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THE LONG-TERM BENEFITS OF ORGANIZATIONAL RESILIENCE THROUGH SUSTAINABLE BUSINESS PRACTICES

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Research summary: *Prior work on the benefits of business sustainability often applies short-term causal logic and data analysis. In this article, we argue that the social and the environmental practices (SEPs) associated with business sustainability not only contribute to short-term outcomes, but also to organizational resilience, which we define as the firm's ability to sense and correct maladaptive tendencies and cope positively with unexpected situations. Because organizational resilience is a latent, path-dependent construct, we assess it through the long-term outcomes, including improved financial volatility, sales growth, and survival rates. We tested these hypotheses with data from 121 U.S.-based matched-pairs (242 individual firms) over a 15-year period. We also tested, but did not find support for, the relationship between SEPs and short-term financial performance.*

Managerial summary: *Most managers look for short-term financial benefits to justify socially responsible or sustainable practices. In this article, we argue that such practices also help firms become more resilient, which helps them avoid crises and bounce back from shocks. However, it is difficult to measure the avoidance of shocks, so we analyzed long-term outcomes. We show that firms that adopt responsible social and environmental practices, relative to a carefully matched control group, have lower financial volatility, higher sales growth, and higher chances of survival over a 15-year period; yet, we were unable to find any differences in short-term profits. We hope this research provides good reasons for firms to practice sustainability beyond the pursuit of short-term profits.*

INTRODUCTION

Researchers argue that sustainable business practices improve corporations' operations, reputation, and market access. Although some of these benefits are realized immediately, others take time to accrue. Yet, most research tests for a direct, causal, and immediate impact on business outcomes of these responsible actions. It is no wonder that systematic support for this relationship has been elusive (Margolis, Elfenbein, and Walsh, 2009; Margolis and Walsh, 2003).

In this article, we argue that social and environmental practices (SEPs) help firms sense and seize long-term opportunities and mitigate threats, which contributes to their resilience. Organizational resilience is the ability of organizations to anticipate, avoid, and adjust to shocks in their environment. Resiliency is a latent, path-dependent capability that cannot be measured directly, so its benefits take a long time to manifest. Moreover, resilient firms must sometimes be willing to take

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short-term financial losses in order to realize the longer-term benefits.

This trade-off between the short and long term has received relatively little attention in business sustainability research, and yet, intertemporal equity is central to sustainability (Bansal and DesJardine, 2014; Slawinski and Bansal, 2015). Sustainable organizations manage their relationships not only with their broader environments, including the natural and social environments, but also over time so that short-term financial pursuits do not compromise the prosperity of future generations (WCED, 1987).

Both sustainability researchers and managers tend to ignore the temporality of firm practices and outcomes. For example, sustainability is often operationalized as the triple bottom line—organizations must manage their social, environmental, and financial performance in order to create shared value for both business and society (e.g., Elkington, 1994; Porter and Kramer, 2011). Ironically, this silence about time frames may actually contribute to the pursuit of short-term efficiencies, rather than long-term prosperity, among *sustainability* managers.

In this article, we theorize the relationship among social and environmental practices and organizational resilience, and argue that social and environmental practices result in less financial volatility, stronger growth rates, and better survival rates—over the long term. We test these predictions using a matched-pair design. Applying propensity score matching, we matched 121 corporations with high SEPs with corporations with low SEPs (242 firms in total), based on similarities in size, performance, risk, and industry. We observed the outcomes over the subsequent 15 years (1994–2008) and found strong support for the general assertion that the benefits from SEPs are difficult to detect in the short term, but resilience-related benefits are possible to detect in the long term.

THE SHORT-TERM BIAS OF SUSTAINABILITY RESEARCH

We define *SEPs* as organizational practices that have a positive effect on society by improving the firm's impact on the social and natural environments. SEPs can include community relations, diversity, employee relations, human rights, product quality and safety, and environment and corporate governance practices. For example, good relationships with suppliers by themselves are not SEPs as they lack a social or environmental component; yet, relationships that require suppliers to use fewer resources are SEPs.

Most authors refer to this concept as corporate social responsibility (CSR); however, we are agnostic about the moral positioning of these practices (Bansal and DesJardine, 2014). Therefore, we believe SEPs better capture the sustainability and systems approach of this article.

SEPs may or may not accrue benefits in the short term. For example, firms can find efficiencies quickly through, for example, reducing resource use or diverting waste. Alternatively, some benefits take a long time to accrue, such as nurturing stakeholder relationships that secure the organization's social license to operate and open up new markets. These longer-term benefits, however, have often not been fully theorized in previous studies because past research tends to theorize causal logics and test relatively short lags between the practices and their outcomes (Gao and Bansal, 2013).

Margolis *et al.*'s (2009) meta-analysis of the relationship between CSR and financial performance showed that researchers often use accounting-based measures of financial returns (e.g., return on assets, return on equity) and market-based measures of financial value (e.g., stock returns, market/book value ratio). In the short term, these measures largely respond to short-term gains in efficiency.

Although many researchers theorize the long-term benefits of SEPs, such as the accumulation of intangible resources and capabilities, including innovation, human capital, reputation, and culture, the empirical work reflects a short-term bias (e.g., Choi and Wang, 2009; Surroca, Tribó, and Waddock, 2010). For example, market measures, such as Tobin's Q or economic value added (the value that the firm creates beyond the market return demanded for its risk profile), are argued to capture the long-term effects of SEPs (Surroca *et al.*, 2010); however, this view is debatable. "Efficient markets" are assumed to respond quickly to new information, so anticipated changes in future cash flows should be reflected in current share prices. However, many market participants tend to exhibit short-term biases, overvaluing the short- over the long-term wins (Froot, Scharfstein, and Stein, 1992; Laverty, 1996; Loescher, 1984). If both the short- and long-term wins were valued similarly, then markets would not respond so dramatically to

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new short-term earnings announcements because the underlying value of organizations would remain relatively stable.

Financial markets may have particular difficulty in assessing the value of SEPs because they are diverse and complex. Consequently, investors are often unable to discriminate between true and false SEP signals. Managers could use information asymmetries to act opportunistically (for example, by distorting various characteristics of SEPs, including their scope, embeddedness in the organization, internal consistency, and economic consequences). Corporations could release information that creates market noise and even increases stock price volatility (Orlitzky, 2013). Therefore, financial performance, as reflected by changes in share prices, is not a reliable indicator of the long-term value of SEPs.

A LONG-TERM RESILIENCY APPROACH TO SUSTAINABILITY

In this article, we argue that a short-term, causal approach to SEPs differs from a resilience approach. Resilience is an interdisciplinary concept that describes the dynamic development of complex adaptive systems that interact across temporal and spatial scales (Folke, 2006). The concept has emerged in a number of disciplines, each focusing on different aspects of resilience, resulting in diverse but related definitions. Ecological resilience, for example, has been defined as the buffer capacity or the ability of a system to absorb perturbations without changing its primary function and structure (Holling, 1996), whereas engineering resilience emphasizes the speed of recovery from a disturbance (Pimm, 1991). Resilient social systems incorporate ideas of adaptation, learning, and self-organization in addition to the general ability to persist through disturbances (Folke, 2006). Therefore, social resilience does not entail responding to a one-time crisis; rather, it involves continuously anticipating and adjusting (Hamel and Välikangas, 2003).

We apply the concept of *organizational resilience*, which we define as the incremental capacity of an organization to anticipate and adjust to the environment. Organizational resilience is not a static attribute that organizations either do or do not possess. It is a path-dependent, latent set of capabilities that organizations develop by noticing and correcting for maladaptive tendencies that help them to cope with unexpected circumstances (Gittell *et al.*, 2006; Sutcliffe and Vogus, 2003; Wildavsky, 1988). Organizational resilience comes from two capabilities: (1) quickly processing and responding to environmental signals (Sutcliffe and Vogus, 2003) and (2) developing flexible resources that can be applied to a wide range of interchangeable alternatives (Sanchez, 1995).

These responses help firms to correct maladaptive tendencies and cope with surprises. The outcomes from resilience come from continuous improvements, low volatility, and strong viability. Resilience helps firms endure over the long term and through crises. Therefore, we argue that resilience contributes to firms' sustainability by helping firms to behave as complex dynamic systems, operating within dynamic systems.

Organizational resilience emerges from many sources. For example, duplicate supplier networks maintain resiliency by buffering the organization from disruptions in supply from a particular supplier or a particular geographical region. The 2011 Japanese tsunami, for example, exposed Toyota's maladaptation to catastrophic natural disasters. Six months after the tsunami, Toyota's production had still not recovered from the damage incurred by suppliers that provide hundreds of auto parts (Globe and Mail, 2011). Toyota's inability to cope with this event signaled its low organizational resilience.

SEPs provide a mechanism for sensing changes

Resilient firms need to sense and interpret information rapidly. Early signs of trouble could escalate to a disaster if firms do not respond quickly (Weick, 2003). The ability to identify signs of trouble develops as firms learn to incorporate differing perspectives (Sutcliffe and Vogus, 2003). Organizations can detect variety in the environment, such as weak cues or emerging problems, only if they have sufficient attentional capacity, which is required throughout the organization (Bansal, 2003; Rerup, 2009). Past disturbances in the environment often strengthen firm resilience. Whereas first disturbances may come as a surprise, subsequent disturbances are more likely to be anticipated, so that firms will recognize the cues and respond appropriately. These capabilities, which are sometimes even routinized, contribute to organizational resilience.

SEPs, such as investments in reliable high-quality goods and services, can provide mutually enriching,

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reciprocal transactions with customers. Stakeholders are willing to share with trusted organizations sensitive information about emerging issues when they believe the organization will respond to the comments and not use the information against them (Harrison, Bosse, and Phillips, 2010). Consequently, stakeholders can help the firm identify changes in the environment, such as new technologies, changes in relative prices, and changes in customer tastes (Harrison *et al.*, 2010).

Stakeholders can also serve as an early warning system for shocks, such as a change in regulations or a strike (Harrison *et al.*, 2010). For example, a mining company with good community relations is likely to identify instances of water contamination more quickly than a company that never interfaces with the community. This information allows firms to appreciate the complex and sometimes contradictory interpretations of data, which increases the vividness (i.e., richness and detail) of weak, but important, cues that can help deflect future problems (Rerup, 2009).

Stakeholder relationships must be continuously monitored and reinforced in order to maintain the level of trust necessary to unlock these value-creating opportunities (Harrison *et al.*, 2010). This trajectory, by necessity, requires firms to make investments today for benefits that accrue over a longer term—a trade-off between more earnings now and greater earnings tomorrow (Chen and Miller, 2011).

SEPs create a stock of flexible resources

Organizational resilience is also fostered through flexible resources, such as committed workers and corporate reputation. Flexible resources are often firm-specific and take years to nurture through consistent, path-dependent efforts (Dierickx and Cool, 1989). Early experiences shape later experiences; an actor's interpretation and response to new challenges depend on the actor's prior attitudes, expectations, feelings, and responses (Sutcliffe and Vogus, 2003). Trial-and-error learning allows firms to not only replace old routines, but also to respond to new problems and avoid major crises.

The flexibility that comes from employees, suppliers, and other stakeholders cannot be traded, bought, or sold. Firms must cultivate this flexibility over time. Even though such trust cannot be traded, it still has practical economic value (Arrow, 1974; Zaheer, McEvily, and Perrone, 1998) because it contributes to organizational flexibility and adaptability. Employees' behaviors are related to employees' motivations, which are related not only to employee-organization fit, but also to the employees' beliefs that their investment in the firm will be reciprocated by the firm's willingness to invest in them (MacDuffie, 1995). People-based SEPs (e.g., employment security) help to foster such reciprocity and build employee loyalty (Gittell *et al.*, 2006; MacDuffie, 1995), which help firms handle temporary, but potentially fatal, disturbances in their organizational environment. For example, loyal workers may be more willing than less dedicated workers to adjust their working hours or salaries to respond to the immediate, and often temporary, needs of the organization.

The firm's suppliers are also important in fostering firm flexibility and organizational adaptability. Good relationships with suppliers stimulate creativity and problem-solving skills that contribute to the development of new quality products. As well, a high level of inter-firm trust facilitates the development of solutions for unanticipated changes in the environment (usually not explicitly covered by the contracts), helping to direct the common effort toward determining how best to reach mutually beneficial solutions rather than assigning blame and debating the responsibility for bearing the cost of changes (Zaheer *et al.*, 1998).

SEPs are also linked to capabilities that encourage continuous innovation or shared vision (e.g., Hart, 1995; Russo and Fouts, 1997; Sharma and Vredenburg, 1998). These capabilities introduce flexibility into firms' responses by improving a firm's capability to adapt quickly to environmental changes and to realign with the environment. For example, improvements in packaging have helped to reduce waste, contributed to the development of new materials, and in many cases, improved storage and transportation options. As path- and time-dependent learning processes develop, SEPs contribute even more to firms' resource stocks (Aragon-Correa and Sharma, 2003; Barnett, 2007; Hart, 1995).

RESILIENCY-BASED OUTCOMES OF SEPS

In this section, we argue that organizational resiliency developed through SEPs is related to lower financial volatility, higher growth, and better

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chances of long-term survival. In other words, SEPs contribute to *long-term*, not *short-term*, financial health.

SEPs reduce financial volatility

Previous literature on resiliency argues that high volatility in returns and markets tends to signal low resilience. Examples of high financial volatility include the erratic changes in IBM's earnings, which plummeted from a profit of $6 billion in 1990 to a loss of nearly $8 billion in 1993 (Hamel and Välikangas, 2003). Hamel and Välikangas (2003) argue that a resilience lens implies that firms continuously anticipate and adjust to their environment, which facilitates the firm goal of "zero trauma."

We argue that SEPs reduce volatility in financial performance: first, because firms that have embraced SEPs can notice and correct maladaptive tendencies more easily. By anticipating future complaints, firms are less likely to suffer from them (García-Castro, Ariño, and Canela, 2010). Second, SEPs build resources and capabilities that can help deflect extraordinary situations that impact firm performance. For example, Bansal and Clelland (2004) argue that firms with high SEPs are less likely to experience social and environmental hazards, which contributes to organizational legitimacy and results in less scrutiny and unsystematic market risk, relative to peers.

Not only are resilient organizations able to sense and respond to unanticipated events and hazards, they are also better able to manage risks. Risk is similar to resilience in that it results from the uncertainty about future outcomes or events (Donaldson, 1999; Orlitzky and Benjamin, 2001), but risk management is also different from resilience. One of the differences is that risk management assumes that hazards are identifiable, whereas resilience prepares organizations for the unexpected. As well, there are key differences in their principles and strategies. Risk management aims to preserve the status quo and avoid transformations; resilience, on the other hand, embraces adaptation to the changes in its environment, aiming only to retain its core functions. Risk management focuses on buffering the firm by building redundancies and slack, oversizing, and isolating aspects of the firm, whereas resilience focuses on flexibility, renewal, and innovation, using such design principles as diversity. For example, an organization that manages risk may write short-term labor contracts to be able to flex the size of its labor force. A resilient organization, on the other hand, may choose to invest in training programs that build flexibility into the labor force, so that people can move between different functions.

SEPs have been linked to financial risk (Bansal and Clelland, 2004; Godfrey, 2005; Orlitzky and Benjamin, 2001), but these studies show the relationship between SEPs and variance in performance over the short term. We argue that reductions in variance are experienced over a long period of time because the firm improves its capacity for sensing, anticipating, learning, and adapting. Therefore, compared with firms with weak or no SEPs, firms with strong SEPs exhibit more stability because they can better anticipate hazards, and where needed, avoid those hazards that will damage their financial performance. For these reasons, we predict that:

> *Hypothesis 1: Firms with high SEPs experience less financial volatility over the long term relative to their peers.*

SEPs stimulate growth

SEPs expose potential market opportunities and resources to exploit growth opportunities through two processes. First, resilient firms can capture and share meaningful information that is critical to firm growth (Nicholls-Nixon, 2005). For example, firms need to modify existing product and service lines and identify customers not currently served. Being open to a variety of viewpoints encourages creativity, which helps to identify opportunities for growth.

Second, resilient firms are better able to attract and retain important resources needed for growth, such as loyal and motivated employees. Previous research shows that the most capable employees care about potential employer's social responsibility (Greening and Turban, 2000; Turban and Greening, 1997). SEPs signal the positive working conditions in the organization and the values and norms that gird the organization's operations (Turban and Greening, 1997). As well, SEPs improve employee motivation, morale, commitment, and loyalty (Branco and Rodrigues, 2006). Employees of resilient firms tend to be strongly committed to the organizational change needed for growth because these attributes create a positive affect and encourage high-quality social-exchange relationships (Shin, Taylor, and Seo, 2012). As we stated

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earlier, strong stakeholder relationships with suppliers and potential partners help firms develop new products and build new growth opportunities.

Growth is most effectively managed when the knowledge and resources needed to make a transition are developed ahead of time, before the pressures of growth force a reactive response (Nicholls-Nixon, 2005). Through improved access to resources, firms are better able to adapt to the organizational needs linked to growth (such as the need to hire new personnel or develop new information systems), which helps the firm move incrementally forward and avoid disruption. Thus, we propose that

Hypothesis 2: Firms with high SEPs experience higher growth over the long term relative to their peers.

SEPs improve survival

SEPs help buffer firms from disruptions and reduce firms' vulnerability to crashes, increasing firms' probability of survival. Applying our two earlier arguments, sensing changes in the environment and adapting to those changes helps firms to survive. Typically, organizations build routines to embed learnings in their processes. Routines are repeated patterns of responses involving interdependent activities that are reinforced through structural embeddedness and repeated use (Gilbert, 2005). Routines normally cause rigidities within organizations (Gersick and Hackman, 1990; Weiss and Ilgen, 1985) and often lead to failure because firms cannot adjust to their new environment. However, SEPs help firms acquire flexible resources that can be applied to a larger range of alternative uses. Therefore, firms with high SEPs can switch among different tasks and quickly reconfigure routines at less cost than their peers.

Prior literature has strongly argued that firms' vulnerability can be reduced through resilience, which is a critical capability for firms facing adversity (Sutcliffe and Vogus, 2003). Some authors reserve the concept of resilience exclusively to explain the organizational ability to retain core functions in the face of unanticipated crises (e.g., Powley, 2009; Wildavsky, 1988). For example, Powley (2009: 1294) describes resilience as "a latent capacity in organizations built overtime though social interaction and relationships" that "might be detected when organizations encounter setbacks." We apply a more nuanced view of resilience (e.g., Folke, 2006; Hamel and Välikangas, 2003), by recognizing that resilience provides flexible, sensing resources that help firms survive and adapt to the environment. Therefore, we expect that:

Hypothesis 3: Firms with high SEPs have higher rates of survival over the long term relative to their peers.

The trade-off between short-term profits and long-term resiliency

Resource constraints can create a trade-off between short-term profits and long-term resiliency. For example, smart building designs use windows for natural lighting and harness thermal energy for cooling and heating, rather than purchasing energy from the grid. Such designs cost more initially, but build resilience. These environmental practices require greater upfront resources than traditional building design, but the operating costs are lower over the long term (Laverty, 1996). Such investments in technologies foster flexibility and responsiveness, two defining elements of resilient systems.

Even more important than resource constraints are the different and often contradictory decisions related to the search for short-term profits and resiliency. Firms that seek short-term results are more likely to ignore the interests of many stakeholders, especially those with disparate opinions (Slawinski and Bansal, 2012). Often the most marginalized stakeholders—so-called fringe stakeholders—can provide the deepest insights into changes in the organizational environment (Hart and Sharma, 2004). Conflict and dissonance cost time and money, and yet, they often generate the most creative insights.

Additionally, resilience often requires investments that can reduce short-term profitability, such as closely monitoring operations and disclosing information (Gelb and Strawser, 2001), training employees, achieving high-quality product standards, and investing in safety (Darnall and Edwards, 2006; Waddock and Graves, 1997). The positive outcomes from these investments do not show up in short-term measures, such as the one-year return on assets. Therefore, those firms that follow a short-term approach often forgo investments in such practices. Because many SEPs require initial

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resources that can erode short-term profits, we predict that

Hypothesis 4: Firms with high SEPs are less profitable in the short term relative to their peers.

METHODS

In this article, we argue that SEPs build organizational resilience, which contributes to less volatility, stronger organizational growth, better chances of survival over the long term, and reduced short-term profitability. We applied a different method to test each of our four hypotheses.

In general, we opted for a matched-pair analysis, which imposes a high standard of rigor in assessing changes over a long period of time. The pairs are formed based on a defined set of characteristics that are likely to be associated with the outcome of the analysis (McKinlay, 1977), which reduces bias and increases precision in empirical studies (Rubin, 1973). As well, a matched-pair design does not impose the causal logic inherent in regression analysis, whereby researchers are required to identify a set of independent variables leading to specific outcomes. Instead, a matched-pair analysis allows for a system of variables (equifinality) to explain differences among firms.

In describing our sample, we identify firms with "high SEPs" as the "treated" group, and the matched pairs as the "control" group. To test the hypotheses, we applied repeated-measures ANOVA and survival analysis, both of which are described in further detail below.

Data sources

We drew financial information from Compustat North America. We also drew on the KLD Domini 400 Social Index (KLD 400) during the period 1991–1993 to identify the firms with high SEPs. The KLD 400 is the first benchmark index constructed using environmental, social, and governance (ESG) factors. It is a widely recognized benchmark for measuring the impact of social and environmental screening on investment portfolios. To determine the firms comprising the KLD 400, the KLD Committee selects companies whose positive social and environmental records are based on the following issues: community relations, diversity, employee relations, human rights, product quality and safety, and environment and corporate governance. The companies are evaluated relative to other companies in their industry and sector as well as in relation to the broader market. For further information on the evaluation criteria, see MSCI KLD 400 Social Index fact sheet (MSCI, 2015).

Sample

To develop the sample, we first identified firms with social and environmental practices (SEPs). We included only those firms that were part of the KLD 400 for all three consecutive years, 1991–1993, and that belonged to sectors represented by at least 10 companies (specifically firms with SIC codes 20, 27, 28, 35, 36, 38, 48, 49, 60, 63, and 73), generating a sample of 195 companies.

We then applied propensity score matching to identify the matched pair (control group). We collected data on all firms included in each sector in the pre-period (three-year average, i.e., 1988–1989–1990). We used a three-year period to avoid the impact of extraordinary situations that may affect sales in a specific year (e.g., the launch of a new product). Drawing from a population of 1,782 firms, we estimated the propensity score to select the closest match (using nearest-neighbor matching). The propensity score was a function of firm attributes based on the predicted likelihood of being included in KLD. Specifically, we considered size, performance, risk, and industry, attributes that have been used in prior research to control for CSR outcomes (e.g., Johnson and Greening, 1999; Ullmann, 1985; Waddock and Graves, 1997). Firm size was measured by total assets and by net sales. Financial performance was captured by return on assets (ROA), return on equity (ROE), and return on sales (ROS). Finally, following Waddock and Graves (1997), we used the ratio of long-term debt to total assets as a proxy for the riskiness of a firm. Additionally, all candidates for matching were also headquartered in the United States, and shared the same two-digit SIC (standard industrial classification) as their SEPs' pair.

In total, we identified 121 firm matches (242 pairs) using nearest-neighbor matching of the original sample of 195 firms, or 62.05 percent of the original sample. The weights of the different sectors in the final sample are as follows: Food and kindred products (5.8%); printing, publishing, and allied industries (5%); chemicals and allied products (11.6%); industrial and commercial machinery and

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Table 1. Descriptive statistics

	High SEP firms		Control firms		
	Mean	SD	Mean	SD	Matched t-test
1991–1993 asset average	5,736	9,701	5,186	12,447	t = 0.72
1991–1993 sales average	2,413	3,461	2,084	3,730	t = 0.92
1991–1993 ROA average	6.81	5.51	9.30	24.26	t = −1.11
1991–1993 ROE average	16.89	22.64	16.95	64.64	t = −0.01
1991–1993 ROS average	8.17	6.45	11.56	31.57	t = −1.17
1991–1993 risk average	0.17	0.14	0.18	0.21	t = −0.59

N = 121 pairs.

computer equipment (15.7%); electronic and other electrical equipment (9.1%); measuring, analyzing, and controlling instruments (6.6%); communications (8.3%); electric, gas, and sanitary services (12.4%); depository institutions (8.3%); insurance carriers (9.9%); and business services (7.4%).

Matched t-tests showed that mean differences between firms with high SEPs and control firms are nonsignificant for any of the matched criteria variables; that is, firms are statistically similar in previous performance, size, and risk (Table 1). The pairs also belonged to the same two-digit SIC industry. These characteristics also helped predict future growth and stability (in absence of the SEPs).

Missing data from firm failures

Our sample includes firms that failed during the 1994–2008 analysis period. When the firm fails, the observation becomes missing because the statistical analysis rejects both the failed firm and its match. Various methods are proposed for dealing with such data, which are unavoidable in such analysis (Lakshminarayan, Harp, and Samad, 1999). Ignoring incomplete records is one such method, but is inappropriate for our data analysis because the results would be biased toward successful firms. Since low performance is an important reason for firm failure, this bias is greater than most people might assume (Denrell, 2005). If the number of failures had been higher in the control group, we would have excluded the worst-performing control firms and retained the worst-performing treated firms in the sample. Additionally, if we had excluded the failed treated firms, we would also have been required to exclude those firms' matched control firm, although the control firm could have survived.

To address the issue of failed firms, we estimated the missing values by using the arithmetic mean of the existing values of the variable in the same class (high SEPs firms or control firms, respectively). This practice is common (Lakshminarayan *et al.*, 1999) and appropriate for our analysis because the mean for the group to which the failed firm belonged would not change, and the matched firm would remain in the sample.

To evaluate the robustness of the results with this method of accounting for missing values, we compared the results of this analysis with the results of other analytical options. For hypotheses related to growth and short-term profits, we tested the robustness of our results in three different ways: (1) filling in the missing observations with zero, (2) using the data from the year prior to failure, and (3) deleting the case. For Hypothesis 1 (financial volatility), we compared our results only with deleting the case because the first two robustness tests do not allow for financial volatility calculations. No significant differences were found in the results of these different analyses.

Data analysis

In management studies, pair matching is frequently used to reduce variation between individuals or organizations (e.g., Ferrier, Smith, and Grimm, 1999; Kassinis and Vafeas, 2002; Mallette, 1991; O'Connor *et al.*, 2006; Schnatterly, 2003; Short and Toffel, 2010). As an analytical device, the matched-pairs methodology is more powerful than regression analysis by allowing for comparisons across similar firms, and more efficient than independently selected samples (e.g., Cochran, 1953).

After we built a matched-pair sample, we applied matched-pairs t-tests, repeated measures ANOVA, and survival analysis. *Matched-pairs t-tests* indicate whether a significant difference exists in the means of the two sets of paired data. This

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methodology allows for the testing of differences at a specific point of time. We use matched-pairs t-tests as a preliminary study of the hypotheses. A *repeated-measures ANOVA* tests the equality of means and is used when all members of a random sample are measured under different conditions (or factors).

Specifically, to test our hypotheses, we defined two conditions: SEPs and time. SEPs have two levels: the treated firm with high SEPs and its control. Time has 15 levels corresponding with 15 different years—1994 to 2008. This analysis allows us to test whether the performance measures differ for treated firms and their corresponding controls over the given time period.

We applied *survival analysis* to test Hypothesis 3. Specifically, we used Cox regression to predict survival rates. Because firms were matched according to size, performance, risk, and industry, which can affect the likelihood of survival, our sample violated the independence of the failure times assumption required in traditional survival analysis. A similar problem arises in familial studies, in which each family member is at risk of developing a disease because they share genetic, and perhaps, environmental factors. Thus, our observations are not independent, but can be divided into 121 independent groups. We fit the Cox model by clustering on the match, using the *cluster (matched)* option in STATA, in order to obtain accurate estimates.

Variables

To measure *financial volatility,* we used stock return volatility. We collected the month-end changes in stock price indices (monthly returns) for each company, covering the 180 months from January 1994 to December 2008. For each year, we calculated the standard deviations of monthly returns—one of the most commonly used measures of volatility (Schwert, 1990)—which resulted in 15 observations for each company. Market data for 22 pairs were unavailable; therefore, we performed these analyses with only 99 pairs (198 firms).

Growth over the long term was measured as the accumulation of net sales growth from 1994 to 2008. Accumulated growth is a better measure for capturing the differences between treated firms and control firms than year-over-year growth because growth occurs continuously and incrementally over time.

Table 2. Survival rates and causes of nonsurvival

	High SEP firms		Control firms	
	Number	Percentage	Number	Percentage
Survival	55	45.5	41	33.9
Acquisitions or merger	60	49.6	65	53.7
Liquidation or bankruptcy	1	0.8	5	4.1
Nonspecified (eliminated)	5	4.1	10	8.3
Total	121	100	121	100

For the survival analysis, we defined three additional variables: event, time, and treatment. *Event* is a dichotomous variable that takes the value of 1 if the firm fails during the 15-year period and 0 if it does not. There are several reasons for failure, including acquisition or merger, liquidation, and bankruptcy. All of these causes are, we believe, linked to a lack of resilience since they represent important changes in firms' primary function and structure. However, we have not included firms that disappear from the database when the cause is neither specified nor easily linked with resilience (e.g., firms that no longer file with the U.S. Securities and Exchange Commission). Table 2 disaggregates the frequency of the causes of failure for responsive firms and their matched pairs.

The variable *time* shows the number of years that firms survive from the initial point (t0 = 1994) to the final period of observation (t15 = 2008). If a firm survived for the duration of the analysis period (event = 0), the value of the variable *time* for these firms is 15 years. Therefore, the data are right-censored. Survival analysis provides an accurate treatment for censured data (Cox and Oakes, 1984). We also defined the *dichotomous variable treatment*, where treated firms are assigned the value of 1 and control firms are assigned the value 0.

Finally, *short-term profitability* is measured by the change in ROA between two consecutive years. ROA is one of the most commonly used financial measures to assess the financial performance of a firm's operations (Murphy, Trailer, and Hill, 1996).

RESULTS

Hypothesis 1 predicted that firms with high SEPs have less financial volatility over the long term

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Table 3. Volatility: repeated ANOVA. Multivariate tests

Effect	Value	F	Hypothesis df	Error df
High SEP firms				
Pillai's trace	0.29	40.42***	1	98
Wilks' lambda	0.71	40.42***	1	98
Hotelling's trace	0.41	40.42***	1	98
Roy's largest root	0.41	40.42***	1	98
Time				
Pillai's trace	0.90	55.42***	14	85
Wilks' lambda	0.10	55.42***	14	85
Hotelling's trace	9.13	55.42***	14	85
Roy's largest root	9.13	55.42***	14	85
High SEP firms × time				
Pillai's trace	0.35	3.23***	14	85
Wilks' lambda	0.65	3.23***	14	85
Hotelling's trace	0.53	3.23***	14	85
Roy's largest root	0.53	3.23***	14	85

Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 99 pairs.

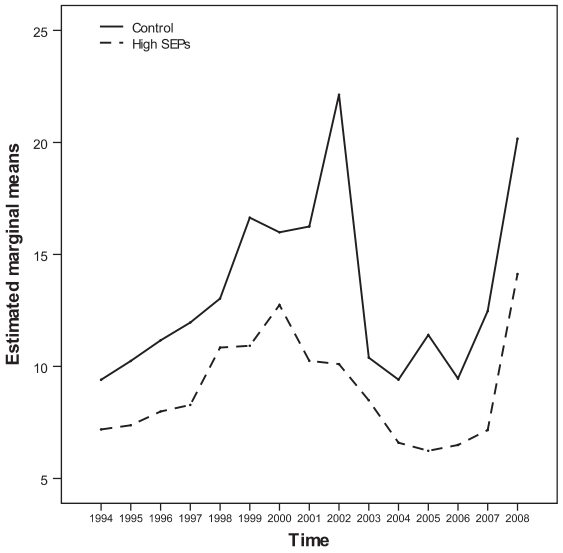

Figure 1. Volatility: high SEP firms vs. control group

Table 4. Volatility: matched-pairs t-test by year

Time	Mean differences[a]	Standard error
1994	−2.22**	0.66
1995	−2.87**	0.83
1996	−3.18***	0.78
1997	−3.68***	0.94
1998	−2.19*	0.89
1999	−5.72**	1.82
2000	−3.24***	0.86
2001	−6.00***	1.14
2002	−12.03***	2.52
2003	−1.91**	0.72
2004	−2.82***	0.53
2005	−5.17**	1.72
2006	−2.97***	0.56
2007	−5.31**	1.64
2008	−6.04**	2.20

[a] High SEP firms-control.
Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 99 pairs.

than the control firms. Table 3 shows the results of repeated-measures ANOVA for the high-SEPs firms and their controls over a 15-year period. The test of sphericity is significant; thus, it is appropriate to examine the results from the multivariate tests. The multivariate tests indicate that the main effect, SEPs, is significant ($F = 40.42$, $p < 0.001$). In other words, the volatility of treated firms is always less than the volatility of their control firms; therefore, we find support for Hypothesis 1. The main effect, time, is also significant ($F = 55.42$, $p < 0.001$), which implies that volatility depends on the specific year (not all years are equal during the analysis period).

As well, we find that a significant interaction effect between financial volatility and time ($F = 3.23$, $p < 0.001$), which implies that differences in volatility between firms with high SEPs and control firms also depend on the specific year (i.e., differences are higher some years than others); however, Figure 1 shows no specific trend in these volatility differences. Additionally, Table 4 shows the matched-pair t-tests used to analyze the differences in volatility for firms with high SEPs relative to their control firms in each three-year period.

We reported the growth analysis results in Tables 5 and 6. Table 5 shows the matched-pairs t-test for net sales for each year under analysis. We observed significant differences between the sales growth of firms with high SEPs firms and their corresponding control firms, beginning in year t + 4. We also completed repeated ANOVA tests. Table 6 shows the results of repeated-measures ANOVA for the net sales of firms with high SEPs and their controls over the 15-year period (1994–2008). The test of sphericity is significant; thus, it is appropriate to examine the results from the multivariate tests. The multivariate tests indicate that the main effect is significant ($F = 5.90$, $p < 0.05$), which means that high SEP firms grow more than control firms. In addition, the tests reveal that the main effect of time is significant ($F = 14.21$, $p < 0.001$); that is, growth

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Table 5. Growth: matched-pairs t-test by year

Time	Mean differences[a]	Standard error
1994	121.16	85.48
1995	241.01	167.52
1996	345.84	270.67
1997	695.40†	406.37
1998	1,007.00*	462.56
1999	1,410.66**	491.88
2000	2,210.93**	651.94
2001	2,340.77***	621.45
2002	1,798.38**	687.12
2003	1,483.43*	734.26
2004	1,435.47†	823.64
2005	1,471.18†	892.72
2006	1,782.55†	994.67
2007	2,292.70*	1,122.17
2008	2,844.92*	1,293.28

[a] High SEP firms-control.
Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 121 pairs.

Table 6. Growth: repeated ANOVA. Multivariate test

Effect	Value	F	Hypothesis df	Error df
High SEP firms				
Pillai's trace	0.05	5.90*	1	120
Wilks' lambda	0.95	5.90*	1	120
Hotelling's trace	0.05	5.90*	1	120
Roy's largest root	0.05	5.90*	1	120
Time				
Pillai's trace	0.65	14.21***	14	107
Wilks' lambda	0.35	14.21***	14	107
Hotelling's trace	1.86	14.21***	14	107
Roy's largest root	1.86	14.21***	14	107
High SEP firms × time				
Pillai's trace	0.27	2.87**	14	107
Wilks' lambda	0.73	2.87**	14	107
Hotelling's trace	0.38	2.87**	14	107
Roy's largest root	0.38	2.87**	14	107

Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 121 pairs.

depends on the specific year (it is not equal to all the years during the entire analysis period). Finally, the results show a significant interaction effect between growth and time ($F = 2.87$, $p < 0.01$). In other words, the evolution of sales during the 15-year period differs between firms with high SEPs and their controls.

Figure 2 indicates that the slope of the firms with high SEPs is steeper than that of their controls. These different growth trajectories therefore

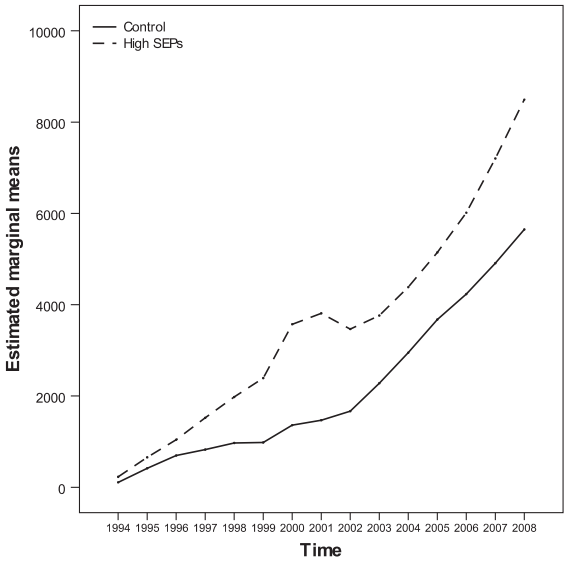

Figure 2. Sales growth: high SEP firms vs. control group

Table 7. Survival analysis: Cox regression

Model 1	Coefficient	Robust standard error	Haz. ratio	Z
High SEP firms	−0.35	0.18	0.70	−1.97*

Wald Chi = 3.89*.
Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 214. Standard error adjusted for 107 clusters in matched.

support Hypothesis 2, which predicted that sustainable firms would grow more over the long term relative to their peers.

The results of the Cox analyses, performed to test Hypothesis 3, are summarized in Table 7. Model 1 indicates that the likelihood of SEPs improving firms' survival is positive and statistically significant. Specifically, SEPs reduce the risk of failure by 30 percent (1 to 0.70). These findings support Hypothesis 3.

In Figure 3, we illustrate the Kaplan-Meier estimate of survival function for treated and control firms. Figure 3 shows that the failure rate of control firms exceeds the failure rate of treated firms.

Finally, Hypothesis 4 predicted that firms with high SEPs are less profitable in the short term than their controls. Table 8 shows the results of repeated-measures ANOVA for firms with high SEPs and their controls over a 15-year period. Again, the test of sphericity is significant; thus, it is appropriate to examine the results from the

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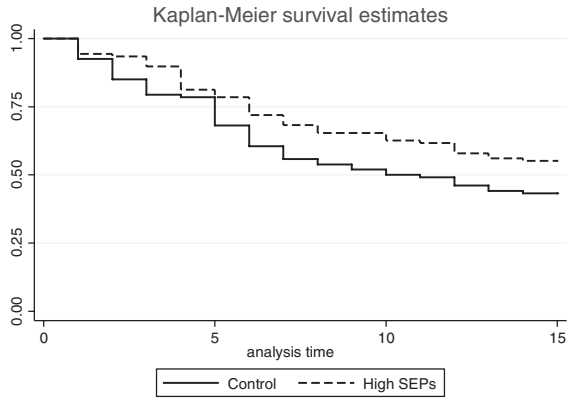

Figure 3. Survival curve: high SEP firms vs. control group

Table 8. Short-term profitability: repeated ANOVA. Multivariate tests

Effect	Value	F	Hypothesis df	Error df
High SEP firms				
Pillai's trace	0.01	1.32	1	120
Wilks' lambda	0.99	1.32	1	120
Hotelling's trace	0.01	1.32	1	120
Roy's largest root	0.01	1.32	1	120
Time				
Pillai's trace	0.57	9.58 ***	14	107
Wilks' lambda	0.44	9.58 ***	14	107
Hotelling's trace	1.25	9.58 ***	14	107
Roy's largest root	1.25	9.58 ***	14	107
High SEP firms × time				
Pillai's trace	0.25	2.52 **	14	107
Wilks' lambda	0.75	2.52 **	14	107
Hotelling's trace	0.33	2.52 **	14	107
Roy's largest root	0.33	2.52 **	14	107

Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 121 pairs.

multivariate tests. The multivariate tests indicate that the main effect of firms with high SEPs is not significant ($F = 1.32$, $p > 0.1$); that is, the short-term returns are similar for firms with high SEPs as they are for their controls. Therefore, Hypothesis 4 is not supported. We discuss this result in detail below.

Table 8 also shows that time is a significant condition, which means that short-term profitability differs by period ($F = 9.58$, $p < 0.001$). Additionally, the test revealed that the interaction between firms with SEPs and time is significant ($F = 2.52$, $p < 0.01$). In other words, the evolution of the short-term profitability is statistically different for

Table 9. Short-term profitability. Matched-pairs t-test by year

Time	Mean differences[a]	Standard error
1994	−0.00	0.02
1995	−0.01	0.01
1996	0.02	0.01
1997	−0.01	0.01
1998	0.03*	0.01
1999	−0.00	0.01
2000	0.08**	0.02
2001	−0.02	0.01
2002	−0.01	0.02
2003	−0.03*	0.01
2004	0.00	0.01
2005	−0.01†	0.01
2006	−0.02**	0.01
2007	0.01	0.01
2008	0.01	0.01

[a] High SEP firms-control.
Significant at the †0.10; *0.05; **0.01; ***0.001 level.
N = 121 pairs.

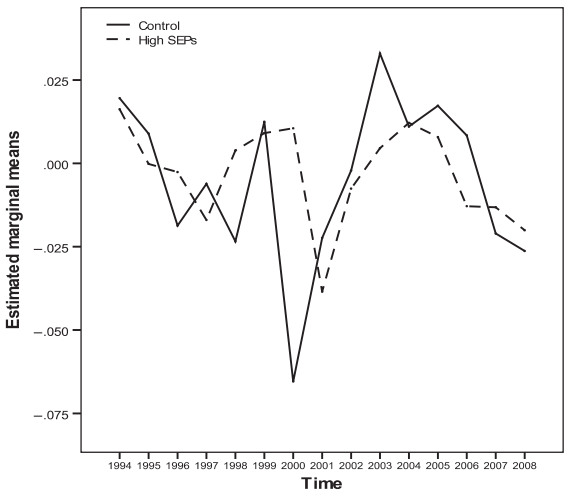

Figure 4. Short-term profitability: high SEP firms vs. control group

firms with high SEPs and their controls. Table 9 shows the matched-pairs t-test used to analyze the differences in the short-term profits of treated and control firms over the 15-year period, showing that there is no specific trend in their respective evolution. In terms of short-term profitability, in some years, firms with high SEPs outperform the control firms and, in other years, perform worse.

Figure 4 illustrates the differences in the short-term profitability of firms with high SEPs and their controls.

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Table 10. Table GLS regression results[a]

	H1: Volatility is the dependent variable		H2: Growth is the dependent variable		H4: Short-term profit is the dependent variable	
	Random-effects	Random-effects (cluster)	Random-effects	Random-effects (cluster)	Random-effects	Random-effects (cluster)
High SEP firms	−4.11***	−4.11***	1,451.91*	1,451.91*	0.002	0.002
	(1.03)	(1.09)	(628.72)	(678.60)	(0.010)	(0.005)
Constant	13.19***	13.19***	1,218.82 **	1,218.82 **	−0.004	−0.004
	(0.74)	(1.02)	(448.41)	(426.55)	(0.007)	(0.004)
Wald Chi2 (dl)	16.04*** *(1)*	14.26*** *(1)*	5.33* *(1)*	4.58* *(1)*	0.04 *(1)*	0.17 *(1)*
Observations	2,095	2,095	2,453	2,453	2,453	2,453
Firms	198	198	242	242	242	242

[a] Table contains unstandardized regression coefficients.
Significant at the †0.10; *0.05; **0.01; ***0.001 level.
Standard errors are shown in parentheses.

Robustness test analysis: generalized least squares (GLS) estimation

As a robustness check of Hypotheses 1, 2, and 4, we also used time series cross-sectional data analysis. This method controls for the confounding effect of time-invariant and company-specific variables (Wiersema and Bowen, 1997). Specifically, we analyzed whether high SEPs predict less volatility, high growth, and less short-term profit in the 15-year unbalanced panel. We also present these random-effects models by clustering the standard errors by firm to obtain results that are robust with correlations within firms across time. Table 10 shows the results of random effects GLS estimation.

The GLS regression results are the same as those obtained with matched t-test and repeated-measures; that is, firms with high SEPs have less volatility and experience higher growth than control firms. However, short-term profitability does not significantly differ between firms with high SEPs and their control firms. We, therefore conclude these robustness tests confirm our hypotheses.

DISCUSSION

In this article, we predicted that the social and environmental practices (SEPs) adopted by sustainable firms contribute to organizational resilience, which is the ability of firms to sense and correct maladaptive tendencies and cope positively with unexpected situations. Organizational resilience provides firms with adaptive capacity that facilitates continuous improvements and improves the firm's viability. We predicted that firms with SEPs experience lower financial volatility, higher long-term growth, higher firm survival, and lower short-term profitability.

Resilience arguments are not new to SEP research. For example, previous studies argued that SEPs encourage stakeholders' trust (Chen and Miller, 2011; Orlitzky and Benjamin, 2001), helping firms to sense exogenous changes (Harrison *et al.*, 2010; Smith and Fischbacher, 2000). SEPs also help firms accumulate important nontradable resources, such as reputation, financing, clients, effective partners, and motivated employees (Chen and Miller, 2011).

Despite the prevalence of these arguments, most empirical work applies a short-term logic with one-year accounting returns or financial market-based outcomes (e.g., Choi and Wang, 2009; Graves and Waddock, 1994; Griffin and Mahon, 1997; Surroca *et al.*, 2010; Turban and Greening, 1997; Waddock and Graves, 1997). These measures can undervalue SEPs and underestimate changes in the perception and behaviors of firms as a result of their social and environmental investments. That is, this previous focus on cross-sectional analyses makes it more difficult to identify the trade-offs between alternative, and possibly competing, performance criteria (Davis and Pett, 2002). In fact, the current emphasis in management practice on short-term profits may be counterproductive to resilience (Korhonen and Seager, 2008). For example, the way that financial performance is currently defined, operationalized, and reported can negatively impact firms' long-term volatility, growth, and survival. Public firms announce financial performance at least

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quarterly, and stock markets report stock prices daily. This focus on short-term financial indicators can damage organizational resilience. Managers often choose investments that favor short-term results and fail to make the significant upfront investments in SEPs that would yield longer-term benefits. To become resilient, firms need to invest in processes that sense and correct maladaptive tendencies, and build resources that allow firms to cope with unexpected circumstances.

This article offers important insight about the resilience-based outcomes of SEPs, which are often detectable only in the long term because resilience is a latent path-dependent capability that takes time to develop and for the benefits to be realized (Aragon-Correa and Sharma, 2003; Barnett, 2007; Hart, 1995). Despite resilience not being directly measurable, we have shown that the practices that lead to resilience, specifically SEPs, resulted in lower financial volatility, higher long-term growth, and a higher survival rate over 15 years of data. We discuss these results in more detail below.

We found that financial volatility is lower for firms with SEPs when compared with their peers. We anticipate that this lower volatility is because SEPs help to both buffer firms from shocks and return firms to their desired state. These findings support those of Gittell *et al.* (2006), who found that, compared with their peers, U.S. airlines that were less likely to lay off employees recovered more quickly from the September 2001 terrorist attacks. As well, DesJardine, Bansal, and Yang (2015) found that U.S. firms that invested in strategic social and environmental practices experienced less of a shock and a faster time to recovery than their peers after the 2008 financial crisis.

In addition, firms that develop SEPs grow faster over the long term than firms that are less responsive to social and environmental issues. Because growth is cumulative, the differences are magnified each year, showing an incrementally increasing effect over the long term. This finding points to the likelihood that firms with high SEPs are able to attract more customers than their peers, and therefore, secure a proportionately larger market share.

We found that firms with many SEPs have higher rates of survival over the long term than firms with fewer SEPs, which supports the most conventional definition of the term "sustainable." In summary, we argued that firms with strong SEPs are able to sense issues in their external environment and adapt accordingly, contributing to their resilience.

We did not find support for Hypothesis 4 that predicted firms with high SEPs would have lower short-term performance than firms in the control group. We believe that this outcome stems from the short-term benefits that SEPs also create, especially by reducing resource use, which improves short-term profitability and can also improve resilience. For example, even in the short term, lower costs can result (e.g., Russo and Fouts, 1997) from strategies that minimize or reuse waste or that intensify processes so that outputs increase relative to inputs (Korhonen and Seager, 2008). However, these "win-wins" are limited, and firms will at some point create new manufacturing processes (Hart, 1995). These investments necessitate generous short-term investments (Chen and Miller, 2011). As a result, there are opposing forces to short-term performance, which have likely contributed to the nonsignificant results in our analysis.

This lack of support for Hypothesis 4, which speaks to the impact of SEPs on short-term performance, is consistent with prior empirical research (e.g., Margolis and Walsh, 2003; Margolis *et al.*, 2009). Most previous studies analyze financial performance within one year of the activity, taking data from specific years. To replicate these prior studies, we applied repeated-measure ANOVAs, which allowed us to compare the short-term performance of treated and control firms over 15 different time periods—one for each year included in the analysis. This test showed that, over the short term, the differences between firms with high SEPs and their control firms are not significant. This finding is important: we are able to say, therefore, that SEPs are likely to contribute to superior long-term outcomes, such as financial volatility, growth, and survival, but their contribution to superior short-term outcomes, such as profitability, is unclear.

The failure to find unambiguous results between short-term SEPs and financial performance in prior studies has been attributed to a variety of methodological shortcomings and differences, such as variance in the definition of key terms (Griffin and Mahon, 1997; Ullmann, 1985). In this article, we argue that the failure to uncover a robust relationship in the short term is due not only to framing and measurement, but also the complexity of the underlying relationships between SEPs and organizational outcomes. SEPs develop organizational resilience, which cannot be directly observed, and their relationship with short-term profits is not consistently positive.

Our results also support the need to extend the window of observations when evaluating the impact of SEPs on firms' financial outcomes. Managing social and environmental challenges involves close interactions among numerous interrelated stakeholders and social actors (including employees, customers, suppliers, and communities), resulting in a great amount of complexity. To understand how firms can benefit from positive stakeholder relationships requires paying attention to capabilities developed over time, such as organizational resiliency. Most prior work has emphasized short-term outcomes, in an effort to better assess cause and effect (Gao and Bansal, 2013). We attempted to overcome these biases by using matched-pair analysis, which allows for equifinality and does not require researchers to isolate the exact mechanisms at play.

Limitations and future research directions

Several important limitations of the study warrant discussion. First, there is the issue of missing data. Incomplete data are unavoidable when dealing with most real-world data sources (Lakshminarayan *et al.*, 1999). In this article, we aim to understand the salience of this limitation through several robustness tests. We are confident with the results presented here.

Second, in this study, the treated cases are part of the KLD 400. We define them as firms with high SEPs because the KLD Committee selects KLD 400 companies by their positive social and environmental records relative to their competitors and the broader market (MSCI, 2015). However, our methods do not allow us to incorporate the high variation in the degree or intensity of SEPs among firms. Consequently, we encourage future research to develop and analyze SEPs using measures that capture this variability.

Concluding remarks

Scholars often espouse the proverbial win-win, arguing that firms can create shared value for both business and society (Elkington, 1994; Porter and Kramer, 2011). However, most of these prescriptions are agnostic to the timing and time frames of the costs and benefits of SEPs, and focus primarily on short-term financial outcomes. We support this prior work, which has largely taken short-term perspective, but also recognize that SEPs contribute to the organization's preparedness for external changes, turbulence, and crises. These disturbances cannot be predicted and take time to manifest (Aragon-Correa and Sharma, 2003; Barnett, 2007). It is important, therefore, not to only look for short-term, causal outcomes, but also differences in outcomes over the long term. This trade-off between the costs and benefits in the short term relative to the long term is a central issue for achieving both business and societal sustainability.

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