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ORIGINAL EMPIRICAL RESEARCH

The effect of green partnerships on firm value

Anna Sadovnikova[1] · **Ashish Pujari**[2]

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Abstract Many businesses increasingly use strategic partnerships to manage corporate environmental agendas. However, how value is created in green partnerships remains largely unexplored. To address this gap, the authors examine the effects of announcements of green partnerships (marketing versus technology) on shareholder value. It is argued that in green partnerships firms leverage marketing and technology-related capabilities for value-enhancing purposes. The results show that announcements of green marketing partnerships have an immediate positive and significant effect on shareholder value, whereas announcements of green technology partnerships produce an immediate negative and significant effect. Nevertheless, green technology partnerships can accrue positive returns, but over a longer-term (1 year) period. In "dirtier" industries, it is more difficult to generate positive returns to green partnerships. Counterintuitively, though, in high-polluting industries, firms having a history of positive environmental performance experience lower financial gains from announcements of green partnerships than firms that were less environmentally responsible in the past.

Keywords Green strategic partnerships · Corporate environmentalism · Organizational capabilities · Firm performance · Shareholder value

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✉ Anna Sadovnikova
sadovna@mcmaster.ca

Ashish Pujari
pujarid@mcmaster.ca

[1] Department of Economics, South Dakota State University, Brookings, SD 57007, USA

[2] DeGroote School of Business, DSB 205, McMaster University, 1280 Main Street West, Hamilton, ON L8S 4M4, Canada

Introduction

The topic of corporate environmentalism continues to grow in importance in today's business world. Responding to social pressures for environmental stewardship, businesses dedicate substantial organizational resources to sustainable products and practices (Kotler 2011).

In their quest to make their businesses greener, many firms increasingly rely on strategic partnerships with other organizations in the market (Wassmer et al. 2014). For example, in 2013–2014, Exxon Mobile engaged in 11 environmentally oriented partnerships. Wal-Mart's 2014 Corporate Social Responsibility Report listed more than 20 ongoing green collaborations with suppliers, universities, and NGOs. Ford Motors' website touts nearly 30 collaborative green initiatives with North American and international organizations, many extending over several years. Forbes recently declared sustainability-oriented alliances among the top ten trends in the business world (Forbes, Jan. 18, 2012).

Inter-firm partnerships represent an established and active research area, have shown to be an important vehicle for fostering firm performance and account for as much as one-third of a firm's revenue (Gulati 1998; Mani and Luo 2015). Nevertheless, practice reveals that they are risky and costly endeavors, and many fall short of meeting expectations (Kale and Singh 2009; Wuyts and Geyskens 2005). The environmental sustainability context makes the prospects of inter-firm

partnerships even less certain. A recent meta-analytical review by Margolis et al. (2009) suggests that socially responsible companies may do better than their not so responsible counterparts. However, there is no definitive conclusion if the effect of corporate environmentalism, as an integral part of firm CSR efforts, on a firm's bottom line is exclusively positive (Jacobs et al. 2010; Dixon-Fowler et al. 2013). Despite their growing significance to business practice, green partnerships still remain a poorly understood phenomenon (Lin and Darnall 2010; Selsky and Parker 2005; Sharma and Kearins 2011) with unclear rewards (Wassmer et al. 2014). The economic potential of inter-firm green strategies has not yet been fully explored (Cronin et al. 2011).

Given the importance of strategic partnerships in the marketplace, and in response to the call for more research into the implementation forms and outcomes of corporate green strategies (Chabowski et al. 2011; Cronin et al. 2011), we explore the effects of announcements of green strategic partnership on shareholder value. We address the following key research questions:

1. How do green strategic partnerships contribute to shareholder wealth?
2. What firm- and industry-related green factors drive the magnitude of the impact of green partnership announcements on shareholder wealth?

We adapt Gulati's (1998) definition of strategic partnerships and apply it to the green context. We define green strategic partnerships as voluntary arrangements between two or more organizations for the purpose of exchanging, sharing or co-developing environmentally friendly, or "green", products, technologies or services to pursue a set of strategic green goals or address critical business needs. Furthermore, in this paper, we distinguish between green marketing and green technology partnerships. A green marketing partnership is an agreement among organizations focusing on the green value chain activities, penetration of green markets, promotion of green product and services, and customer acquisition and retention (Park et al. 2004; Swaminathan and Moorman 2009). A green technology partnership is an agreement among organizations to jointly develop new, environmentally friendly products and services or implement novel greener production technologies (Das et al. 1998; Mowery 1989).

We propose a model that links green strategic partnerships and firm stock market value and examine the boundary conditions under which firms may experience positive or negative financial returns to announcements of green strategic partnerships. Building on the corporate social responsibility (CSR) and organizational capabilities literature, we propose that in green partnerships, firms combine organizational resources such as marketing and technology capabilities with firms' environmental expertise for value-creating purposes.

Based on an extensive archival search, we develop a unique dataset of 190 green strategic partnerships announced by 59 firms in 2005–2007 and analyze it by event study and regression analyses. Specifically, we find that in the short term, stock markets react more favorably to the news about green marketing partnerships than to the news about green technology partnerships. The latter are still able to accrue positive financial returns but only over longer periods. When considering firm- and industry-related green factors, mixed patterns emerge. Investors become skeptical and discount stock market value of a firm if it has a history of poor environmental performance in the past or if it operates in the pollution-intensive industry. However, a firm's good green behavior in the past seems to have no direct effect on investors' valuation of green partnerships.

This study offers several contributions. First, we focus on the CSR practice, which is increasingly relevant for practitioners—green strategic partnerships—and quantify their impact on the stock market performance of a firm. Second, we identify the roles that marketing and technology capabilities play in green strategic partnerships and outline the pathways these capabilities can be leveraged for eco-based competitive advantage. We further explore the relative importance of marketing versus technology capabilities with respect to value creation potential in the context of green strategic partnerships. Finally, we incorporate other firm- and industry-related green factors that have not been previously considered, such as prior environmental performance of a firm and the industry's environmental profile (industry pollution levels). In this respect, we contribute to a long-standing debate about who is to benefit more from corporate environmentalism—those firms that only recently started to "green" their businesses or the firms that have consistently been working on improving their environmental performance (Hart and Ahuja 1996; Varadarajan 2015).

The rest of the paper is organized as follows. First, we briefly review the literature on the impact of corporate CSR on firm financial performance. Then, we develop a set of hypotheses explaining how organizational capabilities affect the relationships between the announcements of green strategic partnerships and firms' stock market value. We then proceed with the methodology and results and conclude with implications for theory and practice and limitations of the study.

Theoretical background and hypotheses development

Corporate environmentalism and firm financial performance

The paradigm of environmental sustainability is considered by many as a common goal for societal and economic development (Peloza and Shang 2011). Understanding what growth opportunities sustainability can provide, while minimizing the

negative impact on the biosphere, has become paramount for organizational survival (Connelly et al. 2011). Research on the economic impact of corporate environmentalism surfaced more than three decades ago and only continues to grow (Peattie 2001). A recent meta-analytical review by Margolis et al. (2009) summarizes a large volume of research on the topic and concludes that corporate social responsibility efforts may enhance firm financial performance, but the ultimate effect is contingent on various organizational and market-related characteristics.

Recently, several studies have adopted the contingency perspective to explore what factors might affect the association between firm CSR and its financial outcomes (Barnett and Salomon 2006; Crittenden et al. 2011). For example, an early paper by Luo and Bhattacharya (2006) examined how efforts to increase consumer satisfaction help leverage firm CSR for shareholder wealth. Mishra and Modi (2016) expanded on that issue by exploring the complementarity effects between marketing capabilities and CSR activities to enhance shareholder value. Another stream of papers (Chakrabarty and Wang 2012; Katsikeas et al. 2016; Luo and Bhattacharya 2009; Surroca et al. 2010) focused on the role and contributions of organizational innovation to the relationship between CSR and firm performance. The representative research on the topic and the relevant findings are summarized in Table 1.

We further extend this line of research by proposing that various organizational capabilities have a differential effect on the relationship between inter-firm green strategies and firm financial performance. We explore the relative importance of different types of organizational capabilities, specifically marketing capabilities versus technology capabilities, in the context of green strategic partnership.

Organizational capabilities and green strategic partnerships

Firm marketing capabilities can be broadly defined as an organizational capacity to compete in the marketplace, based on superior market sensing and stakeholder linking (Day 1994, 2011).

Market-sensing capabilities help organizations to identify critical consumer needs. In the green context, partnerships with environmental activist groups, research institutions, and NGOs provide firms with access to a variety of unique environmental knowledge accumulated by those organizations (Rondinelli and London 2003). Strong market-sensing capabilities help identify environmental knowledge and competencies most relevant for addressing the needs of firm customers and the broader stakeholder community. For example, in a partnership with NGO Greenpeace, German company Foron successfully combined its market knowledge and Greenpeace's unique environmental expertise to create a first-of-its-kind Freon-free refrigerator. The far-reaching outcome of the collaboration was an emergence of a whole new industry of eco-friendly refrigerators in Europe (Stafford et al. 2000). Moreover, market-sensing capabilities can improve firm's value creation potential by erecting competitive barriers and extending firm competitive advantage (Day 1994). Strong market-sensing capabilities can assist firms in addressing emerging ecological regulations by learning about them early on and responding preemptively (Delmas and Montes-Sancho 2010; Diestre and Rajagopalan 2011). For example, firms can partner with government agencies to lobby regulations that favor their green products or join influential industry associations to promote private industry standards that could raise competitors' costs.

Stakeholder-linking marketing capabilities help organizations to build and maintain close relationships with the stakeholder community (Bhattacharya and Korschun 2008; Day 2011). Consumers increasingly make "buy/not to buy" decisions based on the environmental performance of firms (Cronin et al. 2011). Companies with strong stakeholder-linking capabilities can more effectively inform stakeholders about corporate environmental practices, reinforce firms' green image in consumer minds and stimulate them to buy firms' eco-friendly products (Du et al. 2011; Wagner et al. 2009).

Because green products are typically credence goods, for which eco-quality often cannot be fully asserted even after a purchase, other factors such as firm green reputation play an increasingly important role (Siegel 2009). Research has shown that in consumers' minds, companies become increasingly tied to the environmental performance of their business partners and can be "overshadowed" by their green reputation (Vachon and Klassen 2006). By partnering with green market leaders, firms elevate their own environmental profile and provide stronger signals of green value to stakeholders (McWilliams and Siegel 2001; van Marrewijk 2003). Because green products are generally perceived to have additional functional benefits of environmental friendliness, firms can charge premium prices for those and enjoy higher revenues and profits (Homburg et al. 2013; Olsen et al. 2014).

Firm technology capabilities reflect firms' capacity to convert resource inputs to desirable outputs more effectively and efficiently via product and process innovation (Moorman and Slotegraaf 1999). Firms with advanced technology capabilities assume superior economic performance because of greater competitiveness, higher growth potential, and ability to address emerging consumer needs in a timely manner (Mizik and Jacobson 2003).

Products and processes with innovative green technologies at the core help respond to green market demands and optimize costs and improve operational efficiencies (Closs et al. 2011). For example, in green partnerships with channel members, firms can track the green performance of their products from cradle to grave, develop innovative zero-waste products with a closed-loop life cycle, remove hazardous materials and implement substitutes for depleting and increasingly costly inputs, thus minimizing costs and improving operational

Table 1 Research examining the role of organizational resources in shaping the corporate environmentalism–financial performance relationship

Empirical research	Research question	Empirical context	Marketing factors considered	Technology factors considered	Relevant empirical findings
Barnett and Salomon (2006)	The role of a firm's screening strategies in explaining the curvilinear relationship between CSR and firm's financial performance	Socially responsible mutual funds	No	No	Screening based on the environmental performance was negatively related to the average risk-adjusted financial returns of mutual funds
Luo and Bhattacharya (2006)	The role of customer satisfaction in informing the CSR–financial performance relationship	Fortune 500 companies, multiple industries	Yes	No	Customer satisfaction mediates the relationship between the CSR and firm financial performance
Luo and Bhattacharya (2009)	The role of CSR, marketing and R&D factors in reducing firm risks	Publicly-traded firms, multiple industries	Yes	Yes	CSR can reduce firm-specific risks, but the ultimate effect will depend on advertising and R&D strategies of a firm
Surroca et al. (2010)	The mediating effects of firm intangible resources in the CSR–financial performance relationship	Publicly-traded firms, multiple industries	Yes	Yes	Firm intangible resources mediate the relationship between CSR and firm financial performance
Chakrabarty and Wang (2012)	The role of R&D and internationalization capabilities in long-term sustainance of corporate environmental practices	Publicly-traded firms, multiple industries	No	Yes	R&D and internationalization capabilities are instrumental in long-term success of environmentally friendly practices
Servaes and Tamayo (2013)	The role of customer awareness in the CSR–financial performance relationship	Publicly traded firms, multiple industries	Yes	No	CSR has stronger positive effect on firm market value in the presence of high public awareness
Mishra and Modi (2016)	The complementarity effects of marketing capability in the CSR–financial performance relationship	Publicly traded firms, multiple industries	Yes	No	The effects of marketing capability in the CSR–financial performance relationship varies depending on the type of CSR activities performed
This study	The role of marketing and technology capabilities in the green inter-firm strategies–financial performance relationship	Inter-firm partnerships multiple industries	Yes	Yes	The effect of inter-firm green strategies on firm financial performance is contingent on firm capabilities utilized, firm's past green performance and industry pollution intensity

efficiencies (Pujari et al. 2004; Varadarajan 2015). In green partnerships with unrelated partners, firms can implement joint production operation systems, in which partners utilize each other's by-products and waste that would otherwise be discarded (Mariadoss et al. 2011; Sharma et al. 2010). For example, the beer producer Molson Coors Brewery and Merrick and Company, specializing in the renewable energy markets, have jointly developed and implemented a unique technology allowing for the conversion of brewing by-products to gas substitute ethanol (Kwok and Rabe 2010). The partners have maximized joint utilization of organizational resources, leveraged the efficiencies of material and energy savings and reduced operating and production costs, thus increasing economic benefits.

In summary, in green strategic partnerships, firms combine marketing and technology capabilities with environmental expertise for value creation purposes. Partners mitigate the risks of scarcity of valuable resources by making them last longer, optimize firm costs by improving operational efficiencies, and increase revenues by better linking with stakeholders and exploiting emerging opportunities in the green markets. Consequently, we hypothesize that

H1: Announcements of green strategic partnerships will positively affect firm market value.

Marketing versus technology capabilities in green strategic partnerships

Organizational resources that are more unique and inimitable can become a better source of competitive advantage and have a greater value creation potential (Hunt 2011; Kozlenkova et al. 2014). Marketing literature suggests that marketing capabilities might be difficult to imitate due to their social complexity (Eisend et al. 2015; Krasnikov and Jayachandran

2008). By contrast, knowledge related to technology capabilities is more likely to be codified and disclosed in patents, allowing competitors to build on or work around those inventions, and renders technology capabilities, to a greater degree, prone to imitation (Joshi and Nerkar 2011).

In the green context, those discrepancies are presumably even more pronounced. Today, firms are expected to respond to the demands of diverse stakeholder groups beyond the traditional customers, employees, channel members, and investors (Ferrell et al. 2010). The disparate, often conflicting, perspectives of various stakeholders need to be negotiated, balanced and aligned with firm economic objectives, which requires fine-tuned market intelligence, higher-order organizational learning, cultural sensitivity and openness to opposing viewpoints - skills that are socially complex, tacit, and causally ambiguous (Hillebrand et al. 2015; Mish and Scammon 2010). Furthermore, firms are not under any pressure to release knowledge related to marketing capabilities in the public domain (Krasnikov and Jayachandran 2008).

In contrast, in the green context, technology capabilities are not only more likely to be codified and disclosed via patents as previously noted, but because of the social desirability of green technologies, firms might be under pressure to share those in the public domain to facilitate the diffusion of green practices in society. For example, after the commercial success of a Freon-free refrigerator co-developed by Foron and Greenpeace was proven, Greenpeace pressured its partner to make the technology available for free to other interested firms, to accelerate dissemination and ensure mass adoption of the innovation (Stafford et al. 2000).

Thus, marketing capabilities are more difficult for competitors to imitate than technology capabilities are because the former are less tangible and less formalized and based on experiential learning, whereas the latter are more likely to be codified and disclosed in the public domain due to social pressures. Thus, in the context of green strategic partnerships, marketing capabilities represent a better source of competitive advantage and have a greater potential to enhance firm performance than technology capabilities do (Hunt 2011). Accordingly,

H2: Announcements of green marketing partnerships will have a greater positive impact on firm market value than announcements of green technology partnerships.

Firms' prior green performance and green strategic partnerships

Corporate environmental performance can be negative, reflecting an environmentally reactive position of a firm, or it can be positive, reflecting a firm's environmentally proactive stance. A reactive firm keeps environmental activities to a legal minimum for the mere purpose of reducing liabilities associated with non-compliance. An environmentally proactive firm goes beyond the legal minimums and voluntarily exceeds the environmental standards (Hart and Dowell 2010; Kärnä et al. 2003). Importantly, firms may demonstrate positive, proactive environmental behavior in some of their business operations, while exhibiting negative, reactive environmental practices in other functional areas (Aragon-Correa and Rubio-Lopez 2007).

Prior green performance is indicative of green competencies and expertise a firm has developed and affects investors' valuation of a firm's future cash flow. Prior negative green performance suggests that a firm previously followed a course of actions that was minimally acceptable and mandatory for everyone, for example, installed a minimal end-of-pipe pollution control equipment to ensure that emissions did not exceed a specific threshold. By following this path, a firm incurred costs associated with environmental policy compliance but did not acquire any green expertise because anyone can follow the same nominal strategy (Hunt 2011; Leonidou and Leonidou 2011). Although an announcement of a green partnership might signal that a firm intends to improve its environmental performance, because a firm has no unique environmental expertise to be leveraged with marketing and technology capabilities in a green partnership, such a firm is subject to higher liability risks and poor financial performance.

In contrast, prior positive green performance indicates that a firm has been consistently working on improving its environmental performance. A firm's proactive environmental position has already been ingrained in investors' minds and built into their expectations of a firm's future cash flow. Announcement of one more environmentally positive action is consistent with the status quo and will not change the stock market valuation of a firm. Thus,

H3a: A firm's prior negative green performance will be negatively associated with a change in the stock market value of the firm in response to announcements of green strategic partnerships.

H3b: A firm's prior positive green performance will not have an effect on the stock market value of the firm in response to announcements of green strategic partnerships.

Industry pollution intensity and green strategic partnerships

Extant literature suggests that certain industry attributes can have a differential effect on the stock market valuation of strategic partnerships. Industries vary in terms of their pollution intensity—the average emission rates of various pollutants associated with industry activities. In industries that produce high pollution levels, so-called "dirty" industries such as petroleum production or chemical industries, firms face higher liability

risks and are subject to greater scrutiny and more stringent environmental regulations (Varadarajan 2015). Research has shown that firms under unfavorable regulatory regimes assume higher costs of capital (Filbeck and Gorman 2004).

Moreover, in those "stigmatized" industries, environmental costs comprise a sizable portion of firms' total operational costs. To improve environmental performance, firms undergo significant upgrades of operations far above and beyond pollution prevention measures that are small in scale and easy to implement (Diestre and Rajagopalan 2011). Advanced technological modernizations for improving firms' environmental performance result in escalating costs and rapidly diminishing returns on investments (Aragon-Correa and Rubio-Lopez 2007; Hart and Ahuja 1996). Hence, in dirtier industries, cost-related benefits of environmental improvements achieved in a green partnership will be lower than in less dirty economy sectors.

Furthermore, in dirtier industries, the potential of marketing capabilities to leverage a firm's green expertise for value creation purposes might be limited due to weaker stakeholder linking. According to a recent study (Barnett and King 2008), people often hold persistent, unquestioned beliefs regarding the potential ecological threats posed by highly polluting industries and do not discriminate between the firms that act responsibly and improve their environmental performance and those that do not. As a result of the negative reputational commons associated with the industry as a whole, stakeholders push for more stringent control and liability measures for the total population of firms in the industry, rather than underachievers alone (Barnett and King 2008). The finance literature also suggests the persistence of the negative "halo effect" when the wrongdoings of a few firms might have long-term negative financial consequences for the whole industry (Jarrell and Peltzman 1985; Mitchell 1989). Thus,

H4a: All other things being equal, industry pollution intensity is negatively related to the change in firm's stock market value in response to announcements of green strategic partnerships.

With respect to the past performance of firms operating in pollution-intensive industries, prior positive green performance suggests that a firm has already developed some environmental expertise. However, it also indicates that a firm has implemented at least some voluntary upgrades in excess of legal minimums. Given the disproportionally high negative environmental impact of those industries and the higher-than-average environmental compliance costs incurred by industry incumbents, further and more advanced environmental improvements would require substantial technological modernization of firm operations, which is highly risky and assumes escalating operational costs (Hart and Ahuja 1996). As industry "dirtiness" and the complexity of modernizations increase, the rising costs of upgrades would gradually offset the savings gained from the improvements implemented.

In contrast, prior negative green performance indicates that a firm did not invest in environmental upgrades and presumably faced higher ecological liability risks in the past. An announcement of a green partnership would signal a firm's intentions to improve its environmental performance. For "high polluters" who just started implementing environmental upgrades, there are still sufficient opportunities for improvements via low-cost pollution-prevention measures, even in the context of dirtier industries (Aragon-Correa and Rubio-Lopez 2007). For those firms, improvements in environmental performance would lead to lower liabilities and better financial performance in the future. Therefore,

H4b and (c): As the level of industry pollution intensity increases, a firm with more negative (positive) green performance in the past will experience higher (lower) returns to announcements of green strategic partnerships.

The theoretical model is summarized in Fig. 1.

Research methodology

To test the theory herein proposed, we use event study and regression analyses. The event study allows for testing the causal effects of green partnership announcements on a change in firm market value (Srinivasan and Hanssens 2009). Through cross-sectional analyses, we explore the determinants of the magnitude of change in firm market value in response to green partnership announcements.

Event study design

The event study methodology is based on the efficient market hypothesis, which argues that at any moment a stock market price reflects all information regarding that stock in the public domain up to that point (Brown and Warner 1985). The methodology allows the impact of an event to be measured by examining the change in stock price when the event becomes public knowledge. We calculate the abnormal return for the stock of a firm i on the day t as follows:

$$AR_{it} = R_{it} – NR_{it},$$

where AR_{it} is the abnormal return for a firm i on day t, R_{it} is the actual return for a firm i on day t, and NR_{it} is the predicted return of a firm i on day t. The event date is labeled as time $t = 0$.

To predict NR_{it}, we utilize the market index model:

$$NR_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where α_i and β_i represent ordinary least squares estimates of the regression coefficients, R_{mt} is the equal-weighted market return on day t, and ε_{it} is an independent and identically distributed disturbance term. We estimate NR_{it} over a period of 255 days that ends 30 days before the event date, assuming that during the estimation period no information regarding the event of interest is released. We calculate the cumulative abnormal return (CAR) of a firm i as the sum of daily abnormal returns over the event window $[t_1, t_2]$:

$$CAR_i[t_1, t_2] = \sum_{t_1}^{t_2} AR_{it}$$

We estimate the abnormal return on the day of announcement and the cumulative abnormal returns over the various event windows within 10 days either side of the announcement day to control for information leaks and delayed stock market reaction to partnership news. To assess whether the average cumulative abnormal returns are significantly different from zero, we use a combination of the parametric Patell's standardized residual method and the non-parametric generalized sign test (Kothari and Warner 2006).

Data collection

We define an event of interest as a public announcement of a strategic partnership between a publicly traded company and other organizations in the market, with the explicit environmental objectives stated in the announcement. To test the proposed research hypotheses, we collected a dataset of green partnerships announced by publicly traded US companies over the period of 2005–2007. First, we used the KLD Research and Analytics Database to obtain a list of firms for which an independent, third-party assessment of the environmental performance is available. For those firms, we searched the Corporate Register database, which provides access to CSR reports of the largest global corporations. We performed a content analysis of the reports to identify information related to green strategic partnerships. Next, we searched Lexis-Nexis, FACTIVA, newswire services and company websites to identify the dates of the first information releases. If there was ambiguity regarding the precise announcement date, we excluded that announcement from the dataset. We checked for contemporaneous financial (dividend announcements) and management (mergers and acquisitions, other partnerships, law suits, environmental awards, executive management changes, new product launches) announcements. If any such events had occurred in 3 days either side of the announcement day, we removed these announcements from the dataset. We also excluded minor, short-term events that were unlikely to impact the stock market valuation of a firm, e.g., a 1-day computer recycling event organized by a manufacturer in the distributor's location. The final dataset was composed of 54 observations for 2005, 64 observations for 2006 and 83 observations for 2007, 190 events in total. Stock market data were obtained from the Centre for Research in Security Prices (CRSP).

Variables

Dependent variable

The dependent variable is a firm's short-term abnormal stock returns, estimated using the event study methodology described above.

Independent variables

Partnership type We operationalized a partnership type as a dummy variable that takes a value of 1 if a firm announced a green marketing partnership and a value of 0 if it announced a green technology partnership. Examples of each type of green partnerships are provided in Table 2.

Firms' prior green performance (positive vs. negative) We operationalized a firm's prior green performance based on the environmental indices from the KLD Research and Analytics database. The KLD environmental indices represent a set of six "strengths" and seven "concerns" reflective of how firms allocate resources with respect to environmental performance. The "strengths" refer to a firm's positive environmental actions (i.e., reliance on renewable energy, use of recycled materials, or commitment to voluntary environmental programs). The "concerns" indicate that a substantial portion of firm revenues come from hazardous chemicals or that a firm falls behind industry competitors in environmental improvements or has high environmental liabilities (KLD Research and Analytics, Inc. 2003). A firm can have a variety of strengths and concerns and can be evaluated as "green-positive" in some of its business operations and "green-negative" in others. Following other studies in the field, we transformed the individual environmental indices to form the aggregate measure of the Prior Positive Green Performance by summing all the strengths and the aggregate measure of the Prior Negative Green Performance by summing all the concerns. However, we did not aggregate them further to obtain a single measure of a firm's prior green performance because prior research has shown that environmental strengths and environmental concerns are related but theoretically and empirically distinct constructs (Delmas and Doctori-Blass 2010; Mattingly and Berman 2006).

Industry pollution intensity We operationalized industry pollution intensity based on the capital expenditures associated with pollution abatement activities in that industry (Klassen and McLaughlin 1996; Zaim 2004). Data on industry pollution abatement costs are available from the Pollution Abatement

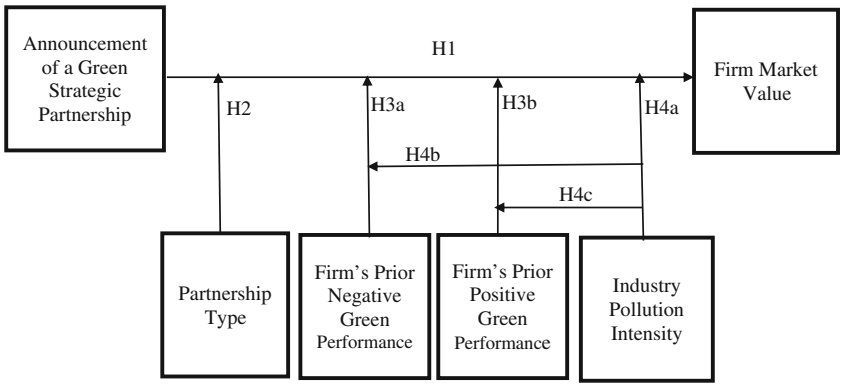

Fig. 1 Theoretical model

Costs and Expenditures (PACE) reports provided by the U.S. Census Bureau every 2 to 5 years. We used the PACE report 1999, published in 2002. The next report, PACE report 2005, was published in 2008.

Control variables

We also controlled for firm reputation, firm size, firm partnership experience, financial leverage, firm book-to-market ratio and stock market beta, year and industry effects. Table 3 provides the details of the variables and sources from which the data were drawn.

Model specification

The decision of a firm to undertake a strategic move can be influenced by certain private information not observable by stock markets (Prabhala and Li 2007). Some firms might be more motivated to pursue green strategies than others (Margolis et al. 2009). Accordingly, we used the two-stage Heckman (1979) selection model to control for selection bias due to systematic differences between the firms that choose to engage in green partnerships and those that do not.

Selection model with Heckman procedure

In the first stage, we obtained a matched sample portfolio consisting of publicly listed firms that did not announce green strategic partnerships during the period under study. Consistent with prior literature, we selected the matched firms based on the same industry sector and similar market capitalization (+/− 20%) for the same year (Homburg et al. 2014; Purnanandam and Swaminathan 2004). In a few cases, when the announcing firm was the largest one and no other firm satisfied a selection criterion of similar size, we matched the firms with the second largest company in that industry. We then ran a probit selection model in which firms' choices to engage in a green strategic partnership were coded as 1 and as 0 if they chose to abstain. Based on a literature review (Gulati 1998; Kale et al. 2002; Shan et al. 1994), the following factors were included as likely to affect firm decisions to form green strategic partnerships: firm age, market capitalization, firm sales, firm financial leverage, firm market share, firm partnership experience, industry competitive intensity, industry growth rate, and industry and year-specific effects. A dummy was also included to control for the industries with more stringent environmental regulations (chemicals SIC 28xx, metals SIC 33xx, paper SIC 26xx and petroleum SIC 2911). Firms in those industries are subject to greater scrutiny and may be more motivated to pursue green efficiencies (Cho and Patten 2007). For the full details regarding the variables and data sources, please refer to Table 3. Because some firms in the dataset announced more than one partnership, we estimated a model with robust errors and clustered events.

> Decision to form a green partnership=f(Firm Age, Firm Market Capitalization; Firm Financial Leverage; Firm Sales; Market Share; Partnership Experience; Industry Competitive Intensity; Industry Growth; Environmentally Sensitive Industries; Industry Effects; Time Effects).

The results of the first-stage selection model are provided in Table W2 (web appendix). We used the resulting parameters to calculate the inverse Mills ratio lambda and included it as an additional explanatory variable in the second-stage model to control for selection bias.

Second-stage model

The dependent variable is a firm's abnormal returns, estimated in the event study. The independent variables include industry pollution intensity, firm's prior positive green performance, firm's prior negative green performance and the interaction terms of industry pollution intensity with prior positive and negative green performance. We mean-centered the concerned variables before creating the interaction terms. The model also controls for partnership type, firm size as measured by firm sales, firm financial leverage, firm reputation, firm partnership

Table 2 Examples of green strategic partnerships

Partnership type	Focal firm	Partner(s)	Goals and objectives as announced	Source
Examples of Green Marketing Partnerships	General Motors	State of Florida and Inland Food Stores	To market new eco-friendly E85 ethanol fuel in North Florida markets	*Company Reports*, FACTIVA, 13-Sep-2006
	Praxair	Petrobras	To supply liquefied cleaner-burning natural gas to areas not served by pipelines and help Petrobras expand natural gas supply network	Praxair press release, firm website, 21-Aug-2006
Examples of Green Technology partnerships	United Technologies	Navantia	To develop advanced fuel cell power modules for use in military and civil vessels	UT press release, firm website, 18-Jul-2006
	PPL Corp	Pennsylvania Department of Environmental Protection and undisclosed partner	To implement novel pollution control equipment at two Pennsylvania power plants	*Waste News*, FACTIVA, 28-Feb-2005

experience, stock betas computed prior to the event of interest over −275 to −25 days, book-to-market value of equity, Mills lambda, industry and time effects (Fama and French 1993, 1995; Luo and Bhattacharya 2009; Mathur and Mathur 2000; Oxley et al. 2009; Park et al. 2004).

Firm Abnormal Returns=f (Partnership Type; Firm's Prior Positive Green Performance; Firm's Prior Negative Green Performance; Industry Pollution Intensity; Firm's Prior Positive Green Performance * Industry Pollution Intensity; Firm's Prior Negative Green Performance* Industry Pollution Intensity; Firm Sales; Firm Reputation; Firm Financial Leverage; Stock Market Betas; Book-to-Market Value Ratio; Mills Lambda; Industry Effects; Time Effects).

Results

The dataset comprises 190 partnerships announced by 59 companies over the period 2005–2007 and includes 83 green marketing partnerships and 107 green technology partnerships. Of the 59 firms, 27 were engaged in both green marketing and green technology partnerships. Among those preferring one or another partnership type, 5 firms were exclusively engaged in green marketing partnerships, 7 firms repeatedly engaged in exclusively green technology partnerships. Twenty firms announced only once, either a green marketing or green technology partnership. The average firm market capitalization was $40 963.2 million. The dataset covers three broad economy sectors including 16 industries, as described by 2-digit SIC codes. The food, textile, chemical sector (SIC 20, 24, 25, 26, 28, 29) comprised 65 partnerships, or 34% of the dataset. The plastic, metal, and machinery sector (SIC 30, 33, 34, 35, 36, 37) comprised 55 partnerships, or 29%. The transportation and public utilities sector (SIC 40, 42, 48, 49) constituted 70 partnerships, or 37% of the dataset. Table 4 provides descriptive statistics and correlations.

To explore the effects of green partnership announcements, an event study using the market model estimation procedure was implemented. The results demonstrate that stock markets do not react significantly to the aggregate announcements of green partnerships. The aggregation of announcements of different types might obscure the relationships that exist. After the dataset was split into green marketing versus green technology partnerships, an analysis of the daily abnormal returns for the 20 days around the announcements reveals that the day of the event and 1 day after show significant stock market reactions. The results are shown in Table 5.

Consistent with prior studies in the field (Chaney et al. 1991; Homburg et al. 2014), the event windows with the significant parametric and non-parametric statistics in both partnership categories were selected for further analysis.

Green marketing partnerships reported positive average abnormal returns (+.31%), $p < 0.01$, on the day of an announcement $t = 0$ and cumulative abnormal returns (+.49%), $p < 0.05$, on the next day. Green technology partnerships reported negative average abnormal returns (−.25%), $p < 0.05$, on the day of an announcement $t = 0$ and cumulative average abnormal returns (−.32%), $p < 0.05$, on the next day. Figures 1, 2, and 3 show the daily (MAR line) and cumulative abnormal returns (MCAR line) following announcements of green marketing partnerships and green technology partnerships, respectively, for the event window (−10, +10).

The results of mean difference tests for green marketing versus green technology partnerships for both the day of an announcement $t = 0$ and for the event window (0; +1) also confirm that average abnormal returns (AARs) differ across partnership types at a significance level of $p < .05$, with the marketing partnership sample reporting positive means and the technology partnership sample reporting negative means (Table W1, web appendix). Thus, H2 is supported.

Table 3 Variables and data sources

Variable	Description	Source
Dependent variable:	Firm's abnormal stock returns	Estimated with event study, CRSP
Independent variables:		
Partnership type	Dummy, marketing partnership (1), technology partnership (0)	Press Releases
Firm's prior positive green performance	Aggregate of firm's environmental strengths	KLD Database
Firm's prior negative green performance	Aggregate of firm's environmental concerns	KLD Database
Industry pollution intensity	Industry pollution abatement costs	Pollution Abatement Costs Report, U.S. Census Bureau 2002
Firm reputation	Firm reputation index	Fortune's Most Admired Companies Ranking
Firm market share	Firm's sales relative to total industry sales	COMPUSTAT
Firm sales	Firm sales	COMPUSTAT
Firm market capitalization	Firm market capitalization	COMPUSTAT
Firm financial leverage	Firm's long-term debt relative to firm's total assets	COMPUSTAT
Firm partnership experience	Number of partnerships firm engaged in 5 years preceding the announcement	Thompson SDC Platinum
Firm book-to-market value ratio	Book-to-market value of equity	COMPUSTAT
Firm betas	Stock betas computed prior to the event over −275 to −25 days	Event study
Firm age	Number of years since firm foundation	Firm SIC filings
Industry growth	Average 3-year sales growth of the industry	COMPUSTAT
Industry competitive intensity	Inverse Herfindahl-Hirschman index	COMPUSTAT
Industry SIC	Industry dummies	COMPUSTAT
Industry sensitive to environmental regulations	Dummy for SIC 26xx, 28xx, 2911, 33xx	COMPUSTAT
Year of partnership announcement	Year dummies	Press Releases

We also checked whether the observed difference in stock market reaction towards announcements of green marketing versus green technology partnerships can be explained by industry attributes, such as technological turbulence. The prevailing view in the strategic management literature is that in high-tech industries, technology partnerships outperform marketing ones, and the opposite is true for the mature low-tech industries (Das et al. 1998). Our dataset includes a good mix of high- and low-tech industries, as defined by the Bureau of Labor Statistics (Heckler 2005). The green marketing sample has a nearly equal split of 43 partnerships announced by firms in operating in low-tech industries and 40 partnerships announced by companies in high-tech economy sectors. The green technology sample comprises 62 partnerships announced by firms in low-tech industries and 45 partnerships announced by firms in high-tech industries. The mean difference tests conducted on the aggregate sample, as well as separately on the green marketing and green technology subsamples, show no statistically significant difference in mean abnormal returns for the low-tech versus high-tech industries for any of the event windows. From the short-term perspective, irrespective of the industry technological turbulence, announcements of green marketing partnerships consistently generate higher abnormal stock returns than announcements of green technology partnerships do.

Next, we estimated the long-term abnormal returns to announcements of green strategic partnerships using a long-horizon event study method that allows researchers to test for abnormal returns spread over long horizons, usually 1 to 5 years (Kothari and Warner 2006). In line with the literature and following the recommendations presented in a recent review of methodological issues in long-horizon event studies by Ang and Zhang (2011), we used two alternative estimation approaches, the buy-and-hold abnormal returns approach and the calendar-time portfolio returns with the Fama-French benchmark. Due to a relatively small sample size, a 1-year horizon was utilized (Kolari and Pynnönen 2010).

The buy-and-hold long-term abnormal returns (BHAR) approach is reflective of a strategy of investing into the stock that completed the event of interest and selling it at the end of the pre-determined holding period. We estimated the BHAR abnormal returns as compounded monthly returns over a 1-year period on a Fama-French benchmark. The calendar-time portfolio long-term abnormal return approach is based on estimating calendar-time portfolio returns for the firms completing the event of interest and calibrating whether those returns are

Table 4 Descriptive statistics and correlations, main model

		N	Mean	Std. dev.	1	2	3	4	5	6	7	8	9	10	11
1	AAR (day 0)	190	−0.05	12.58	1.00										
2	CAR (0; +1)	190	0.01	16.11	.64**	1.00									
3	Partnership type	190	0.44	0.50	.22**	.25**	1.00								
4	Firm sales (ln)	190	10.10	1.03	0.01	0.00	−0.05	1.00							
5	Firm reputation	130	6.72	0.82	0.00	0.02	−0.08	.43**	1.00						
6	Partnership experience	190	1.41	0.90	.16*	.15*	0.02	.30**	−.20*	1.00					
7	Firm's financial leverage	190	0.21	0.10	−0.09	−0.10	−0.11	−0.45	−.40**	−.19**	1.00				
8	Stock market betas	190	0.90	0.29	0.03	0.05	0.08	.234*	0.14	0.08	−.17*	1.00			
9	Book-to-market value ratio	144	0.44	0.21	.26**	0.00	−0.03	0.03	−0.15	0.10	.27**	0.03	1.00		
10	Industry Pollution Intensity	180	2.63	0.47	−0.02	−0.02	−0.08	−.36**	−0.05	−0.06	.31**	−.21**	.20*	1.00	
11	Firm's prior positive green performance	148	−71.89	33.10	−0.09	−0.08	.23**	−.35**	−.32**	−0.02	−0.10	−0.06	−.29**	−.41**	1.00
12	Firm's prior negative green performance	148	45.81	23.42	0.01	0.15	0.04	0.13	0.04	.27**	−.26**	0.13	−.40**	−.28**	0.10

**$p < .01$, *$p < .05$

abnormal in a multi-factor regression model over t-month post-event period. We utilized Fama and French (1993) factors in the multi-factor regression model. Both the BHAR approach and the calendar-time portfolio approach have their weaknesses and limitations. BHAR approach is known to produce inflated estimates due to compounding effects (Ang and Zhang 2011), whereas the calendar-time portfolio approach is criticized for having very low power and being overly conservative (Kothari and Warner 2006). To address these criticisms and ensure the robustness of the results, we used both approaches.

Table 6 shows the results of the analysis. The long-term abnormal returns following the news of green marketing partnerships were not significantly different from zero using either of the two estimation approaches. By contrast, the results for green technology partnerships show positive and statistically significant abnormal returns of approximately 6% of firm market value if estimated with the BHAR model and 4% if estimated using a more conservative calendar-time portfolio within 1 year after the announcement. Despite the initial negative reaction of investors, firms were still able to accrue positive financial returns following the green technology partnership announcements but over a longer period. Thus, based on the results of both short-term and long-term event studies, we found support for H1.

To test H3a,b and 4a,b,c, we ran cross-sectional analysis. The dataset is longitudinal in nature, wherein some firms announced once and others made multiple announcements over the observed period. In this case, a mixed linear model design was deemed appropriate because it allows researchers to account for unobserved heterogeneity and control for the correlated errors among observations nested within firms over time. We specified a mixed model with random intercepts and random slopes reflective of the individual firm and time effects and a set of covariates. The dependent variable is firm abnormal returns on the announcement day $t = 0$. We used with Restricted Maximum Likelihood (REML) estimation procedure (Müller et al. 2013). To examine goodness of fit and identify the best model, we tested the baseline Model 1 with control variables only vs. Model 2 with controls and main effects vs. full Model 3 with the controls, main effects and interaction terms. To compare the models, we used the traditional log-likelihood estimator and the Bayes Information Criterion (BIC), which penalizes more complex models, leading to the optimal, most parsimonious one (Schwarz 1978). The model specification that minimizes the log-likelihood and BIC estimators indicates the model that best fits the observed data. The results (Table W3, web appendix) indicate that Model 3, which includes the controls, main effects and interaction terms and decomposes the direct effects of the industry pollution intensity and a firm's past environmental performance, positive and negative, performs best, reporting the lowest log-likelihood and BIC estimators.

We report the results of the cross-sectional analysis in Table 7. The partnership type variable is a positive and significant determinant of AARs ($p < 0.01$), which supports H2. Consistent with the results of the event study, in the short run, green marketing partnerships generated higher abnormal returns than green technology partnerships. Similarly, the firm past negative performance variable is negative and significant ($p < 0.05$), supporting H3a. The impact of an announcement of a green partnership on a firm stock market value is lower if a firm had a history of poor environmental performance. As predicted, we did not observe a significant effect of firm's past positive performance on the stock market valuation of green partnerships. Thus, H3b is supported. The industry pollution intensity variable is a negative and significant determinant of AARs ($p < 0.05$), confirming H4a. As industry pollution intensity increases, firms experience lower abnormal returns. Furthermore, we observed that the interaction term of the

Table 5 Green strategic partnerships, cumulative abnormal returns over different event windows ($-t_1$, $+ t_2$), market model estimations

	Green marketing partnerships				Green technology partnerships			
Event window	N	Mean CAR	Patell Z	Generalized sign Z	N	Mean CAR	Patell Z	Generalized sign Z
(−7, +7)	83	0.84%	1.63	0.96	107	0.04%	0.79	0.93
(−6, +6)	83	0.55%	1.05	0.96	107	−0.09%	0.34	0.55
(−5, +5)	83	0.50%	1.08	1.62	107	−0.09%	0.28	0.74
(−4, +4)	83	0.39%	0.98	1.40	107	−0.25%	−0.18	0.16
(−3, +3)	83	0.69%	1.84*	2.94**	107	−0.12%	0.14	−0.03
(−3, +2)	83	0.75%	2.40**	2.06*	107	−0.16%	−0.11	0.35
(−2, +3)	83	0.71%	2.01*	2.28*	107	−0.20%	−0.21	0.35
(−2, +2)	83	0.77%	2.64**	2.50**	107	−0.24%	−0.52	0.16
(−1, +2)	83	0.54%	2.19*	1.84*	107	−0.09%	0.14	1.13
(−2, +1)	83	0.62%	2.43**	3.16***	107	−0.39%	−1.37	−1.774*
(−1, +1)	83	0.40%	1.93*	2.28*	107	−0.24%	−0.76	−0.23
(−1,0)	83	0.63%	3.07**	2.06*	107	−0.16%	−0.66	−1.774*
(0)	83	0.31%	2.68**	3.38***	107	−0.25%	−2.03*	−1.97*
(0, +1)	83	0.49%	3.01*	2.50**	107	−0.32%	−1.94*	−1.77*
(0, +2)	83	0.63%	3.07*	2.06**	107	−0.16%	−0.66	−1.774*

**$p < .01$, *$p < .05$

industry pollution intensity and firm's past positive green performance is negative and significant ($p < 0.05$), confirming that the negative impact of the industry pollution intensity on AARs would be stronger for firms with a history of positive environmental performance. Thus, H4c is supported. Finally, the interaction term of the industry pollution intensity and firm's past negative green performance was not significant, although the direction was as predicted. H4b is not supported.

In addition to the predicted effects, we also obtained insights into additional factors that affect the stock market valuation of green partnerships. The Firm Sales variable is negative and significant ($p < 0.01$), suggesting that larger firms gain less from announcements of green partnerships. The partnership experience variable is positive and moderately significant ($p < 0.1$), which is consistent with the established view in the strategy literature that firms with stronger partnership capabilities select most attractive partners and establish partnerships with higher value creation potential. Finally, the firm financial leverage variable is negative and significant ($p < 0.05$), indicating that as firm debt increases, investors become more pessimistic about firm investments into environmental initiatives.

The model was also re-estimated for the event window (0; +1). Six out of seven parameters associated with the hypotheses remained stable in terms of direction and significance. The effect of industry pollution intensity became non-significant, but the sign was preserved as hypothesized.

Additional robustness checks

To further increase confidence in the results, we performed various robustness checks. First, we re-estimated firms' abnormal returns with the alternative Fama-French-Carhart four-factor

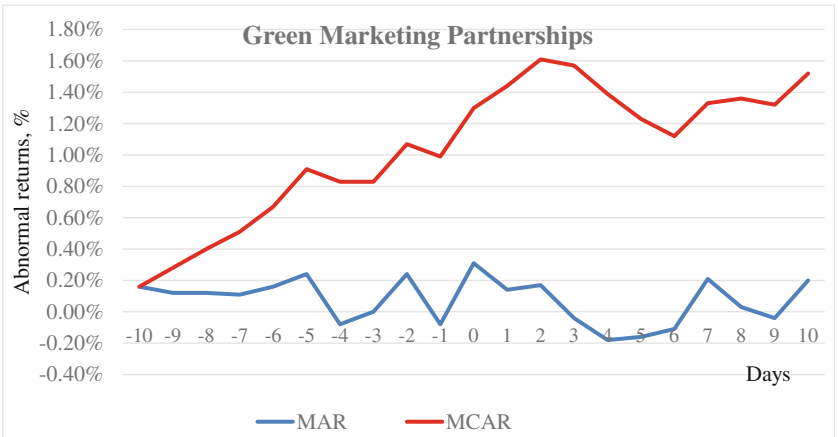

Fig. 2 Daily average abnormal return (MAR) and cumulative abnormal returns (MCAR), green marketing partnerships

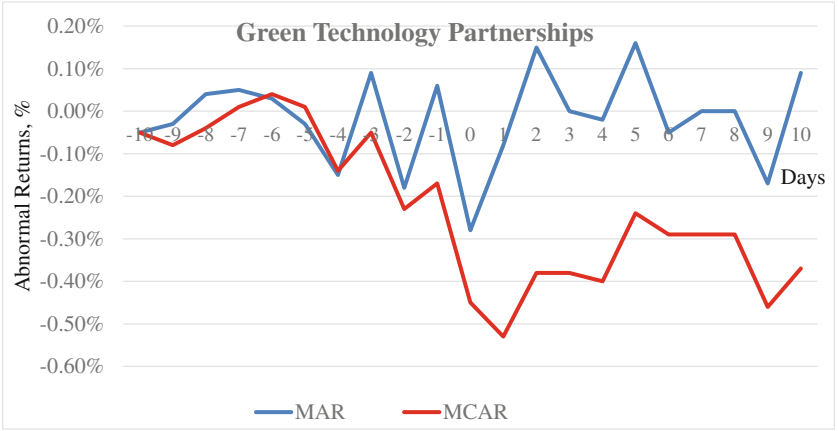

Fig. 3 Daily average abnormal return (MAR) and cumulative abnormal returns (MCAR), green technology partnerships

model (Carhart 1997; Fama and French 1993). The results (Table W4, web appendix) were similar to those obtained with the market model, confirming that on the announcement day $t = 0$, in both partnership categories, stock markets report statistically significant abnormal returns to announcements of green partnerships. However, for the event window (0; +1), green technology partnerships report a non-significant non-parametric rank test, which suggests that the results might be driven by influential outliers. This finding confirms that AARs observed on the day of an announcement $t = 0$ are the most appropriate for cross-sectional analysis. Second, we re-estimated a cross-sectional model with regression with robust standard errors and clustered events, an alternative estimation approach used when data are heteroscedastic and intra-group correlations are suspected. The results of the regression with robust standard errors and clustered events (Table W5, web appendix) replicate those reported in Table 7. Finally, we re-estimated the expanded version of a cross-sectional model with the mixed model design by including additional firm and industry controls, namely firm market share, industry growth, and industry competitive intensity variables. All the hypothesized relationships remained stable in terms of their sign and significance. None of the additional controls was significant, and the model fit did not improve significantly. For reasons of parsimony, we retained a shorter version of the cross-sectional model and reported the results as our main findings.

Table 6 Long-term abnormal returns 1 year after announcement

Partnership type	Post event Fama-French calendar time portfolio approach, 1-year returns (%)	Buy-and-hold benchmark approach, 1-year returns (%)
Green technology partnerships	4.00*	5.86**
Green marketing partnerships	1.92 n.s.	1.03 n.s

*n = 190 **p < .05, *p < .1*

Discussion and implications for theory and practice

We designed this study to explore the impact of green strategic partnerships on firm financial performance. Overall, our findings have implications for theories of CSR, organizational capabilities, and marketing-finance interface.

Theoretical implications

To the best of our knowledge, this is the first study to explore an increasingly relevant type of corporate environmental practice- green strategic partnerships, and their contribution to the stock market performance of a firm and the boundary conditions under which the economic gains are maximized. Our findings demonstrate that stock markets are selective in reacting to announcements of green partnerships, and some of those initiatives can, in fact, destroy shareholder value.

In the short term, green marketing partnerships systematically outperform green technology partnerships, which offers a contrasting view to previous research. Historically, variations in the valuation of different types of inter-firm collaborations have been explained by industry dynamism (see, for example, Park et al. 2004; Song et al. 2005). According to the traditional point of view, in high-tech industries, technology partnerships would be more greatly rewarded by stock markets than marketing partnerships because the former spur organizational innovation, which is a better source of competitive advantage under the conditions of volatile and rapidly changing high-tech industries. In contrast, our research demonstrates that irrespective of industry dynamism, green marketing partnerships can be superior and generate greater returns than green technology partnerships do. This finding contributes to the emerging stream of marketing literature advocating for the relative advantage of marketing over technology resources and elevates marketing's position in the hierarchy of organizational functions (Krasnikov and Jayachandran 2008; Mishra and Modi 2016).

Second, we add to the body of literature on the role and contributions of organizational capabilities to firm performance.

Table 7 Effects of firm's past environmental performance, positive and negative, and industry pollution intensity on stock market valuation of green strategic partnerships, mixed linear regression

Parameter	Estimate	Std. error
Estimates of fixed effects		
Intercept	115.39***	35.33
Green marketing partnership	6.54**	2.32
Green technology partnership	0[a]	0.00
Industry pollution intensity	−16.25**	6.59
Firm's prior negative green performance	−0.22**	0.09
Firm's prior positive. Green performance	0.02	0.08
[Industry Pollution Intensity] *[Firm' Prior Negative Green Performance]	0.09	0.14
[Industry Pollution Intensity] *[Firm's Prior Positive Green Performance]	−0.37**	0.20
SIC2000-2999	6.41	6.02
SIC3000-3999	−8.30	7.82
SIC4000-4999	0[a]	0.00
Y2005	−0.03	8.83
Y2006	−1.11	2.54
Y2007	0[a]	0.00
Firm sales (ln)	−10.03***	3.04
Firm partnership experience (ln)	4.19*	2.46
Mills Lambda	−7.94	7.04
Firm financial leverage	−47.95**	20.71
Stock market betas	8.76**	4.97
Firm book-to-market value ratio	8.35	9.75
Firm reputation	−2.47	1.90
Random effects		
Residual	1.26***	0.23
Variance σ2	4.23	0.49

Dependent variable: AR (day 0); a. Reference category

****p* < .01 ***p* < .05, **p* < .1, *1*-tailed tests of significance

An emerging stream of research has begun to examine the interplay of organizational capabilities with firm CSR and explore their joint value creation potential (Luo and Bhattacharya 2009; Mishra and Modi 2016; Servaes and Tamayo 2013). We extend this line of research by explicitly outlining the pathways through which firm marketing and technology capabilities can be combined with environmental expertise to gain eco-based competitive advantage in the context of strategic partnerships. We also quantify the effect of green marketing versus green technology inter-firm strategies on shareholder wealth.

Third, we contribute to advancing research on the marketing-finance interface. Many studies examining the association between firm CSR and shareholder value focus on the short-term implications and analyze the immediate stock market reaction to firm CSR news. This study takes a step further and analyzes both the short-term and long-term consequences of green CSR, revealing an interesting reverse trend. Initially, green technology partnerships negatively affect firm value but later experience upward stock market price's adjustments. This trend suggests that financial markets are unable to immediately recognize the economic value of green technologies and incorporate it into the stock market price with a drift. Over time, as uncertainty associated with green innovation projects diminishes, investors revise and update their expectations regarding future cash flow, which results in positive abnormal returns (Sorescu et al. 2007).[1]

Moreover, a legacy of prior environmental performance can drive investor sentiment towards green partnerships. In contrast to the argument in the extant literature that CSR may protect firms in times of crisis and offset negative consequences (Schnietz and Epstein 2005), we show that stock markets are, in general, insensitive to information about prior positive environmental behavior and do not amend for that. As levels of pollution intensity in industry increase, firms might even be penalized for being environmentally responsible. Investors also become skeptical if a green partnership is announced by a firm with a history of poor green performance, which reinforces the idea of general investor conservatism regarding green partnerships.

The reason for stock market conservatism can be a lack of experience in CSR and green partnerships in particular. Green collaborations have only recently become a widespread phenomenon, and investors might not have enough expertise to

[1] We are grateful to an anonymous reviewer for this insight.

evaluate them accurately (Harrison and Freeman 1999). Environmental quality in some of its aspects is a public good and market prices often do not exist for those (Reinhardt 2000). Lacking reliable information about costs and benefits of green initiatives, investors tend to be more conservative and discount their future value.

Implications for managers

We offer valuable insights for managerial practice as well. First, our results reliably suggest that green partnerships can be instrumental in carrying out firms' environmental strategies and generate economic gains. At the same time, managers must be aware that not all of those initiatives generate immediate positive returns. Based on the sample of firms studied, announcements of green marketing partnerships, on average, led to a $126.99 million increase in firm market value on the day of an announcement. By contrast, a firm's market value decreased, on average, by $102.41 million on the day when a green technology partnership was announced. Nevertheless, 1 year after an announcement of a green technology partnership, the firms concerned reported an average increase of $1638.52 million in stock market value. Managers interested in greening firm operations can choose alternative pathways to allocate firm resources to green marketing or green technology domains, based on their short-term and long-term goals.

Firms should also pay attention to their environmental reputation. The results highlight the fact that "doing bad" hurts more than "doing good" helps. It is in the interest of firm shareholders that managers implement positive green strategies across all business domains and avoid negative green approaches altogether. At the same time, managers should be cognizant of the potential risks associated with green activism in pollution-intensive industries and that stock markets might not recognize those initiatives as investments with positive future cash flow.

Limitations and suggestions for further research

This study is not without limitations, which suggest avenues for future research. First, one of the major challenges of this study is related to the high heterogeneity of the sample due to the scarcity of green partnership data within any particular industry. Unobserved industry attributes may have affected the examined relationships. Over time, as the amount of data on green partnerships increases, future studies could explore whether the observed effects hold in more homogenous settings and whether other "hidden" relationships surface. Second, due to limitations associated with secondary data, this study focuses on US companies. It is possible that in other countries, stock markets exhibit different patterns of reacting to green partnership news. Future research could consider including data from, for example, European countries, where sustainability issues are of high importance. Third, in contrast to this study, which focuses on large, established firms, future research could explore how small and medium-sized companies (SMEs) use green partnerships. SMEs comprise a majority of businesses worldwide, often lack necessary resources and might be more interested in pursuing green partnerships for efficiency reasons. Finally, the dataset in this study was dominated by partnerships with two partners only, as opposed to multi-partner collaborations. Recent research suggests that a dyadic versus multiple-partner structure might drive investor valuation of strategic collaborations (Fang et al. 2016). Future studies could investigate whether green partnerships with multiple partners, vertical and horizontal, make any difference to changes in stock returns.

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