# Value Creation in Strategic Alliances

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Abstract

*Many firms recognize the appeal of going green and employ strategic partnerships to manage corporate environmental strategies. Yet the mechanisms in green collaborations that create value for a firm remains mostly unexplored. To address this gap, the authors examine the effects of announcements of green strategic partnerships on a firm's stock market value. It was found that announcements of green marketing partnerships have an immediate positive and significant effect on a firm's market value and news about green technology partnerships produce immediate negative and significant effects. The results also show that green technology partnerships still can accrue positive financial returns, but in the long-term perspective, over the 1-year period. In dirtier industries, it is more difficult for firms to generate positive returns to green partnerships. Counter-intuitively, in highly-polluting industries, firms with proactive environmental orientation experience lower financial gains to news about strategic green partnerships, than their reactive, less environmentally-responsible, counterparts.*

1. Introduction

Environmental concerns continue to rise in importance all over the world. As markets expand, many firms now increasingly recognize the need to align economic growth and environmental demands in society. Going green has been proven a viable strategy to respond to the emerging challenges, and many organizations actively seek new ways to enhance firm environmental performance (Banerjee, Iyer & Kashyap, 2003; Luo & Bhattacharya, 2006; Olsen, Slotegraaf & Chandukala, 2014).

In the quest for greening their businesses, many firms increasingly rely on strategic partnerships with other organizations in the market. Forbes has listed sustainability-oriented collaborations among the top ten trends of the business world (Forbes, Jan 18, 2012). Many large

corporations engage in multiple green partnerships every year. For example, in 2013-2014 Exxon Mobile invested in 11 partnerships related to environmental R&D and biosphere's protection. Wal-Mart's 2014 Corporate Social Responsibility Report lists more than 20 ongoing green collaborations with suppliers, research institutions and local communities. Ford Motors on their website tells about collaborative environmental initiatives with more than 30 North-American and international organizations, many multi-year ones. A nascent, but rapidly developing stream in academic literature also suggests green partnerships have become a popular approach to manage corporate environmental strategies (i.e. Senge, Linchtenstein, Kaeufer, Bradbury & Carroll, 2007; Lin & Darnall, 2010).

Inter-firm partnerships represent an established domain studied in many disciplines. Extant literature suggests strategic collaborations can be an important vehicle to foster firm performance (Gulatti, 1998) and account for as much as one-third of firm revenues (Mani & Luo, 2015). Yet, practice shows partnerships are risky and costly endeavors; many fall short of meeting the expectations and destroy stakeholder value (Kale & Singh, 2009; Wuyts & Geyskens, 2005). The green context makes it even more complicated. There is no a definitive conclusion as whether the effect of corporate environmental initiatives on the firm's bottom line is unconditionally positive (i.e. Jacobs, Singhal, & Subramanian, 2010; Dixon-Fowler, Slater, Johnson, Ellstrand & Romi, 2013). Skepticism remains if high costs and uncertain payoffs associated with improvements in firm environmental performance warrant such efforts (Engardio, Capel, Carey & Hall, 2007). Thus, despite their growing significance to corporate practices, green partnerships remain a "poorly understood phenomenon" (Selsky & Parker, 2005) with unclear reward mechanisms (Wassmer, Paquin, & Sharma, 2014).

Given the importance of inter-organizational relationships in the marketplace and responding to the call for more research into the implementation forms and outcomes of firm environmental strategies (Chabowski, Mena, & Gonzalez-Padron, 2011; Cronin, Smith, Gleim, Ramirez, & Martinez, 2011), we explore the effects of announcements of green strategic partnerships on firm's stock market value and investigate the factors that drive the magnitude of the impact. We define green strategic partnerships as voluntary arrangements between two or more organizations for exchange, sharing, or co-development of environmentally friendly, green, products, technologies or services to pursue a set of strategic environmental goals or address critical business needs (Gulati, 1998).

Building on the resource-based theory (Barney & Clark, 2007), we propose that in green strategic partnerships firms can develop and leverage strategic environmental capabilities, a source of competitive advantage and superior firm performance. We explore the patterns in the stock market reaction to announcements of strategic green partnerships and relate those to the partnership scope, firm environmental strategic orientations, and environmental characteristics (pollution intensity levels) of the industry. Understanding under what conditions green cooperative arrangements enhance organizational performance as reflected in firm market value helps optimize firm's resource allocation and maximize benefits to a broader community of stakeholders. We use a combination of event study and regression analysis to investigate the impact of 342 green strategic partnerships on the firm's stock market value, announced by 77 companies from January 2005 to December 2007. Hereafter, we use the terms "partnership" and "collaboration" interchangeably.

## 2. Theory Development

### 2.1.Resource-based theory and firm environmental capabilities

The fundamental tenet of the resource-based theory is that organizations are heterogeneous in resources they control. A firm possessing resources that are valuable, rare, inimitable, and organized to be exploited by the firm (VRIO), enjoys competitive advantage and generates more economic value than the marginal firm in its industry (Barney and Clark 2007, Barney and Hesterly 2012). Firm capabilities are subsets of firm-specific resources which create value by extending, modifying and improving the productivity of other firm resources (Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece &Winter, 2009; Makadok, 2001).

The growing trend of environmental activism in society raises global concerns about ecological degradation and decreasing availability of many natural resources. In the corporate context, it draws attention to the ideas of a fundamentally resource-constrained environment and intensifying competition for depleting, non-renewable materials (Kotler, 2011). The ability to deploy firm's scarce resources efficiently and exploit their productive potential to its fullest, while minimizing the negative impact on the biosphere becomes of utmost importance (Russo & Fouts, 1997).

Organizations develop strategic environmental capabilities to address the firm environmental goals (Aragon-Correa & Sharma, 2003). The environmental capabilities enable organizations to identify and respond to green market opportunities and develop and deliver greener, more efficient, products and operational technologies (Berchicci, Dowell & King, 2012; Hart and Dowell, 2011).

Environmental capabilities can become a source of long-term competitive advantage if they satisfy the VRIO conditions as defined by the resource-based theory (Kozlenkova, Samaha & Palmatier, 2014). The resource is valuable (V) if it decreases costs or increases firm revenues beyond what would have been the case at the absence of such resource (Barney & Clark, 2007).

Environmental technologies help conserve material and energy inputs and minimize firm costs (Srivastava, 2007). Companies with strong green market sensing develop successful environmental brands and charge significant price premiums (Olsen et al., 2014). The resource is rare (R) if it is possessed by a small number of firms only (Makadok, 1999). Greener products might be costly to develop (Prakash, 2002) and "eco-efficiency will be one of the major challenges for R&D practice … in the next decades" (Noci & Verganti, 1999). Thus, highly successful environmental products are relatively rare. The resource is imperfectly imitable (I) if it is difficult to be replicated within the reasonable period of time (Makadok, 1999). Environmental capabilities are firm-specific and organizationally-embedded resources. They are integrated in the organizational structure and span across firm functions and hierarchical levels (Christmann, 2000). Darnall and Edwards (2006) argue that environmental capabilities are deeply rooted in firm knowledge and practices and build over time. Thus, environmental capabilities are complex and causally ambiguous resources which makes them difficult to disentangle and replicate by competitors (Grewal & Slotegraaf, 2007). The resource is supported by the organizational structure and utilized to its full potential (O) if the effectiveness of the resource increases at the presence of such structure (Barney & Hesterly, 2012). Prior research shows that environmental innovation relies on organizational culture and governance mechanisms supportive of green learning (Dangelico & Pujari, 2010). Darnall, Jolley & Handfield (2008) show that successful green product management requires a system of environmental norms and beliefs integrated with organizational structure and effective programs of personnel training for environmental responsibility. Thus, the environmental capabilities satisfy the VRIO conditions and thereby can be a source of long-term competitive advantage and superior organizational performance.

2.2. Firm environmental capabilities and strategic partnerships

No organization has all the resources and capabilities it requires to neutralize threats and exploit market opportunities, so firms undertake external search to get the desirable inputs (Penrose 1959). When those are not easily transferable in a market transaction, i.e. because they are mingled with other firm resources, strategic partnerships can be an avenue to pursue (Eisenhardt & Schoonhoven 1996). Because environmental capabilities are interconnected and socially complex resources and, thus, might be difficult to trade discretely (Berchicci et al., 2012; Mariadoss, Tansuhaj & Mouri, 2011), firms might resort to strategic partnerships.

How do firms develop and leverage the critical environmental capabilities in inter-firm collaborations?

Partnering with upstream and downstream partners, firms can develop and leverage environmental capabilities by organizing for "greener and leaner" product value chain (Srivastava, 2007). Collaborating with suppliers and distributors on environmental issues, firms gain better control and track environmental performance of their products from cradle to grave and develop innovations with closed-loop life cycle – essentially with no resource waste. Re-assessing material and product design issues, partners edit out hazardous materials and create substitutes for depleting and thus increasingly costly inputs, thus minimizing costs and improving efficiencies of firm operations (Pujari, Peattie, & Wright, 2004).

In partnerships with unrelated partners, firms can develop innovative environmental solutions by organizing joint production operation systems. Partners utilize each other's by-products and waste that would be discarded otherwise (Mariadoss et al., 2011; Sharma et al., 2010). For example, Molson Coors Brewery, a major beer producer, and Merrick & Company specializing in the renewable energy markets jointly developed a unique technology allowing to

convert brewing by-products into gas substitute ethanol (Kwok & Rabe, 2010). In the partnership, Molson has minimized waste output by converting it into a resalable product and lowered environmental risks and associated penalties. Merrick has taken advantage of lower input costs - those of brewing refuse. The partners maximize utilization of organizational resources, leverage efficiencies of material savings and reduced production costs, and achieve energy conservation goals, thus creating economic, environmental and social benefits.

Partnerships with NGOs and environmental groups can help firms get access to unique environmental expertise held by those stakeholders and develop innovative products with greater environmental benefits, which can command premium prices, capture additional market share, or both (Rodinelly & London, 2003). For example, in the alliance with Greenpeace, a German refrigerator manufacturer Foron blended its innovative technological resources and NGO's unique environmental expertise to create the first of a kind successful Freon-free refrigerator. The collaboration has brought to life a whole new industry of eco-friendly refrigerators in Europe with a great potential for growth (Stafford, Polonsky & Hartman, 2000).

In partnerships with environmental regulators and voluntary industry associations, firms develop valuable environmental capabilities to deal with environmental policies and mitigate regulatory risks (Delmas & Montes-Sancho, 2010; Diestre & Rajagopalan, 2011). Firms learn about future ecological policies early on and get ready for the coming changes before competitors even know. The influential industry associations might engage in setting of environmental industry standards which would raise the competitors' costs or improve members' competitive positions by working with government to create regulations favoring their products. In those partnerships, firms also improve the corporate image with general public and can extend reach in local communities (London, Rondinelli & O'Neill, 2005). In 2006 PG&E Corp.

partnered with California Public Utility Commission to advocate a new voluntary utility program ClimateSmart. The 5-year initiative was aimed to incentivize business and residential customers to neutralize greenhouse emissions associated with their energy use (*PR Newswire US*, December 14, 2006). In a partnership with regulators, PG&E got endorsement and aggressively promoted its energy saving products and established an image of a green leader in the region, reinforcing connections in the local business community and environmental activist groups and building up credibility in the eyes of eco-sensitive consumer groups.

As a summary, in green strategic partnerships firms can develop and leverage strategic environmental capabilities, a source of long-term competitive advantage and superior firm performance. Partners mitigate the threats of resource scarcity by making firm's valuable resources last longer, optimize costs by improving operational efficiencies, and increase revenues by exploiting opportunities in green markets. Based on that,

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

### 2.3.Technology-oriented versus marketing-oriented environmental capabilities in green strategic partnerships

As a way of categorization, environmental capabilities can be technology-oriented and refer to a firm ability to create unique environmentally friendly products and energy and material-saving technologies less dependent on non-renewables. Environmental capabilities can also be marketing-oriented and relate to a firm ability to identify green markets' needs and build successful relationships with consumers, suppliers, channel members and broader stakeholder groups by offering environmentally-enhanced value proposition (Day, 2011).

According to the resource-based theory, the capabilities that are more unique and inimitable provide a better source of long-term competitive advantage (Kozlenkova et al., 2014). Extant

literature suggests that marketing-oriented capabilities might be more difficult to replicate because of their social complexity (Krasnikov & Jayachandran, 2008; Simonin, 1999). Contrary to that, knowledge powering the technology-oriented capabilities is more likely to be codified in patents, shared with others, i.e. via licenses, and, thus, more easily imitated by competitors (Joshi & Nerkar, 2011).

In the environmental context, those discrepancies might be even more pronounced. At the core of firm strategies is the market value proposition.The notion of corporate environmentalism has broadened the traditional, purely economic view of value to encompass environmental and social benefits (Porter & Kramer, 2011). This invites a variety of perspectives on what constitutes value, advocated by diverse social groups and puts a firm in the center of much broader than ever before a network of stakeholders. Firms are responsible for "creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large", as defined by American Marketing Association (please see www.ama.org). Marketing-oriented environmental capabilities help firms sense the needs and effectively respond to unique expectations of multiple disparate stakeholder groups (Bhattacharya & Korschun 2008, Rueda-Manzanares, Aragón-Correa & Sharma, 2008). Getting approval from the stakeholders with diverse, often conflicting demands requires fine-tuned market intelligence, high cultural sensitivity and openness to opposing viewpoints, unique social capital and organizational high-order learning, the skills that are socially complex and mostly tacit in nature (Hart & Sharma, 2004; Hillebrandt, Driessen & Koll, 2015; Mish & Scammon, 2010). Unlike technology-oriented environmental capabilities, firms are not under pressure to codify knowledge related to the marketing-oriented environmental capabilities and disclose it in the public domain (Krasnikov & Jayachandran, 2008). Marketing-oriented environmental

capabilities, less tangible, less formalized and based on experiential learning closely held by a firm, are more difficult to access and imitate by competitors. They become a better source of long-term competitive advantage and have a greater potential to enhance firm performance than technology-oriented environmental capabilities. Based on that,

H2. *Announcements of green marketing partnerships will have a greater positive impact on firm market value than those of the green technology partnerships.*

### 2.4. Firm's environmental orientations and green strategic partnerships

Corporate environmentalism can take different forms. Firms can be reactive in some of its business practices and be proactive in the others (Aragon-Correa & Rubio-Lopez, 2007). The reactive environmental stance is driven by compliance with environmental regulations to lessen the negative impact on environment (Hart & Dowel, 2011). The proactive environmental stance requires to go beyond the legal norms in order to prevent, rather than simply reduce harm to the environment (Kärnä, Hansen & Jusli, 2003).

Resource-based theory's logic suggests that the environmental capabilities developed with the green proactivity in mind will have superiority over those capabilities associated with the reactive green approach (Leonidou & Leonidou, 2011; Menon & Menon, 1997). Under the reactive green orientation, firm's strategic decisions are driven by conformity with regulations which prescribe minimally acceptable course of action and are mandatory for everyone to follow, i.e. minimal end-of-pipe pollution control equipment to keep emissions below a certain level. Firms choosing the reactive path incur costs associated with the environmental policy compliance, but do not acquire competitive advantage as anyone can follow the same nominal strategy.

When driven by the proactive green orientation, firms look beyond mere compliance and proactively transform product value chain above the required minimums. Such measures are more complex in execution, involve multiple organizational levels, and might be less visible to external observers (Connelly, Ketchen & Slater, 2011; Sharma & Henriques, 2005). They require managerial discretion and creative problem-solving, making those environmental capabilities idiosyncratic and context dependent and, thus, less imitable by competitors (Aragon-Correa & Rubio-Lopez, 2007). Therefore, the environmental capabilities associated with the proactive green orientation become a better source of long-term competitive advantage than the environmental capabilities associated with the reactive green orientation.

*H3. For a firm announcing a green strategic partnership, firm's proactive green orientation will be associated with a greater positive impact on firm market value, than the firm's reactive green orientation.*

2.5.Industry pollution intensity and green strategic partnerships

Extant literature suggests that industry attributes can have a differential effect on stock market valuation of strategic collaborations. Industries vary in the pollution intensity - average emission rates of various pollutants associated with producing specific industry activities. In those with higher pollution levels – "dirty" industries like petroleum production or chemicals sectors, firms face higher environmental risks (Diestre & Rajagopalan, 2011). In order to improve environmental performance, firms there often have to undergo massive upgrades in their production operations far above and beyond small-scale and easy-to-achieve pollution prevention measures (Jänicke, Binder & Mönch, 1997). Prior studies have shown that advanced technological modernizations to improve environmental performance might result in escalating costs and rapidly diminishing returns to investments (Aragon-Correa & Rubio-Lopez, 2007; Hart

& Ahuja, 1996). Thus, in those industries, environmental capabilities would be costlier to develop. Besides, a recent study by Barnett and King (2008) suggests that in highly polluting industries stakeholders often have persistent, taken-for-granted beliefs about the potential environmental threats posed by those economy sectors. Stakeholders become unable to discriminate between the firms that possess strategic environmental capabilities and do not violate environmental regulations and those who do not. Because of the "negative reputational commons" (Barnet & King 2008) associated with the industry as a whole, stakeholders push for more stringent monitoring measures and additional environmental fees for the total population of firms, rather than underachievers only. Literature in the finance field also confirms that wrongdoings by a few firms may have long-term negative financial consequences for the whole industry (e.g. Jarrel & Peltzman, 1985; Mitchel, 1989). Based on that,

*H4a. The relationship between the announcement of a green strategic partnership and firm market value will be negatively affected by the industry pollution intensity*.

In the same vein, in dirtier industries, a firm's proactive green orientation signals that the firm has already implemented some voluntary environmental upgrades in excess the legal minimums. Further improvements might necessitate substantial modernization in firm operations, which would entail significant costs and shrinking returns (Hart & Ahuja, 1996).

*H4b. As the level of industry pollution intensity increases, the positive effect of the firm's proactive green orientation on firm market value will decrease.*

3. Research Methodology

To test our theory, we use a combination of event study and regression analysis. The event study methodology allows us to test the causal effect of green partnership announcements on change in firm market value. With cross-sectional analysis, we explore the drivers of the

magnitude of change in firm market value in response to green partnership's announcement, specifically, the alliance type, firm's strategic green orientations and industry pollution intensity.

*3.1. Event Study Design*

The event study methodology is based on the efficient market hypothesis arguing that at any moment a stock market price reflects all information on that stock available up to that point (Brown & Warner 1985). The methodology allows measuring the impact of the event by examining the change in the stock price around the time when the event becomes public knowledge. The significance of the abnormal return above the normal expected return which is due to the general market, captures the effect of the event in question.

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, $NR_{it}$ 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 $\alpha_i$ and $\beta_i$ represent ordinary least square estimates of the regression coefficients, $R_{mt}$ is the equal-weighted market return on day t, and $\varepsilon_{it}$ is an independent and identically distributed disturbance term. We estimate $NR_{it}$ over an estimation period of 255 days which ends 30 days before the event date. We assume that during the estimation period no information on the event of interest is released.

We calculate cumulative abnormal return (CAR) of a firm i as a sum of daily abnormal returns over the event window $[t_1, t_2]$:

$$CAR_i [t_1,t_2] = \sum_{t1}^{t2} AR_{it}$$

Recently, there has been criticism about misapplication of the short-term event study approach in the field of corporate social responsibility, related to using excessively long event windows, the "noise" from multiple confounding events and reduced power of the test statistics (McWilliams, Siegel & Teoh, 1999). Responding to these concerns, we utilize short event windows and estimate the abnormal return at day 0 which is a date of announcement and the cumulative abnormal returns over the various event windows within 10 days around the announcements 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 and the results are not driven by a few firm events, we use a combination of the parametric Patell's standardized residual method and the non-parametric generalized sign test (Kothary & Warner, 2006).

### 3.2. Data Collection

We define the event of interest as a formal announcement of a strategic partnership of a publicly traded company with other organizations in the market with explicit environmental objectives as outlined in the announcement.

To test the theory, we collected a dataset of green partnership announcements for publicly traded US companies for the period of 2005-2007. We used KLD Research & Analytics Database to generate the initial list of companies. The KLD database is extensively utilized in environmental and social responsibility management literature (i.e. Luo, Wang, Raithel & Zheng, 2015; Surroca, Tribó, & Waddock, 2010) and provides an independent, third-party assessment of environmental performance of over 3000 largest publicly traded U.S. companies. For the list of firms drawn from KLD, we searched the Corporate Register database which provides access to corporate social responsibility' reports of many largest companies worldwide. We did a content

analysis of the reports to obtain information on the events of interest. The keywords for search were “alliance”, “partnership”, “partner”, “cooperation”, ”cooperate”, “collaboration” ”collaborate”, “association”, ”associate”, “conjunction”, “co-venture”, ”joint venture”, “agreement”, “relationship”. We retained only those partnerships with explicitly stated environmental goals, i.e. developing a new environmental technology, bringing eco-friendly products to the market.

Next, we searched Lexis-Nexis, FACTIVA, newswire services, and companies’ websites to identify the dates of the first information release on each event. Firm news often reach the markets through different channels, and examining a variety of sources ensures the accuracy and comprehensiveness in data collection. To minimize any potential confounding effects, we checked for contemporaneous financial (like dividend announcements) and management announcements (mergers and acquisitions, other partnerships, law suits, executive management changes, new product launches). If those happened within 3 days around the announcement day, we removed those announcements from the dataset. At this stage, the sample included 427 events. Controlling for industries, 342 observations (about 80% of the sample) fell within the three industry sectors SIC 2xxx, SIC 3xxx, and SIC 4xxx with the rest 85 scattered across six categories, SIC 1xxx, 5xxx, 6xxx 7xxx, 8xxx, 9xxx. The sectors SIC 2xxx, 3xxx, 4xxx include manufacturing industries traditionally considered major polluters and required to report on pollution release regularly, and also include transportation companies and public utilities generating substantial amounts of greenhouse emissions. In those industries, companies face higher environmental liability risks and, thereby, they are more likely to consider “green” issues among the top priorities (Diestre & Rajagopalan, 2011). To be able to account for potential differences among the industries, but minimize the risks of spurious effects if too diverse

economic sectors are considered, we decided to focus on the industries that would benefit most from analysis and limited the sample to those defined by SIC codes 2xxx-4xxx. The finalized data set comprised 81 observations for 2005, 106 observations for 2006, and 155 observations for 2007, totally 342 events. At this stage, an immediate interesting observation was that over time the number of green strategic partnerships firms engaged annually was increasing. We obtained the stock market data from the Centre for Research in Security Prices (CRSP).

3.3. Variables

*Dependent Variable:* The dependent variable is the firm's abnormal stock returns calculated, using the event study methodology described above.

*Independent Variables*: *Partnership Type.* We hypothesize that an engagement in a green strategic partnership is positively associated with a firm's market value and that the effect of the partnership type would differ if the company practices green marketing-oriented versus green technology-oriented capabilities. We assumed that to leverage and reap benefits of marketing-oriented environmental capabilities a firm would engage in a green marketing partnership and it will form a green technology partnership, if interested in developing and exploiting technology-oriented environmental capabilities.

In a green technology partnership, firms jointly develop new green products or services or implement green production and supply chain practices like waste management, pollution control measures, etc. In a green marketing partnership, partners collaborate to stimulate demand for eco-sustainable products and services, strengthen brand name recognition and customer loyalty and improve firm's green reputation with local communities and general public.

We also excluded minor, short-term events which are unlikely to have an effect on firm's stock market valuation, like partnering with a local municipality to celebrate the Earth Day or

running a one-day computer recycling event in the local school. Examples of green strategic partnerships of each type are provided in Table 1.

--- Insert Table 1 about here ---

*Firm's Strategic Green Orientations (reactive vs. proactive):* Firm's strategic orientation is manifested in how firms allocate their valuable strategic resources (e.g. Hambrick, 1983). In line with this, we operationalized firm's strategic green orientations, proactive and reactive, based on the environmental indexes from the KLD Research & Analytics database. We utilized the KLD rating instruments to capture firm's strategic green orientations because those are reliable measures of firm environmental actions (Mattingly &Berman, 2006) used extensively in management literature and providing a serious advantage beyond the alternative measures by allowing for a multidimensional nature of firm environmental orientation. The KLD environmental indexes represent a set of 6 positive and 7 negative indicators reflective of how firms allocate resources with respect to the environmental domain. The positive indicators or "strengths" capture proactive environmental strategic actions a company undertakes, like running notably strong pollution prevention programs, reliance on renewable energy and clean fuels, a substantial use of recycled materials in firm manufacturing processes, notable conservation projects, superior commitment to voluntary environmental programs, etc. The negative indicators or "concerns" are reflective of a substantial portion of firm revenues coming from hazardous, agricultural, ozon depleting chemicals or fossil fuel products, an involvement into environmental controversies or falling behind industry competitors to implement environmental improvement measures, high emissions and environmental liabilities (KLD Research and Analytics, Inc., 2003). A firm can be high both on the strengths and the concerns and adopt proactive environmental strategies in some of its business operations and be reactive in the others.

Following other studies in the field, we transformed the individual KLD scores into the aggregate measures of the Proactive Environmental Orientation by summing up all the positive indicators, strengths, and Reactive Environmental Orientation by summing up all the negative indicators, weaknesses. Those were not aggregated further to form a single measure of the corporate green orientation because prior research has shown the environmental strengths and environmental concerns are related, yet theoretically and empirically distinct constructs (e.g. Delmas & Doctori-Blass, 2010; Mattingly & Bergman, 2006).

*Industry Pollution Intensity.* We operationalized industry pollution intensity, based on industry capital expenditures associated with pollution abatement activities in that industry (Klassen & McLaughlin, 1996; Zaim, 2004). Data on industry pollution abatement costs is available from the Pollution Abatement Costs and Expenditures database provided by the U.S. Census Bureau every 2-5 years. Pollution Abatement Costs and Expenditures Report 1999 published in 2002 was used for the analysis. The next Pollution Abatement Costs and Expenditures Report 2005 was published in 2008 only.

*Control variables*. The model controls for the effect of the firm reputation, firm size, firm partnership experience, firm financial leverage, partner type, and industry growth on the stock market valuation of the green partnership. We collected reputational ranks for individual firms from the Fortune's The Most Admired Companies. Partners in collaborations were classified as for-profit versus not for-profit partners. COMPUSTAT was used to obtain the firm size measure based on firm sales, firm financial leverage, and industry growth. Thomson SDC Platinum database was used to obtain information on firm partnership experience operationalized as a number of partnerships a firm had in 5 preceding years. Table 2 provides a summary of variables and the sources from where data were drawn.

--- Insert Table 2 about here ---

### 3.4.Model Specification

We run regression analysis in 2 steps. The decision of a firm to undertake a strategic move can be influenced by some private information not observable by the stock market (Prabhala & Li, 2007). We used two-stage Heckman (1979) selection model to control for any potential selection bias due to the systematic differences between the firms who engage in green strategic partnerships and those who do not.

*Selection Model with Heckman procedure.* At the first stage, we obtained a matched sample portfolio consisting of publicly listed firms that did not announce green strategic partnerships during the studied period. Consistent with prior literature, we selected the matched firms based on the same industry sector and similar market capitalization (+/- 20%) in the same year (Homburg, Vollmayr & Hahn, 2014; Purnanandham & Swaminathan, 2004). In a few cases, when the announcing firm was the largest one in the industry and no other firm satisfied the selection criterion of similar market share, we matched those with the second largest company in that industry. We then run a probit selection model, where the firm's choice to engage in a green strategic partnership was coded as 1, 0 otherwise. Based on extant literature (i.e. Gulatti, 1998; Kale, Dyer & Singh, 2002; Shan, Walker & Kogut, 1994), we included the following factors likely to affect the firm's decision to form a green strategic partnership: firm age, firm's market capitalization, firm sales, firm's financial leverage, firm's market share, firm's partnership experience, industry's competitive intensity, industry growth rate and dummies to control for industry and year effects. Also we included a dummy for the industries with higher sensitivity for environmental regulations (chemicals SIC 28xx (excluding pharmaceuticals SIC 283x), metals SIC 33xx, paper SIC 26xx, and petroleum 2911). Prior studies have shown that firms in those

industries are the subjects to a more scrutiny by general stakeholders and might be more motivated to pursue green efficiencies (Cho & Patten, 2007; Walden & Schwartz, 1997). Some companies in the dataset announced more than one partnership. We estimated the model with robust errors for clustered events.

$$\textit{Decision to form a green partnership}_i = \beta_0 + \beta_1(\textit{Firm Age}_i) + \beta_2(\textit{Firm Market Capitalization}_i) + \beta_3(\textit{Firm Financial Leverage}_i) + \beta_4(\textit{Firm Sales}_i) + \beta_5(\textit{Firm Market Share}_i) + \beta_6(\textit{Partnership Experience}_i) + \beta_7(\textit{Industry Competitive Intensity}_i) + \beta_8(\textit{Industry Growth}_i) + \beta_9(\textit{Environmentally Sensitive Industries}_i) + \textit{Industry dummies}_i + \textit{Year dummies}_i + \varepsilon_i.$$

The results of the first-stage selection model are provided in Table 8 in the Results section. We used the resulting parameters to calculate the inverse Mills ratio lambda that was included as an additional regressor in the second-stage model to control for selection bias and obtain unbiased parameter estimates.

*Second-Stage Model.* The dependent variable is the average abnormal returns obtained in the event study. The independent variables include industry pollution intensity, firm's environmental proactive orientation, firm's environmental reactive orientation and the interaction terms of industry pollution intensity with proactive and reactive orientations, respectively. We mean-centered the industry pollution intensity and firm's environmental orientation variables, before creating the interaction terms. The model also accounts for the partnership type, firm size as measured by firm sales, firm' financial leverage, firm reputation, firm's partnership experience, stock betas computed prior to the event of interest over -275 to -25 days, book-to-market value of equity, industry dummies, year dummies. We added those factors to the model as prior research report that they can drive stock market prices and thus condition the announcement effects (e.g. Fama & French, 1993, 1995; Oxley, Sampson, & Silverman, 2009;

Park, Mezias & Song, 2004). We also controlled for a partner type, for-profit organizations (suppliers, competitors, distributors, buyers, etc) versus not for-profit organizations (government agencies, NGOs or universities). If the green capabilities' argument holds, we would expect green partnerships with for-profit partners generate higher abnormal returns than the partnerships with not for-profit organizations. For-profit organizations driven by a search for competitive advantage in the marketplace are more likely to develop valuable strategic capabilities and bring them to the partnership. Also we added a dummy to control if it is a first time when a firm announces a green partnership. We controlled for a potential selection bias by including the inverse Mills ratio lambda from the first-stage Heckman selection model (Table 8). The model misspecification test and the test for omitted variables indicated the model was specified correctly.

$$AAR(0)_i = \beta_0 + \beta_1(\text{Firm's Environmental Proactive Orientation}_i) + \beta_2(\text{Firm's Environmental Reactive Orientation}_i) + \beta_3(\text{Industry Pollution Intensity}_i) + \beta_4(\text{Firm's Environmental Proactive Orientation}_i * \text{Industry Pollution Intensity}_i) + \beta_5(\text{Firm's Environmental Reactive Orientation}_i * \text{Industry Pollution Intensity}_i) + \beta_6(\text{Partnership Type}_i) + \beta_7(\text{Firm Sales}_i) + \beta_8(\text{Firm Reputation}_i) + \beta_9(\text{Firm Financial Leverage}_i) + \beta_{10}(\text{Stock Beta}_i) + \beta_{11}(\text{Book-to-Market Value of Equity}_i) + \beta_{12}(\text{First Green Partnership}_i) + \beta_{13}(\text{Partnership Experience}_i) + \beta_{14}(\text{Mills Lambda}_i) + \beta_{15}(\text{Partner Type}_i) + \text{Industry dummies}_i + \text{Year dummies}_i + \varepsilon_i.$$

4. Results

The data set comprised 342 partnerships formed by 77 companies and includes 235 marketing partnerships and 107 technology partnerships. 37 out of 77 companies engaged in both green marketing and green technology partnerships. 27 companies in the dataset announced only one, green marketing or green technology, partnership. Among those preferring one or another

partnership type, 12 companies exclusively engaged in green marketing partnerships. One company repeatedly engaged in exclusively green technology partnerships. In 158 partnerships, the focal firm partnered with at least one for-profit partner like suppliers, competitors, distributors, etc. In the rest 184 partnerships, the focal firm partnered with government agencies, NGOs, or universities. With respect to the industry sectors, SIC 2000-2999 (food, textile, and chemicals) comprised 118 partnerships or 35%, SIC 3000-3999 (plastic, metal, and machinery) comprised 92 partnerships or 27%, and SIC 4000-4999 (transportation and public utilities) constituted 132 partnerships, which is 38% of the sample.

Do green partnership announcements affect firm market value? Do green marketing partnerships generate higher returns, than green technology partnerships? To explore the effects of green partnership announcements, event study with market model estimation was implemented, first, with the aggregate sample and then with the separate subsamples, marketing versus technology partnerships. The results demonstrated that stock market does not react significantly to the aggregate announcements of green partnerships. However, when the data was split into green marketing versus green technology partnerships, the analysis of the daily abnormal returns for 20 days around partnership announcements showed that the day of the event and 1 day after exhibited significant stock market reaction. The results are provided in Table 4.

--- Insert Table 4 about here ---

Consistent with prior studies (e.g. Chaney, Devinney, & Winer, 1991; Homburg et al., 2014), the event windows with the most significant parametric and non-parametric statistics in both partnership categories were selected for further analysis. Green marketing partnerships reported positive average abnormal return on the day of announcement 0 (+.21%) and the cumulative abnormal return (0.32%) for the event window (0; +1), all results were significant.

Green technology partnerships reported negative average abnormal returns (-.28%) on day 0 and cumulative average abnormal returns (-.35%) for the event window (0, +1), all were significant. Figures 1, 2 show daily and cumulative abnormal returns to announcements of green marketing partnerships and green technology partnerships, respectively, for the event window (-10, +10). The highest daily average abnormal returns (AAR% line) to announcements of green marketing partnerships happened on day 0 and the cumulative positive effect (CAAR% line) was quite noticeable and reached its maximum 0.8% on day +2. In case of green technology partnerships, the lowest daily abnormal return (AAR% line) also happened on day 0. The cumulative average abnormal return (CAAR% line) showed a consistent negative trend.

--- Insert Figure 1 about here ---

--- Insert Figure 2 about here ---

For additional robustness check, a mean difference test across partnership types was applied (Table 5). The results showed that for the event day 0, abnormal returns differed across partnership categories at $p<.001$ significance level, with marketing partnership sample reporting positive and technology partnership sample reporting negative means, which confirmed the findings from the market models discussed above. The partnership type has a differential effect on stock market reaction towards green partnership news, and the green marketing partnerships generate greater abnormal returns than the green technology partnerships do. Thus, Hypothesis 2 was supported.

--- Insert Table 5 about here ---

To further explore the effects of green marketing and green technology partnerships on firm market value, we run the mean difference test of abnormal returns for the firms engaging in 1 type (green marketing or green technology) of partnership versus firms engaging in both types

of partnerships was done. After removing 27 observations where firms had 1 announcement only, the results showed that the firms announcing both green marketing and green technology partnerships outperformed the firms that engaged in 1 type of green partnerships only (Table 6). Remarkably, majority of those firms in the second group chose to announce green marketing partnerships. The results held for both the announcement day 0 and the event window (0, +1).

--- Insert Table 6 about here ---

Next, the long-term abnormal returns to announcements of green partnerships with long horizon event study were estimated. In line with extant literature and following the recommendations in the recent review on the methodological issues in long-horizon event studies by Ang and Zhang (2011), both methods, the buy-and-hold abnormal returns and the calendar time portfolio returns with Fama-French benchmark, were utilized. Due to a fairly small sample size, 1-year horizon was used only (Kolari &Pynnonen, 2010). Table 7 provides the results. News of green marketing partnerships reported no long-term abnormal returns. Contrary to that, the green technology partnerships showed positive and statistically significant abnormal returns around 8% of a firm's market value if estimated with buy-and-hold model and 4% if estimated with a more conservative calendar portfolio with Fama-French benchmark model, within 12 months after the announcement. Despite the initial negative reaction of investors those firms were still able to accrue financial returns to green technology partnership announcements, but over longer period of time. Thus, based on the results for short-term and long-term event studies, we found support for Hypothesis 1.

--- Insert Table 7 about here ---

Do firm's environmental proactivity and environmental reactivity have a differential effect on firm market value? Does the level of industry pollution intensity moderate this effect?

To test the hypotheses H 3, 4a, 4b, we used cross-sectional analysis. The regression with robust standard errors and clustered events was used. The dependent variable is firm's abnormal returns on the announcement day estimated with the event-study methodology. First, the baseline model with the control variables only was implemented (Model 1). In the Model 2, the independent variables were added, and finally a full model (Model 3) included the independent variables, interaction terms and control variables. Examination of the Pearson correlations (all below .6 as reported in Table 4), as well as multicollinearity diagnostics (variance inflation factors all below 10) suggested the multicollinearity should not be a problem (Meyers, Gamst & Guarino, 2006).

Analysis of the results (Table 9) showed that the full model performed best explaining 15.7% of variance in stock market abnormal returns in response to green partnership news. Consistent with the results of the event study, the effect of the partnership type was significant. Green marketing partnerships on average generated higher abnormal returns than green technology partnerships. Contrary to expectations, firm's environmental proactivity had no significant effect on stock market abnormal returns due to announcements of green partnerships, whereas the effect of firm's environmental reactivity was negative and significant at $p<.05$. Thus, Hypothesis 3 was partially supported. The effect of industry pollution intensity was negative and significant $p<.05$. As hypothesized, as the industry pollution intensity increased, companies with higher levels of environmental proactivity experienced lower abnormal returns. Thus, Hypotheses 4a and 4b were supported.

--- Insert Table 8 about here ---

--- Insert Table 9 about here ---

The effect of the first time green partnership variable was significant and negative at $p<.01$. Controlling for firm's partnership experience in the previous 5 years, companies announcing a green strategic partnership for the first time experienced less favorable stock market reaction.

The effect of the partner type was significant and positive at $p<.05$. Firms partnering with other for-profit organizations experienced higher abnormal returns than firms collaborating with government agencies and other not for-profit organizations.

The model in Table 9 was also re-estimated for the event window (0; +1). Four out of five parameters related to the hypotheses remained stable in terms of direction and significance. The effect of the industry pollution intensity becomes non-significant, but the sign preserved as hypothesized.

*Additional Robustness Tests*

We estimated the abnormal returns with market index model over alternative estimation periods, 300 to 46 days and 260 to 10 days before the event day. The results of the event study replicated those in Table 4.

We also used the alternative Fama-French-Carhart four-factor model which added three additional risk factors (return differential between portfolios of small and big capitalization stocks, return differential between portfolios high and low book-to-market ratio stocks, and return differential between portfolios of high and low prior-return stocks) to the market model (Carhart, 1997; Fama & French, 1993). The results (Table 10) were similar to those for market model.

--- Insert Table 10 about here ---

Also, we re-estimated the regression model with weighted least square regression (WLS) where weight for each observation is equal to the square root of the standard error provided in the market model regression (Oxley et al., 2009). The WLS regression approach is an alternative method to address the potential problem of heteroscedasticity when the dependent variable is an estimate obtained in the event study, with the level of precision varying across observations (Saxonhouse, 1976). The results replicated those in Table 9.

We re-estimated the regression model with an additional dummy for partnerships with government institutions to control for the potential effect of investors positively overreacting to those. All the hypothesized relationships and signs still hold.

## 5. Discussion and Implications

We designed this study to explore the effects of green partnership announcements on firm market value. A major insight from this research is that stock markets are indeed selective in reacting towards the announcements about green strategic partnerships, and some of those initiatives can, in fact, destroy stakeholder value. This insight is in line with the broader view in the environmental management literature that financial impact of the corporate environmentalism depends on the nature of corporate environmental initiatives (Russo & Fouts, 1997).

However, further examination of the variations in investors' reaction reveals that the ultimate effect is contingent on the partnership type (green marketing versus green technology), firm environmental profile (firm's proactive and reactive orientations), and the environmental characteristics of the industry (pollution intensity levels). The results demonstrate that announcements of green marketing partnerships have an immediate positive impact on firm market value. The stock market seems optimistic about the environmental trends in the market and rewards the firms bringing green value to consumers. These results are similar to the ones

observed in another event study analyzing the effect of environmental excellence on the firm's bottom line and reporting comparable cumulative abnormal returns (+.63%) for 3-day event window (Klassen & McLaughlin, 1996). Contrary to that, news about green technology partnerships have an immediate negative impact on firm's stock market value. Investors seems conservative about the potential of green technology partnerships to create long-term competitive advantage and come up with commercially viable green technologies in the presence of conventional, often cheaper, alternatives in the market. Investors discount value of green technology partnerships by withdrawing investments.

Extant literature traditionally explains variation in stock market valuation of various types of strategic collaborations by industry turbulence (e.g. Park et al., 2004; Song, Droge, Hanvanich & Calantone, 2005). In rapidly-changing high-tech industries, technology partnerships are more rewarded by investors, whereas marketing partnerships are more valuable in mature, slow-growth industries. In this study, the dataset includes a good mix of high- and low-tech industries, as defined by the Bureau of Labor Statistics (Hecker, 2005). For example, the green marketing sample includes152 partnerships announced by firms operating in the low-tech industries and 83 partnerships announced by companies from the high-tech economy sectors. The green technology sample comprises 62 partnerships by firms in low-tech and 45 partnerships by firms in high-tech industries. The mean difference tests conducted on the aggregate sample, as well as separately on marketing versus technology subsamples show no statistically significant difference in mean abnormal returns for low-tech vs. high-tech industries. Irrespective of industry's technological dynamism, news about the green marketing partnerships consistently generate higher abnormal stock returns than the news about green technology partnerships.

Despite the initial negative stock market's reaction towards the green technology partnerships, after a one year period , those firms experience an increase in stock market value. Empirical studies in inter-organizational literature argue that it usually takes about one year for technology partnerships to develop an idea and patent it (e.g. Ahuja 2000, Phelps 2010). A firm then brings in its marketing-oriented environmental capabilities to commercialize the green innovation and deliver value to consumers, which is rewarded by investors. This is also supported by the observed complementarity effects - greater joint returns when exercising different activities (Dierickx & Coll, 1989; Moorman & Slotegraaf, 1999) of green marketing and green technology capabilities in their impact on firm market value. The firms announced both green marketing and green technology partnerships consistently outperformed the firms engaging in one or another type of green partnerships. To the extent that the technology capabilities originate in attending and responding to consumer needs, green marketing capabilities facilitate development and exploitation of green technology capabilities, together creating synergy effects and enhancing firm performance (von Hippel, 1978).

The green partnerships with for-profit organizations like suppliers, distributors, competitors, and buyers generate higher abnormal returns than the collaborations with not for-profit organizations like government agencies, local municipalities, NGOs or universities. In the general management literature, the overall argument about the distinction between the profit-oriented and commonweal organizations is that the former are generally funded through sales in the economic markets and thus more influenced by the competitive dynamics, whereas the latter ones are funded via public sources and heavily driven by political and institutional considerations (Fottler, 1981; Boyatzis, 1982). Thus for-profit firms might be more likely to

develop and bring to the partnership unique strategic capabilities, a source of long-term competitive advantage.

The firms' environmental orientations, reactive versus proactive, also play the role in driving investors' sentiment about green partnerships of strategic green partnerships. Contrary to expectations, stock markets in general seems irresponsive to the information about firms' proactive green orientation, but negatively overreact to the information about firms' reactive green stance. Investors remain conservative about firm's voluntary environmental efforts beyond a mere compliance and even penalize firms for those if performing in excessively polluting industries.

6. Implications for Managers

This study offers valuable insights for managerial practice. Firms are facing mounting pressures from multiple stakeholder groups to give considerations for environmental concerns. The study results provide an empirical support for the importance of investing into green inter-organizational strategies. Environmental strategic partnerships can be instrumental in addressing firm environmental objectives and have a beneficial effect on firm performance. However, managers need to be aware that not all green strategic partnerships have an immediate positive economic impact, and they should recognize short-term and long-term implications of different types of green strategic partnerships. Based on the sample of the firms studied, on average, firm market value increases by $92.82 million on day 0 in response to an announcement of a green marketing partnership. Firm market value decreases by $123.77 million on day 0 if a green technology partnership is announced. One year after the announcement of a green technology partnership, those companies report an average increase in stock market value $1768.14 million.

Managers interested in greening their operations can chose alternative pathways and focus on marketing or technology domains. However, firms are better off if partnering with for-profit organizations because those might be better equipped with environmental resources and capabilities that can become a source of long-term competitive advantage. Managers should also consider implementing green partnerships across multiple organizational functions, e.g. marketing versus technology, to capitalize on complementarities among them and enjoy synergy gains. Firms should also pay attention to firm's environmental strategy orientations. Some prior studies suggest that proactive environmental stance may protect firms in times of financial crises (Schnietz & Epstein, 2005). However, this study demonstrates that "doing bad" hurts more than "doing good" helps. To minimize financial losses, managers should implement pro-active environmental strategies across all the business domains and avoid reactive environmental approaches altogether. At the same, firms might experience decreasing returns to announcements of green strategic partnerships if performing in "dirtier" industries.

7. Limitations and suggestions for further research

The major challenge of this study relates to a high heterogeneity of the sample because of a scarcity of environmental partnerships' data within any particular industry. Unobserved industry attributes might have affected the examined relationships. Over time, as amount of data on green partnerships increases, future studies could examine whether the observed effects hold in more homogenous settings and if other "hidden" relationships surface.

The study has revealed that partner business motives, for-profit versus not for-profit, might have a differential effect on stock market valuation of green partnership news. Extant literature suggests that nonprofits are better organized to create public goods and address interests of multiple stakeholder groups (Abzug & Webb, 1999). Why partnerships with those

organizations, addressing environmental and social issues, generate lower returns for businesses deserves further exploration.

As more data becomes available, it would be interesting to explore whether the choice of the governance structure of green partnerships (i.e. green partnership versus green joint-venture) and thus, associated governance costs ha s any implications for firm performance. Finally, this study utilizes the sample representative of heavily polluting industries which are subject to extensive public policy regulations. Exploring if the same trends and relationships hold in less "dirty" sectors setting might provide additional insight and assist managers in devising effective corporate environmental strategies.

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Table 1

Examples of Green Strategic Partnerships

| Partnership Type | Focal Firm | Partner(s) | Goals and objectives as announced | Source |
|---|---|---|---|---|
| Green marketing partnerships to enter new eco-sensitive markets, strengthen green reputation and brand name recognition, reinforce stakeholder relationships | 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 |
| | Chevron Corp | David School District, Utah | To provide pollution-control equipment and help the community retrofit 230 district's school buses | *The Salt Lake City Tribune*, LexisNexis, 18-Jan-2007 |
| | Pepco Holdings | Cross-Industry Clinton Global Initiative, 8 energy companies | To support regulatory reforms and increase participants' investment in energy efficient markets to about $1.5 billion annually | US DOE press release, RP Newswire, 27-Sep-2007 |
| Green technology partnerships to implement new green production technologies or develop new greener products | 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 | Project to install new pollution control equipment at two Pennsylvania power plants | *Waste News*, FACTIVA, 28-Feb-2005 |

Table 2

Variables and Data Sources

| Variable | Description | Source |
|---|---|---|
| Dependent variable | Firm's abnormal stock returns | Event study |
| Independent variables | | |
| Partnership Type | Dummy, marketing partnership (1), technology partnership (0) | Press Releases |
| Firm's Green Proactive Orientation | Aggregate of firm's environmental strengths | KLD Database |
| Firm's Green Reactive Orientation | 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 | Book-to-market value of equity | COMPUSTAT |
| Partner Type | Dummy, for-profit partner (1), not for-profit partner (0) | |
| Firm betas | Stock betas computed prior to the event over -275 to -30 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 |
| Industries Sensitive to Environmental Regulations | Dummies for SIC 26xx, 28xx (except 283x), 2911, 33xx | COMPUSTAT |
| Year of Partnership Announcement | Year dummies | Press Releases |

Table 4

Green 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) | 235 | .18% | .53 | .34 | 107 | -.25% | .070 | -.01 |
| (-6,+6) | 235 | .15% | .37 | .47 | 107 | -.29% | -.18 | .18 |
| (-5,+5) | 235 | .17% | .48 | 1.12 | 107 | -.27% | -.25 | .18 |
| (-4,+4) | 235 | .30% | 1.13 | 1.65* | 107 | -.41% | -.64 | .18 |
| (-3,+3) | 235 | .38% | 1.62 | 2.30* | 107 | -.25% | -.35 | -.59 |
| (-3,+2) | 235 | .39% | 1.87* | 1.52 | 107 | -.25% | -.48 | -.40 |
| (-2,+3) | 235 | .36% | 1.64 | .99 | 107 | -.33% | -.75 | .18 |
| (-2,+2) | 235 | .37% | 1.93* | 2.30* | 107 | -.33% | -.94 | -.98 |
| (-1,+2) | 235 | .29% | 1.88* | .99 | 107 | -.15% | -.20 | .38 |
| (-2,+1) | 235 | .34% | 1.90* | 2.30* | 107 | -.48% | -1.81* | -1.75* |
| (-1,+1) | 235 | .27% | 1.88* | 1.25 | 107 | -.29% | -1.10 | -.40 |
| (-1,0) | 235 | .16% | 1.40 | .60 | 107 | -.22% | -.84 | .18 |
| ***(0,0)*** | ***235*** | ***.21%*** | ***2.72***** | ***1.91**** | ***107*** | ***-.28%*** | ***-2.46***** | ***-2.14**** |
| ***(0,+1)*** | ***235*** | ***.32%*** | ***2.82***** | ***1.78**** | ***107*** | ***-.35%*** | ***-2.25**** | ***-2.53***** |
| (0,+2) | 235 | .34% | 2.61** | .86 | 107 | -.21% | -.97 | -1.37 |

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

Table 5

Mean Difference Test for Green Technology vs. Green Marketing Partnerships

| Group | Observations | Mean | STD Err. | Std. Dev. | [95% CI] | |
|---|---|---|---|---|---|---|
| Technology partnerships | 107 | -2.44 | 1.20 | 12.40 | -4.81 | -.06 |
| Marketing partnerships | 235 | 2.12 | .79 | 12.06 | .57 | 3.67 |
| Combined group | 342 | .70 | .67 | 12.33 | -.62 | 2.01 |
| diff | | -4.56 | 1.42 | | -7.35 | -1.77 |
| diff = mean(Technology) -mean(Marketing) | | | | | t = -3.21 | |
| Ho: diff = 0 | | degrees of freedom = 340 | | | | |
| Ha: diff < 0 | | Ha: diff =0 | | Ha: diff > 0 | | |
| Pr(T < t) = .00 | | Pr(\|T\| >\|t\|)= .00 | | Pr(T > t) = .99 | | |

Table 6

Mean Difference Test for 1 Partnership Type Used versus Both Partnership Types Used

| Group | Observations | Mean | STD Err. | Std. Dev. | [95% CI] | |
|---|---|---|---|---|---|---|
| 1 Partnership Type Used | 47 | -2.69 | 1.64 | 11.28 | -6.00 | .63 |
| Both Partnership Types Used | 270 | 1.07 | .69 | 11.37 | -.29 | 2.43 |
| combined | 317 | .51 | .64 | 11.42 | -.75 | 1.77 |
| diff | | -3.75 | 1.79 | | -7.29 | -.22 |
| diff = mean(1Partnership Type Used) –mean (Both Partnership Types Used) | | | | | t = -2.90 | |
| Ho: diff = 0 | | degrees of freedom = 315 | | | | |
| Ha: diff < 0 | | Ha: diff = 0 | | Ha: diff > 0 | | |
| Pr(T < t) = .02 | | Pr(\|T\| > \|t\|) = .04 | | Pr(T > t) = .98 | | |

Table 7

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* | 8.60** |
| Green Marketing partnerships | 1.00 n.s. | 1.00 n.s |

*n=342 **p<.05, *p<.1*

Table 8

Stage 1 Heckman Selection Model

| Dependent variable: Decision to engage in a green partnership | Coef. | Robust SE |
|---|---|---|
| Firm Age | .01 | .00 |
| Firm Financial Leverage | -.10 | 1.83 |
| Firm Market Share | 2.26 | 1.27* |
| Industry Competitiveness | 719.40 | 272.31*** |
| Partnership Experience | -.40 | .21** |
| Environmentally Sensitive industries | .04 | .52 |
| Industry Growth | -.18 | .22 |
| Firm Sales | 1.76 | .40*** |
| Firm Market Capitalization | -.59 | .26** |
| Industry Dummies included | | |
| Year Dummies Included | | |
| Constant | -10.45 | 2.52*** |
| Pseudo R2 | .43 | |
| Wald chi2(13) | 46.66*** | |

n=166, ****p<.01**p<.05, *p<.1, 1*-tailed tests of significance

Table 9

The Effect of Firm's Environmental Proactive Orientation, Firm's Environmental Reactive Orientation and Industry Pollution Intensity on Stock Market Valuation of Green Strategic Partnerships

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| DV: AR (day 0) | Coef. | Robust Std. Err | Coef. | Robust Std. Err | Coef. | Robust Std. Err |
| Partnership Type | | | 4.44** | 1.87 | 5.33*** | 1.90 |
| Firm Sales | -1.53 | 1.84 | -1.86 | 1.81 | -3.95** | 2.3 |
| Firm Reputation | -1.22 | 1.11 | -2.43** | 1.15 | -3.84*** | 1.26 |
| Firm Partnership Experience | .01 | .17 | .05 | .13 | .25** | .15 |
| Firm's First Green Partnership | -4.84** | 2.44 | -6.57*** | 2.64 | -6.05*** | 2.19 |
| Firm's Financial Leverage | -32.74** | 14.69 | -23.68** | 13.64 | -24.73** | 13.55 |
| Inverse Mills Ratio | 1.78 | 4.69 | 3.52 | 4.46 | 1.40 | 4.35 |
| Betas | 3.26 | 3.92 | .77 | 3.73 | .80 | 3.75 |
| Firm Book-to-Market Value | 8.98** | 4.82 | .80 | 5.04 | -3.88 | 4.14 |
| Partner Type | 1.71 | 1.63 | 2.64* | 1.75 | 2.97** | 1.75 |
| Industry' Pollution Intensity | | | -7.93*** | 2.53 | -6.23** | 3.04 |
| Firm' Environ. Reactive Orientation | | | -.09*** | .03 | -.18*** | .053 |
| Firm' Environ. Proactive Orientation | | | -.01 | .04 | -.04 | .04 |
| [Ind. Pollution Intensity] *[Firm' Environ. Reactive Orientation] | | | | | .01 | .09 |
| [Ind. Pollution Intensity]*[Firm' Environ. Proactive Orientation] | | | | | -.36*** | .11 |
| Year Dummies included | | | | | | |
| Industry Dummies included | | | | | | |
| Intercept | 20.66 | 20.11 | 31.20* | 23.11 | 63.80** | 30.88 |
| Observations | 208 | | 201 | | 201 | |
| R-square | .08 | | .13 | | .157*** | |
| F | 2.19*** | | 5.46*** | | 5.94*** | |

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

Table 10

Green Partnerships, Cumulative Abnormal Returns over Different Event Windows ($-t_1$,$+ t_2$), Fama-French-Carhart Four-factor Model Estimations

| | Green Marketing Partnerships | | | | Green Technology Partnerships | | | |
|---|---|---|---|---|---|---|---|---|
| Event Window | N | Mean CAR | Portfolio Time-Series CDA t | Rank test | N | Mean CAR | Portfolio Time-Series CDA t | Rank test |
| (-1,+1) | 235 | .20% | 1.63* | .79 | 107 | -.16% | -.86 | -.39 |
| (0,+2) | 235 | .30% | 2.45*** | 1.69** | 107 | -.05% | -.28 | -.97 |
| (-1,0) | 235 | .13% | 1.29* | .67 | 107 | -.16% | -1.01 | .58 |
| ***(0,0)*** | ***235*** | ***.20%*** | ***2.85****** | ***1.75**** | ***107*** | **-.22%** | **-1.98**** | **-2.52***** |
| ***(0,+1)*** | ***235*** | ***.28%*** | ***2.72****** | ***1.53**** | ***107*** | **-.22%** | **-1.44*** | **-.78** |

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

Figure 1

Daily Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR), Green Marketing Partnerships

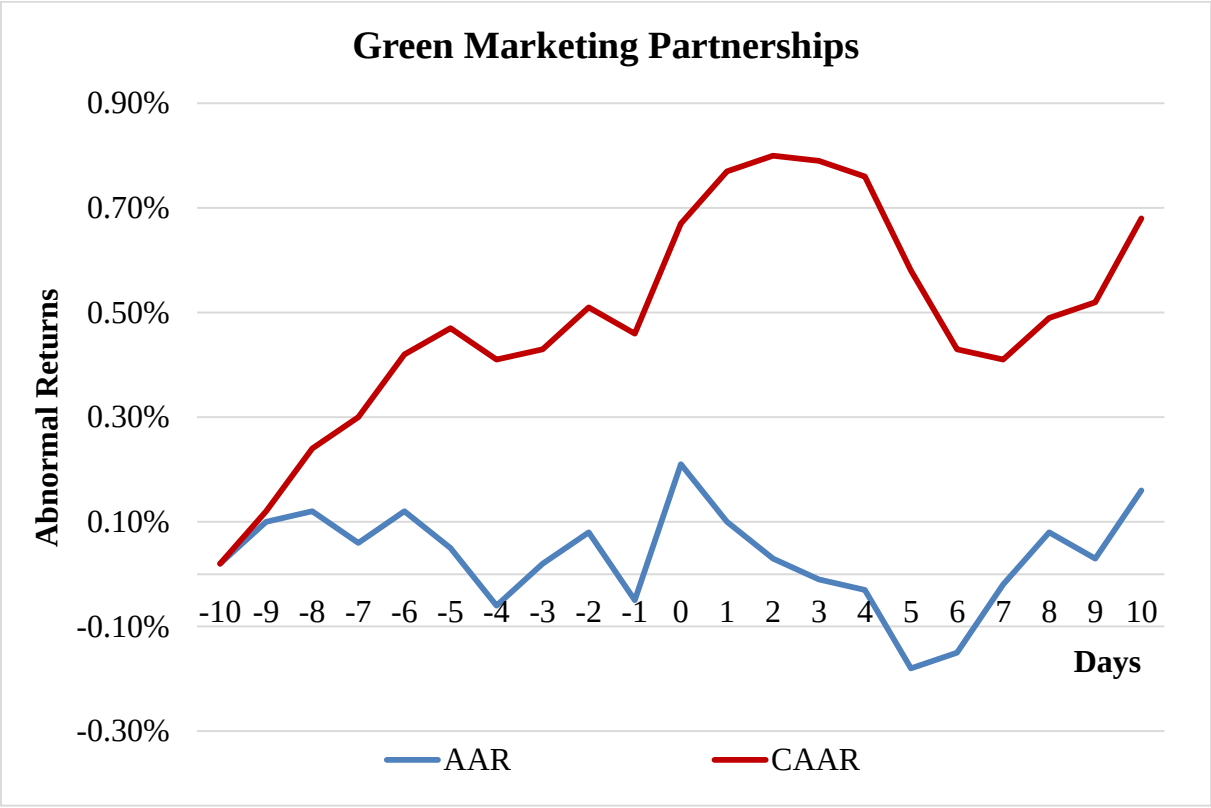

Figure 2

Daily Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR), Green Technology Partnerships