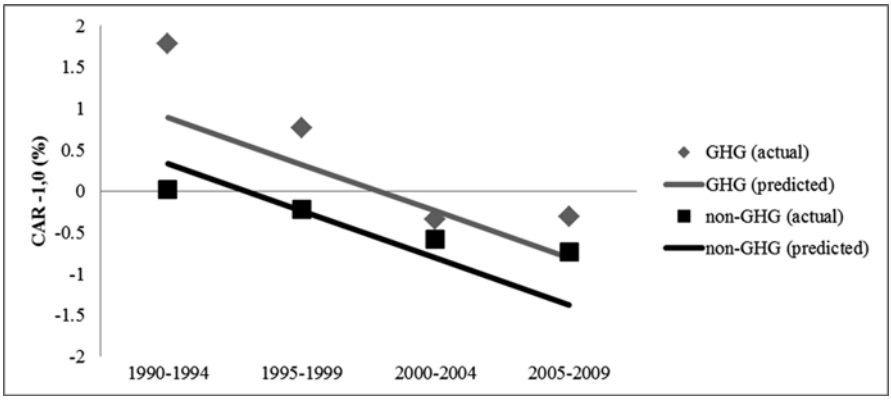

Fig. 14.2 Stock market reaction to voluntary emission reduction of GHG emissions and non-GHG emissions from 1990 through 2009; lines represent predictions of WLS regression model and markers represent actual mean cumulative abnormal returns aggregated over 5-year periods

This evidence is important to both researchers and managers as it highlights the impacts of time-dependent characteristics of emissions reduction in particular.

In this study, we did not determine the precise time-related factors driving the downward trend in shareholder value effects of firms announcing emission reductions. As discussed above, the potential factors include diminishing availability of easily reduced emissions (low hanging fruit), continued regulatory ambiguity in the US, and diffusion of continuous improvement capabilities, among others. Given the number of economic, environmental, and social factors that trend with time, the specific causes of the negative time trend in abnormal returns are indeterminate and require further study.

We note that the results presented here are valid only for the sample frame studied and should not be extrapolated into the future. Just as economic, environmental, and social conditions changed 1980–2009, they will continue to change, impacting the market value impacts of emissions reductions (and other environmental initiatives) to firms. For example, regulatory remedies such as limits or taxes on emissions, or market-based incentives such as cap-and-trade programs, could substantially change the value proposition of environmental initiatives. Similarly, increasing social demand for improved environmental performance could lead to increased brand equity and revenues for environmentally conscious firms. Indeed, as seen in Fig. 14.2, the stock market reaction, although trending downward, appears to be leveling out in recent years.

14.4 Future Research

There exist several avenues for fruitful future research. First, the very nature and definition of environmental initiatives is continually evolving. The emergence of new technologies, scientific discoveries, societal concerns, and the ever-changing state of our natural environment all influence the adoption, growth, or diminishment of specific environmental types. The core sample used in our analyses was collected during 2004–2006. While all samples are time-limited by definition, this can be especially problematic in the fast-changing world of sustainability. As illustrated by the example of emission reductions announced over a 20-year period that we discussed above, the market value impacts of those environmental initiatives are dynamic and time-sensitive. Statistical evidence across time will inform managers as to the changing nature of the market's assessment of environmental efforts.

Second, many environmental initiatives impact not only the focal firm, but also its supply chain partners. For example, incorporating environmental performance criteria in supplier selection might boost both environmental and financial performance for the entire supply chain. Such impacts are challenging to accurately define and measure across multiple firms, but are grounds for interesting future research.

Third, in this chapter we employed the stock market reaction as a proxy for the financial performance impacts of environmental initiatives. Although widely

employed and well-established in the academic literature, the effectiveness of this proxy is dependent on the generally accepted notion of market efficiency. Accounting-based measures of financial performance such as ROA, ROE, or sales growth can yield additional information on the specific mechanisms by which environmental initiatives impact financial performance and are not dependent on market efficiency.

Fourth, beyond the value captured in the stock market reaction, it is plausible that environmental initiatives may create value in other, intangible ways including increased customer loyalty (measured as customer satisfaction, retention rate, or word-of-mouth publicity), higher employee satisfaction, reputation within the community, and long-term survivability, which are perhaps not fully reflected in the market's reaction to announcements. Consideration of the impacts of environmental initiatives using a triple-bottom-line perspective could result in greater assigned value to environmental initiatives and is another interesting direction for future research.

In summary, this chapter examines the relationships between firm-level environmental initiatives and market value. We also outline the implications of our results for researchers and managers and suggest avenues for future research. Research that examines the effects, nuances, and limitations of firms' environmental initiatives will continue to be pertinent as society's demands on the natural environment continue to grow.

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References

Ashley S (1993) Designing for the environment. Mech Eng 115(3):52–56

Barnett ML, Salomon RM (2006) Beyond dichotomy: the curvilinear relationship between social responsibility and financial performance. Strat Manage J 27(11):1101–1122

Barnett ML, Salomon RM (2012) Does it pay to be really good? Addressing the shape of the relationship between social and financial performance. Strat Manage J 33(11):1304–1320

Barney J (1991) Firm resources and sustained competitive advantage. J Manage 17(1):99–120

Berman SL, Wicks AC, Kotha S, Jones TM (1999) Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. Acad Manage J 42(5):488–506

Binkley C (2007) Green fashion: beyond T-shirts. Wall Street J D8

Brown SJ, Warner JB (1985) Using daily stock returns: the case of event studies. J Financ Econ 14(1):3–31

Bulkeley WM (2007) IBM to launch push for green—new business to address cutting energy thirst of computer centers. Wall Street J B4

Business Wire (2008) Reliant energy invests in emission controls for Pennsylvania generating plants

Business Wire (2009) Cummins recognized for environmental practices by Newsweek magazine

Connelly BL, Certo ST, Ireland RD, Reutzel CR (2011) Signaling theory: a review and assessment. J Manage 37(1):39–67

Corbett CJ, Klassen RD (2006) Extending the horizons: environmental excellence as key to improving operations. Manuf Serv Oper Manage 8(1):5–22
Corbett CJ, Muthulingam S (2007) Adoption of voluntary environmental standards: the role of signaling and intrinsic benefits in the diffusion of the LEED green building standards. UCLA Working Paper, California
Delmas M (2001) Stakeholders and competitive advantage: the case of ISO 14001. Prod Oper Manage 10(3):343–358
Dow Jones News Service (2007) DuPont sets goal of eliminating use of teflon chemical
Dowell GA, Hart SL, Yeung B (2000) Do corporate global environmental standards create or destroy market value? Manage Sci 46(8):1059–1074
Engardio P, Capell K, Carey J, Hall K (2007) Beyond the green corporation. Bus Week 50
EPA (2008) Environmentally preferable purchasing. http://www.epa.gov/epp/index.htm. Accessed 18 Dec 2008
EPA (2011) 2010 TRI national analysis overview. http://www.epa.gov/tri/tridata/tri10/nationalanalysis/overview. Accessed 15 July 2012
Fisher-Vanden K, Thorburn KS (2011) Voluntary corporate environmental initiatives and shareholder wealth. J Environ Econ Manage 62(3):430–445
Friedman M (1970) The social responsibility of business is to increase profits. New York Times Magazine
Gilley KM, Worrell DL, Davidson WN, El-Jelly A (2000) Corporate environmental initiatives and anticipated firm performance. J Manage 26(6):1199–1216
Griffin JJ, Mahon JF (1997) The corporate social performance and corporate financial performance debate. Bus Soc 36(1):5–31
Guenster N, Derwall J, Bauer R, Koedijk K (2006) The economic value of corporate eco-efficiency. http://ssrn.com/abstract=675628
Hart SL (1995) A natural-resource-based view of the firm. Acad Manage Rev 20(4):986–1014
Hart SL, Ahuja G (1996) Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. Bus Strat Environ 5(1):30–37
Hendricks KB, Singhal VR (1996) Quality awards and the market value of the firm: an empirical investigation. Manage Sci 42(3):415–436
Jacobs BW (2014) Shareholder value effects of voluntary emissions reduction. Prod Oper Manage 23(11):1859–1874
Jacobs BW, Singhal VR, Subramanian R (2010) An empirical investigation of environmental performance and the market value of the firm. J Oper Manage 28(5):430–441
Karpoff JM, Lott JR, Wehrly E (2005) The reputational penalties for environmental violations: empirical evidence. J Law Econ 48(2):653–675
Khanna M, Damon LA (1999) Voluntary 33/50 program: impact on toxic releases and economic performance of firms. J Environ Econ Manage 37(1):1–25
King AA, Lenox MJ (2001) Does it really pay to be green? An empirical study of firm environmental and financial performance. J Ind Ecol 5(1):105–116
King AA, Lenox MJ (2002) Exploring the locus of profitable pollution reduction. Manage Sci 48(2):289–299
Klassen RD, McLaughlin CP (1996) The impact of environmental management on firm performance. Manage Sci 42(8):1199–1214
Kroes J, Subramanian R, Subramanyam R (2012) Operational compliance levers, environmental performance, and firm performance under cap and trade regulation. Manuf Serv Oper Manage 14(2):186–201
Marcus A, Aragón-Correa JA, Pinske J (2011) Firms, regulatory uncertainty, and the natural environment. Calif Manage Rev 54(1):5–16
Margolis JD, Walsh JP (2003) Misery loves company: rethinking social initiatives by business. Adm Sci Q 48(2):268–305
Matsumara EM, Prakash R, Vera-Muñoz SC (2014) Firm-value effects of carbon emissions and carbon disclosures. Account Rev 89(2):695–724
McGuire JB, Sundgren A, Schneeweis T (1988) Corporate social responsibility and financial performance. Acad Manage J 31(4):854–872

Melnyk SA, Sroufe RP, Calantone R (2003) Assessing the impact of environmental management systems on corporate and environmental performance. J Oper Manage 21(3):329–351
Montabon F, Sroufe RP, Narasimhan R (2007) An examination of corporate reporting, environmental management practices, and firm performance. J Oper Manage 25(5):998–1014
PR Newswire (2005) Union Pacific announces emissions reduction program in cooperation with the California Air Resources Board
Orlitzky M, Schmidt FL, Rynes SL (2003) Corporate social and financial performance: a meta-analysis. Org Stud 24(3):403–441
Porter M, van der Linde C (1995) Green and competitive: ending the stalemate. Harv Bus Rev 73(5):120–134
Rao P, Holt D (2005) Do green supply chains lead to competitiveness and economic performance? Int J Oper Prod Manage 25(9):898–916
Reinhardt F (1999) Market failure and the environmental policies of firms. J Ind Ecol 3(1):9–21
Rothenberg S, Pil FK, Maxwell J (2001) Lean, green, and the quest for superior environmental performance. Prod Oper Manage 10(3):228–243
Russo MV, Fouts PA (1997) A resource-based perspective on corporate environmental performance and profitability. Acad Manage J 40(3):534–559
Seifert B, Morris SA, Bartkus BR (2003) Comparing big givers and small givers: financial correlates of corporate philanthropy. J Bus Ethics 45(3):195–211
Seifert B, Morris SA, Bartkus BR (2004) Having, giving, and getting: slack resources, corporate philanthropy, and firm financial performance. Bus Soc 43(2):135–161
Skapinker M (2008) Virtue's reward? Companies make the business case for ethical initiatives. Financial Times 8
Sroufe R (2003) Effects of environmental management systems on environmental management practices and operations. Prod Oper Manage 12(3):416–431
Ullman AE (1985) Data in search of a theory: a critical examination of the relationships among social performance, social disclosure, and economic performance of US firms. Acad Manage Rev 10(3):540–557
von Paumgartten P (2003) The business case for high-performance green buildings: sustainability and its financial impact. J Facil Manage 2(1):26–34
Walley N, Whitehead B (1994) It's not easy being green. Harv Bus Rev 72(3):46–52
Wang H, Choi J, Li J (2008) Too little or too much? Untangling the relationship between corporate philanthropy and firm financial performance. Org Sci 19(1):143–159
Wijen F, van Tulder R (2011) Integrating environmental and international strategies in a world of regulatory turbulence. Calif Manage Rev 53(4):23–46