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Sustainability and Competitive Advantage: An Empirical Study of Value Creation

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EXECUTIVE SUMMARY

This paper seeks to fill a gap in existing literature by testing whether sustainable companies are able to compete effectively in terms of financial performance and attractiveness to investors. Our sample consists of firms appearing in the Innovest 'Global 100' rankings released annually at the World Economic Forum in Davos, Switzerland. Our empirical results indicate that sustainable companies do not significantly underperform the stock market as a whole, and are viewed as highly competitive within their industries. We provide a theoretical basis for these results by linking classic corporate strategy and competitive advantage theories to the performance of sustainable enterprises.

Keywords: Sustainability, Competitive advantage, Porter hypothesis, Corporate strategy, Empirical study

THEORY AND LITERATURE REVIEW

The most widely accepted and often quoted definition of sustainability traces back to a report issued by the World Commission on Environment and Development: "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (United Nations, Report of the World Commission on Environment and Development, 1987, p.8). As applied at the firm level, sustainable business theory generally emphasizes the interdependence among financial, social, and environmental performance factors (the three of which are often referred to as the "triple bottom line") for generating long term value (e.g., Lovins & Hawken 1999; Elkington, 1997; Esty & Winston, 2009). Unlike previous empirical papers addressing the market performance of sustainable companies, this paper also contributes to the conceptual literature by applying classic theories of corporate strategy to analyze how sustainability can serve as an important source of competitive advantage.

In assessing whether environmental initiatives may adversely impact firm competitiveness, it is helpful to first consider theories on the competitive impact of environmental regulation, before turning to voluntary sustainability initiatives in which firms typically undertake environmental commitments that go above and beyond what is required by law.

Environmental Regulation and Competitiveness: Evolution of the "Porter Hypothesis"

This year marks the 20th anniversary of the initial publication of Harvard Strategist Michael Porter's so-called "Porter Hypothesis," in which he defied conventional wisdom by declaring:

> "Strict environmental regulations do not inevitably hinder competitive advantage against rivals; indeed, they often enhance it" (Porter, 1991).

The prevailing view of virtually all economists at that time was that stricter environmental regulations would require firms to internalize and reduce negative externalities such as pollution, thereby automatically raising costs, restricting options, reducing profits, and hampering international competitiveness. Porter thought otherwise, suggesting that well designed environmental regulations can serve as a source of innovation, while also helping firms improve operational efficiencies (Porter, 1991; Porter & van der Linde, 1995; Ambec & Lanoie, 2008; Johnstone & Hascic, 2010).

Over the last 20 years, many researchers have empirically tested the Porter Hypothesis, and a recent comprehensive literature review by Ambec et al. (2011) conclude:

> "Altogether, these [empirical] works deduce that there is a positive link, although varying in strength, between environmental regulation and innovation" (p. 8).

Other recent empirical studies have found that stricter environmental regulations lead to modest gains in productivity, particularly when measured over a period of several years – initially reducing productivity in year one, having a slightly positive effect in year two, and then resulting in more positive outcomes in years three and four (Ambec et al., 2010; Lanoie et al., 2008).

Voluntary Sustainability Initiatives and Competitiveness

Even if studies on the Porter Hypothesis generally support the view that well designed environmental regulations do not hamper competitiveness, this still leaves the question of whether firms can remain competitive when implementing voluntary environmental sustainability initiatives that go above and beyond regulatory mandates. Indeed, the main counter-argument posed by early critics of the Porter Hypothesis was that, if opportunities existed to reduce pollution in a profitable manner absent government regulation, then profit-maximizing firms would have been taking advantage of those opportunities already (Ambec et al., 2010). In fact, firms are now making this realization, as a growing number of respected multinational companies show that they are willing to go beyond legal compliance requirements to systematically reduce their environmental impacts and embrace social responsibility because it helps the firm deliver greater value and enhance competitiveness.

Below, we analyze these growing sustainability initiatives through the lens of widely accepted corporate strategy principles to explain how such programs can be a source of competitive advantage. We first consider the classic definitions of corporate strategy, especially the important distinctions between "operational effectiveness" and "strategic positioning," and then explain how sustainability initiatives can influence both of these key attributes of competitive advantage.

Leveraging Sustainability to Improve "Operational Effectiveness"

In defining the essence of strategy, Michael Porter has drawn critical distinctions between "strategic positioning" and "operational effectiveness," ultimately concluding that operational effectiveness is "necessary but not sufficient" for achieving a long term competitive advantage in a dynamic and ever-changing marketplace (Porter, 1996).

Operational effectiveness and strategic positioning are both essential to performance, but that they work in very different ways. While operational effectiveness includes the elements of efficiency and economies of scale, it is not limited to these concepts. Rather, it includes any capabilities that allow a firm to perform a similar range of activities relating to production and delivery of products and services better than its rivals when the entire range of firm activities are viewed as a whole. (Porter, 1996). By contrast, effective strategic positioning involves efforts to differentiate the firm and its products/services by establishing a unique position that distinguishes the firm from its competitors in a manner that provides superior value to customers. For example, various forms of innovation can serve as a basis of differentiation, as can finding unique ways of organizing interrelated sets of activities across the firm (Porter, 2008). As a result, operational effectiveness and strategy cannot be viewed in isolation from one another, since firms cannot sustain competitive advantage and remain profitable in the long term unless they can achieve both. As stated by Porter (2008):

> Managers must clearly distinguish operational effectiveness from strategy. Both are essential, but the two agendas are different. The operational agenda involves continual improvement everywhere there are no trade-offs. Failure to do this creates vulnerability even for companies with a good strategy. The operational agenda is the proper place for constant change, flexibility, and relentless efforts to achieve best practice. In contrast, the strategic agenda is the right place for defining a unique position, making clear trade-offs, and tightening fit.

The majority of studies making the "business case" for sustainability over the last decade have focused on benefits that relate to a firm's operational effectiveness, such as efficient use of resources, cost savings from waste reduction, and the advantages of sustainable supply chain management. More recently, the sustainability literature has also begun to explore strategic benefits of sustainability that help to differentiate the firm through innovation, improved positioning, and strategic "fit." Achieving these strategic benefits requires a deeper integration of sustainability principles within the firm, through "whole systems thinking" and "eco-effectiveness," as well as across a broader set of activities in the larger supply chain.

Improving Operational Effectiveness Through Eco-Efficiency

A growing number of business case studies suggest that well-executed sustainability programs can lead to dramatic improvements in a company's operational effectiveness. For example, Ambec and Lanoie (2008) point to four distinct ways companies can leverage sustainability initiatives to reduce costs, including: 1) lower costs of materials, energy, and services; 2) reduced cost of labor through efficiency/productivity gains; 3) lower costs of capital; and 4) improved risk management and relations with external stakeholders.

Studies examining benefits of environmental sustainability programs have focused on the cost savings through gains in "eco-efficiency." Eco-efficiency involves "producing and delivering goods while simultaneously reducing the ecological impact and use of resources" (Schmidheiny, 1992; Starik & Marcus, 2000). Instead of focusing mainly on the costs of eliminating or treating pollution, principles of eco-efficiency require managers to focus on the opportunity costs represented by pollution and waste streams generated in business processes (e.g., wasted resources, wasted effort, additional abatement and disposal steps, potential health and safety liabilities, and diminished product value to the customer) (Porter & Van der Linde, 1995). This shift in perspective can help companies reduce or eliminate their reliance on environmentally hazardous production processes, redesign existing product systems to reduce environmental impacts, and develop new products with lower life cycle costs (Hart, 1997). Studies on eco-efficiency variables reflect that firms can achieve significant cost savings through improved production efficiency and by gathering the "low hanging fruit" associated with reducing excessive wastes, lowering cost of materials, and conserving energy (e.g., Hart & Ahuja, 1996; Molina-Azorin et al., 2009).

Improving Operational Effectiveness Through Sustainable Supply Chain Management

Companies can multiply such cost savings from eco-efficiency, and generate additional benefits, by coordinating with suppliers and customers in an effort to implement interconnected cost savings and efficiencies across a larger sustainable supply chain. Indeed, effective sustainable supply chain management is becoming widely viewed as a business value driver rather than as a cost center (Wilkerson, 2005; Mefford, 2011). Many of the world's supply chain leaders have actively embraced sustainable supply chain management because they recognize it is a significant source of improved operational effectiveness (Rosenbloom, 2010). For example, Wal-Mart is hailed as the "best supply chain operator of all time," and has moved aggressively to green its supply chain (Plambeck & Denend, 2007; Heying & Sanzero, 2009). In October 2008, Wal-Mart CEO Lee Scott issued a challenge to more than 1,000 suppliers in China to reduce waste and emissions; cut packaging costs by 5% by 2013; and increase the energy efficiency of products supplied to Wal-Mart stores by 25% in three years' time (Nidumolu et al., 2009; Plambeck, 2007).

Sustainable supply chains must not only perform well on traditional measures of profit and loss, but also on an expanded measure of performance that includes social and environmental dimensions (often referred to as "triple bottom line") (Elkington, 1999; Kleindorfer et al., 2005; Esty & Winston, 2009). Studies reflect that sustainable supply chain management not only reduces adverse environmental and social impacts, but also improves operational effectiveness in relation to one or more of the following:

- **Green design**: Systematic consideration of design issues associated with minimizing environmental impacts and health risks over the full life cycle of a product, starting with earliest stages of developing new products and production processes (Fiksel, 1998).
- **Green operations**: All aspects of greening the product manufacture/remanufacture, usage, handling, logistics and waste management once the design phase has been finalized (Srivastava, 2007; Lund, 1984).
- **Green manufacturing**: Seeks to reduce the ecological burden by using appropriate material and processes (e.g., recycled content, or refurbishing/remanufacturing processes) (Srivastava, 2007; Lund, 1984).
- **Waste minimization**: includes the reduction of hazardous waste which is generated during production and operations, or subsequently treated, stored or disposed (Lund, 1984).
- **Reverse logistics**: processes involved in planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption back to the point of origin for the purpose of recapturing value or proper disposal at the end of useful life (Zhu & Sarkis, 2004; Rogers & Tibben-Lembke, 1999).

The above stages of greening a supply chain involve many different sustainability related disciplines, including environmental risk management, product safety, occupational health and safety, pollution prevention, cradle-to-cradle product lifecycle management, resource conservation, and waste management (Srivastava, 2007). Systematically undertaking such sustainable supply chain activities also helps companies within the supply chain better integrate their discrete activities, thereby increasing efficiencies, promoting economies of scale, lowering costs, better managing risks, and thus improving operational effectiveness for the participating firms.

In terms of classic competitiveness theory, these sustainability-related supply chain activities also help firms move closer to the so-called "productivity frontier," defined by Porter as follows:

> Imagine for a moment a productivity frontier that constitutes the sum of all existing best practices at any given time. Think of it as the maximum value that a company delivering a particular product or service can create at a given cost, using the best available technologies, skills, management techniques, and purchased inputs…. When a company improves its operational effectiveness, it moves toward that frontier…. The

> productivity frontier is constantly shifting outward as new technologies and management approaches are developed and as new inputs become available. (Porter 2008)

As Porter (2008) further notes, however, firms within a given industry tend to emulate one another's best practices, which can lead to "competitive convergence" and lower margins within the entire industry over time if competition among firms is based only on operational effectiveness. The way out of such a cycle is for firms to actively seek out sources of differentiation that help to establish a unique competitive position, deliberately choosing a different set of activities to deliver a mix of value that is difficult to emulate and distinct from any competitor.

Leveraging Sustainability for Strategic Positioning and Differentiation

Sustainability and First-Order "Strategic Fit"

Differentiation is the linchpin of successful strategic positioning, and as explained by Porter (2008), "[s]trategy is the creation of a unique and valuable position, involving a different set of activities.… Choosing a unique position, however, is not enough to guarantee a sustainable advantage [because] a valuable position will attract imitation by incumbents, who are likely to copy it."

Competitors typically copy a position either by repositioning themselves to match the competitive position, or by "straddling" to occupy multiple spaces on the competitive landscape. Well integrated sustainability initiatives can help prevent a firm's valuable position from being copied by reinforcing what Porter identifies as "strategic fit." Fit is the process of aligning organizational activities to reinforce one another, such that the configuration of one activity raises the value of other activities. Strategic fit is what allows firms to sustain a competitive advantage over a longer time horizon:

> Strategic fit among many activities is fundamental not only to competitive advantage but also to the sustainability of that advantage. It is harder for a rival to match an array of interlocked activities than it is merely to imitate a particular sales-force approach, match a process technology, or replicate a set of product features. Positions built on systems of activities are far more sustainable than those built on individual activities. (Porter 2008)

In turn, deeper levels of "fit" make the competitive position even more difficult to copy, as follows:

- **<u>First-order fit</u>**: Simple consistency between each activity (function) and the overall strategy.
- **<u>Second-order fit</u>**: Multiple activities serve to reinforce one another.
- **<u>Third-order fit</u>**: Goes beyond activity reinforcement to "optimization of effort" across an entire system.

For example, to achieve first-order fit, a firm already oriented towards *needs based positioning* could identify a segment of customers that are environmentally sensitive and offer new "green" versions of existing product lines, differentiating those products based on their ecological characteristics and reduced environmental impact in a way that appeals to the needs of this particular customer segment (Elkington, 1994; Molina-Azorin, 2009). Similarly, a company such as Zip Car would more likely align its sustainability-oriented business model with an *access based positioning* strategy to achieve first-order fit, given that customers in particular geographic areas (e.g., urban areas, college campuses) are more likely to utilize its services. Proactive environmental and socially responsible practices allow firms to differentiate their brands based on enhanced reputation, higher levels of social approval, and greater trust from key stakeholders such as customers and employees. In turn, this often allows the company to benefit from premium pricing and/or increased sales (Miles & Covin, 2000; Rivera, 2001). In addition to these forms of first order fit, firms can also reinforce second and third order strategic fit by integrating sustainability initiatives more deeply into their operations.

Eco-Effectiveness and Whole Systems Thinking Reinforce Deeper "Strategic Fit"

Firms hailed as industry leaders in sustainability are likely to facilitate second and third-order strategic fit by integrating sustainability principles more deeply into sets of interrelated activities across a larger system. In the last decade, academic literature on sustainable business theory has shifted from analytical modes of thinking (focused on independent variables) to a holistic "systems thinking" approach, focused on the interrelationships among the many parts of an entire system (Senge et al., 2008; Gharajedaghi, 2006). Senge (2006) has described systems thinking as ''a discipline for seeing wholes …. interrelationships rather than things .... patterns of change rather than static snapshots'' (p. 68). Similarly, Ackoff (2010) states that "Systems thinking looks at relationships (rather than unrelated objects), connectedness, processes (rather than structure), the whole (rather than just its parts), the patterns (rather than the contents) of a system, and its context" (p. 6).

Systems thinking provides a vehicle for integrating sustainability with Porter's (2008) classic concepts of second and third order strategic fit:

> In all three types of fit, the whole matters more than any individual part. Competitive advantage grows out of the entire system of activities….The more a company's positioning rests on activity systems with second-and third-order fit, the more sustainable its advantage will be. Such systems, by their very nature, are usually difficult to untangle from outside the company and therefore hard to imitate. And even if rivals can identify the relevant interconnections, they will have difficulty replicating them.

Consistent with this emphasis on whole system thinking, recent academic literature on sustainable business reflects an important shift in emphasis from "eco-efficiency" towards "eco-effectiveness" (Young & Tilley, 2006). Although the literature on "eco-effectiveness" has not been framed in terms of corporate strategy, it has important implications for strategic positioning and fit.

The concept of eco-effectiveness emerged from the perceived limitations of eco-efficiency, which critics claim can only slow down the rate of environmental depletion and production of non-recycled waste, but cannot prevent or reverse it (Young & Tilley, 2006; Barbiroli & Raggi, 2009). Eco-effectiveness goes beyond eco-efficiency by emphasizing cradle-to-cradle design in seeking to create industrial systems that emulate healthy natural systems, rooted in the central principle that "waste equals food" (McDonough & Braungart, 1998). Thus, by its very nature, eco-effectiveness is consistent with Porter's notion of third-order fit, because it depends on creating sets of interlocking and interdependent processes that must be optimized across an entire system. Achieving true "eco-effectiveness" helps firms and their supply chain participants lock out competitors by reinforcing second and third order strategic fit.

Sustainability and Eco-Effectiveness Lead to "Blue Oceans"

In outlining their "blue ocean" strategy theory, Kim and Mauborgne (2005) urge companies to abandon the assumption that current structural conditions within an industry are already set such that firms are forced to compete within those parameters. This traditional mindset paints the competitive landscape as a zero-sum game in which one company can only gain when a competitor loses, leading to intense competition that turns bloody waters into a "red ocean". Instead, blue ocean strategy is based on the premise that the competitive landscape is dynamic and constantly shifting, allowing innovative industry players to periodically reconstruct market boundaries through a focus on "value innovation" (Kim & Mauborgne, 2005). This concept of "value innovation" relies on finding innovative ways to simultaneously pursue <u>both</u> differentiation and lower cost in order to unlock greater value and new demand, rather than focusing on supplying only existing demand. The authors provide a number of case examples of companies that use this approach to break the value/cost tradeoff barrier, thereby changing market structures to avoid head-to-head competition (Kim & Mauborgne, 2005). The essence of blue ocean theory can be summed up in a phrase borrowed from the ancient Chinese general, Sun Tzu:

> "The supreme art of war is to subdue the enemy without fighting."

This same type of holistic systems thinking discussed above is also useful for identifying blue ocean strategies:

> [B]lue ocean strategy is achieved only when the whole system of a company's utility, price, and cost activities is properly aligned. It is this whole-system approach that makes the creation of blue oceans a sustainable strategy. Blue ocean strategy integrates the range of a firm's functional and operational activities….Imitating a whole system approach is not an easy feat. (Kim & Mauborgne, 2005, p. 77)

Consistent with blue ocean theory, sustainability is a driver of innovation not only for creating new "greener" products, but more importantly for reconstructing market boundaries, creating new demand, and delivering new combinations of value to customers by shifting the frontier of cost/value tradeoffs. Recognizing unmet societal needs and serving previously ignored market segments often requires redesigning products and/or distribution systems, leading companies to discover new opportunities for repositioning and differentiation in traditional markets as well (Porter & Kramer, 2011).

The process of leveraging sustainability to identify blue ocean opportunities also relates back to the concepts of eco-efficiency and eco-effectiveness discussed above. Eco-efficiency helps to explain how firms can use sustainability to pursue the lower cost dimension of blue ocean theory through improved energy efficiency, waste reduction, lower materials costs, and higher productivity. Eco-effectiveness explains how companies can begin to redesign commerce around regenerative rather than depletive practices. Eco-effectiveness requires firms to make a fundamental shift from a linear approach to a cyclical approach that mimics systems found in nature (Dyllick & Hockerts, 2002). Redesigning commerce around such regenerative systems can helps firms redefine the competitive landscape.

Examples of this concept include firms that have shifted from consumption-oriented business models based only on delivery of products or materials, to models focused instead on delivery of value, services, and solutions to their customers (Sharma & Henriques, 2005). Such systems create new, market-based mechanisms that encourage and reinforce sustainability rather than incentivizing over consumption and generation of excess waste. Building such regenerative, solution-based systems also helps deliver greater value to customers while improving environmental performance.

A simple example can be found in major IT companies that have shifted from selling computers to providing an integrated combination of consulting, software, hardware, and technical support services to customers under a solutions-based approach. This re-orientation creates greater value for customers, facilitates better design of processes to match customer needs, and allows equipment and supplies to be readily recovered, refurbished, and recycled at the end of their useful life. The unique combination of interlocking activities required to design and deliver such an integrated package of solutions to customers is not only difficult for competitors to replicate, it also delivers greater value-for money to clients (Roy, 2000).

Similarly, Interface, Inc. has not only redesigned its commercial floor covering products and processes to dramatically reduce environmental impact in sourcing and production, but the company is shifting to a service rather than consumption based approach in the way they structure commerce. For instance, the company now offers integrated products and services, such as the "Evergreen" leasing program, through which the company not only provides commercial floor coverings, but also takes direct responsibility for ongoing care and replacement of the carpet, ensuring that worn carpeting is recycled as an input into new products at the end of life (Stubbs &Cocklin, 2008).

Suppliers in the chemical industry also have begun offering "chemical management service contracts" to replace traditional chemical product delivery contracts. The suppliers collaborate directly with their industrial customers to design the production facilities, deliver the chemical, deploy the chemical as indirect production material, and handle waste treatment, recovery, and recycling. The customer then pays the supplier based on a value-added service instead of the quantity of chemicals purchased. This new structure fundamentally alters incentives in the relationship by actually motivating suppliers to reduce their chemical usage, and also helps the chemical producers to manage environmental, health, and safety risks on a more proactive and preventative basis (Reiskin et al., 2000).

Sustainability as "The Key Driver of Innovation"

By analyzing sustainability through the lenses of classic theories of strategy, it becomes evident that firms hailed as sustainability leaders should be able to leverage their sustainability programs as a source of competitive advantage. At a minimum, eco-efficiency helps firms lower costs over time through improved financial performance. Even more important is the potential for deeply integrated sustainability programs to serve as a source of differentiation, or even to reshape market boundaries through value innovation that is rooted in whole systems thinking.

Indeed, management gurus Ram Nidumolu, C.K. Prahalad, and M.R. Rangaswami have gone so far as to assert that "sustainability is now the key driver of innovation," stating:

> Executives behave as though they have to choose between the largely social benefits of developing sustainable products or processes and the financial costs of doing so. But that's simply not true. We've been studying the sustainability initiatives of 30 large corporations for some time. Our research shows that sustainability is a mother lode of organizational and technological innovations that yield both bottom-line and top-line returns. Becoming environment-friendly lowers costs because companies end up reducing the

> inputs they use. In addition, the process generates additional revenues from better products or enables companies to create new businesses. In fact, because those are the goals of corporate innovation, we find that smart companies now treat sustainability as innovation's new frontier. (Nidumolu et al., 2009)

We set out to design an empirical means of testing whether companies recognized as being the most sustainable are in fact able to compete effectively in terms of their financial performance and attractiveness to investors. The theories discussed above can be most effectively tested by analyzing their price behavior to new information. Finance theory suggests that efficient markets should respond to new information, and the cost-benefits of sustainability may become evident in the stock price reaction after firms are recognized as sustainability leaders in a prominent venue. Below we describe the empirical methodology used to examine the competitiveness of sustainable firms.

EMPIRICAL METHODOLOGY

Our empirical study tests the theory that major companies most recognized for their sustainability leadership are well positioned to compete effectively with the market at large. While there are a number of studies on the relative stock performance of "sustainable" firms, there is none that uses our methodology or integrates the stock price performance of sustainable firms with the competitiveness literature. Moreover, existing studies present conflicting findings, so our study helps to resolve this ongoing debate.

Empirical studies examining links between environmental/social performance and market/stock price performance tend to fall into three categories: portfolio comparisons, regression analyses, or event studies (King & Lenox, 2001; Jacobs et al., 2010).

Portfolio comparisons typically analyze whether the returns from a portfolio of companies having a strong environmental record outperform other portfolios or the market as a whole, while regression analyses attempt to establish correlation between environmental performance factors and financial performance measures. Under both of these methods, there can be a degree of subjectivity in measuring environmental performance, it can be difficult to control for a host of other variables that could impact outcomes over time, and finding a positive correlation between environmental and financial performance does not necessarily prove causation (Jacobs et al., 2010). These challenges may help to explain why portfolio comparisons of sustainable companies have resulted in mixed findings. For example, Cohen et al. (1997) find that there is no impact on stock market performance for the environmentally best performing companies, whereas White (1996) and Derwall et al. (2005) find that stocks of environmentally superior companies showed better results than their counterparts on the basis of portfolio studies.

By comparison, event studies focus on specific and non-subjective events such as environmental announcements, and a statistically significant market reaction to such events does reflect a causal link. (Jacobs et al. 2010). In prior research, event studies have been employed to test market response to both positive and negative environmental events. For example, on the positive side, event studies have analyzed announcements for listing of companies on sustainable stock indices such as the Dow Jones Sustainability Index (e.g., Benson, Gupta, & Mateti, 2010), positive environmental product and process announcements (e.g., Gilley et al., 2000), and environmental awards (e.g., Klassen & McLaughlin, 1996). On the negative side, event studies have also analyzed the impact of citations for excessive pollution (e.g., Hamilton, 1995), environmental crises (e.g., Klassen & McLaughlin, 1996), and lawsuits (e.g., Karpoff et al., 2005). Such event studies have tended to find a strong negative influence on stock price for negative environmental events, whereas when events reflecting positive environmental performance had a positive influence on financial performance, it was not as strong (Hamilton, 1995; Klassen & McLaughlin, 1996; López et al., 2007). These latter results may be explained in part by the prospect theory, which concludes that investors tend to assign heavier weight to negative economic news than that given to positive economic news (Kahneman & Tversky, 1979, 1984). We selected an event study methodology because we conclude that the event study method tends to offer superior statistical reliability for our purpose, as compared to portfolio comparisons or regression analyses.

Data Collection and Sample

Our sample of sustainable firms is created using firms that appear on the Innovest 'Global 100 Most Sustainable Corporations in the World' list, a widely recognized database of global companies achieving the highest recognition for sustainability which is released in January each year at the World Economic Forum in Davos, Switzerland. We note that the Innovest rankings consider criteria that capture the concept of "eco-efficiency" discussed above, such as categories for energy, water, carbon, and waste productivity. In addition, Innovest incorporates criteria relevant to "value innovation" and "eco-effectiveness," such as leadership and innovation related elements (Corporate Knights, 2011).

Stock price information needed for the empirical tests are obtained from the Center for Research in Security Prices (CRSP) database.

Empirical Models

Our empirical models use various event-study approaches to compare the risk-adjusted performance of US companies in the annual Innovest rankings against the performance of more than 8000 companies making up the US stock market as a whole.

TABLE 1

List of Companies

Name	Ticker	2005	2006	2007	2008	2009
United Technologies Corp.	UTX	●	●	●	●	●
United Parcel Service, Inc.	UPS	●	●			
Bank of America Corp.	BAC	●	●			
PepsiCo, Inc.	PEP	●				
Pitney Bowes Inc.	PBI	●				
Hewlett-Packard Co.	HPQ	●	●	●	●	●
FPL Group, Inc.	FPL	●	●	●	●	●
Pinnacle West Capital Corp.	PNW	●	●	●	●	●
Agilent Technologies Inc.	A	●	●	●	●	
Xerox Corp.	XRX	●				
Schlumberger Limited	SLB	●	●			
Baxter International Inc.	BAX	●	●	●	●	●
Marriott Intl, Inc.	MAR	●				
Eastman Kodak Co.	EK	●	●	●	●	●
Alcoa, Inc.	AA	●	●	●	●	●
Weyerhaeuser Co.	WY	●				
Bristol-Myers Squibb Co.	BMY	●				
Intel Corp.	INTC	●	●	●	●	●
Ecolab Inc.	ECL	●				
AT&T, Inc.	T	●				
Coca-Cola Co. (The)	KO		●	●	●	●
Johnson & Johnson	JNJ		●			
Masco Corp.	MAS		●			
Nike Inc.	NKE		●	●	●	●
General Electric Co.	GE		●	●	●	
Advanced Micro Devices Inc.	AMD			●	●	●
American Intl Group, Inc.	AIG			●	●	
Genzyme Corp.	GENZ			●	●	●
Goldman Sachs Group, Inc. (The)	GS			●		●
Google, Inc.	GOOG			●		
J P Morgan Chase & Co.	JPM			●		
Walt Disney Co. (The)	DIS			●	●	●
State Street Corp.	STT				●	●
Amazon.com Inc.	AMZN					●
Dell Inc.	DELL					●
PG&E Corp.	PCG					●
Procter & Gamble Co. (The)	PG					●
ProLogis	PLD					●

Notes: The samples are constructed using U.S. companies listed in the 2005 to 2009 'Global 100 Most Sustainable Corporations in the World' rankings released annually at the World Economic Forum in Davos, Switzerland.

We study abnormal returns around the event dates for various time windows. With include the date of the announcement (day 0) and the day prior to the announcement (day 1) to account for possible information leakages. We use a 4 trading day window around the event (-1, +2) to capture the immediate stock impact of the announcement, as well as a 1-month time window (-1, +22), and a 3-month time window (-1, +65) to understand the affect over the longer-term. In line with current finance research, we restrict our event window to 3-months so we do not, on average, pick up the stock reaction to extraneous events. Also, using the entire time period that the information is available provides a larger time-series panel sample, thereby reducing the biases from a small one-year sample.

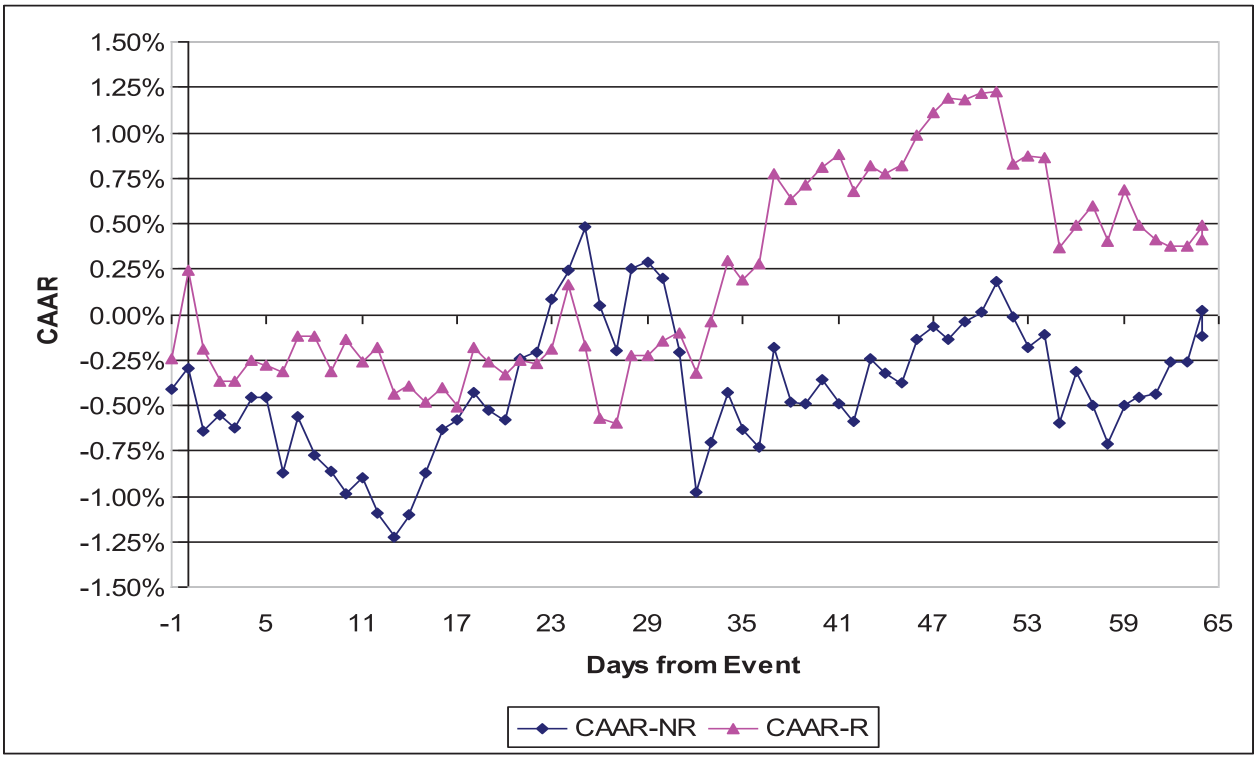
These abnormal returns may reflect premiums for risk differentials, rather than long-term abnormal stock returns. Consequently, we test for long-term abnormal stock returns using the market model and the Fama and French 1993 multifactor model. Additional tests include the momentum factor suggested by Carhart 1997.

There is considerable debate in the finance literature regarding the use of event-time or calendar-time and buy-and-hold returns or cumulative returns for long-run studies. Fama 1998, in fact, suggests that long-run studies suffer from the bad model problem, and that abnormal returns depend on the approach (event-time or calendar-time), the risk-adjustment model, the method used to aggregate returns, and the power of the statistic used to test for significance.[5] To check for the robustness of our findings, we specify our empirical models using various approaches.

In line with the empirical literature, we use the empirical specifications of the CAPM and the Fama-French three-factor asset pricing models, and present results using both an event-time and a calendar-time approach, and with various methods of estimating relative performance such as cumulative average abnormal return (CAAR) and buy-and-hold abnormal return (BHAR). Detailed specifications of the empirical models used are provided in the Appendix.

FIGURE 1

Cumulative average abnormal returns (CAAR) after the event



[5] See Eberhart et al 2004 for a detailed exposition of the debate.

EMPIRICAL RESULTS

We create two samples of sustainable firms using all U.S. companies listed in the Innovest Global 100 Sustainability rankings from 2005 to 2009. For the *repeats* sample, firms that are ranked in multiple annual rankings will have more than one observation in the sample. Firms may be penalized more when first included in the rankings, but not when included again in subsequent years. Consequently, we create a *non-repeats* sample such that firms that appear in multiple annual rankings will be included in the sample only once - in the year of first listing. The final time series panel data consists of 93 observations for the repeats sample and 38 observations for the non-repeats sample. In Table 1 we list all US firms in the Innovest rankings for each year from 2005 to 2009.

Figure 1 illustrates the performance of our samples relative to the value-weighted CRSP index. The CAAR on any day represents the relative performance of our samples since the day before announcement; a negative CAAR indicates that the average stock in our sample under-performed, while a positive CAAR indicates outperformance since announcement. We observe that firms in the repeats sample do worse than the typical firm immediately after announcement, but make up for the underperformance in a little over a month. The non-repeats sample displays similar price behavior but the underperformance is a lot less prominent. In fact, the firms on average do better three months after the announcement.

In Table 2, we present findings of tests that use the various *event-time* approach for various risk-adjustment models. The results of tests of the repeats sample in Panel A suggest that immediately around the announcement of the rankings, sustainable firms underperform the market portfolio by around 0.5%. The Panel B Results of tests of the non-repeats sample are similar. These stocks, however, recover most of these losses in the months after the event – the negative abnormal returns in the (-1, +22) and (-1, +65) windows are economically small and statistically insignificant.

TABLE 2

Abnormal Returns using Event-Time Approaches

Panel A: Repeats Sample	(-1, +2)	(-1, +22)	(-1, +65)
CAAR - Market Model	-0.41 (-2.857***, -2.368***)	-0.47 (-1.648**, -1.745**)	-0.52 (-1.358*, -1.123)
CAAR - Fama-French	-0.40 (-1.256, -2.354***)	-0.57 (-0.742, -2.354***)	-0.41 (-0.317, -1.110)
CAAR – Carhart	-0.61 (-2.086**, -1.965**)	-0.79 (-1.089, -1.965**)	-2.89 (-2.401***, -1.757**)
BHAR	-0.44 (-2.696***, -2.073**)	-0.18 (-0.836, -0.828)	0.19 (-0.137, -0.414)
Panel B: Non-Repeats Sample	**(-1, +2)**	**(-1, +22)**	**(-1, +65)**
CAAR - Market Model	-0.47 (-2.320**, -2.177**)	0.22 (-0.453, -0.879)	0.07 (-0.240, -0.879)
CAAR - Fama-French	-0.43 (-1.060, -1.145)	0.08 (0.084, -1.470*)	0.06 (0.038, -0.496)
CAAR – Carhart	-0.52 (-1.326*, -0.866)	0.01 (0.015, -0.866)	-1.88 (-1.177, -0.866)
BHAR	-0.61 (-2.530***, -2.147**)	-0.03 (-0.396, -0.524)	-0.87 (0.057, -0.200)

Notes: The samples are constructed using U.S. companies listed in the 2005 to 2009 'Global 100 Most Sustainable Corporations in the World' rankings released annually at the World Economic Forum in Davos, Switzerland. For the *repeats* sample, firms that are ranked in multiple annual rankings will have more than one observation in the sample. For the *non-repeats* sample, firms that appear in multiple annual rankings will be included in the sample only once - in the year of first listing. CAAR represents the cumulative average abnormal daily return in percent around the event date. BHAR represents the buy-and-hold abnormal daily return in percent around the event date. Abnormal returns are reported for windows (-1, +2), (-1, +22), (-1, +65) of trading days around the event date, where day 0 is the announcement date. The final time series panel data consists of 93 observations for the repeats sample and 38 observations for the non-repeats sample. Stock price data are obtained from the Center for Research in Security Prices (CRSP) database. Portfolio time-series t-statistics and non-parametric generalized sign z test statistics are in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% level respectively.

Table 3 shows that the calendar-time approach tests support these findings – sustainable firms display statistically significant underperformance in the short run after announcement, the effect is greater when firms are first included in the rankings, and most of the of the losses are recovered in the longer term.

We also note that, for the sake of brevity, we only present results using a value-weighted CRSP index to proxy for the market in the paper, but results using the equally-weighted CRSP index are qualitatively similar.

TABLE 3

Abnormal Returns using the Calendar-Time Approach

Panel A: Repeats Sample	AR (α)	β	s	h	Adjusted R-squared
(-1, +2)	-0.0012 (-0.98)	1.1471 (9.21***)	-0.3416 (-1.23)	0.5051 (2.04**)	0.9350
(-1, +22)	-0.0001 (-0.22)	1.1415 (35.44***)	-0.0206 (-0.24)	0.0489 (0.71)	0.9331
(-1, +65)	-0.0000 (-0.22)	1.0978 (57.37***)	-0.1328 (-2.93***)	0.0801 (2.11**)	0.9373
Panel B: Non-Repeats Sample	**AR (α)**	**β**	**s**	**h**	**Adjusted R-squared**
(-1, +2)	0.0013 (0.35)	0.9169 (2.41**)	-0.7063 (-0.83)	0.9987 (1.32)	0.5796
(-1, +22)	0.0004 (0.36)	1.0534 (12.59***)	-0.0099 (-0.05)	-0.0049 (-0.03)	0.6295
(-1, +65)	-0.0004 (-0.54)	1.2627 (20.84***)	-0.2919 (-2.03**)	-0.1273 (-1.06)	0.6395

Notes: The samples are constructed using U.S. companies listed in the 2005 to 2009 'Global 100 Most Sustainable Corporations in the World' rankings released annually at the World Economic Forum in Davos, Switzerland. For the *repeats* sample, firms that are ranked in multiple annual rankings will have more than one observation in the sample. For the *non-repeats* sample, firms that appear in multiple annual rankings will be included in the sample only once - in the year of first listing. AR represents the average abnormal daily return, using the calendar-time Fama-French three-factor model, in percent around the event date. Abnormal returns are reported for windows (-1, +2), (-1, +22), (-1, +65) of trading days around the event date, where day 0 is the announcement date. The final time series panel data consists of 93 observations for the repeats sample and 38 observations for the non-repeats sample. Stock price data are obtained from the Center for Research in Security Prices (CRSP) database. OLS t-statistics are in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% level respectively.

CONCLUSION

We discuss how firms may employ sustainability to gain competitive advantage by applying classic principles of corporate strategy theory. We apply these concepts to explain how firms can leverage their robust sustainability initiatives to gain operational efficiencies, increase operational effectiveness, improve strategic positioning/fit, spur innovation, redesign commerce, and enhance value. Our findings have important implications for firms considering investments in sustainable practices, for investors in assessing the value of sustainable companies, and for legislators in designing more effective regulations.

Our empirical models use various event-study approaches to compare the risk-adjusted performance of US companies in the annual Innovest rankings against the performance of more than 8000 companies making up the US stock market as a whole.

Our empirical results support the conclusion that the long-run performance of the Innovest sustainability leaders is not statistically different from that of the US stock market portfolio on a risk-adjusted basis. Thus, it appears that sustainable companies that excel in their environmental, social and governance ("ESG") benchmarks do not significantly underperform the stock market as a whole, and thus they are still viewed as highly competitive within their industries as compared to the market at large.

Innovest has been publicly releasing their rankings since January 2005, and therefore our sample of sustainable firms is somewhat limited. However, our findings are qualitatively similar to Benson, Gupta, and Mateti 2010 who use a different empirical method to study the performance of the 100-plus firms in the Dow Jones Sustainability Index. Also, we only consider US firms in the Innovest rankings – future research could extend our study to include all firms benchmarked against a suitable global stock index.

APPENDIX

Event-Time Approaches

1. Cumulative Average Abnormal Return (CAAR)

In this traditional event-study approach, cumulative average abnormal returns are calculated for various time windows around the sample events. The CAARs generated are examined using various risk-adjustment models.

The traditional market model, our first risk-adjustment model, takes the form:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt},$$

The empirical specification to obtain abnormal return is defined as:

$$AR_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{mt}),$$

where, for stock *j* in period *t* after the event,
AR_{jt} = the abnormal return on stock,
R_{jt} = the return on stock,
R_{mt} = the return on the market index,
$\hat{\alpha}_j, \hat{\beta}_j$ = market model parameter estimates in estimation period using OLS.

The average of abnormal returns (AAR_t) in period *t* after event is measured as:

$$AAR_t = \frac{1}{N}\sum_{j=1}^{N} AR_{jt},$$

where, N = number of stocks in the sample.

The cumulative average abnormal returns ($CAAR_T$) during event-time window *T* is calculated as:

$$CAAR_T = \sum_{t=1}^{T} AAR_t$$

Additional factors are included in the risk-adjustment models of:
Fama-French (1993):

$$R_{jt} - R_{ft} = \alpha_j + \beta_j (R_{mt} - R_{ft}) + s_j SMB_t + h_j HML_t + \varepsilon_{jt},$$

and Carhart (1997):

$$R_{jt} - R_{ft} = \alpha_j + \beta_j (R_{mt} - R_{ft}) + s_j SMB_t + h_j HML_t + u_j UMD_t + \varepsilon_{jt},$$

where,
R_{ft} = one-month Treasury bill rate,
SMB_t = the return on a portfolio of small stocks minus the return on a portfolio of big stocks,
HML_t = the return on a portfolio of high book-to-market ratios minus the return on a portfolio of low book-to-market ratios,
UMD_t = the return on a portfolio of high momentum stocks minus the return on a portfolio of low momentum stocks,
α_j = monthly abnormal stock returns measure,
β_j, s_j, h_j, u_j = Factor loadings on the systematic risk factors R_m-R_f, SMB, HML, UMD, respectively.

2. Buy-and-Hold Abnormal Return (BHAR)

The BHAR event-time study model, another traditional test for the significance of long-term abnormal returns, takes the form:

$$BHAR_{jt} = \prod_{t=1}^{T}(1 + R_{jt}) - \prod_{t=1}^{T}(1 + R_{mt})$$

where, for stock *j* in event time window *T*,
BHAR = buy-and-hold abnormal return measure.

Calendar-Time Approach

The calendar-time approach tests for significance of long-term abnormal returns using the Fama-French (1993) three-factor model with the empirical model taking the form:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + s_p SMB_t + h_p HML_t + \varepsilon_{pt}$$

where, for portfolio *p* in calendar period *t*,
R_{pt} = the average portfolio return,

Portfolios are created each calendar day for the samples - a firm is included in the calendar day portfolio in each day of its event window.

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