ABSTRACT

Dissertation Title: THE EFFECTS OF INFOMEDIARIES, NONMARKET STRATEGIES AND CORPORATE POLITICAL ACTION ON INNOVATION ADOPTION

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Strategic management research has recently become interested in the role of strategies that effect social stakeholders, such as the media, and how they affect the adoption of technological innovation. This dissertation consists of two essays that investigate how these stakeholders affect technological innovation adoption and how firms can increase the likelihood of having their products adopted by influencing these stakeholders.

The first essay takes a fine-grained approach at investigating how the content of media coverage influences the adoption of wind projects in the United States wind energy industry. By focusing on certain characteristics of media coverage, I develop a theoretical framework that examines how coverage facilitates perception formation of an innovation in the market. Using content analysis, I examine certain characteristics of media coverage including media attention, positivity of tenor, issue diversity, economic & aesthetic issues and complexity of messaging,

and hypothesize about the impact these characteristics have on how quickly stakeholders coalesce around a unified vision of a new technology.

The second essay builds on the first essay by exploring how firms employ strategies in both social and political markets in an attempt to influence different segments of the general environment. I argue theoretically that general environmental segments, such as sociocultural and political markets, that were typically thought of as exogenous to the firm may be impacted by the firm. By introducing media specific concepts from the organizational literature and political strategies from the public policy domain to strategic management, this study investigates how firms can achieve more rapid technological innovation adoption by strategically using 1) social exchange mechanisms with the media for the facilitation of perception formation in the market and 2) corporate political activity to influence policy makers for the creation of beneficial legislation. I study both of these phenomena using a comprehensive sample of U.S. based wind projects that have either been proposed or are commercially operational between 2000 and 2009.

The findings from both of these essays advance strategic management research by connecting themes from organizational research, mass communications and public policy research to help explain perception formation and technological innovation adoption in the market.

THE EFFECTS OF INFOMEDIARIES, NONMARKET STRATEGIES AND CORPORATE POLITICAL ACTIVITY ON INNOVATION ADOPTION

By

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Dissertation submitted to the Faculty of the Graduate School of the
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Dedication

To my understanding wife and children

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"Choose a job you love, and you will never have to work a day in your life"

− Confucius

DECLARATION

I, the undersigned, hereby declare that this dissertation entitled, "The Effects of Infomediaries, Nonmarket Strategies and Corporate Political Action on Innovation Adoption" is my own work, and that all the sources I have used or quoted have been indicated or acknowledged by means of completed references.

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Scott Benjamin Date

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DISSERTATION INTRODUCTION

Organizational research on reputation, legitimacy and perception formation has revealed the impact of one sociocultural force, the media, on shaping the public perceptions about organizations and innovations (Deephouse, 2000; Pollock & Rindova, 2003; Zavyalova, Pfarrer, Reger & Shapiro, 2012). However, little is known about what characteristics about the media coverage itself are driving perception formations and the assignment of value of a new technology. This dissertation investigates the impact of the media as a sociocultural force and specifically, what characteristics of media coverage impact perception formation. Further, this research investigates if internal resources can be employed in these social markets to influence media coverage concerning a technological innovation.

The objective of this dissertation is to expand the organizational literature on the effects the media and the influence it can have on technological innovation adoption. Specifically, Essay 1 focuses on one particular nonmarket stakeholder who can influence social perceptions, the media, and investigates what characteristics of media coverage play a role in the collective perception formation and value assignment of a new technology. Essay 2 expands this line of inquiry to test if firms employing internal resources can influence media coverage and also introduces a second nonmarket stakeholder, the government, and examines how firms engage in tactics aimed at influencing these external stakeholders. By actively engaging with these influential parties, firms facilitate the speed of perceptions formation of their technological innovations by the marketplace. I develop a theoretical framework for why certain characteristics are more impactful at creating stakeholder approval and empirically test these hypotheses in the context of renewable energy. I develop arguments and empirically examine the use of press releases by firms to influence media coverage concerning their innovation.

Additionally, I test the effects of corporate political activities among elected policy making representatives as a strategic tool firms use to influence the general environment. These activities lead to more favorable legislation for the adoption of the innovation and a faster assignment of value among observers. Finally, I empirically test the effects of these firm actions on the adoption of their novel technology.

The empirical setting for this dissertation is the approval of new wind farm projects in the United States renewable energy industry. This context allows me to study the ability of stakeholders in the social and political markets external to the market transaction influence on perception formation and assignment of value to a new technology. This context is also appropriate for estimating the impact this process has on the adoption of new technology.

In Essay 1, I examine how the characteristics of media provided information impact the adoption of a technological innovation. There exists an emerging stream of literature that investigates the use of language as a tool for influencing stakeholder perceptions (Elsbach 1994; Jonsson & Buhr, 2011; Pollock & Rindova, 2003; Wade, Porac & Pollock, 1997). This essay extends the growing body of strategic linguistic inquiry research to include the characteristics of media coverage and the impact they have on *technological innovation adoption*. I hypothesize that certain characteristics such as 1) media attention 2) positivity of tenor 3) the diversity of issues covered by the media regarding an innovation 4) how certain contextual issues such as economics and aesthetics are framed by the media and 5) the complexity of written media messaging used in the coverage of newly introduced technology will impact the probability and speed of adoption of the technological innovation. I argue that certain characteristics such as media attention and positivity of tenor will create salience, familiarity and legitimacy for the technological innovation and facilitate the collective social approval among stakeholders;

approval being defined as a broad public recognition of a firm and associated quality of that firm (Deephouse, 2000). This approval, in turn, affects the likelihood that the communities will allow the installation and construction of these large-scale development projects. I also propose that the media can create conflict and confusion about the technology when coverage includes a widely diverse set of issues or the textual messaging is difficult to comprehend. Specifically, I explore several salient contextual issues, such as economics and aesthetics, to see if the interaction with the tenor of coverage ameliorates this confusion and facilitate perception formation and technological innovation adoption.

I empirically explore a series of hypotheses using a sample of over 390 proposed and commercially operational wind projects from 2000 to 2009. I conduct a content analysis of over 2,600 news articles related to these projects. The results suggest that certain characteristics of the media are associated with more rapid adoption of new technology. These findings support extant research on the influence of the media while deepening our understanding of the characteristic specific effects of media coverage.

In Essay 2, I investigate how firms invest in strategies in both the social and political markets as a method of influencing these segments in order to gain a more rapid adoption of the firm's innovation. Where Essay 1 reveals how media coverage affects perception formation and the assignment of value to a new innovation, this essay shows how firms use this information for their benefit by interacting with and influencing these nonmarket stakeholders. I apply social exchange theory to help explain how firms use the media as a strategic asset for facilitating perception formation for their innovations. This essay builds a theoretical argument that may explain why firms provide information subsidies to the media as a mechanism for exchange for media coverage. Using the same sample of wind farm proposals and projects, I conduct a

qualitative analysis that examines the interactions between the firm and the media regarding the release of a new technology. These findings indicate that the firm may be able to influence the amount of coverage received in the public press, whereby, hastening the time for perception formation, assignment of value and technological innovation adoption.

The second aspect investigated in this essay is corporate political activity, a corporations attempt to shape government policies in ways favorable to the firm (Baysinger, 1984). Building on the public policy perspective of campaign contributions, I extend this research to answer the strategic questions: Can corporate political activity have an effect on the adoption of a technological innovation?

Taken together, these two essays investigate what characteristics of media coverage are most salient to the formation of positive perceptions regarding a new technology and how firms can capitalize on managing these external stakeholders. This research provides a robust addition to existing strategic media literature on the effectiveness and management of social approval assets on innovation adoption by investigating these media characteristics and examining how firms can manage the coverage provided by the media (Pfarrer, Pollock & Rindova, 2010; Pollock & Rindova, 2003; Suchman, 1995; Zavyalova et al., 2012). Additionally, this stream adds to the technological innovation adoption literature regarding techniques for innovation diffusion (Rogers, 1962; 1995). The mass-media serves as an influential member to stakeholders in their perception formation of new technology. As such, understanding the characteristics of their coverage and how a firm can influence these information purveyors is an important part of understanding technological innovation diffusion and adoption. I also join a select few strategic management scholars who bridge the gap between social and political strategies and firm performance (Bonardi et al. 2006; Getz, 1997). The impact of sociocultural and political markets

on technological innovation adoption will only continue to expand as we become a more socially connected society. By theoretically arguing and empirically testing political and social market strategies, I identify several mechanisms which explain how the general environment should not be taken as given and therefore, is not entirely exogenous to the adoption of a technological innovation.

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Essay 1

The Effects of Infomediaries on Innovation Adoption: Speed of Adoption in the US Wind Energy Industry

ABSTRACT

This essay examines how the framing of information by the media influences the probability of technological innovation adoption. I argue that the information, opinions, and endorsements reported and generated by the media affect stakeholders' impressions and perception formation concerning new innovations. I focus on the interplay between certain characteristics of third party media accounts such as: (1) media attention (2) positivity of tenor (3) diversity of issues being covered and (4) complexity of messaging on the likelihood that the technological innovation will become adopted by the community. Using the emergent U.S. wind energy sector as my research setting, I find that while media attention and positivity of tenor increase the likelihood of adoption, issue diversity and specific contextual issues, such as aesthetics and economics, reduce the probability of adoption. Finally, I uncover some interesting interactions between the positivity of tenor and these contextual issues.

INTRODUCTION

From extant research over the past 30 years, we know that the media play an active role in public perception formation and how primary stakeholders assign value. Filling this role, the mass-media, as information purveyor, has been shown to facilitate perception formation with the public, "thereby influencing the perceptions and opinions of other stakeholders" (Rindova, Petkova & Kotha, 2007 p.32; Pollock & Rindova, 2003; Rogers, 1995). Current literature has examined how the media acts as a strategic resource for firms (Deephouse, 2000), can affect the evolution of industries (Anand & Peterson, 2000; Anand & Watson, 2004), affects firm reputation (Rindova, Petkova & Kotha, 2007; Zavyalova, Pfarrer, Reger & Shapiro, 2012) and have an effect on performance outcomes such as IPO pricing (Pollock & Rindova, 2003) or financial investment vehicles (Jonsson & Buhr, 2011; Pollock, Rindova, & Maggitti, 2008). Some studies have investigated the importance of certain characteristics of the media such as exposure and tenor of media coverage as a predictor of certain performance indicators (Deephouse, 2000; Pollock & Rindova, 2003; Pfarrer, Pollock & Rindova, 2010; Zavyalova, Pfarrer, Reger & Shapiro, 2012). All of the extant literature has provided extensive contributions to research questions related to how the media can impact the evolution and development of a firm. However, little is known of what characteristics of their information impact the adoption of a technological innovation.

This research contributes to the existing pioneering work on media studies by investigating *what* content issues receiving media attention impact how innovations become adopted. While prior researchers have opened the dialogue about the impact of media coverage by investigating characteristics such as exposure and tenor, this research dives deeper into the actual content issues being covered. I add to their findings by expanding the existing literature to

include important content related concepts such as the diversity of issues in the media coverage and certain contextual 'hot button' issues being covered in their media coverage. First, I seek to build upon this stream of literature about the media as a source of perception purveyor, by applying it to the context of technological innovation adoption. The media may influence how the public views new technological innovations. Second, I explicate the idea that certain characteristics and issues covered by the media can influence groups of stakeholders to either coalesce around a unified vision of the innovation or form negative views concerning its adoption. These characteristics provide a deeper insight into the mechanism by which the media affects organizations, industries and products.

The core argument proposed in this paper is that the media play an important role in the formation of stakeholders' perceptions about the innovation. This view of the media is drawn from the institutional theorist view that third party information providers can shape stakeholders perceptions (Elsbach, 1994; Rao, Greve & Davis, 2011). By focusing attention and interest on certain innovations, the media engages in "agenda setting" for public discussion and thus plays an important role in informing and framing new private-to-public innovations (Carroll & McCombs, 2003; McCombs & Shaw, 1972). New industries present high levels of uncertainty. The innovations within these industries lack legitimacy, causing the public to rely on the media as an authoritative source of information (Deephouse, 2000; Gamson & Modigliani, 1989; Suchman, 1995). Much of the prior media work approaches media influence from a social-structural perspective without acknowledging what characteristics of their coverage shape perceptions.

In addition to *what* the media chooses to cover, *how* the information is portrayed to stakeholders also affects impression formation and legitimation of these projects. This research

expands beyond the current research of simply studying media *exposure* and *tenor* by dissecting media messaging into a series of issues and characteristics in order to evaluate which of these variables has a material impact on favorable impression formation among stakeholders and subsequent adoption. Additionally, I examine how the media can bring clarity to some of these concerns by interacting these contextual issues with positive tenor.

I test the developed theory in the context of wind farm proposals and adoptions in the U.S. wind energy industry from 2000-2009. The emergence of wind energy generation in the United States and the increase in its media coverage provides an appropriate context in which to explore these issues (Russo, 2003; Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). In examining the effects of the media on adoption, I test a series of related hypotheses: What is the influence of 1) *media attention* **2)** *positivity of tenor* **3)** *issue diversity* **4)** *specific contextual issues such as economic and aesthetic*, **5)** *message complexity* and **6)** *the unique interactions between positivity of tenor and contextual issues* of media coverage on the likelihood and speed of adoption of an innovation?

This study contributes to the strategic management literature on stakeholder perception formation and technological innovation adoption by exploring what characteristics of media coverage have a material impact on the probability and speed of technological innovation adoption. This is relevant for several reasons. First, the use of the media serves as a communication medium between producers and consumers. Understanding the salient characteristics of media coverage can facilitates the development process of innovations (Rosa, et al., 1999). Second, as fast-cycle markets continue to evolve, the importance of having your potential buyers quickly understand your product has major financial implications (Barney, 1991; Bettis & Hitt, 1995; Lieberman & Montgomery, 1988). Finally, if firms understand the

mechanisms behind how the media impacts adoption, they can focus on interacting with the media via press-releases to capitalize on the most direct path of perception formation and value assignment.

The paper proceeds as follows. I first develop a theoretical argument that explains how it is not just the content that the media choose to cover but the characteristics of this content that influence innovation adoption time. Next, I examine how these media accounts influence stakeholders' understanding of a new technology by creating interpretive frames and legitimacy. I then develop and empirically test a series of hypotheses that investigate the relationship between these characteristics of the media accounts and the likelihood of adoption for the new technology. I describe the longitudinal sample used to test these hypotheses and discuss the content analysis methodology employed to develop some new exploratory variables. Subsequently, I present the methodology that I will use to empirically test these hypotheses and provide a series of robustness check. Finally, I review the results of the analysis and discuss the contributions of this study and implications for future research.

THEORY DEVELOPMENT & HYPOTHESES

There are many factors that affect the emergence of new industries and the subsequent adoption of new technology by stakeholders. Scholars are trying to understand how these innovations originate (Sine & Lee, 2009), diffuse (Kennedy & Fiss, 2008; Rogers, 1962, 1995; Russo, 2001), become legitimate (Hargadon & Douglas, 2001; Higgins and Gulati, 2006; Kennedy, 2008; Rosa, Porac, Runser-Spanjol & Saxon, 1999) and eventually become adopted. The process of adoption is heavily influenced by how stakeholders *form perceptions* and *assign value* to the new technology (Hargadon & Douglas, 2001; Rindova & Petkova, 2007; Rosa,

Porac, Runser-Spanjol & Saxon, 1999). It is how these perceptions are influenced by external parties which are the central theoretical contribution of this manuscript.

Entrepreneurship and organizational scholars have continued to refine our understanding of the factors that explain the acceptance of organizations, industries and innovations (Aldrich & Fiol, 1994; Dewar & Dutton, 1986; Fombrun & Shanley, 1990; Kennedy & Fiss, 2009; Rindova et al., 2007; Rogers, 1962). What started as a discussion dominated by economists studying relative advantage and functional utility provided by a new technological innovation has recently expanded to include the effects of social logics such as reputation, endorsements by prominent third parties, legitimacy and perception formation, on the adoption process (Deephouse & Suchman, 2008; Lounsbury, 2007; Pfarrer, Pollock & Rindova, 2010; Rindova et al., 2003; Rindova et al., 2007). These social approval assets play an important role in how perceptions are formed concerning new entities and are equally salient in the perception formation and the assignment of value for new technology. According to the unified theory of technology diffusion based in the information technology field, social approval and influence are key components to rapid adoption of new technology among an organization (Venkatesh, Morris, Morris & Davis, 2003). How quickly stakeholders can understand an innovation and form perceptions can effect its adoption and subsequently a firms' performance; yet "the processes through which these perceptions form are not well understood" (Rindova et al., 2007, p. 31).

When technological innovations are introduced, stakeholders look to various sources to form perceptions and assign value to the innovation. Strategy scholars have investigated the "push" technique that producers engage in for assisting stakeholders with the sensemaking process (Gioia & Chittipeddi, 1991; Weick, 1995). By relying on cultural influences of the social embeddedness of an innovation, producers attempt to shape its value (Dacin, 1997;

Hargadon & Douglas, 2001; Rindova & Petkova, 2007). In other words, producers look to facilitate perception formation and assign value to an innovation by using prior experiences, similar products or related perceptions. Several studies illustrate the importance of the sociocognitive dynamics of how stakeholders perceive the physical appearance of an innovation in the product market and assign it comparative value (e.g. Hargadon & Douglas, 2001; Rindova & Petkova, 2007; Rosa, et al., 1999). We see the same dynamics at work in the acceptance of new firms. New ventures lack reputations and performance records; subsequently, they are burdened with high levels of uncertainty about their quality (Fombrun, 1996; Gompers & Lerner, 2001; Rindova et al., 2005). Prior research has addressed this firm level deficiency by showing that firms benefit when stakeholders understand their products and business models (Aldrich & Fiol, 1994; Lounsury & Glynn, 2001). Overall, consensus in the research reveals that a novel firm, entities, industry or innovation relies on dynamic sociocognitive processes to facilitate the formation of perceptions and the assignment of value.

The innovation adoption process requires potential adopters to coalesce around a shared understanding of the technological innovation by engaging in the cognitive processes of information gathering categorization and sensemaking (Deephouse, 1999; Rogers, 1995; Suchman, 1995; Rosch & Lloyd, 1978; Weick, 1995). This process begins when stakeholders seek information from objective third parties, opinion leaders or trusted sources. Recent research has begun to highlight the importance of information intermediaries (*infomediaries*, Deephouse & Heugens, 2009; Hagel & Singer, 1999) such as the media, financial analysts, regulators, and consumer advocacy groups, in shaping primary stakeholders' knowledge, opinions and actions relating to organizations, industries and products (Deephouse, 2000; Elsbach, 1994; Pollock &

Rindova, 2003; Rao, 1994). These purveyors of information are primary in the initial formation of opinions for new technological innovations.

Stakeholders seek information about the new technology and the mass-media, fill this role of opinion leader (Deephouse, 2000; Deephouse & Heugens, 2009; Rogers, 1965; Shoemaker & Reese, 1996). The extant research has shown that the media is an active participant which affects the sensemaking process, influences stakeholders' impression formation and directs their actions (Deephouse, 2000; Deephouse & Heugens, 2009; Fombrum & Shanley, 1990; Jonsson & Buhr, 2011; Pollock & Rindova, 2003; Rindova et al., 2007). Pollock & Rindova (2003) confirm by reporting, "by performing its function of informing, highlighting and framing, the media presents market participants with information that affects impression formation and the legitimation of firms" (p. 632). The media plays a vital role in forming initial perceptions of a technological innovation by how it chooses to frame the subject.

The media plays a key role in the diffusion of information concerning a technological innovation (Rogers, 1962, 1995). Sociologists have studying the role that the mass-media plays in providing this information. Rogers (1962) explicates the need for media attention as a catalyst for disseminating the information about the relative advantage for a technological innovation but has not evaluated what specific *characteristics* or factors of this coverage play a role in increasing the speed of the diffusion or the probability of its adoption. Similarly, the field of information technology has developed the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis & Davis, 2003). This theory, extremely similar to the diffusion model used in sociology, highlights the needs for performance expectancy, effort expectancy, social influence and facilitating conditions. The model explains that in order for a technological innovation to become adopted, it must provide functional utility, ease of use, degree of "in-

group" behavior and availability of supporting features. The media plays a role in providing information concerning functional utility and ease of use while serving as a method of influencing social behavior. Thus, the media plays a role on technological innovation adoption (Shao, 1999).

The theoretical consensus among scholars from a variety of domains is that the media play an integral role in assisting in perception formation, value assignment and legitimacy creation in the eyes of stakeholders. However, the mechanisms by which the media shape perceptions are yet to be investigated. In order to understand these mechanisms, I apply the sensemaking process to understand innovation adoption (Weick, 1995). The process of establishing value for an innovation is a cognitively complex one for stakeholders. Stakeholders defined by Edward Freeman as "any group or individual who can affect or is affected by the achievement of the firm's objectives" (Freeman, 1984:25) require information in order for their impressions to either coalesce into a favorable assessment that facilitates speedy adoption of the technological innovation or results in reject of the innovation for lack of understanding the value proposition. Stakeholders try to make sense of a new innovation by placing it into a preexisting cognitive category (Rosch & Lloyd, 1978; Rosa, Porac, Runser-Spanjol, Saxon, 1999; Weick, 1995; Weick, Sutcliffe & Obstfeld, 2005). However, with technology that is drastically different than existing technology, this sometimes proves unsuccessful. Stakeholders must then work to develop an understanding of the technological innovation, create a new category and assign it value. As technological innovations deviate more from currently acceptable normative forms, the complexity begins to create cognitive roadblocks and inhibits the adoption process (Rogers, 1995). This process is exacerbated when adoption requires larger groups of stakeholders to understand this complex technology and uniformly form perceptions about its acceptance. Not

only must stakeholders make sense of these innovations but also a larger set of stakeholders must become knowledgeable and supportive as a collective whole in order for the technology to become adopted. Social psychologists refer to the behavior of the collective whole as in-group behavior (Stangor, Swim, Sechrist, DeCoster, Van Allen & Ottenbreit, 2003; Stangor & Leary, 2006). The media plays an important, yet understudied role, in its effect of developing in-group behavior.

The media are influential third parties that play a role in the formation of public opinion. Whether it's for a firm, industry or novel technology, the media plays a role in shaping social perceptions and influencing public opinion (McCombs, 1981; McCombs & Shaw, 1972). Recently, the use of media has been shown to influence public opinion by providing informational signals about legitimacy and perceptions concerning firms (Fombrun & Shanley, 1990; Pollock & Rindova, 2003; Zavyalova et al., 2012). When the mass-media chooses to cover a topic it frames it, either positively or negatively, (McCombs, 1981) and creates social perceptions about quality, legitimacy, reputation and value. This process then reduces ambiguity, uncertainty and riskiness resulting in a more favorable impression about the innovation (Anand & Peterson, 2000; Heath & Tversky, 1991; Pollock & Rindova, 2003; Suchman, 1995). Taken together, the media actually creates collective social perceptions (McCombs, 1981) which influence "in-group" evaluations of novel technologies. For example, Apple has received approximately 15.1% of all of media coverage of technology products between June 2009 and June 2010 and it has been overwhelmingly positive (Pew Research Center, 2012). Of the 427 stories that were analyzed, 42% viewed Apple as innovative and superior to its competitors. These social perceptions being created by the media may lead to the creation of value for the firm as sociocultural factors begin to impact stakeholders' behavior and

the decision to adopt the technology. Similarly, in Deephouse (2000), media favorableness improved the banks return of assets via the social approval asset of reputation. Pervasive media coverage and how they frame the topic is interpreted as either social acceptance or uniform rejection. In a unique article about US media coverage and smoking habits, authors Pierce and Gilpin (2001) found that the annual incidence of cessation for smoking "mirrored" the pattern of news media coverage of smoking and health. As media coverage revealed patterns of smoking as out-group behavior, smoking cessation increased. The media not only aids in the formation of perceptions but may also serve as a method of influencing stakeholder behavior and action. Thus, this leads to my research question of what characteristics of the media coverage have an impact upon the adoption of a technological innovation.

Aspects of Media Accounts

Media Attention. Prior research has shown that as media increases the attention to a firm by provided information greater favorable impression formation occurs and legitimation for firms and organizations is facilitated (e.g. Deephouse 2003; Kennedy, 2008; McCombs, 1972; Pollock & Rindova, 2003; Rindova et al., 2007). These studies have shown that simply providing an increased level of coverage will impact how the public makes sense of a new concept or process. Exposure to media coverage creates familiarity and an increased level of awareness with the new technology, which helps to create cognitive legitimacy of the category (Aldrich & Fiol, 1994). Cognitive legitimacy aids in the spread of knowledge about the new technology and research has revealed that this familiarity creates positive affect (Zajonc, 1968). Additionally, cognitive psychologists Heath and Tversky (1991) showed that exposure to information about an activity reduces the perception of risk.

Applying these concepts to technological innovation adoption, I expect that when the media provides more attention about a certain innovation, it may facilitate the familiarity creation of the innovation, thereby increasing the likelihood and shortening the time that it takes for stakeholders to create meaning and establish value of the technological innovation, thus impacting the stakeholder's acceptance of the new technology. Extant literature has revealed the importance of speed and decision making (Baum & Wally, 2002). I propose that the greater the attention that the media provides to a technological innovation and the greater the exposure of information presented to stakeholders via this media attention about a new technology, the easier it is for the public to create a perception about how the innovation will affect them, accept the project as legitimate via repeatedly seeing it covered by the media and make fast decisions about its appropriateness (Baum & Wally, 2002). Increased media attention should increase the probability and reduce the time it takes for a technological innovation adoption. Stated formally,

> *Hypothesis 1a. The increase in media attention about a technological innovation positively affects the likelihood of that innovation becoming adopted.*

While increased media attention may increase acceptance, reduce risk and establish legitimacy, cognitive limitations suggest that this process proceeds in a non-monotonic fashion (Pollock & Rindova, 2003). Research in social cognition suggests that attention limitations may cause this phenomenon (Fiske & Taylor, 1991). The paradigm of information load refers to the finite limits to absorb and process information during a period of time. The presence of too much information can result in a cognitive overload resulting in informational anxiety. This is especially relevant with new technology that offers few existing schemas or categories in which to place it. When a technological innovation is completely unknown, it will garner higher levels of attention from the stakeholders (Fiske & Taylor, 1991). The novelty of the innovation means

that each piece of information will be new and unique. Quickly, stakeholders will meet their cognitive limitations, at which time new information will no longer have an impact. Redundancy of information will also diminish the effect of later exposure to media coverage. As stakeholders begin to form impressions about a technological innovation, each additional piece of media coverage will include elements of redundancy in their coverage. This redundancy will result in less attention being given to later pieces of information being portrayed by the media resulting in a declining effect of media attention on innovation perception formation. I propose that these processes, taken together, will facilitate the likelihood of adoption but at a diminishing rate. Stated more formally:

> *Hypothesis 1b. The increase in media attention about a technological innovation positively affects the likelihood of that innovation becoming adopted but at a diminishing rate.*

Media Tenor. The framing of social issues by the media provides stakeholders with visible documented written communication concerning the approval or disapproval or the innovation (Elsbach, 1994; McCombs, 1972; Rindova & Pollock, 2003). Informational content that the audience is exposed to is not simply codified on paper but is a method of influence (Krippendorff, 2004). The interpretations that the media provides about innovations become part of the stakeholder sensemaking process (Fombrun, 1996; Rindova et al., 2007). The mass-media serves as an agenda-setting agency by the position, placement, amount of media attention and tenor it chooses dedicate to an issue (McCombs, 1972; McCombs, 1981; McCombs, Llamas, Lopez-Escobar and Rey, 1997). Organizational research has found the tenor of media coverage to have a significant effect on firm performance.

Extant research has begun to unpack the nuances of tenor in different fields. For example, political research has found that media influences perceptions of candidates through the

tenor of their coverage (McCombs, Llamas, Lopez-Escobar and Rey, 1997). These findings indicate a positive correlation between the tenor of media coverage and the approval of political figures. In the organizational literature, scholars such as Gameson and colleagues (1992) and Rindova and colleagues (2007) argue that the forum of media coverage allows stakeholders to identify what constitutes a good firm by interpreting how the media frames the firm. I argue that the media's status as expert, objective information providers is the reason stakeholders place high emphasis on the media as a reliable institutional source of information and why the overriding tenor of the information influences stakeholder impressions of the technological innovation. The positivity or negativity of the coverage provides cues which influence stakeholders' interpretation and aid in the forming of public opinion. As stakeholders develop a unified organizing vision of a technological innovation, media plays an integral part by providing accounts that helps inform and form these opinions. I propose that when the media frames the technological innovation with favorable coverage, supportive pubic opinions are formed and the innovation will be adopted at a faster pace than in markets where the media offers neutral or negative framing. I therefore hypothesize that:

> *Hypothesis 2: Technological innovations that receive a more positive tenor of media coverage are more likely to become adopted.*

Issues Diversity. **"**We highlight the role of the media as an information intermediary and propose that the characteristics of the information it provides serve as information stimuli that affect the formation of investors' impressions of firms" (Pollock & Rindova, 2003: 631). The deeper the understanding of the characteristics of the information being provided, the greater our understanding becomes of the impact of the media on innovation decisions. The diversity of issues being covered by the media is an understudied characteristic of media attention.

While the media plays the roles of information disseminator, legitimacy provider, former of pubic opinion and value creator, it is also capable of causing confusion among stakeholders. The philosophy of limited capacity was first introduced in 1956 in Miller's work about the magic number "seven". This magical number seven (plus or minus two) represented the upper limits of human capacity to process information of simultaneously interacting elements. Miller goes on to explicate that accuracy, validity and reliability begin to suffer as we reach these cognitive limitations. Cognitive limitation research is also seen in the public agenda setting literature. It was noted early in the agenda-setting research that the capacity for the public agenda is limited to five to seven issues (McCombs & Zhu, 1995; Shaw & McCombs, 1977). Not only that, but issues were viewed as zero sum. New issues were introduced at the expense of other issues (Zhu, 1992). This work found that it was not only an issue of salience, as hypothesized as media attention, but also the salience of competing issues of other media events (McCombs & Zhu, 1995). As a greater number of issues compete for the attention on a public agenda, the greater the chances of higher volatility. We see this play out in media coverage of new technological innovations.

In the innovation-decision process, the decision to adopt a technology requires *clear knowledge and understanding* of how the innovation will impact the stakeholders (Dewar & Dutton, 1986; Rogers, 1995). Adoption decisions that possess ambiguity are characterized by multiple conflicting frames which create a lack of or poor understanding of a situation (Chi, Glaser & Rees, 1982; Gerwin, 1988; McCaskey, 1982). This ambiguity creates conflicting interpretations of the technological innovation and restricts the coalescence of a unified vision. They offer the media many opportunities to cover a vast variety of issues and concerns which currently create great uncertainty and confusion among stakeholders. Radical technological

innovations create levels of technical, financial and social uncertainty that inhibit the adoption of the innovation (Gerwin, 1988). As more of these issues are raised in the media concerning the innovation, confusion and competing frames ensue (Kraft & Clary, 1991; Smith & Marquez, 2000).

The diversity of issues raised causes confusion and uncertainty (Chi, Glaser & Rees, 1982), and also may be a reflection of competing frames and conflict concerning an innovation. As more issues are raised by the media, stakeholders' ability to cognitively evaluate the potential of the emerging technological innovation is jeopardized resulting in reduced likelihood of adoption. An example of the issues identified from the data has been attached as Figure 1.

Therefore, as this study advances the use of the media as a source of information purveyor, it is imperative to understand the number of issues and their diversity in order to appropriately study how the media affects the decision to adopt a new technology. The diversity of issues can thus slow down the cognitive processes and innovation-decision making process in the market. Stated more formally:

> *Hypothesis 3: Technological innovations that include a larger diversity of issues in the media coverage are less likely to become adopted by the market.*

Context Specific Issues

While management scholars have suggested that the content of the media coverage is important, no one has studied actual issues presented in the media content in an empirical study. As such, this manuscript seeks to deepen the understanding of issue diversity by diving deeper into certain context specific issues and empirically testing these issues in the appropriate setting. The renewable energy industry emergence and its mediocre adoption have received much recent attention among organizational scholars (e.g., Russo, 2001; Russo, 2003; Sine & David, 2003;

Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). The industry is relative unfamiliar among stakeholders and infomediaries play a major role in creating perceptions about this emerging industry. Similar to the work of Pollock & Rindova (2003), I chose this industry because it requires the formation of impressions regarding innovations that the public has little prior existing knowledge. This industry is an ideal context to study how and why certain issues receiving media attention can impact the adoption of a technological innovation. The media attention, positivity of tenor and coverage of issues can assist in the formation of these impressions. At this point, I look at specific issues of the media coverage concerning the renewable energy industry which are relevant to technological innovation adoption drawn from the sample context of the U.S Wind Industry. These issues will allow me to investigate the impact of impression formation and perception coalescence as they relate to several important issues to large-scale development projects: economic and aesthetic issues.

Economic. Innovation research has successfully shown the importance of economics and functional utility in the adoption of an innovation (e.g. Rogers, 1962, 1995; Tushman & Anderson, 1986). This economic driven stream of innovation adoption research investigates how a new technology must be able to provide a price-performance advantage in order to destroy the incumbent technologies competencies (e.g. Henderson & Clark, 1990; Rogers, 1962; Tushman & Anderson, 1986). Relative economic advantage and functional utility play a key part in the "gale" of creative destruction and innovation adoption (Rogers, 1995; Schumpeter, 1942). This line of inquiry has clearly shown that a new technological innovation must be able to provide financial incentives in order for stakeholders to be incentivized towards its adoption.

Prior research has explicated that media coverage has a direct effect on economic related decisions such as IPO underpricing and turnover (Pollock & Rindova, 2003), financial institutions return on assets (Deephouse, 2000) and mutual fund evaluations (Jonsson & Buhr, 2011). These studies suggest that media coverage highlighting economic decisions can have an impact on market reactions. Information concerning the economic effects of the adoption of a new technology is important to the assignment of value concerning the technology and ultimately the adoption of the technology. Therefore, when the media covers technology that is generally viewed as economically favorable and provides a relative advantage over existing technology (see Rogers, 1965), this coverage confirms existing positive schemas and should facilitate the formation of a positive perception concerning the innovation. Alternatively, when the media covers innovations that do not provide economic advantage and are viewed as generally unfavorable, the coverage confirms the existing negative schemas concerning the technological innovation. This coverage will hinder the adoption of the technology by confirming beliefs pre-existing beliefs that the innovation does not provide relative economic advantages.

In general, large scale infrastructure projects, in particular wind projects, typically draw negative attention concerning their financial effects on the community and are viewed as economically challenging (Kaldellis, 2005; Krohn & Damborg, 1999). Drawing from survey data on the social attitudes toward wind energy applications in Greece, the majority of stakeholders have negative impressions on financial dimensions of wind projects (Kaldellis, 2005). In particular, the vast majority (83%) did not want involvement with wind projects due to financial issues. These concerns involved the financial behavior of wind projects and project

viability. These green technology projects may be environmentally clean but economically are financial inferior to traditional coal, natural gas or nuclear power.

Therefore, given that wind energy has been proven to be economically inferior to other technologies, I hypothesize that large scale renewable energy projects that receive coverage of economic issues will generally highlight this inferiority and slow down the probability and speed of technological innovation adoption.

> *Hypothesis 4a: All else equal, technological innovations in the context of the wind industry that receive more coverage of economic issues are less likely to become adopted by the market.*

Institutional theorists would argue that the media can influence stakeholders' perception of the desirability of the innovation and can legitmate it under conditions of high uncertainty (Elsbach, 1994; Zuckerman, 1999). Mass media determines the importance of issues via the amount of coverage and how they frame the issues (McCombs, 1972). The media plays an important role in not only providing economic information to stakeholders concerning the technological innovation but also in how it chooses to frame this information. Stakeholders rely on third party opinion leaders to help them make sense of the technological innovation and the tenor by which these parties report it assists in the formation of perceptions (Deephouse, 2000; Pollock & Rindova, 2003). The media are viewed as opinion leaders; how these opinion leaders choose to frame economic issues, either positively or negatively, provides stakeholders with visible cues of support or rejection in the court of public perception (Elsbach, 1994).

Given the inherent propensity of negative opinions toward the economic impact of wind, the media plays an important role in influencing the perceptions of stakeholders through *how* they present this information. They can provide social approval (Rao, Greve & Davis, 2001)

which ultimately enables stakeholders to handle issues with uncertainty and value assignment. Where economic issues are extremely important in the formation of impressions about the relative advantage of the technological innovation, the ability of the media to take an inherently negatively perceived innovation and frame the issues in a positive light should impact how favorably stakeholders view the innovation. Thus, the positivity of the tenor of coverage of economic issues will reduce uncertainty and help assign value, resulting in a higher probability of adoption for the new technology.

In sum, I expect the tenor of media coverage to interact with the economic issues such that when the overall tenor of coverage is positive in articles that include economic issues, the effect on the speed by which the innovation is adopted will be hastened. I hypothesize this as:

> *Hypothesis 4b: The positivity of tenor will positively moderate the effects of coverage of economic issues in the media on the likelihood that technological innovations will become adopted by the market.*

Where the transparency of economic issues is important in the formation of perceptions concerning a technological innovation, there are other highly charged emotional issues which raise concerns in the adoption of large scale public infrastructure projects. These issues deal with the creation of disamenities for community stakeholders and subsequently result in negative impression formation of the project. Next, I hypothesize about one such contextual issue related to disamenities: aesthetic issues.

Aesthetic. Aesthetics are indeed important to the adoption process of an innovation. In areas of disruptive technologies, firms capable of replacing existing dominant forms with aesthetically like formed models can facilitate the process of innovation adoption (see Hargadon & Douglas, 2001). Aesthetic properties of product form and design can cue both cognitive and

emotional responses which effect the perceptions of value for the innovation (Rindova & Petkova, 2007). Current research has investigated the positive impact of aesthetics upon technological innovation adoption. For example, a recent article relates aesthetics to the extremely rapid diffusion and adoption of Apples iPhone. While aesthetic issues can facilitate adoption when replacing the existing institutional norm with an aesthetically similar or improved product, these issues are emotionally and powerfully charged when radical, disruptive or discontinuous innovations are being introduced. Furthermore, when the introduction of these innovations creates aesthetic disamenities for stakeholders, innovation adoption can be slowed down and stymied by media coverage of these issues.

Specific to the context of wind energy, opponents have largely rejected the adoption of this technology based on the phenomenon known as NIMBY – "not in my back yard" (cf. Cupchik, 1995; Gipe, 1995; Kaldellis, 2005; Krohn & Damborg, 1999; Wolsink, 2000). The NIMBY syndrome has commonly been associated with the siting of major infrastructure facilities (e.g., hazardous, nuclear and conventional waste facilities, tunnels, railroads, interstates and airports) and has been responsible for reducing the likelihood of receiving community support. This phenomenon refers to situations where stakeholders publically support the adoption of infrastructure facilities; however, when they learn the affect these projects will have upon them individually, they shift their support away from the project. Literally, the public supports the projects, as long as it is not being proposed in their community. The publics' negative perception of these projects stems from a series of *perceptual and aesthetic* issues which are well documented in the NIMBY research (see Kraft & Clary, 1991; Krohn & Damborg, 1999; Smith & Marquez, 2000; Wolsink 2000).

These aesthetic issues create disamenities for the community where the project is being proposed. Real estate research provides hedonic models which evaluate the affects of amenities and disamenities on property valuation (see also Benson, Hansen, Schwartz & Smersh, 1998; Deller, Tsai, Marcouiller & English, 2001; Gottlieb, 1994). These models empirically illustrate and predict the positive and negative financial effects of both amenities and disamenities on property financial values in local communities. For example, with residential properties, homes with aesthetic amenities such as lakefront or oceanfront views will increase the value of the property (Benson et al, 1998). Large-scale infrastructure projects such as railroads, highways, powerplants and bridges are typically viewed as providing disamenities for community stakeholders (Gipe, 1995; Kaldellis, 2005; Krohn & Damborg, 1999) resulting in reduced property valuation. These disamenities are created through market externalities which require stakeholders to make sacrifices due to the implementation of the infrastructure. In evaluated the issues raised in this energy policy research, the top two causes cited for stakeholders to uniformly reject a proposal include the "threat of noise pollution and the spoiling of scenery" (Krohn & Damborg, 1999: 956; Wolsink, 2000:50). The aesthetic component of NIMBY projects has always been associated with a negative outcome to the community and typically results in a financial nonmarket externality to the individual property owners and the public at large. Therefore, communities faced with the adoption of infrastructure projects, which by definition will inherently create disamenities for stakeholders, will consistently rely on the negative institutional norms in creating their perception concerning this technology.

I propose that information provided by the media that mentions aspects associated with aesthetic concerns for large-scale infrastructure projects will raise a red flag to the collective stakeholders and reduce the rate by which the innovation will be adopted. Formally stated,

Hypothesis 5a: All else equal, technological innovations that receive less coverage of aesthetic issues are more likely to become adopted by the market.

As argued above, the tenor of media coverage plays a pivotal role in how the public forms impressions about new technology. The public develops perceptions and opinions about these technological innovations while being influenced by media coverage. Especially with emotional charged issues such as aesthetic disamenities, how this information is presented by third party objective purveyors will influence how stakeholders form perceptions. While aesthetic issues are traditionally viewed negatively in the context of large-scale renewable energy projects, the media can play an important role in diffusing the negativity surrounding these issues by presenting them in a positive light. Therefore, I propose that the positivity of the tenor of coverage affects how perceptions concerning aesthetic issues are formed.

Hypothesis 5b: The positivity of tenor will positively moderate the effects of coverage of aesthetic issues in the media on the likelihood that the technological innovation will become adopted by the market.

Complexity of Coverage. Information complexity, as portrayed by various communication channels, has been shown to have a negative correlation with comprehension ability in a range of disciplines including marketing messaging (Benedict, Dellaert & Stremersch, 2005; John, Weiss & Dutta, 1999), health (Estey, Musseau & Keehn, 1991), psychology (Freides, 1974), financial analysis (Gu & Wang, 2005; Plumlee, 2003) and entrepreneurial venturing (Hjorth & Steyaert, 2004). The degree of complexity of the word choice and sentence structure used in the media messaging will have an impact on how quickly the stakeholders can make sense of the information. As empirically shown by Estey, Musseau & Keehn (1991), readers of information written on the third grade level had higher comprehension

than when the same messaging was written on a ninth grade level. Applying these findings to technological innovation adoption messaging, stakeholders seeking information concerning a novel technology must be able to comprehend the message before they can progress to being persuaded to adopt the innovation itself.

In Rogers (1995) work on the diffusion of information, he identifies complexity as a key factor which inhibits the time it takes for the market to adopt a technological innovation. So not only is the innovation itself difficult to comprehend, but the actual media coverage describing how the innovation will affect the community may show a wide variance of messaging complexity. The media plays a critical role in reducing the uncertainty about these projects by providing information that is written in an understandable format delivered to the public. As discussed by Hjorth & Steyaert (2004), opinion leaders (in this case the media) are able to influence people's construction of reality but "must consider the ability, education and experience of the audience before structuring the complexity of their message" (p.184). The media are thus tasked with the difficult role of taking relatively complex radical technological innovations and educating the public in an easy to understand written format. I expect the complexity of coverage itself to also inhibit the cognitive sensemaking process. When the information being reported by the media is technical in nature, the written message may be difficult for stakeholders to comprehend. For example, with large scale renewable energy projects being introduced to a community, the level of difficulty in which reading and processing the information relevant to the innovation may be higher than with less complex innovations. The difficulty in understanding the media messaging about these technological innovations may create cognitive confusion among the community stakeholders and delays the formation of perceptions about this innovation. In these situations, the complexity of the messaging does little

to reduce uncertainty. I propose that an increased complexity of the messaging provided by the media will reduce the likelihood and speed of an innovation adoption. Stated more formally,

> *Hypothesis 6: Technological innovations that have lower complexity of media messaging are more likely to become adopted by the market.*

A full model of the hypothesized relationships has been included as Figure 2.

METHODOLOGY

Research Setting: US Wind Energy Industry

Testing hypotheses that were derived from my theoretical model requires a context that is relatively new and evolving, allowing for perception formation and social construction of meaning. Emerging industries are ideal as they are at the earliest stages of development (Forbes & Kirsch, 2011). These industries are poorly understood and lack "taken-for-grantedness" (Rao, 2004). I have identified and selected the U.S. wind energy industry from the period of 2000 to 2009 as an emerging industry to test my hypotheses. Scholars studying environmental initiatives, such as the adoption of renewable energy, have identified a strong social construction of markets element towards greening technologies (Bansal & Roth, 2000; Forbes & Kirsch, 2010; Russo, 2003; Samdahl & Robertson, 1989). Accordingly, management and strategy scholars have recently been using the wind energy industry as a research context for investigating emerging industries, entrepreneurship and the social implications that affect and influence the adoption of these technologies (Russo, 2003, Sine & David, 2003; Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). The relative newness of this industry and its proliferation over the past decade lends itself to study what factors have affected the adoption of these greening technologies. Sine & Lee (2009) have revealed the impact of social movements on

entrepreneurial activity surrounding wind farm *applications*. They study the pre-launching of wind farms as measured by the initial stages of development (Sine & Lee, 2009). This research seeks to pick up where Sine & Lee left off by extending the social construction aspect of industry emergence to include the actual adoption of the wind farms by stakeholders in various counties across the United States. This industry provides an appropriate context for me to study the influence of the social construction of meaning and perception formation of an innovation and ultimately how it affects the performance of the firm (Aldrich & Fiol, 1994; Deephouse, 2000; Pollock & Rindova, 2003).

A longitudinal panel was developed from a wide range of sources. To maintain accuracy, I collected data on *all* wind projects either proposed or commercially operation during this period using information provided by the American Wind Energy Association (AWEA). AWEA, a non-profit organization which promotes wind energy as a clean source of electricity, tracks up-to-date information on a variety of aspects for all proposed and operational wind farms. Through a membership arrangement with AWEA, I accessed the complete list of wind farm projects from their database. Where appropriate, I verified AWEA information using wind developers websites and company press releases. I further supplemented this information with articles in periodicals and other wind farm directories in order to construct a thorough panel dataset. The database includes all wind development projects which were proposed or adopted from 2000-2009, for which I tracked information on articles written by media outlets, press releases made by firms, announcement and operational dates of projects, renewable energy regulations, population, and other firm and location specific characteristics for each project. I will go into more detail about why I chose this decade of wind development and the construction of this database in the sample section.

Proliferation of Renewable Energy Industry

Following the OPEC Oil Embargo Act of 1973, federal and state tax incentives sparked a renewed interest in the development of wind energy in the United States. In the 20 year span following this act, the proposal of wind farm projects and subsequent adoption of these innovations has been fairly limited. As the technology has become more economically viable, the number of proposals being submitted to local communities and the adoption rate of wind generating power plants has become more common I have plotted the major issues that have been identified and their frequency of coverage found in the data for this research in Figure 1. Figures 3 & 4 highlight the history of wind farm installation capacity since 1990 and the rapid expansion of proposals and adoption rates of wind generated power plants across the Unites States from 2000-2009, respectively. Accordingly, I drew my sample for this research project from the decade which included the largest amount of proposal and installation activity (2000-2009).

This study tests perception formation and assignment of value in an emerging industry. The ideal setting allows for different groups of stakeholders being exposed to different amounts of media coverage to have variance in their decision to adopt the technology. The wind industry provides an opportunity to study how different communities (1) are exposed to the information provided by the media, (2) interpret the tenor, issues and complexity revealed through this textual framing of the coverage and (3) act on the adoption of the technology within their various communities. Therefore, the ideal setting would be one which offers the opportunity to study this influence in a number of different settings.

To that end, projects have been introduced in 41 different states and 237 different counties providing an opportunity to investigate community sensemaking in a variety of different communities.[1] The wind industry allows me to study how community stakeholders with limited or no exposure to wind power plants may be influenced by media coverage. Figure 3 reveals the broad penetration that the wind industry has experienced across the United States. It is for these reasons illustrated above that I believe that the US Wind Energy industry is an appropriate context to test my hypotheses.

Sample Construction. I tested my hypotheses using longitudinal panel data on 390 proposed or commercially operational wind farms in the United States observed between 2000 and 2009. In order to construct the sample, I collected information from various data sources including the American Wind Energy Association (AWEA), the Department of Energy (DOE), the U.S. Census Bureau, the Database of State Incentives for Renewable Energy (DESIRE) and Lexis/Nexus.

First, using a database from AWEA, I identified a list including 628 operational wind projects and 361 proposed wind projects. This was a comprehensive list of wind farms beginning with projects installed in 1970 through those proposed by May 2011. AWEA's information is considered by industry experts to be one of the most complete lists of installed and proposed wind farms available and has been used in numerous academic work on renewable energy as well (e.g. Bird, Bolinger, Gagliano, Wiser, Bolinger & Barbose, 2005; Sine & Lee, 2009; Swisher, 2009). AWEA's research analysts uncover information on installed and

[1] States were wind farms were proposed and/or installed between 2000 and 2009 include: Alabama, Alaska, Arkansas, Arizona, California, Colorado, Delaware, Hawaii, Iowa, Idaho, Illinois, Indiana, Kansas, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, New Mexico, Nevada, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin & Wyoming.

proposed wind farms including information regarding project name, amount of electricity, number of wind turbines, developer, turbine manufacturer, county, state and other location characteristics among other important key factors.

Some projects being tracked by AWEA are in the initial phase of research and development. These projects have not filed any Federal Energy Regulatory Commission documents and many times have not been assigned a project name or proposed electric capacity for the project. This information is important to this study as my unit of analysis is project level adoption and not being able to identify the project by name causes a problem with further data collection for these projects. Of the total 361 proposals, only 51 of the proposed projects in the database lacked this information and were removed from the dataset.

For your convenience, a visual breakdown of the complete dataset construction has been attached as Figure 5.

Wind projects come in a variety of size, from a single wind turbine located on a residential property to a mega-farm consisting of over 2,000 turbines producing commercial renewable energy.[2] Individual wind projects ranging from 1 turbine to 8 turbines (measuring 2.5 MW in capacity) used for residential purposes which are not supplying electricity into the electrical grid have less stringent zoning requirements and subsequently require minimal community input in order to receive county zoning approval (Gipe, 1995). Referring to AWEA's definition of a *Wind Power Plant*, a commercial wind farm generates in excess of 20 MW of electricity which it sells into the electricity grid (AWEA, 2009).[3] The focus of my study is on commercial wind projects which require the community perception formation, value

[2] Titan Wind Farm is a proposed wind farm in South Dakota that will use 2,020 Clipper Liberty 2.5 MW wind turbines in order to produce 5,050 MW of electrical output.

[3] At the time that this sample was gathered proposed projects with less than 20 MW accounted for only 517.51MW of the total proposed 62,135.87 MW (.00833).

assignment and approval in order for these projects to become adopted. Subsequently, projects producing or proposing less than 20 MW of electricity have been removed from the sample. Of the proposals gathered during data collection, the amount of mega-wattage proposed by projects of less than 20MW represented an insignificant amount (.83%) of the total proposed wind capacity. As of May 2011, AWEA had records of 368 commercially operational wind power plants generating over 20 MW of electricity and 255 proposed wind power plants in the United States that met this criteria. This deduction is also illustrated in Figure 5.

As discussed earlier and illustrated in Figures 3 & 4, wind energy has seen its largest period of proliferation between the years 2000 and 2009. This time period offered the greatest opportunity to study a large number of proposals and adoptions. Accordingly, the sample was gathered from 10 years of data on projects from this time period. In order to meet the qualifications for this sample, projects had to have been proposed after January 1, 2000 and adopted prior to December 31, 2009. I began by removing projects that were commercially producing electricity prior to this date as the proposal date would have been prior to January 1, 2000. Figure 4 illustrates that very little commercial wind energy was being produced prior to 2000 and the effects of left censoring should not impact the results. The majority (1616 MW) of the power being generated by wind power plants was originated in the State of California.

Following prior research on energy related studies, I used information from the Federal Energy Regulatory Commission (FERC) filing date as a method of coding the date of when the project was officially announced (Russo, 2001; Sine, Haverman & Tolbert, 2005; Sine & Lee, 2009). Under Section 210 of the National Energy Act of 1978 (Public Utilities Regulatory Policies Act, 1978), wind developers could construct nonutility facilities for the production of wind power in the United States (Sine & Lee, 2009). Part of the requirements for satisfying

these new regulations included the filing of a *Notice of Intent* with the Federal Energy Regulatory Commission; this was the first step in proposing an interstate energy producing commercial wind farm. In accordance with prior research (Russo, 2001; Sine & Lee, 2009), this information provided a starting point to track viable wind farms. I gathered information concerning the filings on record with FERC, and then cross referenced the complete list of operational wind farms using the AWEA database. The AWEA database provided a more complete set of operational wind farms that were not located on the FERC database. After performing an intraocular test comparing the FERC filing entries and the total number of proposals in the AWEA database, I found several projects (both proposed and operational) in the AWEA database that did not have FERC filings. Upon further research into the process of applying as a commercial energy provider, I discovered that siting certificates are also issued at the state level through exemptions to the FERC guidelines. While FERC approval is required for the *interstate transmission* of electricity, it does not regulate the *intrastate* transmission of electricity. Each state can employ their own regulations for approvals and subsequently some states may not require FERC filings.[4] Projects that are established for the sole use of providing electricity in their own state would not show filings with the Federal Energy Regulatory Commission. Therefore, I supplement this source with additional methods for tracking announcement dates.

In order to overcome this deficiency, I researched news publications concerning these wind projects for establishing inclusion in the sample by ensuring that the proposal of the project was not made prior to January 1, 2000. The method of establishing announcement dates by using media coverage is ubiquitous across many disciplines. Research in finance and accounting

[4] Many states use a special criteria expedited process. For example, according to the State of Oregon, OAR 345-015-0310 and -0320, "The applicant does not submit a Notice of Intent. The Department issues a project order after the applicant submits a Preliminary Application for a site certificate."

have used the first date of publication in the Wall Street Journal as the date of announcement for tracking everything from stock behavior and board of directors' reactions to managerial motives and turnover. I employed a similar technique for establishing announcement date of the proposed wind farm. Using the Lexis/Nexis search engine for *all US newspapers*, I tracked the first quarter and year that the first article was published or press release was made concerning a specific wind project. I ran a search on Lexis/Nexis using each projects name in the search database. I was careful to search for both the terms *"project"* and *"farm"* in the name as coverage differed depending on the source. For example, some newspapers referred to the "Grand Ridge Wind Farm" and others referred to this same project as the "Grand Ridge Wind Project". All projects which were announced in the media prior to January 1, 2000 were excluded from the dataset.

The results from both of these methodologies for establishing the announcement date of the project allowed me to refine my final sample set. Of my original sample, 41 projects with wind generation of greater than 20MW were either already operational or proposed prior to this sample period beginning January 1, 2000. This included 30 projects from California, 4 projects from Texas, 3 projects from Iowa, 2 projects from Wyoming and 2 projects from Minnesota. The map revealing the nominal effect of removing these projects announced prior to January 2000 has been included for your convenience as Figure 7. These observations were dropped from the sample leaving 335 operational and 247 proposed wind power plants.

On occasion, wind farms are implemented in multiple phases. For instance, Grand Ridge Wind Farm in Illinois received the approvals for all three phases of the development during the initial project evaluation. As the subsequent phases of Grand Ridge were constructed, no further approvals were required from the zoning board or the community-at-large. The media impact for

the approval of all phases of the Grand Ridge Wind Farm happened prior to the implementation of the first phase and this is fairly typical in the industry. In order to measure initial reaction to information about a novel technology, I removed all projects that were termed, "phase II" or higher or "expansion" in the project name. This resulted in a total reduction of 117 wind power plants including 94 operational and 23 proposals from the sample (see Table 1 for a complete list of these projects). Following this adjustment, the sample stands at 241 operational and 224 proposals.

As will be shown in the methods section, this manuscript uses a Cox proportional hazard model to test both the probability that a wind farm will become operational and the time it takes from the date of announcement to commercial operation (more about this in the methodology section). In order to utilize the speed of adoption component offered by this model, I had to track the *date of project announcement*. As explained above, I utilized two separate methods for establishing this announcement date. First, in keeping with traditions of prior wind power research (Sine & Lee, 2009) I tracked entry of proposal using the required Federal Energy Regulatory Commission (FERC) *Notice of Intent* filing form for firms producing electricity and selling it across state lines. Additionally, I tracked the date upon which the first news article appeared in any newspaper across the United States. Of the remaining sample of 465 wind projects, 23 installed wind power plants and 52 proposals tracked by AWEA did not have either a FERC *Notice of Intent* or any media coverage. These projects had to be removed from the sample as they did not fit the criteria required to run the Cox Proportional Hazard Model.

The resulting sample included a total of 390 wind power plant projects of which 218 were operational and 172 were in the proposal phase. The final sample is illustrated in Figure 5.

Dependent Variable

Technological Innovation Adoption. To capture technological innovation adoption, I created a dichotomous variable for the date that a commercial wind farm officially provided electricity into the power grid.

Market acceptance has been categorized in energy policy journals as the date on which the plant becomes commercially viable (Gipe, 1995; Wolsink, 2007) and accordingly, this dichotomous variable received the value of "1" on the date that it was officially providing electricity in the grid, and "0" otherwise. First, information, including both quarter and year, was available via the AWEA database. I verified the AWEA information using wind developers websites and company press releases; I found perfect correlation *(pw = 1.0)* between the information provided in the AWEA database and the verification from websites and press releases.

While studying the *probability* of the wind farms becoming adopted is certainly interesting in its own right, the availability of date specific adoption made the use of a proportional hazard model more appropriate. The Cox proportional hazard model is a survival model that relates the time that passes to the covariates. This model allows me to dig deeper into analyzing if the explanatory variables affect the *speed and probability* of adoption of the technology (Hellman & Puri, 2000; Tuma & Hannan, 1984). This dependent variable, innovation adoption, includes the dichotomous nature of a logit or probit as well as aspects of time between announcement and adoption. A more detailed analysis of the Cox model and it use in this study are to follow. The variable *technological innovation adoption* was used to test all hypotheses in the project.

Content Analysis: Method for Developing Independent Variables

Before I discuss the "operationalization" of the independent variables, I will build a case for the use of content analysis of news articles as the appropriate methodology to gather data for testing my hypotheses. First, I will explain the role that the media play in influencing stakeholders through the use of communication messaging. Second, I go on to support why newspapers, and particularly local newspapers, are a great source of information for local stakeholders. Finally, I will explain why content analysis is the appropriate technique to collect data on these independent variables from newspapers.

The media play an integral role in influencing the actions and decision of stakeholders (Pfarrer, et al., 2010; Rindova et al., 2006). Prior research suggests that public interpretations are influenced by news columns, editorials and letters to the editor (Deephouse, 2000; Fombrum & Shanley, 1990). Gioia and Chittipeddi (1991) investigated how written messages can influence an audience by taking an empirical look at how the president of a large pubic university used communication messages to facilitate the change in his organization. Along these lines, Zavyalova et al. (2012) investigated the role of media reputation following periods of firm disruptions. These scholars have shown the pervasive impact of the media on stakeholders and this dissertation builds on this foundation by investigating the media's impact on technological innovation adoption in an emerging industry.

Content analysis is a cornerstone of this dissertation and as such, it is important to highlight the developing use and acceptance of this method in the strategic management literature. Content analysis has long been accepted as a method of evaluating language in human cognition, values, intentions and attitudes (Duriau, Reger, Pfarrer, 2007; Reger & Huff, 1993; Short & Palmer, 2008). This technique has been used by researchers to gain an understanding on

everything from corporate strategies to CEO mental models by analyzing the text created through shareholder letters, press releases, news articles and corporate mission statements (see Duriau, Reger & Pfarrer, 2007; Short & Palmer, 2008). Strategic management literature has seen an increase in the use of this methodology in organizational boundaries (Fiol, 1989), strategic groups, impression management and corporate reputation (Fombrun & Shanley, 1990). Additionally, text has been used in the innovation and entrepreneurship literature in analyzing new product development, new venture creation and new industry legitimacy (Aldrich & Fiol, 1994; Baum & Powell, 1995; Lounsbury & Glynn, 2001). Therefore, I believe that content analysis has established itself as a viable method for not only studying and categorizing communications but also for providing a quantitative method for applying the written word to cause-affect relationships.

Newspaper articles, whether received digitally or in-press, are a primary source for the public to obtain information. Press accounts "organize the world both for journalists who report it and …. for us who rely on their reports"(Gitlin, 1980:7). As reported by Fiss & Hirsch (2005), the press shapes the collective public vocabulary and shared understandings. In a recent survey by Nielsen Ratings done in 2011, content in newspaper articles ranked as the third highest trusted source of information after recommendations by friends and consumer opinions (Nielsen Global Trust in Advertising Survey, Q3, 2011)[5]. This is inline with prior research by Stempel (1991), findings that 67.3% of participants in a nationwide survey claimed to get their news about local businesses from the local newspapers (see also Deephouse, 2000; Palmgreen & Clarke, 1977). Therefore, I believe that newspaper articles, especially local publications, are a great method for

[5] This survey was conducted on 28,000 internet respondents in 56 countries. Newspaper content was seen as more trustworthy than television, magazines and radio. However, this survey was conducted in the context of advertising as opposed to the influence of news content.

understanding what information stakeholders are being exposed to and how this media attention could shape stakeholder perception concerning a new technology.

I used Lexis-Nexis as a source to track news coverage of wind farm projects. Lexis-Nexis is a ubiquitous source for obtaining news columns for research and has been well accepted in the strategic management literature (e.g. Pfarrer et al., 2010; Rindova, Petkova & Kotha, 2007; Rindova & Pollock, 2006; Zavyalova et al., 2012). Using Lexis-Nexis, I collected local, regional and national newspaper coverage about each individual proposal and operational wind project. As stated above, local newspaper articles represent the easiest method for local stakeholders to gather information about the wind farm project. Therefore, this was the primary search conducted. The majority of the counties *(65.13%)* where wind farms are proposed or installed are smaller rural areas with populations of less than 50,000 residents. Thus, I first tracked the newspaper coverage of wind projects at the local level. For instance, in studying wind in Oregon, Lexis-Nexis will query *The Clatskanie Chief* (Oregon), *Daily Journal of Commerce* (Portland, OR), *Lewiston Morning Tribune* and the *McKenzie River Reflections* (McKenzie Bridge, OR). Then I tracked the statewide and national coverage of the wind project. The advent of internet based news reading allows for the possibility of coverage in national newspapers to affect how local communities interpret large-scale wind projects. I certainly did not want to neglect the potential for these national publications to affect local stakeholders perception formation. Accordingly, Lexis-Nexis allows for queries to be done nationwide. This query draws from 531 sources such as *The New York Post*, *The Baltimore Sun* and *The New York Times.* Arguably, most of these sources did not include information concerning wind developments in Oregon. These sources for news coverage of the 390 projects yielded a total of

2,675 local and national articles published. The overwhelming majority of news articles gathered came from local newspapers.

Independent Variables

Media Attention. Because one of the goals of this study was to evaluate the effect of media coverage itself, I followed prior research by tracking the number of articles being written about the event as a measurement of coverage (Deephouse, 2000; Jonsson & Buhr, 2011; Pollock & Ridova, 2003; Rinova et al., 2007; Zavyalova et al., 2012). Since the media transmits information to audiences, affects cognitive processes, facilitates comprehension and influencing the liking of the innovation, the mere exposure of media provided information may have an influence on adoption (Zajonc, 1968).

As has been done in prior literature, I measured media attention by performing a numerical count of the total number of articles concerning each wind project written during the period from when it was first announced through when either the project became commercially viable or the sampling period ended (Deephouse, 2000; Pollock & Rindova, 2003). I queried Lexis-Nexis for the project name using their databases for all local and national news publications. Again, I was careful to search for both the terms *"project"* and *"farm"* in the name of the wind farm as coverage differed depending on the source. First, articles were collected on each individual wind project for entire sample period yielding a total of 2,675 articles. Next, the articles were separated out by project and then by quarter to fill in longitudinal panel data for articles per project-quarter. In situations where projects had not yet become adopted, I counted articles until the end of my sampling period: December 2009.

Positivity of Tenor. To measure the tenor of each article, I used CATA software (LIWC) to conduct a content analysis of the gathered articles about each project. This independent variable, *positivity of tenor*, refers to the positive or negative language used by the media in the coverage of the wind project in the sample (Deephouse, 2000; Jonsson & Buhr, 2011; Pfarrer, Pollock, & Rindova, 2010; Pollock & Rindova, 2003; Westphal & Deephouse, 2011). I measured tenor as has been done in extant organizational research using media coverage; however, I adopted the use of a computer-aided textual analysis program (CATA) for a more exact development of the construct. CATA programs are designed to facilitate the process of analyzing textual data (Pennebaker, Booth & Francis, 2007; Short & Palmer, 2008) and provides a systematic set of procedures to classify information which helps to remedy the problem of construct measurement problems (Short, Broberg, Cogliser & Brigham, 2010).

The use of LIWC as a CATA program has been successfully used in the field of psychology (e.g. Ireland, Slatcher, Eastwick, Scissors, Finkel & Pennebaker, 2010; Pennebaker, Booth & Francis, 2007; Pennebaker & Francis, 1996; Pennebaker & King, 1999; Tausczik & Pennebaker, 2009) and has recently surfaced in the strategic management literature (Pfarrer et al., 2010; Zavyalova et. al., 2012). The software provided me a total number of positive affect and negative affect words in the article. I created a variable called *positivity of tenor* which was the result of dividing the number of positive affective words by the total affective words. As was the case with prior research, the mean positivity of tenor of the articles written in my dataset was *(μ = .8076);* however, the *positivity of tenor* is relative to other articles as this provides a continuous scale by which to measure tenor. Since my panel data is divided into quarters, I combined all articles that were written about each project during that quarter into individual groupings. These files were then fed into LIWC and the resulting *positivity of tenor* represented

the overall tenor for that quarterly period. As a reflection of reality, articles tend to have a more positive tenor (Zavyalova et al., 2012). This study revealed a similar pattern. This variable is measuring the positivity of tenor of each quarter of article on a continuous scale where the higher the tenor number, the more positive the coverage over that quarter.

When stakeholders read emotionally charged affective news coverage, these impressions have salience and memorability (Hastie & Dawes, 2001). Perception formation is a dynamic process that happens over a period of time to a group of stakeholders as their opinions are formed about the introduction of a new technology. Prior research has indicated that these initial attitudes about the wind proposal may affect future judgments about the acceptance of the proposal (Fiske & Taylor, 1991). Therefore, in developing the *positivity of tenor* variable, I measure social memory of wind farm coverage as the sum of current coverage and prior decayed news coverage. I employ the technique used by Zavyalova et al. (2012) by assigning a weight of *1/n* for each quarter prior to the quarter of coverage. This provides a cumulative measure of current quarter tenor plus the decayed tenor from each prior quarter. The use of this decay measure accounts for the residual effect of social memory concerning prior wind farm coverage and better reflects the cumulative impressions stakeholders are forming about the project (cf. Pfarrer et al., 2010; Zavyalova et al., 2012).

Issue Diversity. This variable represents the number of unique issues being raised in the media concerning the wind farm proposal. Building on existing research about coding scheme methodology, I began by using a deductive process to design the coding scheme for the potential issues affecting wind farm adoption by looking at existing theoretical developments (Potter & Levine-Donnerstein, 1999; Short et al., 2009; Weber, 1990). I conducting an in-depth analysis

of wind related articles published in the energy and management literature (e.g. Kraft & Clary, 1991; Krohn & Damborg, 1999; Russo, 2000; Smith & Marquez, 2000; Wolsink, 2000) and a comprehensive case study written on the Cape Wind Project (for addition details see Vietor, 2008). These writings served as basis for identifying issues related to the adoption of large-scale renewable energy projects.

When dealing with large-scale renewable energy development projects, many issues have been already been identified in the NIMBY (Not In My Back Yard) publications. Scholars have identified numerous issues affecting the adoption of wind technology. Vietor (2008) identified a series of issues related to Cape Wind, an off-shore proposal located off Horseshoe Shoal Massachusetts. These issues included environmental, health and safety, boating, aesthetic, tourism, economic, wildlife, affect on historic landmarks and recreation fishing. Cape Wind is a unique off-shore development, so I expanded my search to include other academic research. A comparative study using the work of Krohn & Damborg (1999), Kraft & Clary (1991) and Wolsink (2000) further revealed consistency across all three articles identifying economic, aesthetic, environmental and wildlife as the primary drivers for approval and rejection of large-scale energy proposals. This deductive analysis provided me with a baseline list of issues for examination.

Prior organizational scholarship has encouraged the use of both inductive and deductive approaches to construct design (Jehn & Doucet, 1996). Having already established the list of deductive issues, I proceeded inductively to investigate other issues identified in my sample of articles.

The published articles found in Lexis-Nexis about the wind farm projects provided a variety of factors that affect social perception and acceptance of these somewhat controversial

innovations. In order to systematically identify these *issues*, I implemented a multi-step process for the development of the *issue diversity* variable. Using the information from the articles, a trained doctorate degree holder and I created a typology of issues revealed by the media with special focus on establishing and ensuring construct validity (Short et al., 2009). First, I trained the coder how to properly identify specific concerns about wind energy adoption in the published articles. We followed the format of Rindova et al., (2007) by breaking the data into categories by using an open coding scheme. We began with the list of issues identified in the deductive analysis process. We also allowed for new issues to emerge from the data and existing issue to be combined (Rindova et al., 2007). We accomplished this by independently reading through a sample of articles and identifying major themes and concerns in each of the articles. We then compared the independent lists. We investigated patters in the data and developed definitions of our core constructs.

After our initial review, we agreed to independently create master categories of issues in which we would place the numerous concerns that we had coded in our initial analysis into larger buckets, a process known as matching patterns (Rindova et al., 2007). For instance, concerns such as pollution reduction, fossil fuel emission and clean energy were combined into a master category labeled *Environmental*. Similarly, employment, property values, electricity costs were assembled together as *Economic.* As recommended by Short et al., (2009) we engaged in a discussion about the findings from each independent search. Our findings revealed a master list of 13 major concerns covered in the media. We then agreed to only include categories which were present in greater than 25% of the articles. This criterion eliminated the following categories: religion, marine, tourism, airspace and military. Individually, both legal and regulatory issues were identified in over 25% of our sample, but due to the similarities in both

concepts, we created a combined category for legal/regulatory. This provided a set of 7 issues that ultimately went into the issue diversity variable. [6] Next, each wind project was coded for the number of issues covered by the media. Projects could range from having no issues identified in any of the media coverage through some displaying coverage of all 7 issues. This variable is "operationalized" on a continuous scale from 0 to 7 and the variable *issue diversity* represents the total number of issues raised about a particular project over the course of the project quarter. Table 2 provides definitions and examples of issues identified in the articles. In the next section, I will describe the process for coding if an issue was being covered by the media in an article.

I created a special purpose dictionary for performing content analysis on these issues identified in the data by utilizing the procedures highlighted by Short et al., (2009). This dictionary supplements the predefined dictionaries of existing CATA and is a necessary part of expanding the management research literature (Krippendorf, 2004; Short & Palmer, 2008). I constructed my dictionary using single words as the unit of analysis. Using an inductive approach, I employed the assistance of a training doctoral degree holder to identify words related to each issue identified above. First, we jointly went through a sample of articles and identified a comprehensive list of commonly used words that related to potential concerns in the adoption of large-scale development projects. Next, we identified the working definition for each issue in the *issue diversity* variable. Table 2 illustrates the definitions that were used. Then, we independently assigned words from the commonly used list to different issues. At this point, I performed an inter-rater reliability test on the results. In contrast to the suggestion by Short et al., (2009) to use Holsti (1949) formula, I chose to use Cohen's Kappa (1960) to perform this test. I believe that this test is superior to Holtsi and Krippendorf's Alpha in that it provides a

[6] The issues identified in the *issue diversity* variable include: aesthetic, economic, health, community disturbances, wildlife, environment & legal/regulatory

more conservative estimate by eliminating some of the chance occurrences of coding similarities (Bakeman, 2000). I used Neuendorf's (2002) step-by-step example for calculating Cohen's Kappa;

$$\frac{Pr(a) - Pr(e)}{1 - Pr(e)}$$

where *Pr(a)* is the observed probability of agreement and *Pr(e)* is the expected percentage of agreement

Interrater reliability resulted in a Cohen's Kappa of .883. According to Ellis (1994), coefficients between .75 and .80 are indicative of high reliability as well as satisfying the heuristic of .80 commonly used in the literature (Krippendorf, 2004). Finally, we refined our list through a series of iterative discussions in order to settle on a final custom dictionary for the 7 issues.

Using both the deductive and analytic induction processes (Jehn & Doucet, 1996), I was able to integrate the relationship of all the issues in the data into an overall theoretical model for the variable *issue diversity.*

Aesthetics. I measure the aesthetic coverage of a project in terms of the percentage of words in the custom dictionary for this category as a ratio to total words in the article. As described above, the *aesthetic* category was created using a variety of perceptual issues raised in the NIMBY research (e.g. Kraft & Clary, 1991; Krohn & Damborg, 1999; Smith & Marquez, 2000; Wolsink 2000) combined with an inductive procedure for word selection related to aesthetics (Short et al., 2009). Throughout the NIMBY research, the top two causes of residential property owners attempting to keep various types of facilities out of their neighborhoods are the "threat of noise pollution and the spoiling of scenery" (see Krohn & Damborg, 1999 p. 956; Wolsink, 2000 p. 50). The words in the *aesthetic* category build from NIMBY theory developed in prior literature and include perceptual issues related to the senses.

The variable is measured as a continuous variable equal to the ratio of aesthetic words identified by LIWC using the custom created dictionary to the total number of words in the article.

Economics. Similar to the construction of the aesthetics category, I constructed a category called *economics.* This category is also a subset of the issue diversity variable. In this category, I am trying to measure the impact that information concerning financial implications for wind farms will have on the likelihood that it will be adopted in the community. Again, I constructed a category of financial terms using both a deductive and inductive method for identifying words related to economic matters. The variable is measured as a continuous variable equal to the ratio of *economic* words identified by LIWC using the custom created dictionary to the total number of words in the article.

Complexity. Created in 1975 by Rudolph Flesch and J. Peter Kincaid, the Flesch-Kincaid readability test measures the comprehensibility of articles and written forms of communication (Kincaid, Braby & Mears, 1988; Kincaid, Fishburne, Rogers & Chissom, 1975). This measure provide scores of comprehensibility on a 100-point scale and a measure of the grade level upon which the article is written. Flesch and Kincaid developed two tests to evaluate the readability and understandability of texts. This measure is ubiquitously used in health (Paasche-Orlow, Taylor, Brancati, 2003), education (Williams-Jones & MacDonald, 2008), computer science (Mailloux, Johnson, Fisher & Pettibone, 1995), insurance and law (Helms, 2003). The measure is "operationalized" by utilizing Microsoft word's Flesch-Kincaid software program. I calculated the complexity of each quarter of coverage for each project by running the groups of quarterly articles per project through the Microsoft program. The results included two measures: 1) The Flesch Reading Ease is a number ranging from 0 to 100, where 100 would be the easiest

writing to understand and 0 would be the most difficult and 2) Flesch-Kincaid Grade Level which provides the average grade level that is capable of understand the text[7].

I chose to operationalize complexity using the Flesch-Kincaid Grade Level Measure. This measure correlates better with ease in understanding and forming a perception more than the actual readability measure. Numerically, articles are written on grade levels as young as 5th grade and as high as 22nd grade. I use the Flesch-Kincaid Grade Level Measure as my primary independent variable in measuring complexity and will use the readability measure as a robustness check. My interest in this variable was to test if the more complex articles were inhibiting the process of perception formation. Therefore, I calculated the mean complexity measure and created the variable as the difference (either more or less complex) of the article from the mean.

Controls

Regulatory. Previous industrial organizational research has shown that changes in governmental regulations can have an effect on firm performance (Bondardi, Holburn & Vanden Bergh, 2006; MacDonald, 1987). Specific to the renewable energy sector, I followed prior research in energy policy suggesting that the State-level renewable portfolio standard (RPS) is the best theoretically and empirically useful tool for stimulating the proliferation of renewable energy (Bird et al. 2005; Fershee, 2008; Yin & Powers, 2010). I control for the *regulatory environment* by including the legislation known as a renewable portfolio standard. The

[7] The readability yardstick presented in the chart was an adaptation from Flesch, R. (1948). "A new readability yardstick". *Journal of Applied Psychology* 32: 221–233. & Farr JN, Jennkins, JJ. Paterson DG (October 1951). "Simplification of Flesch Reading Ease Formula". *Journal of Applied Psychology* 35 (5): 333–337.

renewable portfolio standard (RPS) is a state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date (US DOE, 2010). It provides states with a mechanism to increase renewable energy generation using a cost-effective, market-based approach that is administratively efficient. [8] Each state has the option to include a renewable portfolio standard in their state policies. Currently, 32 of the 50 states have renewable portfolio standards of varying degree in place. Table 3 shows the comprehensive list of states with an RPS in place, the percentage of renewable energy required under the RPS and the date on which the legislation for the RPS was enacted. I used a comprehensive source of state, local, utility and federal incentives program database known as the Database of State Incentives for Renewables & Efficiency (DSIRE) to track the enactment of the various renewable portfolio standards across all states. [9] To account for regulatory policy driving the adoption, I controlled for state specific policies by including a dichotomous indicator variable for states with renewable portfolio standard. More specifically, I tracked the date upon which the regulatory policy was enacted and arranged my panel to reflect the change to *renewable portfolio standard* of "1" upon the quarter and year the legislation was enacted, coding those states with this policy as RPS=1, otherwise RPS=0.

Population. In an attempt to control for the heterogeneity among stakeholders in different locations I focused on local marketplace characteristics (Kassinis & Vafeas, 2006). *Population* density and county characteristics often affect the location of both pollution creating energy plants (Kassinis & Vafeas, 2006) and wind farms (Russo, 2003; Sine, Haveman & Tolbert, 2005;

[8] Information regarding the definition and state renewable portfolio standards was gathered through the US Department of Energy and the Environmental Protection Agency.

[9] DSIRE is funded by the US Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE), primarily through the Office of Planning, Budget and Analysis. The website is administered by the National Renewable Energy Laboratory, which is operated by the Alliance for Sustainable Energy, LLC.

Sine & Lee, 2009). I used the same method employed by Russo (2003) using data from the United States Census Bureau from 2000 to 2009.

Market. The existence of substitutable electricity creates a threat to the adoption of wind power as a source of electricity. Accordingly, the market for coal, natural gas and other sources of substitutable electricity could affect the adoption of wind power (Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). The price of substitutable electricity will impact the concentration of suppliers and subsequently the motivation of the market to adopt this new technology (Porter, 1980). I controlled for the prices of available substitutes using Sine & Lee (2009) variable avoided costs for the production of electricity using coal. In 2009, coal provided 45.9% of the net generation of electricity in the United States.[10] I gathered the information of the average coal price for each state between the years 2000 and 2009 using the United States Department of Energy, Energy Information Administration (US EIA)[11]. The average price of coal was measured at the State level in dollars/10^6 Btu.

Political. The adoption of a new technology can be heavily influenced by the political ideology of the residents of each individual state. Democratic majorities in the state legislature are significant antecedents of the state-level renewable portfolio standards being enacted and could certainly have an affect on adoption rates (Yin & Powers, 2010). Democratic majorities possess political views concerning environmental and financial policies which influence the adoption of a sensitive innovation such as renewable energy. Therefore, it is important to control for these political ideologies in my study. Using the Berry and colleagues (1998) measure for citizen political ideology, I controlled for political heterogeneity among citizen groups in the

[10] Source: Energy Information Administration, Form EIA-923, "Power Plant Operations Report". Other sector generation included Nuclear (20.9%), Hydro (7%), Gas (22.1%) and Petroleum/Other (4.2%).
[11] Source: Energy Information Administration, http://www.eia.doe.gov/emeu/states/_seds.html ; see documentation at: http://www.eia.doe.gov/emeu/states/_seds_tech_notes.html

community. This is a very common measure for citizen ideology in the political literature (e.g. Berry, Fording & Hanson, 2003). This measure tracks the liberal-conservative nature of the constituents in a congressional district in regards to electing officials and voting on local referendums (for more information see Berry, Rindquist, Fording & Hansen, 1998). The lower the number on the spectrum, the more conservative the constituents are in their voting preferences.

Prior Perception. I control for the mental schemas and prior perception formation of stakeholders by counting the number of projects that have been either proposed or installed prior to the subject proposal. Schemas represent the subjective theories developed from an individuals experience about how the world operates (Fisk & Taylor, 1984). As stakeholders gather information about large-scale renewable energy projects, they begin to form opinions about these projects which could influence future adoption decisions. To account for this, I include a *prior perception* control variable which captures how many proposals they have been exposed to in their county in the past. Having collected all of the wind farm proposals and installed projects from the AWEA database, I track each county and assign a timeline of proposals from the introduction of the first proposal until the end of the sample. I operationalize this variable as a numerical count variable for the number of proposals presented in that county prior to the subject proposal.

Firm Experience. The zoning and approval process for large-scale development projects is extremely complex. Therefore, the prior experience of firms and managers can have a substantial impact on the probability and speed by which the process is completed (cf. Childs, 1972; Hambrick & Mason, 1984; Porter, 1980). In order to control for this firm attribute, I operationalized firm experience as the number of projects that a firm has installed anywhere in

the country prior to the subject proposal. This variable was measured as a numerical count variable.

Year Dummies. Finally, in order to control for possible effects of any exogenous shocks due to the economy, other potential Federal level legislation, the increasing trend toward the adoption of green technology or unaccounted for omitted variables, I created year dummy controls for each of the 10 years in the dataset.

Method of Analysis

Estimation Procedures

Proper specification of the model involves choosing the correct econometric technique for converting theory into a regression model. Therefore, selecting the appropriate functional form specification is the first step towards minimizing biases and inconsistencies. This is a study where the dependent variable is adoption of a technological innovation. This dependent variable provides a binary event indicator that represents a moment in time that the innovation is adopted.

This is also a longitudinal panel study consisting of pooled time series data. This means that my data is also capable of measuring the time at risk of the adoption event happening by quarter and year. The dichotomous dependent variable leads me towards a probit, logit or proportional hazard model. The precision of the time component of this data provides an opportunity to add robustness to a standard probability model. As such, the proportional hazard model is an ideal estimation procedure (Hellman & Puri, 2000). I contemplated using a probit regression analysis to evaluate the adoption of these wind farms. Given that adoption is a binomial response variable, the probit analysis could certainly have been instituted to test if my covariates increased the probability of project adoption. The pooled time series data included

not only if the technological innovation became adopted but also the precision of which quarter and year that the innovation was adopted by the community.

In selecting this hazard model specification, I also considered that it is a continuous-time hazard model with multiple time variant independent variables. Prior research which included such precision of data and similar variable characteristics has employed the Cox proportional hazard model for their analysis (see also, Kennedy & Fiss, 2009; Rao et al., 2011; Westphal & Zajac, 1994). These reasons supported the model specification for the Cox proportional hazard model.

This model is a 'survival analysis' tool which allows me to model the time it takes for the adoption of the technology to occur. The word survival is used somewhat generically. In the management rubric, the use of survival analysis can apply to an event history analysis such as project adoption. In other words, this model is a method of analyzing the time to occurrence of an event. The model allows me to measure the risk of a single-decrement event happening. The adoption of a specific project makes the Cox model an appropriate model for measuring this one time adoption. I use the *stcox* procedure in the Stata statistical package to run the regression analysis (Stata, 2012). I employed a Cox proportional hazard model with year fixed effects to capture the likelihood that a wind project would become adopted by stakeholders (see Cox, 1972).

The Cox model also allows me to include a series of independent variables and control variable. I ran a Cox proportional hazard model to test if the covariates including media attention, positivity of tenor, issue diversity, specific issue coverage and complexity explain the outcome of adoption. This model has been used in prior literature to test adoption rates. Westphal & Zajac (1994) used the Cox model to test adoption of long-term incentive plans and

Rao, Greve & Davis (2001) employed it to investigate adoption of media coverage. The Cox model allows for testing continuous-time event history analysis with time-varying covariates, as is the case with this study (see also Allison, 1984 & Yamaguchi, 1991). This model has numerous features that deal with issues such as right censoring and hazard shape. I chose the Cox model over the Weibull & Gompertz parametric hazard models as the Cox is a very flexible model making no assumption about hazard shape. This model also makes no assumptions about hazard shape over time; subsequently there are no assumptions of underlying distribution of adoption times (Cleves, Gould, Gutierrez, 2004). My sample suffers from right censoring, an issue where the wind project may not be adopted during the period of study. This model makes quality estimates with samples that are both right and left censored (Hellman & Puri, 2000; Tuma & Hannan, 1984). Thus, wind projects that have not been adopted by the end of the sample period are taken into account with this particular hazard model. Finally, using a Cox model as opposed to a nonparametric analysis allows for the inclusion of control variables. There are other survival analysis tools such as the Weibull, Gompertz and Bayesian; however the very flexible Cox model is the dominant survival analysis model used in statistics (Cleaves et al., 2004; Yamaguchi, 1991).

The concept of survival in this situation is defined as the project becoming commercially operational and the duration of time it took to achieve this status. The survival function $\lambda_i\,(t)$ is defined as the probability that the project takes *(t)* periods or longer to become adopted. The specifications of the Cox proportion hazard model that I ran are as follows:

$$\lambda_i(t) = \lambda_0(t)e^{Xi(t)\beta}$$

where $\lambda_i(t)$ is the hazard rate of wind project i, $\lambda_0(t)$ is the baseline hazard rate and $Xi(t)\beta$ are the media characteristic covariates and regression parameters. The media covariates are time variant factors that may affect the probability and speed of technological innovation adoption. These covariates include media attention, positivity of tenor, issue diversity and complexity. While I run all main effect variables in a single model, I have decided to step these variables into the full model one at a time. The purpose for selecting this process was following the development of media related research from prior literature. Early literature by Deephouse (2000) and Pollock & Rindova (2003) measured the effects of media using variables such as exposure, exposure squared and tenor. Therefore, I elected to follow the process of existing literature and apply these variables to the outcome variable technological innovation adoption first. These results help to test and confirm existing theory on a new measure of performance. I then chose to introduce my other two main effect variables to the equation. I report the hazard rates in the results of my analysis as it provides an easy method of interpreting probabilities changes due to the effects of independent variables. I then include all main effect variables into a single model to see the impact of all variables together. Finally, I begin to step in a series of interactions between positivity of tenor and industry specific issues. This allows me to see how each interaction affects technological innovation adoption and evaluate the effect sizes independently. I do finally include all variables and all interacting variables into the full model.

RESULTS

Descriptive statistics and correlations on the variables included in the analysis are presented in Tables 4 and 5. While an examination of the bivariate correlations revealed in Table 5 does not indicate any major issues of collinearity, several of these correlations illustrated

in Table 5 are over 0.50. To address the potential of any multicollinearity issues, I conducted a variance inflation factor analysis (VIF) and found no evidence of serious multicollinearity. The VIF correlations range from small to moderate with no factor exceeding the general warning level of 10. A variance inflation factor of 10 or less is considered the threshold limit measuring the lack of multicollinearity (O'Brien, 2007). The highest mean variable inflation factor was 5.98 for *issue diversity* and 2.71 for *positivity of tenor*. The results from the variance inflation factor analysis have been included as Table 6.

I now turn to the testing of my hypotheses. The results of the test of the Cox proportional hazard models of the relationship between media coverage characteristics and adoption period are reported in Tables 7 and 8. Model 1 includes entry of the series of control variables. For the selection of the proper model of interpretation, I conducted a χ^2 difference test. I used Model 7 (which includes all main effects variables) as my comparative model. Therefore, I will report the hazard ratios for each model as I step in the main effect variables but will only interpret the results that appear in the full model number 7. Hypotheses 1a and 1b evaluate the effects of the media attention on the adoption of the innovation. In Models 2 and 3, the main effects of media attention and the non-monotonic effects of media attention were explored. Media attention had been investigated in prior literature and is now being tested on adoption decisions. Taken together, these models imply that there is a positive relationship between media attention and adoption and support the hypotheses that media attention affect the probability of the adoption, but at a diminishing rate ($\lambda_i(t) = 1.28$, $p < 0.01$, $\beta = -0.99$, $p < 0.05$). Given the deviation from 1 for the variable *media attention* (1.28 – 1 = .28) and the deviation from 1 for the variable *media attention squared* (-.99 – 1 = .01), the shape of the relationship appears to increase sharply with early media attention but taper off as opposed to a drastic reduction for future articles. Figure 8

was drawn using the coefficients from Model 3. Interpreting these results, we see a steep slope during periods of low media attention but the slope of the line tapers off as higher amounts of media attention are given to specific projects. The slope never actually turns negative meaning that additional media attention will not hurt the likelihood of adoption. Therefore, we provide support for the suggestion by Pollock & Rindova (2003) that additional pieces of media coverage do not have the same impact as early pieces of coverage. The χ^2 difference test between Models 1 and 7 showed statistical significance ($\chi^2 = 89.78$; $p < 0.001$). Model 7 represents a full model with all the linear effects. Thus, I interpret the hazard ratio of the Cox model using results provided in Model 7. This model provides results of media attention ($\lambda_i(t) = 1.05$, $p > 0.10$, $\lambda_i(t) = 1.00$, $p > 0.10$). When placed in the full model, the significance of the covariate disappears indicating that the variance in the dependent variable due to media attention has been fully moderated by other variables in the full model. At this point, the hazard ratio becomes 1.00 indicating that additional articles have no effect on the likelihood of innovation adoption. Therefore, Hypotheses 1a and 1b are only partially supported. This analysis suggest that additional media coverage, by itself, may increase awareness, establish legitimacy and assign value but this effect becomes less potent as the total number of articles increases.

As presented earlier, I chose to step in my variables in order to analyze the effects each variable would have as it was entered into the model. As will be revealed in the next model, the effect of *media attention*, while interesting by itself, is affected by additional covariates being entered in the model. To test Hypothesis 2, which relates the positivity of tenor of the media coverage to the probability of adoption of the technological innovation, I use a decayed *positivity of tenor variable*. The results of Model 4 in Table 2 reveal several interesting findings. First, the *positivity of tenor* is an important component in probability and speed of adoption of a

technological innovation, lending support for Hypothesis 2 ($\lambda_i(t) = 1.74$, $p < 0.01$). The Chi-Squared difference test between Models 4 and 6 showed marginal significance ($\chi^2 = 14.26$; $p < 0.001$); however the results for *positivity of tenor* were robust across all models providing support for this hypothesis. The hazard ratio of 1.74 suggests that increasing the overall positivity of tenor of coverage for a technological innovation by one unit, as measured by the ratio of positive affective words to overall affective words, may increase the likelihood of technological innovation adoption by 74%. This effect size is large and reveals an important correlation between tenor of media attention and innovation adoption. The second finding which is quite interesting is that my findings from Model 3 concerning the effects of media attention are fully mediated by the positivity of tenor. This indicates that media attention, by itself, is a crude measure in media analysis and much can be learned by shifting focus to include tenor when utilizing the methodology of content analysis. Again, interpreting the results from the full model 7 reveals a hazard ratio for positivity of tenor of 4.00. This means that projects receiving coverage that is positive in nature are 4 times as likely to become adopted as those not receiving this positive media coverage.

Table 7 continues to investigate the main effects of issues diversity and contextual issues on the adoption of the technological innovation. Model 5 includes tests that relate the diversity of issues being covered by the media to the likelihood that an innovation becomes adopted. Hypothesis 3 indicated that the media could potentially confuse the public by introducing too many issues. The negative and significant coefficient for issue diversity ($\lambda_i(t) = -0.86$, $p < 0.01$) revealed in Model 5 shows that a larger number of issues raised in the media may cause a reduction in the likelihood of a timely innovation adoption. The hazard ratio of -0.86 supports prior literature in public opinion (Zhu, 1992) that adding additional issues causing volatility in

decision making. Each additional issue added to coverage reduces the likelihood of that project becoming adopted by 14%. In continuing to refine this measure to more contextually relevant issues, Model 6 investigates hypotheses 4 and 5 concerning economic and aesthetic issues. Because economic and aesthetic issues are nested within issue diversity, I chose to remove issue diversity from Model 6 in order to avoid any collinearity issues among the variables.

I predicted that economic coverage was important to the adoption process of a new technology. Discussing economic issues in the public discourse about large scale renewable energy projects would amplify existing negative schemas about these projects, thus slowing the time and decreasing the probability of adoption of these projects. I find support for this hypothesis (4) with a hazard ratio of -0.87 indicating that additional discussions about economic issues may results in a reduction of the probability of adoption by 13% ($\lambda_i(t)= -0.87$, $p < 0.10$). I ran a chi-square difference test to evaluate the use of this model to the full model illustrated in Model 7. In comparing Models 7 and 6, there was significance ($\chi^2 = 3.44$; $p < 0.05$). Therefore, the results from the full model for the *economic variable* ($\lambda_i(t) = -0.95$, $p > 0.10$) presented indicate that there was partial support for this hypothesis. I believe that the full model shows that the attention given to economic issues is attenuated when considering the full number of issues being covered by the media. These findings support the existing findings from the public opinion literature concerning the presentation of multiple issues in the agenda-setting literature (McCombs & Zhu, 1995; Shaw & McCombs, 1977). Hypothesis 5 predicted that aesthetic issues may affect the probability of technological innovation adoption by slowing down the speed of adoption. The coefficient of aesthetics was negative, however lacked significance in either Model 6 or the full Model 7. This suggests that the adoption rate of projects that received coverage of NIMBY topics was no different than the control group's adoption rate, failing to

lend support for this hypothesis ($\lambda_i(t) = -0.83$, $p > 0.10$). There are very few studies to date that empirically analyze how aesthetics affect technological innovation adoption. Existing NIMBY theory leads us to believe that the decision to adopt large scale development projects is driven by aesthetics. The failure to find support for this hypothesis brings into question the practical effects of this theory.

Finally, Table 7 illustrated the introduction of the *complexity* of the messaging used in media coverage. Hypothesis 6 examines if the difficulty level in the understanding of the text influences how quickly stakeholders can form perceptions about the technological innovation. Using the average grade level upon which the text is written, I find support in Model 7 for the complexity of the coverage on the innovation of the adoption. The negative hazard ratio suggests that as complexity of the messaging increases by one grade level, the likelihood of having that innovation adopted is reduced by 5%. Thus, hypothesis 6 is supported ($\lambda_i(t) = -0.95$, $p < 0.10$).

Table 8 reports the results for a series on interactions between the *contextual issues variables* and the *positivity of tenor*. I use the full model displayed in Model 10 to interpret the results of the interaction effects. Hypothesis 4b investigated if the positivity of coverage would moderate the effects of economic coverage. While the sign of the coefficient did change as the interaction was introduced, indicating that the positivity of tenor can have an effect on changing how the public interprets economic issues, the findings are not supported ($\lambda_i(t) = 1.09$, $p > 0.10$). While existing theory supports that the media plays a role in perception formation, many factors can contribute to how this role plays out in perception formation (Deephouse, 2000; Pollock & Rindova, 2003). Hypothesis 4b hypothesized that the media can change existing negative existing schemas concerning economics into positive support in the decision to adoption a

technological innovation. One explanation for the failure to find support for this hypothesis may depend on the depth of existing knowledge concerning economic issues. As reported by Kaldellis (2005), communities have fairly strong opinions concerning the negative consequences of wind farm adoption. This may translate into a lack in the ability of the positivity of media attention to change these existing schemas.

Hypothesis 5b predicted that the positivity of media tenor would positively moderate the effects of aesthetic coverage. The change in sign of the coefficient and its significance displayed in Model 7 indicate that the media may play a part in influencing our acceptance of an innovation by covering controversial issues in a positive light ($\lambda_i(t) = 1.26$, $p < 0.05$). This result is most interesting. The positivity of the media coverage effectively changed a negative schema which was related to the reduction of innovation adoption and transformed that into a positive result increased the percentage of adoption rate by 26%. This relationship was modeled in Figure 9 using the regression coefficients from Model 7, with "low" indicating levels of media attention at one standard deviation below the mean and "high" indicating levels of media attention at one standard deviation above the mean. This figure illustrates the negative effect of aesthetic issues being discussed by the media is attenuated by the positivity of the tenor of the coverage. This indicates that positive media coverage can remove negative effects on technological innovation adoption due to aesthetic issues being coverage by the media. Therefore, this hypothesis is supported. Different than the interaction with economic issues, this may reveal something about the ability of the media to sway public opinion about aesthetic issues.

Robustness Checks

Endogeneity Concerns. Since the relationship between media coverage of wind project proposals and their adoption by stakeholders is fundamental to this research, I needed to investigate the possibilities that the probability of media coverage was not equal among all wind project proposals. *Endogeneity* in media related studies translates into the media's position as affecting and being affected by the outcome variable. It is unlikely that all innovations have the same probability of receiving media attention. This endogeneity problem could exist because something other than the innovation itself is causing the media coverage. This creates the possibility of an omitted variable bias and the implications of *endogeneity* could cause the outcomes to suffer from biased coefficient estimates (Hamilton & Nickerson, 2003). I sought to empirically control for any selectivity problems or omitted variable biases in the data collection and analysis of project adoption. For this, I employed the Heckman two-stage model for dealing with endogeneity.

First, I used Lee's (1983) methodological solution based off of Heckman's (1979) work on using a two-stage estimation model. This model has been successfully used in other media related "adoption" research (cf. Pollock & Rindova, 2003; Rao et al., 2001). Specifically, Rao et al. (2001) used this method on a longitudinal panel data Cox model very similar to the model specifications for this research project. The Heckman model seemed to be logical for the use of correcting for omitted variable bias and is ideal when using a limited dependent variable such as a binary variable like technological innovation adoption (Bascle, 2008).

First, running this two stage model required an instrumental variable. The Heckman model requires exclusion restrictions which are "variables that explain the decision to self-select

but are unrelated to the outcome of interest" (Bascle, p. 293). Therefore I first developed an instrumental variable for use within the Heckman model. This variable needed to be related to media coverage yet unrelated to the adoption of the technological innovation. I chose the bankruptcy of newspapers as my instrumental variable. From the period of 2005 to 2009, over 120 newspapers have declared bankruptcy. Of these 120, 16 newspapers had subscriptions of 100,000 or more in cities across the United States. I created a dichotomous dummy variable for newspapers that have declared bankruptcy during the sampling period. I found that newspaper bankruptcy represented a reasonable instrumental variable ($p = .066$) for including in the Heckman two-stage model. The first stage of the Heckman analysis performed a probit regression to evaluate the likelihood that the innovation would receive media coverage. I included the following variables in this first stage probit regression: the political ideology of the state constituents, populations within each county, experience of the firm proposing the project, and exposure to prior projects within that county. Each one of these variable could potentially affect the likelihood of the innovation receiving media coverage.

The results from the Heckman two-stage model provided an insignificant inverse mills ratio result ($\lambda = -0.05$, $p>.10$) suggesting that endogeneity is not an issue. Additionally, the model revealed that the use of bankrupt newspapers served as an acceptable instrument in the model.

Alternative measure of positivity of tenor

Because there are a series of nuances with content analysis and the use of linguistic inquiry software, I ran a series of robustness checks to ensure proper measurement of the main variables of interest. First, regarding tenor, following prior research by Pfarrer, Pollock & Rindova (2010) & Deephouse (2000), I ran the models using the Janis-Fadner coefficient of

imbalance. Prior strategic research has operationalized tenor using the Janis-Fadner coefficient of imbalance (Bansal, 2004; Deephouse, 1996; Deephouse, 2000; Pfarrer et al., 2010). Developed by Irving Janis and Raymond Fadner, this measure provides a quantitative method of evaluating any type of communication as having favorable, unfavorable or neutral content (Janis & Fadner, 1943; Janis & Fadner, 1965). Their formula for calculation is as follows:

$$Tenor = (P^2\text{-}PN)/V^2 \text{ if } P > N; 0 \text{ if } P = N; \text{ and } (PN - N^2)/V^2 \text{ if } N > P.$$

Whereby, P is the average number of positive articles, N represents the average number of negative articles and V is the total number of articles written about a wind project of the course of the month. Using this formula, the potential range for a wind project's tenor is -1 to 1, where -1 would indicate all negative articles written during the course of the month about that project and 1 would indicate all positive articles written about a project over the course of the month. I then weighted the negative articles by *3x* in order to test these results for robustness. I ran the test coding positive articles with percentages of *.60, .65, .70, .75* and found that the results held at all levels using this measure *($p<.05$)* level or above.

Alternatives to economic and aesthetics

Since this paper introduces the construct *diversity of issues* and contextual categories such as *economics* and *aesthetic* coverage to the strategic management literature, I spent a significant amount of time developing custom dictionaries. The dictionaries are directed at measuring constructs unique to the management field. To test the robustness of these self-designed categories, I tested them against some existing categories used in the psychology literature (see Pennebaker, Booth & Francis, 2007; Pennebaker & Francis, 1996; Tausczik, & Pennebaker, 2009). LIWC provides over 70 dimensions of study used in the field of

psychology[12]. For the self-designed category of *economics*, I tested the robustness of the variable with the measure of money used by LIWC. The pairwise correlation between these two variables was 0.9146 and significant at the $p<.05$ level.

I tested my sample using the dictionary for money in several ways. First, I tested it as a continuous variable with the ratio of money words identified in the LIWC dictionary to the total number of words in the article. The results from this test did not show significance when tested in the full model, confirming the initial results illustrated in Model 10. When I compared the results of Model 7, which showed marginal significance with the robustness model using the same variables plus money, the robustness of the original findings did not hold. Albeit the original model tested at a $p<.10$ value, these marginal results did not hold. Utilizing coding schemes from prior literature, I then created a dichotomous variable for money using .66 as an inclusion factor for being coded as a 1 (Tetlock et al., 2008; Pew Research Center, 2012). When testing the variable money in this model, the results did show significance at the $(p<.10)$ which did confirm prior results shown in Model 7. This analysis confirmed that the creation of the self-designed economics category does share some similarities with the psychological constructs of money but could use continual refinement.

Next I evaluated the robustness of the *aesthetics* issues. This self-designed custom dictionary for this category was created based on input deduced from NIMBY research. Throughout the NIMBY research, the top two causes of residential property owners attempting to keep various types of facilities out of their neighborhoods are the "threat of noise pollution and the spoiling of scenery" (see Krohn & Damborg, 1999 p. 956; Wolsink, 2000 p. 50). My dictionary for this issue included such words as view, landscape, visual, hearing and noise. As such, I selected the dimension, *perception*, from the Pennebaker & Francis dictionary used with

[12] http://www.liwc.net provides a complete description of dictionaries.

the LIWC software. The pairwise correlation between these variables was 0.6148 and significant ($p>.05$).

When testing in the full model, the beta coefficient for perception was negative, as was predicted by the original hypothesis and the self-designed *aesthetics* category. Also, the findings were robust in that no significance was found for this variable. I then reviewed the interaction between aesthetics and tenor and found this model to reveal a change in sign and significant support for the hypothesis. I created an interaction term for perception x tenor and ran a model using this variable as a robustness check. As in the original model, the sign did change to positive making the main affect variable significant, however, the *p* value of *.133* did not offer support as a robustness check. This certainly indicates that there is some correlation between the psychological construct of perception and aesthetics but the aesthetic category is more contextual related to large-scale development projects.

Finally, I was concerned that the occurrence of these issues was too rare in the media coverage causing problems with the measures. Traditional statistical methods for testing rare events can sometimes be sharply underestimating or grossly inefficient. To check the robustness of my findings I conducted a rare events analysis for both the economic and aesthetic variables. My findings revealed a *P(aesthetics) = .2144* and a *P(economic) = .2725*. This does not violate the $p < .05$ heuristic when testing for rare events issues.

CONTRIBUTIONS

This research makes a major contribution to media influence research. It brings to light how the media creates perception about a technological innovation using characteristics of content of coverage. Extant literature has just scratched the surface on the different ways that the

media can affect perception formation by investigated *how* the media impact performance using variables such as *tenor* and *volume* (Deephouse, 2000; Jonsson & Burh, 2011; Pollock & Rindova, 2003; Zuckerman, 1999). While the existing media research provides a foundation for establishing media effects, this dissertation expands the purview by investigating and analyzing the content of the coverage itself. Using linguistic inquiry word count software to analyze the quantity and content of issues concerning the innovation, this dissertation supports existing media theory on the impact of how the media frames issues (McCombs, 1972) and brings to light how cognitive limitations dealing with multiple issues are associated with reducing the speed of perception formation.

First, I contribute by expanding existing theoretical findings in the media literature by testing media attention and tenor on technological innovation adoption. While existing research focuses on the actual coverage that media provides for firms, industries and products, I find that it may not be the media attention, per se, that appears to be driving the results but how positively the media decides to frame the issues. This finding adds additional credibility to the theoretical proposition that framing matters (McCombs, 1972). With regards to the existing hypotheses in the extant literature on media attention and tenor, the results of my research suggest that tenor fully moderates the effects of media attention on technological innovation adoption.

Second, extant research has stopped short of investigated *what* characteristics of the coverage have an impact on technological innovation adoption. This research makes a major contribution here by unpacking some of the questions of these characteristics of media coverage such as issue diversity, economic issues, aesthetic issues and message complexity on the cognitive processes of information gathering and sensemaking. Drawing on psychological research on sensemaking and perception formation (Weick, 1995, Weick, Sutcliffe & Obstfeld,

2005), I extend this lens to evaluate how media brings salience to technology adoption issues helping stakeholders to coalesce around a unified vision of the technology.

This research also makes a contribution to understanding how specific characteristics of coverage can play a role in the speed and probability of innovation adoption. Utilizing the results from the diversity issues variable, I explicate these theoretical concepts by extending cognitive research of cognitive load and confusion in decision making (Chi, Glaser, & Rees, 1982). I have found that when categories and schemas concerning new technology are unavailable, how the media presents the information for new schema development is associated with how quickly perceptions are formed (Sweller, 1988). This study applies this concept to market adoption to show the impact of cognitive overload on the time it takes for stakeholders to create a new innovation category. Interestingly, stakeholders need information (as revealed by my study of media attention) in order to develop schemas about the innovation; however, introducing too many unique concepts may actually slow down the process (McCombs & Shaw, 1972). In support of the notion that cognitive overload may play a role in reducing adoption speed and rates, I found that message complexity and the diversity of issues being covered by the media affected the levels of adoption of U.S. wind power plants. These findings contribute to the growing body of perception formation and value assignment for new technology.

This research also makes a contribution to how perception formation can contribute to adoption of new technological innovations (Hargaddon & Douglas, 2001; Rindova & Petkova, 2007; Rosa, Porac, Runser-Spanjol, & Saxon, 1999). I extend the innovation research on how stakeholders form perceptions regarding technological product innovations by craftily using media coverage as a tool for that influences these perceptions. Building on sociocognitive research concerning how firms attempt to facilitate the process of perception formation about an

innovation, I introduce the effects of media coverage on this process. Where existing research has revealed how product form and existing schemas affect our perception formation, my research adds to our understanding of the social structure of markets and how the stakeholders seek, acquire and interpret information concerning new innovations (Aldrich & Fiol, 1994). My theoretical framework makes an important contribution to innovation adoption research because it introduces the effects of external factors to the adoption process. It articulates the importance of the influence of infomedaries on perception formation of a novel technology. To my knowledge, this is the first study to test these characteristics on innovation adoption and the only study to capture issue diversity and specific issues in an empirical context.

This study also adds to the relatively few studies that investigate emerging industries (Forbes & Kirsch, 2011). Due to the paucity of data about emerging industries, it is difficult to empirically study the causes of why some industries progress and some fail. Using a specific context allowed me to generate some interesting theoretical arguments about external party influences on emerging industry development.

Next, as noted by both Deephouse (2000) and Pollock & Rindova (2003), little research has been done linking mass communication and organizational studies. Everett Rogers (1962) notes that mass-communication is the most pervasive method of building awareness about a new technology. This study adds to this stream of research by introducing the idea that mass communication can have an impact on how perceptions are formed and the adoption of new technology happens in an emerging industry. The media acts as an institutional actor capable of shaping the entrepreneurial landscape through its coverage of technology. My findings suggest that different characteristics of media reporting can have different effects on both the probability and speed of adoption. The media not only acts as a purveyor of information capable of

influencing the process by which the stakeholders develop an understanding about technological innovations, but also as an active force as a source of legitimacy and assignor of value to innovations. This research adds to our understanding of legitimacy and aids in the development of an organizing vision by applying this concept to technological innovation adoption.

I also add to the stream of research on linguistic inquiry and media content (Pfarrer et al., 2010; Pollock & Rindova, 2003; Tetlock, et. al., 2008; Zavyalova, 2012). I build on existing content analysis tools used in psychology by developing custom dictionaries relevant to the study of organizations and strategy (Pennebaker, Booth & Francis, 2007; Short, Broberg, Cogliser & Brigham, 2010; Short & Palmer, 2008; Tausczik & Pennebaker, 2009). There is a growing body of research which uses linguistic inquiry as a method of analysis. This research steam is relatively nascent yet provides a rich opportunity for strategic management research. This manuscript facilitates the development of certain management constructs.

Finally, this study also contributes to the growing body of research in the social acceptance of renewable energy (Gipe, 1995; Wolsink, 2007). By focusing on the influence that the media have on social perceptions of renewable energy, I extend this stream of extremely important energy policy research. This research begins to develop a theoretical model which includes the effects of external third parties on the adoption of sustainable energy industry adoption. Specifically, by combining our existing knowledge from sensemaking (Weick, 1995) and the effects of the media (Rindova & Pollock, 2003) to the renewable energy context, this research reveals the importance of perception management by the media of this developing industry.

Practical Implications

The findings of this study have several substantial implications for practice. As developers launching large scale renewable energy projects, increasing the probability and reducing the speed of adoption requires that stakeholders will understand the implications of these projects can result in major financial gains to the firm. Whereas much of the research on innovation adoption is theoretical in nature, I have conducted an empirical analysis which suggests that perception formation in the social market could translate into rapid innovation adoption. From a transaction cost approach, developers can use these results to better understand some of the potential risks and rewards of engaging the media as a conduit for legitimacy. Firms can investigate how social market strategies such as issuing press releases and providing informational access can potentially influence these key infomediaries and provide financial returns for the organization (Baron, 1996, 2004).

This study also explicated the importance of media tenor and specific contextual issues in their coverage. By revealing the importance about *which* issues represent "hot buttons", firms can focus attention of providing press releases and access to product information that may facilitate the formation of perceptions and assuage the concerns of stakeholders. These are a source of "cues" that help stakeholders make more rapid decisions in situations of uncertainty (Kirsch, Goldfarb & Gera, 2009). For instance, in this particular context, this research indicated the importance of aesthetics when it was framed favorably by the media. Developers are constantly battling community stakeholders in the NIMBY debate. If developers could find allies in the media, this coverage could prove to be quite influential in the community (Nielsen, 2011). Because increasing the probability of having your innovation adopted by stakeholders is

of primary importance to firms launching these development projects, managers should take heed of the importance of the social construction element of innovation adoption.

Taken together, the findings from this research provide a better understanding of the importance of creating value using social construction techniques. I build on the concept that visibility by itself doesn't necessarily represent a good thing but proper management of this visibility can be quite fruitful (Pfarrer, Pollock & Rindova, 2010; Zavyalova et al., 2012). The managerial implication is that a firm should actively take part in pursuing how the media will frame their developments and the facility the complexity of that coverage.

Directions for Future Research and Limitations

The limitations in this study provide some exciting ideas for future research. First, this is a single industry study using the renewable energy industry. Researchers should take care about overgeneralizing the findings from this manuscript. An opportunity exists to take the concepts of media influence and investigate to what extent they exist across other industries. Similarly, this research uses the individual wind project as the level of analysis. The phenomenon could be aggregated to the industry level. By doing so, future research could add to the call to action for more development in investigating emerging industries (Forbers & Kirsch, 2011). Specifically, this study provides an ideal jumping off point to investigate the role that the media plays in renewable energy industry emergence. Future studies could include other renewable energy emerging industries such as solar and biofuels and examine how the competitive race for industry adoption is influenced by the media.

While this study went well beyond the existing media research on the characteristics of media coverage, an exciting opportunity exists to expand the role that issues play on innovation

adoption. This work explicated economic and aesthetic issues at play; however, more work is needed to uncover issues that may impact perception formation and innovation adoption. Innovation diffusion research in sociology and the unified theory of technology adoption raise many variables that can play a part in the innovation adoption process. Future media related research create categories to study their impact upon the adoption of a technological innovation receiving this coverage. A study such as this can uncover some linkages between interesting issues and adoption.

My research suggests that the media may have an effect on the adoption of technological innovation but stops short of investigating what firms can do to capitalize on this knowledge. As such, this research can serve as a building block for strategic research that links firm actions outside the market on innovation adoption. Strategies executed in social and political markets have been acknowledged as having an impact on the market process and influencing media coverage can be incorporated into this stream of research (Baron, 1996, 2004; Kennedy, 2008). Such work would provide practical implications to firms seeking to use the media as a tool for shaping public perceptions about their innovations.

The control variables used in this study provide a unique vision into several other interesting areas of research. I found significance for political, regulatory and market conditions on the adoption of technological innovations. Research on these variables could be expanded to include how the external environment affects innovation adoption. Future work may need to explore whether political party affiliation and citizen ideologies play a role in the adoption of social value enterprises. Additionally, investigation may be warranted on how regulatory pressures and legislation affect innovation of social goods.

The use of LIWC in content analyzing business press is certainly a limitation. LIWC does suffer from some validity issues. The method of coding affect in the program does result in a high proportion of positive emotion words to negative emotion words. While computer aided textual analysis does increase reliability and reproducibility of research, it may suffer from some valence issues in analyzing emotional content. Along these lines, using CATA to analyze emotion could cause confusion with analyzing outcomes, such as successes in receiving wind farm approvals. The business press probably uses positive emotion in concert with reporting on positive outcomes. The software could be picking up outcomes as opposed to tenor. Some research exists confirming the systematic relationship between emotional valence issues and LIWC results but none in the field of organizational or strategic management (see Alpers, Winzelberg, Classen, Roberts, Dev & Koopman, 2005). I believe that the continual use and refinement of this software will better align the measurement with the different constructs.

An opportunity exists to combine this research with social psychology. Society and culture influence a wide variety of behaviors from how we view others in society, how we eat, what our body type should look like, which products we buy, how we raise our children, how we should feel about political candidates to which firms are environmental friendly and how we should feel about social value creation (Stangor & Leary, 2006; Stangor, Swim, Sechrist, DeCoster, Van Allen & Ottenbreit, 2003). Social psychology literature is full of characterizations of stakeholders, as individual groups, who seek to be unified in their belief structure and remain a part of an "in-group" (Stangor, et al., 2003; Stangor & Leary, 2006). The media is an important driver of creating "in-group" status. This is clearly evident with the explosive growth of companies like Apple Computers and Facebook.

Finally, this paper introduces the new construct *issue diversity*. With no prior literature addressing the effects of cognitive overload related to diversity of issues, there is limited research to draw inferences. While this presents a limitation of the paper, I hope that it encourages future development in the area of cognition and perception formation. Empirically, I have developed new methods of operationalizing this new construct. As with any new construct, future development can fine tune its validity and reliability. While this presents a limitation of the study, I believe that content analysis will continue to provide important insights in a number of research domains in entrepreneurship. Finally, the challenge of measuring adoption at the community level is difficult. The process by which wind energy is adopted is a fluid process of meetings, hearings and zoning decisions, many of which are reported in the media and included in my dataset. It is difficult to capture all of the possible influences impacting the speed of adoption in a large scale study (see Cape Wind, 2010 for an appreciation of the variety of possible influences for any particular project). Thus, while I controlled for several alternative explanations for our findings, future research is needed.

CONCLUSIONS

In this essay I aimed at expanding the role that the media plays on perception formation for a technological innovation. Specifically, I argued that the characteristics of media coverage can affect the probability and speed of a technological innovation adoption. The findings from this research have implications across a variety of areas including infomediary theory in management, diffusion and innovation adoption theory and practical applications.

For media researchers, this study highlights the importance of the subject matter itself on how perceptions are formed among readers of this information. Infomediary theory includes

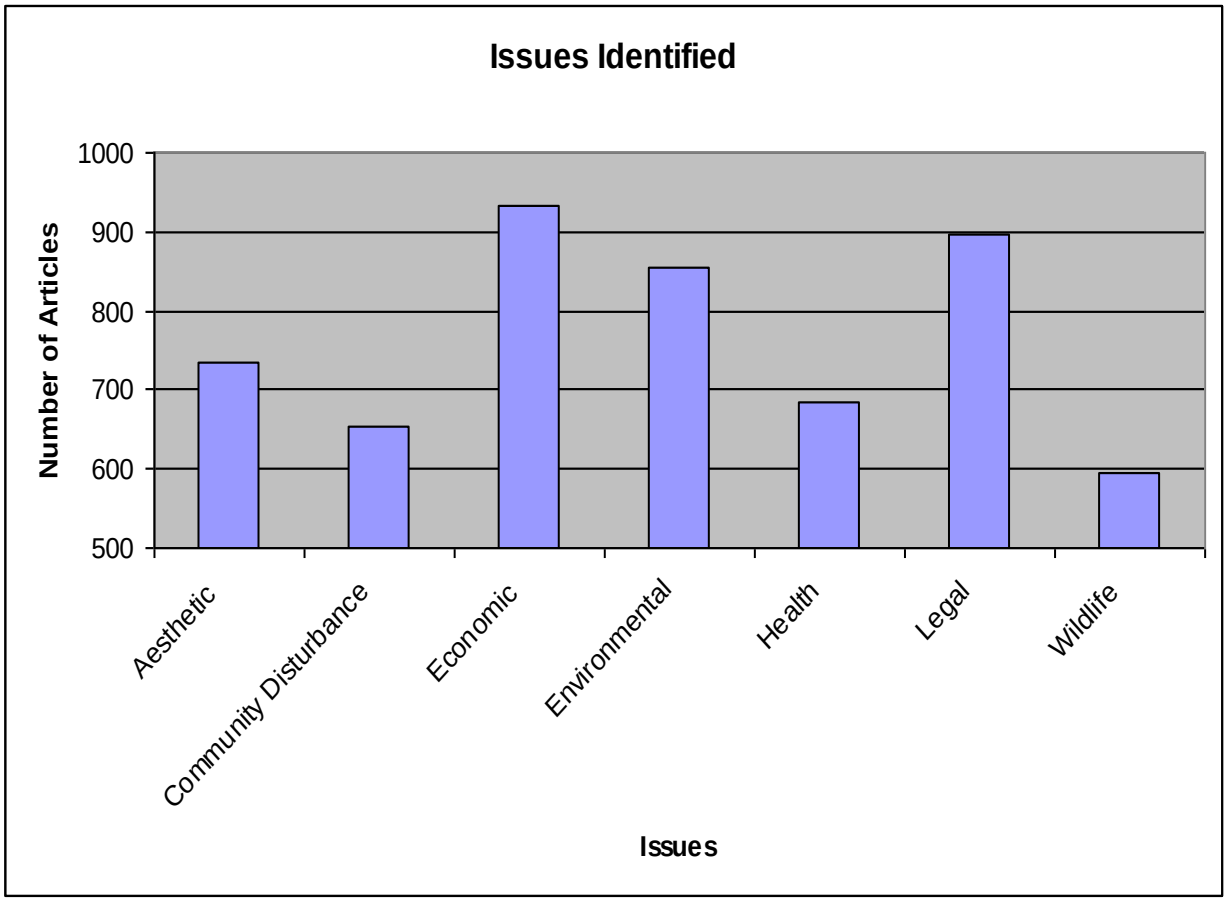
concepts of exposure and tenor as methods of conferring legitimacy upon firms and their actions (Suchman, 1995) but fails to include investigation about the characteristics of the coverage itself. This research switches the focus of the media away from viewing it as a reflection of reality and shifts focus to the media as an active market force. These findings can broaden our understanding of infomediary theory in management by seeing the media as a director of public attention (McCombs et al., 1997). While the debate concerning the true purpose of media coverage remains, this research provides some empirical implications towards the role that the media plays in facilitating perception formation in the market for new technological innovations.

This research also has implication for diffusion theory. The sociological view of diffusion theory acknowledges the pervasive power that the media provides in diffusing information about a technological innovation (Rogers, 1995). This research implies that not all media coverage about a technological innovation will increase the likelihood of adoption. Extant research in this area took the viewpoint that "all media coverage is good for diffusion." This research illuminates characteristics such as issue diversity and economics which actual retard the diffusion of these innovations. Therefore, the research has implications on diffusion theory by providing findings about the information that is diffused and its effect on technological innovation adoption. These implications will draw attention to a more specific interpretation of media coverage in diffusion theory.

Finally, there are practical implications for this research. This research draws attention to information characteristics and how they interact with cognitive information processing among community stakeholders. Firms seeking to increase the likelihood for adoption for the technological innovations can provide information using key issues of interest to the media in order to affect how their technology is covered by these infomediaries. The implications of this

research upon management theory include focus on the media that affects perceptions of innovation and is a force that firms need to acknowledge and manage coverage about their products.

FIGURE 1
Issues Identified in the Media by Count



Source of articles: Lexis/Nexis

FIGURE 2: Full Model

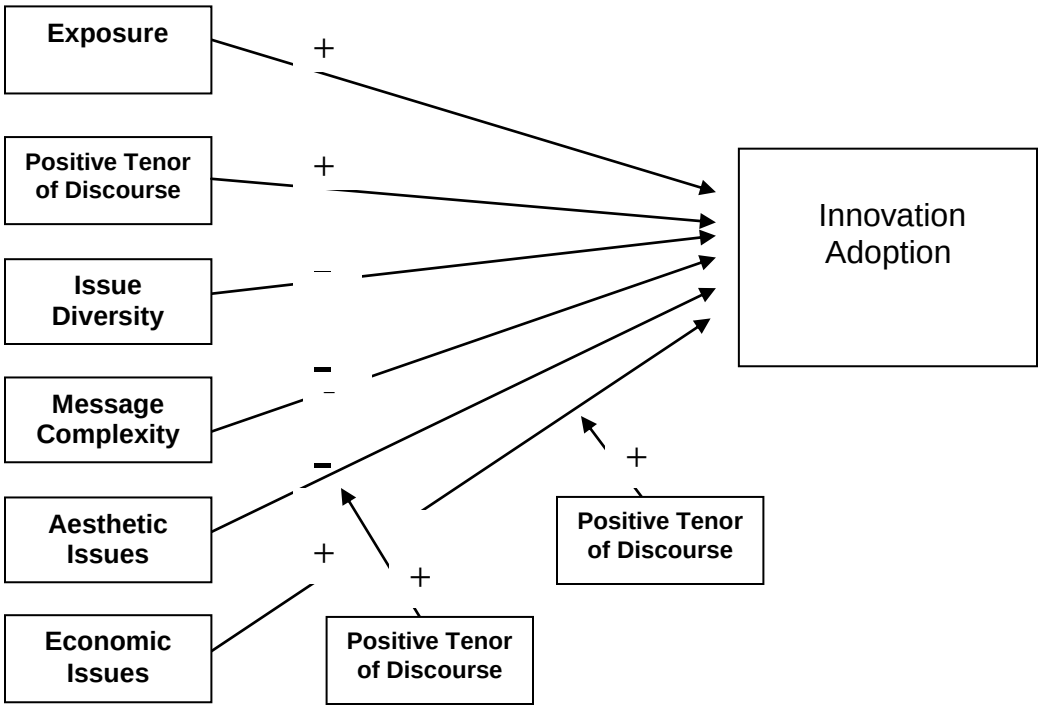
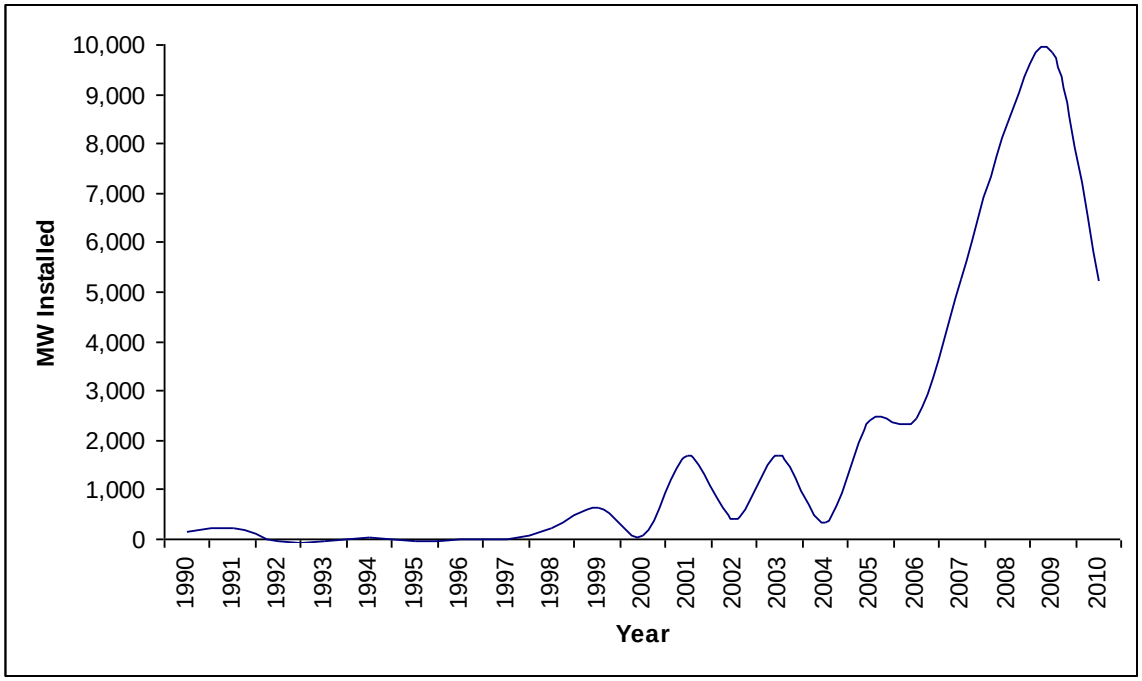
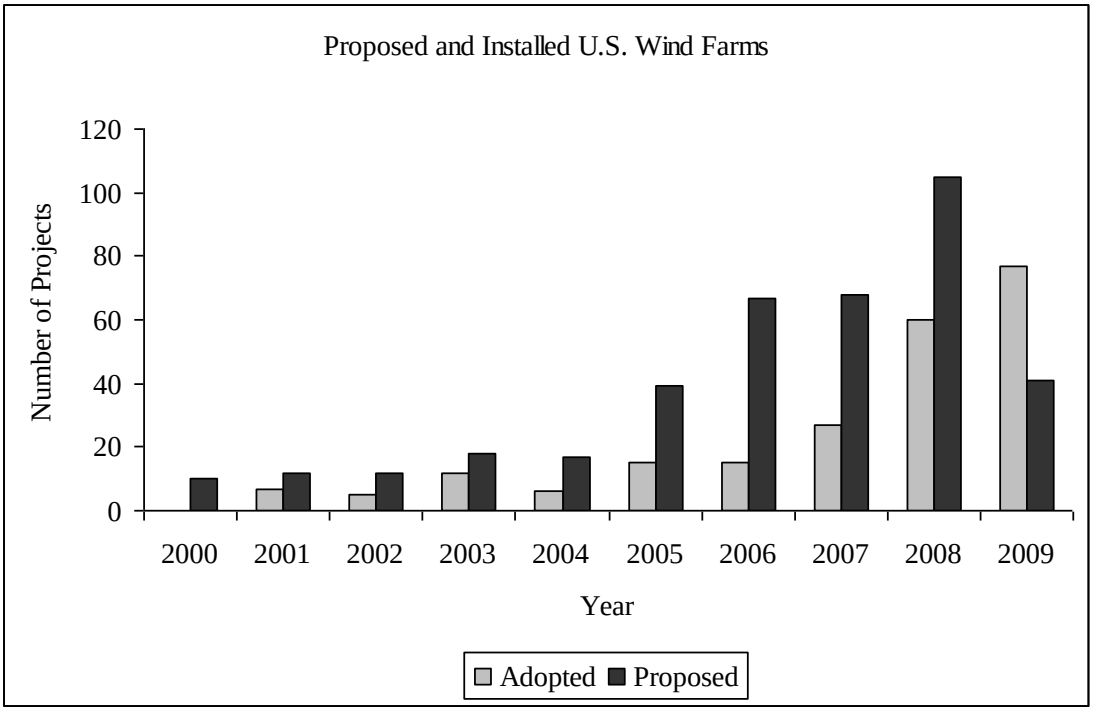


FIGURE 3
Net Annual Addition of Installed Wind Energy in United States, 1990 – 2010



Source of data: United States Department of Energy

FIGURE 4



Source of data: American Wind Energy Association

FIGURE 5
Sample Data Reduction

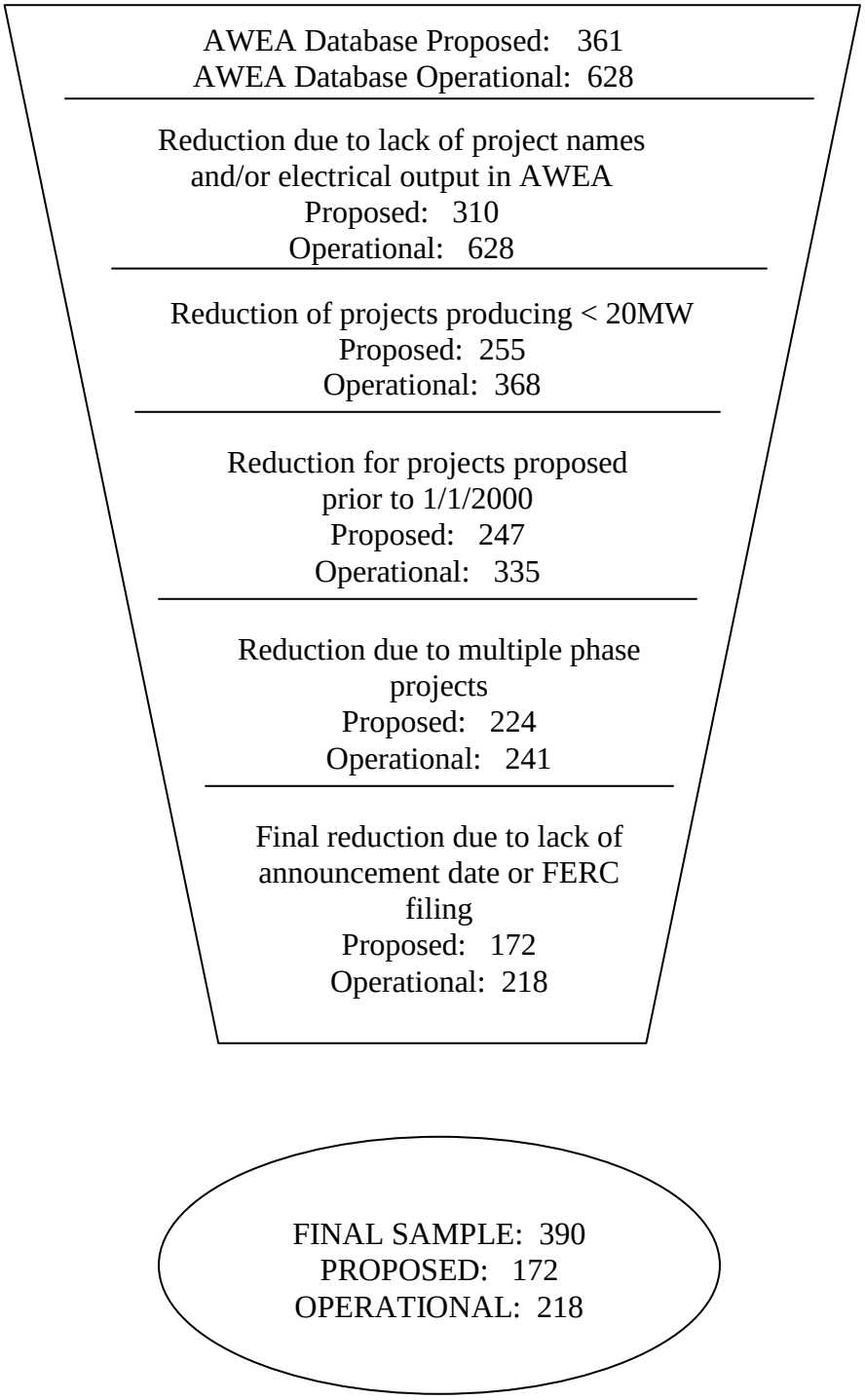
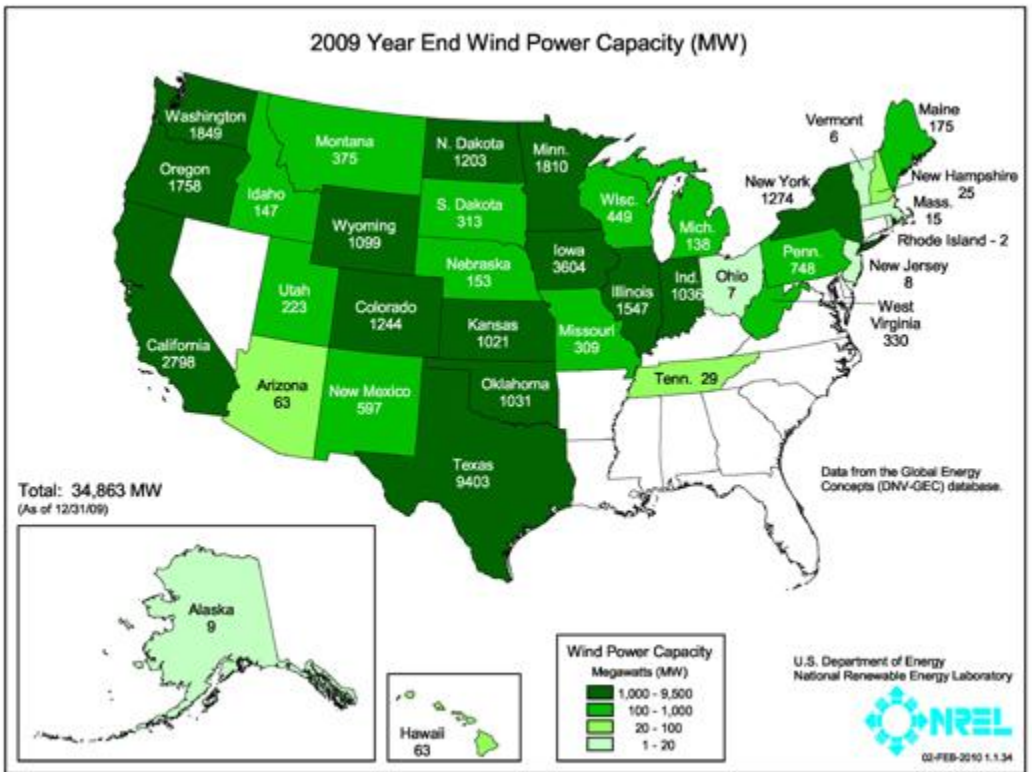
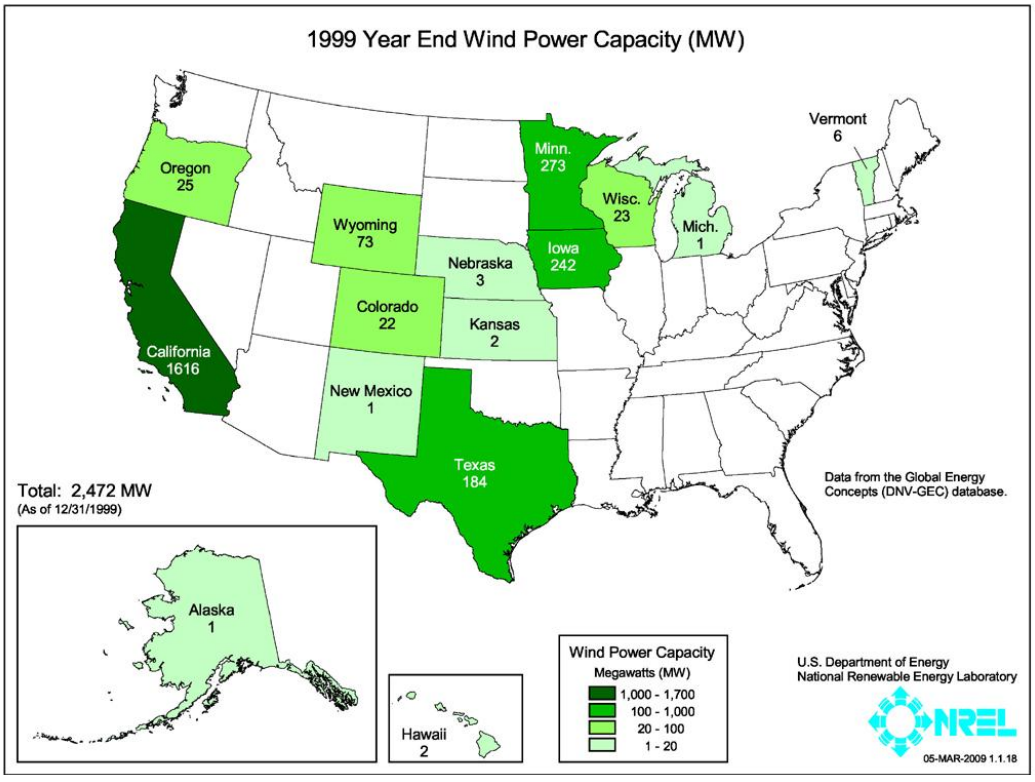


FIGURE 6



Source: U.S. Department of Energy – National Renewable Energy Laboratory

FIGURE 7



Source: U.S. Department of Energy – National Renewable Energy Laboratory

FIGURE 8
Graph of the Non-Monotonic Relationship of Media Attention on Innovation Adoption

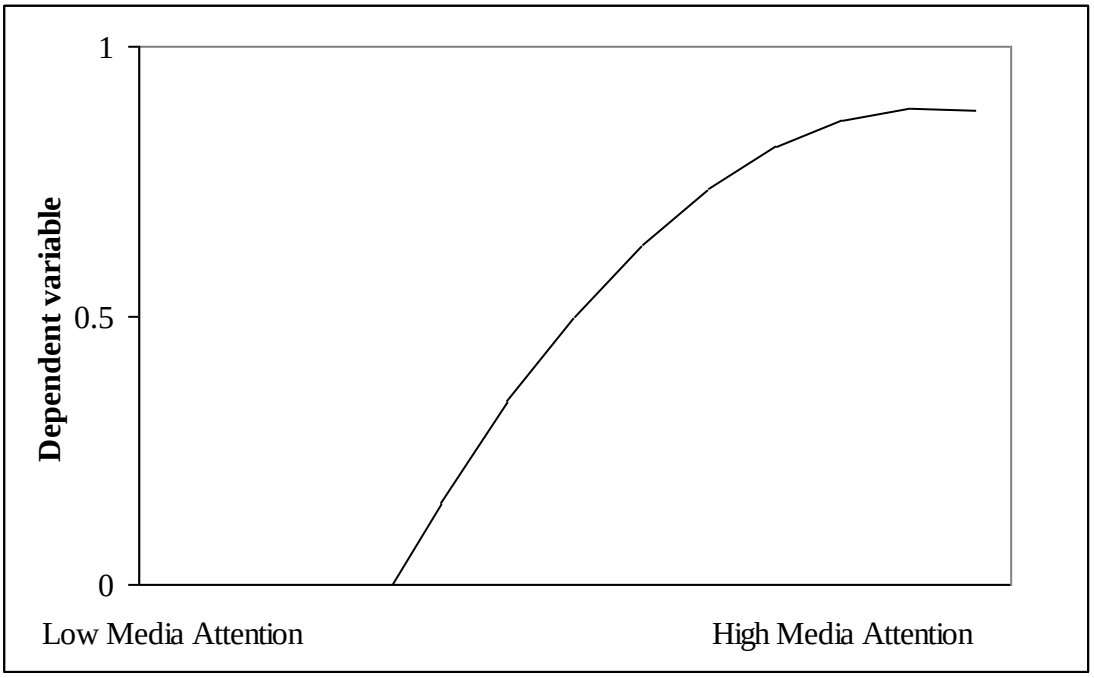


FIGURE 9
Graph for the Interaction between Economics and Positivity of Tenor

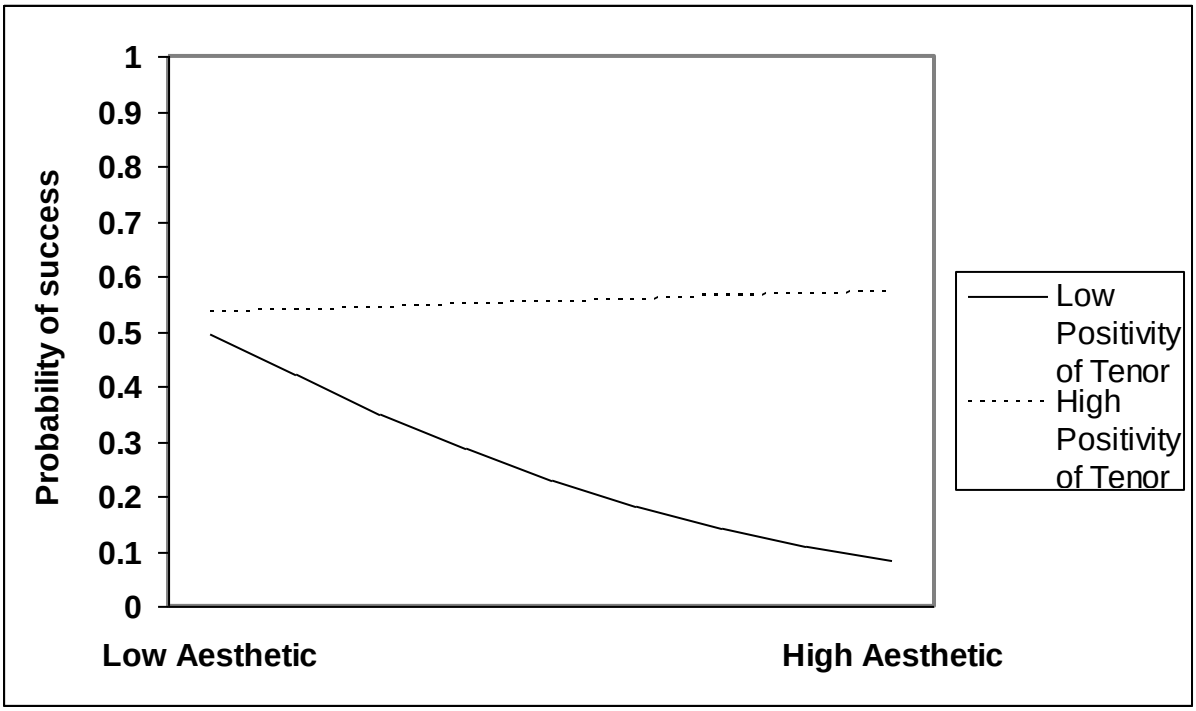


TABLE 1
Secondary Phase Wind Power Plant Development

PROJECT	STATE	O/P	PROJECT	STATE	O/P
Steel Park II	AZ	P	Caprock Wind Ranch, phase II	NM	0
Alta Mesa IV	CA	P	New York II	NY	P
Mountain View Power Partners II Wind	CA	O	New York III	NY	P
Mountain View Power Partners III Wind	CA	O	Maple Ridge Wind, phase Ia	NY	O
Victory Gardens Phase IV Wind	CA	O	Maple Ridge Wind, phase II	NY	O
Oak Creek Wind Power Phase 2 Wind	CA	O	Oklahoma Wind Energy Center - B	OK	O
Solano IIA Wind	CA	O	Centennial Wind Energy II (2007)	OK	O
Altech III Wind	CA	O	Blue Canyon II Wind	OK	O
Shiloh II Wind	CA	O	Blue Canyon IV Wind	OK	O
Peetz Table Wind Energy Center Phase II	CO	O	Blue Canyon V Wind	OK	O
Peetz Table Wind Energy Center Phase III	CO	O	Keenan II	OK	P
Bluewater Wind offshore II	DE	P	Leaning Juniper II	OR	P
Kaheawa Wind Power II	HI	P	Condon Wind , phase II	OR	O
Northstar Wind phase II	IA	O	Stateline Expansion Wind	OR	O
Top of Iowa III Wind	IA	O	Klondike II Wind	OR	O
Pioneer Prairie II Wind	IA	O	Klondike IIIA Wind	OR	O
Century Wind Expansion	IA	O	Klondike III Wind	OR	O
Cerro Gordo Wind	IA	O	Biglow Canyon Phase II Wind	OR	O
Crystal Lake Clipper II	IA	O	Biglow Canyon Phase III Wind	OR	O
Flying Cloud Wind	IA	O	Locust Ridge II Wind	PA	O
Endeavor II Wind	IA	O	Buffalo Ridge II	SD	P
Pomeroy III Wind	IA	O	Sherbino II	TX	P
Endeavor IIa Wind	IA	O	Great Plains II	TX	P
Pioneer Prairie II (09) Wind	IA	O	Camp Springs II (4Q07) Wind	TX	O
Pomeroy II (4Q07) Wind	IA	O	Sunray II Wind	TX	O
Storm Lake II Wind	IA	O	Lone Star II (4Q07) Wind	TX	O
Story County II Wind	IA	O	Lone Star II (2Q08) Wind	TX	O
Top of Iowa II Wind	IA	O	Goat Mountain Phase II Wind	TX	O
Top of Iowa III Wind	IA	O	Sweetwater 5 Wind	TX	O
Crystal Lake - Clipper (08) Wind Phase II	IA	O	Notrees 2A (Vestas) Wind	TX	O
Goshen II	ID	P	Sweetwater Phase II Wind	TX	O
Twin Groves Wind Expansion	IL	O	Lone Star II (1Q08) Wind	TX	O
Walnut Ridge (phase II)	IL	O	Panther Creek II Wind	TX	O
Twin Groves II (4Q07) Wind	IL	O	Champion (Roscoe II) Wind	TX	O
Twin Groves II (08) Wind	IL	O	Sweetwater Phase III Wind	TX	O
Grand Ridge II Wind	IL	O	Capricorn Ridge Expansion (1Q08) Wind	TX	O
Grand Ridge III Wind	IL	O	Buffalo Gap 3 Wind	TX	O
Grand Ridge IV Wind	IL	O	Inadale (Roscoe IV) Wind	TX	O
Fowler Ridge II Wind	IN	O	Panther Creek III Wind	TX	O
Fowler Ridge Clipper Expansion	IN	O	Horse Hollow III Wind	TX	O
Meadow Lake II	IN	O	Buffalo Gap II Wind	TX	O
Spearville II	KS	P	Pyron (Roscoe III) Wind	TX	O
Spearville III	KS	P	Horse Hollow II Wind	TX	O

Meridian Way II Wind	KS	O	Milford II	UT	P
Smoky Hills II Wind	KS	O	Milford III	UT	P
Stetson Wind Expansion Wind	ME	O	Milford IV	UT	P
Lake Benton II Wind	MN	O	Milford V	UT	P
Elm Creek Wind power II	MN	P	Nine Canyon III Wind	WA	O
Bent Tree Wind (phase II)	MN	P	Wild Horse II Wind	WA	O
Moraine II Wind	MN	O	Nine Canyon Wind	WA	O
Glacier II	MT	O	Marengo II Wind	WA	O
North Dakota Wind II Wind	ND	O	Windy Point II Wind	WA	O
Langdon II - FPL Wind	ND	O	Forward Expansion Wind	WI	O
Langdon II - Otter Tail Wind	ND	O	NedPower Mount Storm II Wind	WV	O
Oliver II Wind	ND	O	Mountain Wind II	WY	P
Ashtabula II Wind	ND	O	Foote Creek Rim III Wind	WY	O
Wilton Energy II	ND	O	Glenrock III Wind	WY	O
Aragonne Mesa II	NM	P	Seven Mile Hill II Wind	WY	O
Desert Sage Wind II	NM	P			

*O – Operational Wind Farms
*P – Proposed Wind Farms

TABLE 2
Coding of Issue Diversity

Issue Identified	Definition	Examples in Text
Economic	Relating to production, distribution and consumption of goods and service	'Readily available and economically priced electrical services'
Aesthetic	Pleasing in appearance, Responsive to or appreciative of what is pleasurable to the senses	'Ugly, noisy blight on wide open space' 'Ocean vista sullied' 'Noise pollution'
Health	The condition of being sound in body, mind or spirit	'Health concerns' 'Mental sickness and other ill effects'
Community Disturbances	A local variation from the average, act of disturbing Someone	'Problems with TV reception' 'Shadow flicker' 'Increased traffic'
Legal Regulatory	Of or related to the law, making or concerned with making rules about acceptable business activity	'Approval of county government' 'Permitting & jurisdiction issues'
Environmental	The natural world	'Clean alternative source of electric energy' 'Reduction in emissions' 'Rare & irreplaceable natural resources'
Wildlife	Animals living in nature, wild animals	'Birds may be killed by' 'Avian studies' 'Wildlife protection' 'Endangered bats & squirrels'

*Definitions were based on Merriam-Webster Learners' Dictionary

TABLE 3
Renewable Portfolio Standards

State	Amount	Year	Date Enacted
Arizona	15%	2025	3/30/2001
California	33%	2030	9/12/2002
Colorado	20%	2020	11/2/2004
Connecticut	23%	2020	4/29/1998
District of Columbia	20%	2020	1/1/2005
Delaware	20%	2019	7/21/2005
Hawaii	20%	2020	6/25/2001
Illinois	25%	2025	6/22/2001
Massachusetts	15%	2020	11/19/2007
Maryland	20%	2022	5/26/2004
Maine	40%	2017	11/5/2004
Michigan	10%	2015	10/6/2008
Minnesota	25%	2025	1/1/2003
Missouri	15%	2021	6/26/2007
Montana	15%	2015	4/28/2005
New Hampshire	23.80%	2025	5/11/2006
New Jersey	22.50%	2021	1/1/1999
New Mexico	20%	2020	3/1/2004
Nevada	20%	2015	6/17/2005
New York	24%	2013	9/24/2004
North Carolina	12.50%	2021	8/20/2007
North Dakota*	10%	2015	3/23/2007
Oregon	25%	2025	6/6/2007
Pennsylvania	8%	2020	11/30/2004
Rhode Island	16%	2019	6/29/2004
South Dakota*	10%	2015	2/21/2008
Texas	5,880 MW	2015	12/16/2000
Utah*	20%	2025	3/18/2008
Vermont*	10%	2013	6/14/2005
Virginia*	12%	2022	4/2/2010
Washington	15%	2020	11/7/2006
Wisconsin	10%	2015	4/28/1998

Source: Recreated from information provide by http://www.epa.gov/chp/state-policy/renewable_fs.html and US department of energy http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#chart *voluntary RPS.

TABLE 4
Descriptive Statistics[a]

Variable	Mean	s.d.	Min.	Max
1. Technological Innovation adoption	0.07	0.25	0	1
2. Media Attention	0.78	1.96	0	25
3. Positivity of tenor	0.50	0.56	0	2.81
4. Issue diversity	1.72	2.93	0	7
5. Economics	0.57	1.12	0	9.35
6. Aesthetics	0.08	0.21	0	2.51
7. Complexity	12.82	1.76	5.00	22.10
8. Regulatory	0.76	0.43	0	1
9. County population[b]	159.49	416.41	0.37	3053
10. Political	60.56	14.69	17.52	93.28
11. Market	1.70	0.58	0.66	4.01
12. Prior perception	1.61	1.40	1	14
13. Firm experience	3.66	3.89	0	21

[a] n = 3426

[b] in 100,000's of people

TABLE 5

Pairwise Correlations[a]

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Technological													
1. Innovation adoption	1.00												
2. Media Attention	0.07 *	1.00											
3. Positivity of tenor	0.18 *	0.57 *	1.00										
4. Issue diversity	0.07 *	0.70 *	0.78 *	1.00									
5. Economics	0.06 *	0.52 *	0.67 *	0.76 *	1.00								
6. Aesthetics	0.01	0.38 *	0.47 *	0.64 *	0.39 *	1.00							
7. Complexity	-0.08 *	0.06	0.02	0.24 *	-0.15 *	0.18 *	1.00						
8. Regulatory	0.01	-0.02	0.00	-0.02	0.01	-0.02	-0.01	1.00					
9. County population[b]	-0.02	-0.07 *	-0.11 *	-0.07 *	-0.06 *	-0.04 *	-0.07 *	-0.21 *	1.00				
10. Political	-0.04 *	0.02	0.06 *	0.04 *	0.00	0.06 *	0.04 *	0.39 *	0.03	1.00			
11. Market	-0.01	0.06 *	0.08 *	0.06 *	-0.01	0.09 *	0.06 *	0.24 *	0.12 *	0.56 *	1.00		
12. Prior perception	0.01	-0.01	-0.02	0.00	-0.01	0.01	0.01	0.10 *	0.10 *	0.22 *	0.21 *	1.00	
13. Firm experience	0.09	0.03	0.07	0.06	0.01	0.09	0.15	0.15 *	-0.07 *	0.11 *	0.01	0.16 *	1.00

[a] **n = 3426**

[b] **in 100,000's of people**

*** *p* < .05**

TABLE 6
Variable Inflation Factors

Variable	VIF	1/VIF
Issue diversity	5.98	0.167106
Positivity of tenor	2.71	0.368376
Economics	2.33	0.430017
Media Attention	2.02	0.494422
Aesthetics	1.85	0.540509
Market	1.53	0.652470
Political	1.52	0.658271
Regulatory	1.22	0.817583
Complexity	1.11	0.902094
Firm experience	1.10	0.909061
Prior perception	1.05	0.949708
Population	1.05	0.956546
Mean VIF	1.96	

TABLE 7

Results of Fixed-Effects Cox Proportional Hazard Rate Analysis for Operational Wind Farms[a]

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Regulatory	1.21 (0.26)	1.32 (0.27)	1.32 (0.27)	1.36 (0.27)	1.34 (0.27)	1.39 (0.28)	1.39 (0.28)
County population	1.08 (0.08)	1.01 (0.08)	1.00 (0.08)	1.08 (0.08)	1.08 (0.08)	1.09 (0.08)	1.09 (0.08)
Political	-0.98 ** (0.00)	-0.98 ** (0.01)	-0.98 ** (0.01)	-0.98 ** (0.01)	-0.98 ** (0.01)	-0.98 ** (0.01)	-0.98 ** (0.01)
Market	-0.78 (0.12)	-0.80 (0.13)	-0.81 (0.13)	-0.77 † (0.12)	-0.81 (0.13)	-0.78 (0.12)	-0.78 (0.12)
Prior perception	-0.99 (0.05)	1.01 (0.05)	1.00 (0.05)	-0.99 (0.05)	-0.99 (0.05)	-0.99 (0.05)	-0.99 (0.05)
Firm experience	1.08 ** (0.02)	1.08 ** (0.02)	1.08 ** (0.02)	1.08 ** (0.02)	1.08 ** (0.02)	1.08 ** (0.02)	1.08 ** (0.02)
Media Attention		1.11 ** (0.02)	1.28 ** (0.07)	1.00 (0.00)	1.10 (0.09)	1.01 (0.08)	1.03 (0.04)
Media Attention Squared			-0.99 * (0.00)	-0.93 (0.06)	-0.99 (0.00)	-1.00 (0.00)	
Positivity of Tenor				1.74 ** (0.13)	2.68 ** (0.36)	3.90 ** (0.52)	4.00 ** (0.69)
Issue Diversity					-0.86 ** (0.04)		
Economics						-0.87 † (0.08)	-0.89 (0.08)
Aesthetics						-0.58 (0.08)	-0.50 (0.25)
Complexity							-0.98 † (0.01)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
χ^2	64.50	81.54	91.31	140.02	150.11	150.84	154.28
Log-likelihood	-1053.37	-1087.80	-1082.91	-1058.56	-1053.52	-1053.15	-1061.84

[a] n = 3015. Standard errors are in parentheses. Year dummies were included in the analysis but are ommitted from the table.

† *p < .10*

**p < .05*

***p < .01*

TABLE 8

Results of Cox Proportional Hazard Rate Analysis for Operational Wind Farms[a]

Hazard Rate Analysis for Operational Wind Farms Continued[a]

Variables	Model 8		Model 9		Model 10	
Regulatory	1.38	(0.28)	1.38	(0.28)	1.40 †	(0.28)
County population	1.08	(0.08)	1.08	(0.08)	1.00	(0.08)
Political	-0.98 **	(0.01)	-0.98 **	(0.01)	-0.98 **	(0.00)
Market	-0.78	(0.12)	-0.76 †	(0.12)	-0.76 †	(0.12)
Prior perception	-0.99	(0.05)	-0.99	(0.05)	-0.99	(0.05)
Firm experience	1.08 **	(0.02)	1.08 **	(0.02)	1.08 **	(0.02)
Media Attention	-0.98	(0.07)	-0.98	(0.07)		(0.07)
Media Attention Squared	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Positivity of Tenor	2.81 **	(0.57)	3.22 **	(0.68)	1.99 **	(0.17)
Aesthetics	-0.03 *	(0.04)			-0.59 **	(0.13)
Aesthetics x Positivity of tenor	1.26 *	(0.12)			1.22 *	(0.12)
Economics			-0.72	(0.18)	-0.86	(0.15)
Economics x Positivity of tenor			1.09	(0.10)	-0.98	(0.09)
Complexity	-0.99	(0.02)	-0.99	(0.02)	1.00	(0.03)
Year fixed effects	Yes		Yes		Yes	
χ^2	150.67		147.75		154.79	
Log-likelihood	-1053.23		-1054.69		-1051.17	

[a] n = 3015. Standard errors are in parentheses.

† *p < .10*

**p < .05*

***p < .01*

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Essay 2:

The Effects of Nonmarket Strategies on Innovation Adoption

ABSTRACT

This paper investigates how resources internal to the firm may influence two segments of the external environment, sociocultural and political. I draw from areas of resource theory, social exchange theory and public policy to examine how firm resources can be employed to impact the social market using press releases to influence media attention and corporate political activity in the political markets to influence beneficial changes in legislation. Using the U.S. wind industry as my context, I find empirical results supporting my hypothesis that firms can engage in strategic actions to influence media attention concerning a technological innovation. This attention may lead to an increased in probability of technological innovation adoption. Interesting, I find that a firm dedicating campaign contributions can not be directly linked to the creation of favorable policy changes facilitating the innovation adoption. These results are in line with many prior public policy articles attempting to link corporate political activity and measures of firm performance.

INTRODUCTION

Research on the media and performance effects have recently found a location in mainstream strategy literature (e.g. Deephouse, 2000; Deephouse & Heugens, 2009; Gamson, Croteau, Hoynes, & Sasson, 1992; Jonsson & Buhr, 2011; Kennedy, 2008; Pollock & Rindova, 2003; Westphal & Deephouse, 2011; Zavyalova, Pfarrer, Reger & Shapiro, 2012). These cognitive linguistic studies suggest that the media plays a role in creating perceptions of value, establishing legitimacy and reducing uncertainty. The effects of media coverage are being tested on firm performance outcome variables such as investor reactions (Jonsson & Buhr, 2011; Pfarrer, Pollock & Rindova, 2010), initial public offering prices (Pollock & Rindova, 2003) and social approval assets such as reputation (Deephouse, 2000; Fombrun & Shanley, 1990; Rindova, Williamson, Petkova & Sever, 2005).

In the past several years, media researchers have begun to unpack some strategic actions that firms can take to proactively affect the media attention about their firm or products. This work includes the influence of *information infomediaries*, third parties which disseminate information, frame issues, influence stakeholders perceptions and encourage action (Deephouse, 2000; Pfarrer, Pollock & Rindova, 2010; Pollock & Rindova; 2003; Zavyalova, Pfarrer, Rindova & Shapiro, 2012). By using *information subsidies*, prepackaged written pieces of information about the firms' activities (Rindova, Pollock & Hayward, 2006), firms may be able to influence the amount and type of media attention of their innovations by these infomediaries. Specifically, drawing on research from impression management, scholars have begun to unpack the abilities of the firm to influence the tenor of the media's coverage when following a crisis (Zavyalova et. al., 2012). I extend the theory of these scholars to include a strategic approach to include managing the impression of the firm's novel technology in the eyes of the media, through these

information subsidies, and its subsequent effects on innovation adoption. I contribute to this research by investigating the relationship between firm actions, amount of media attention and innovation adoption as a performance outcome.

A second contribution of this manuscript is investigating firm actions in political markets. This research investigates if firm actions can have an impact in the political markets and if these actions can facilitate the adoption of their technological innovations. Political science research has theoretically identified a mechanism for influencing public policy change through corporate political activity (CPA) in the form of lobbying and political campaigns (Arnold, 1990; Austen-Smith & Wright, 1994; de Figueiredo & Edwards, 2007; de Figueiredo & de Figueiredo, 2002; Milbrath, 1963; Moe 1980). Political science literature typically limits and applies their findings to institutions and political factors but does not integrate these frameworks into the corporate or strategic management environments (Getz, 1997; Grier & Munger, 1993; Oliver & Holzinger, 2008). As noted by Getz (1997) "if political action is ever to be fully integrated with strategic planning and organizational behavior (intellectually or practically), much more empirical work on effectiveness will need to be done" (p. 64). This essay answers this call to action. Further, the existing empirical evidence concerning the relationship between corporate political activity and economic returns is mixed (Hillman, Keim & Schuler, 2004). Therefore, a contribution of this study is to provide a gateway between political science and strategic management by engaging in an empirical analysis that investigates how a firm's political strategies using corporate political activity are intricately intertwined with a firm's market strategies and technological innovation adoption. More specifically, I test the dedication of financial resources via campaign contributions to influencing regulatory policy changes that will result in a higher probability and faster adoption of a new technology.

Finally, I draw from and extend stakeholder theory by investigating the *instrumentality* of the stakeholder model (Donaldson & Preston, 1995; Freeman, 1984; Rowley, 1997). Having investigated stakeholders in both the social and political markets, I apply these findings to test if the probability and speed of technological innovation adoption can be facilitated by the simultaneous alignment of stakeholders in both of these markets. Stakeholders are "those groups without whose support the organization would cease to exist" (Freeman, 1984)[13]. This definition implies that firms must integrate contributions from these stakeholders in order to achieve their goal of existence - with existence being defined as firm performance, profitability, stability or growth (Donaldson & Preston, 1995). Accomplishing these performance goals may require the collaborative effort among various groups of stakeholders (Reid & Toffel, 2009). Thus, this third contribution lies in the advancement of stakeholder theory by investigating the impact of aligning the interests of several stakeholder groups simultaneously. I further the concept of stakeholder theory instrumentality by conducting an empirical study that examines how the adoption of a firm's technological innovation can be affected by the alignment of multiple stakeholders.

I approach this by addressing several specific strategic questions: (1) Can a firm invest resources in order to influence media attention and coverage of an innovation and if so, does this increase in amount of media attention result in more rapid technological innovation adoption (2) Can a firm invest resources in order to influence regulatory policy change, and if so, does this regulatory change increase the likelihood of technological innovation adoption? and if propositions 1 & 2 are indeed supported, (3) Does increasing the alignment of both of these

[13] This definition was originated by the Stanford Research Institute (SRI) in 1963 and was quoted in Freeman's *Strategic Management: A Stakeholder Approach*, 1984. The work at SRI was influenced by concepts developed at Lockheed by Igor Ansoff and Robert Stewart.

social and political market strategies result in a multiplicative increase in the likelihood of technological innovation adoption?

The paper proceeds as follows: First, I provide an overview of two specific segments of the environment: the sociocultural and political markets. I develop a theoretical framework for integrating market strategies with social and political strategies. I then develop a series of hypotheses which will test the relationship between the social market strategies on media coverage and technological innovation adoption and a firm's political strategies on regulatory change. I will then empirically test these hypotheses using data from the United States wind industry from 2000 to 2009. Finally, I conclude with a discussion of the empirical results and the study's contributions to the strategic management literature.

THEORY AND HYPOTHESES DEVELOPMENT

Two fundamentally different perspectives have evolved in the field of strategic management. There are those that believe rent generation is influenced from the "outside-in" (e.g. Schmalensee, 1985; Wernerfelt & Montgomery, 1988). Exogenous factors such as political, regulatory, social, and economics influence industry structure and subsequently firm performance (Porter, 1980, 1991; McGahan & Porter, 1997). Then there are those who reside in the "inside-out" camp which embraces the resource-based or business-specific approach to firm performance (Barney, 1986, 1991; Penrose, 1959; Roquebert, Phillips & Westfall, 1996; Rumelt, 1991). They theorize that idiosyncratic internal resources and capabilities drive rents and economic returns (Rumelt, 1991; Wernerfelt, 1984). These camps tend not to cohabitate leaving the question, "where do you draw the boundaries between exogenous and endogenous factors when it comes to predicting firm performance?" Recently, scholars have empirically addressed

this problem using nested models (Misangyi, Elms, Greckhamer & Lepine, 2006; Tarzijan & Ramirez, 2010). With business being nested within the industry, this provides a better empirical measure for decomposing the variance in profitability but fails to address the endogenous possibility that the interior nested sample (business) can influence the outer shell (external environment). An even more compelling question involves the integration of these camps, "Can internal firm resource and capabilities influence the external environmental segments…which ultimately influences the adoption of an innovation?"

An entire stream of literature has been dedicated to comparing and contrasting both of these theoretical schools of thought (see Barney, 2001; McGahan & Porter, 1997; Peteraf, 1993; Teece, 2009; Teece, Pisano & Shuen, 1997)[14]. One of the central tenets of strategic management is the matching of internal resources and capabilities with opportunities created in the external market (Porter, 1980). Thus, I do not argue that both the internal perspective and the external perspective are both important to understanding strategic development. However, research on dynamic capabilities fails to assess possible outcomes due to the interactions between the two perspectives. This research will begin to investigate this phenomenon.

Here is a brief history summarizing the beginning of this debate in the strategic literature. First, Schmalensee (1985), Rument (1991), Roquebert, Phillips & Westfall (1996) and McGahan & Porter (1997) attempted to partial out which perspective contributes a larger portion of the variance in profitability. The debate between industry, business level and corporate effects ensued. Industrial organizational economists and strategic management scholars drew the line in the sand as to which factor, external or internal, was responsible for influencing firm performance. Then, Mahoney & Pandian (1992) and Oliver (1997) were among the first to try to

[14] As a source of competitive advantage, dynamic capabilities refer to the shifting character of the environment and the key role of strategic management of firm resources to adapt to this changing environment.

mediate the cohabitation debate by discussing the complementarity of both perspectives. The integration of the resource-based view with organizational economics provided a more complete understanding of both theories, but did more to appease the debate than try to truly challenge the interrelatedness of both camps. Therefore, how to think about the interactions between these schools remains relatively understudied.

Environmental change 'may change the significance of resources to the firm' (Penrose, 1959: 79). While both camps may disagree on which accounts for the larger portion of variance in profitability, they all agree that *external factors affect resource* to some degree (cf. McGahan & Porter, 1997; Misangyi, Elms, Greckhamer & Lepine, 2006; Roquebert, Phillips & Westfall, 1996; Rumelt, 1991; Schmalensee, 1985; Tarzijan & Ramirez, 2010). Picture the flow of influence from the outer external shell to the internal core of the firm. Factors of the general environment affect industry related parties, ultimately affecting the firm directly. A visual representation has been adapted from Hitt, Ireland & Hoskisson (2012) and included as Figure 1. The fundamental assumption in this model and understudied assertion is that we know little about what affects the general environment. While admittedly understudied, Porter himself ask the questions, "should the environment be taken as a given or not?" (1991:99). Extant literature on strategic management has created a unidirectional flow of influence, leaving out the option for the effects the firm has upon its environment. To challenge Porter's question even further, can the innermost shell of the firm influence what happens in the outermost shell in the environment?

Exogenous Factors

Factors of the general environment exogenous to the firm matter. Whether you reside in the industrial organizational economics (IOE) camp or the strategic management camp, extant

research has shown that external factors affect firm profitability (McGahan & Porter, 1997; Misangyi, Elms, Greckhamer & Lepine; 2006; Roquebert et al., 1996; Rumelt, 1991; Schmalensee, 1985; Tarzijan & Ramirez, 2011). This debate has raged on for more than 25 years with each side attempting to claim credit for the majority of variance in firm profitability. IOE scholars assign as much as 75% of the variance to industry effects (Schmalensee, 1985: 349) and even a reluctant strategic management camp has allocated 48% to industry year interaction effects (Rummelt, 1991: 11). My research does not attempt to further investigate this question or the discrepancy in their results; other scholars have engaged in this area (Misangyi, Elms, Greckhamer & Lepine; 2006; Roquebert et al., 1996). I bring this research to your attention to simply make the claim that external factors do explain some portion of performance and warrant the development of theory concerning the mechanism of how exogenous general environmental factors impact technological innovation adoption.

The general environment represents a broader society that influences both the industry and the firms in it (Porter, 1991). General environmental factors include a group of seven external market factors in which a firm operates (Hitt, Ireland & Hoskisson, 2012). These factors include *sociocultural*, *political*, economic, demographic, global, physical and technological. A table describing each of these segments and a description of factors has been included as Table 1. These seven factors both constrain the available choices that firms can engage and form industry structure (McGahan & Porter, 1997; Porter, 1991). The influence from these external general environmental factors helps create industry structure. Caves (1964) revealed how industry structure affects firm performance using the SCP paradigm. This paradigm was designed by industrial organizational economist to explain the unidirectional phenomenon of the external factors and their effects on the firm. Industry structure influences

the conduct of the firm which impacts market performance. Figure 1 illustrates this unidirectional flow of influence. This model treats environmental effects on firm performance as exogenous. In this model, external environmental factors remain impervious to the behavior of the firm or the conduct of the market. I argue that the structure of the industry and the environmental forces that govern them are only partly exogenous and that these factors are influenced by the actions of firms internal to the market. I am not necessarily arguing for the development of a P-C-S (performance – conduct – structure) model; however, simply acknowledging the lack of complete exogeneity of the external market may open up a new line of strategic inquiry.

In the following section, I develop the overarching theory of the impact of social and political market strategies and propose two hypotheses that will investigate sources of influence from the market level on the general environment – and provide examples of how they affect the *sociocultural* segment and the *political* segments of the general environment.

General Strategies in Social and Political Markets

Firms strategically configure their activities with institutions to maximize economic returns via objectives such as creating positive media attention concerning their firm or influencing the implementation of favorable legislation (cf. Austen-Smith & Wright, 1994; Baron, 1996, 1999; Carroll & McCombs, 2003; de Figueiredo & Edwards, 2007, de Figueiredo & de Figueiredo, 2002; Deephouse, 2000; Kennedy, 2008; McConnell, 1966; Pollock & Rindova, 2003). It has only been in the last decade that we have seen an interest in developing knowledge concerning how these strategies affect the performance of the firm. In doing this, management scholars have only recently begun to realize the interdependence and

interrelatedness of strategies that have a direct impact on their performance and an indirect impact through social and political markets (Baron, 1999; Bondardi, 2004; Bonardi, Holburn & Vanden Bergh, 2006; Hillman & Hitt, 1999; Lux, Crook & Woehr, 2011; Schuler 1996). The objective of this research is to illuminate how these strategies provide a full range of incentives to both the industry and the firm itself while also unlocking the indirect effects on market strategies related to technological innovation adoption.

Studying indirect social and political strategies without understanding their implication on firm performance based market strategies is like studying the cause without ever studying its effect. The goal of a *social or political strategy* is to affect the outcome of a specific issue (Baron, 1995; Hillman, Keim & Schuler, 2004). This could include implementing strategies in social markets by providing information provisions to the media that facilitate the process of creating positive public perceptions about a technology or lobbying for specific regulatory change that encourages the adoption of a particular technology. The goal of a *market strategy* is to create a competitive advantage for a firm by applying possible market actions to a strategic situation (Baron, 1998; Porter, 1991). For example, this research builds on the work of Kennedy (2008). In social markets, firm's implement resources through the use of press releases in order to influence the amount of media attention. I extend this research to show the market impact on technological innovation adoption due to the increased salience in the social market. Similarly in the political markets, Baron (1997) studied a political strategy of how lobbying led to opening up a rival's market for competition; then he studies how this action provided a return for the firm from a revised market strategy by creating greater market access for their product. In this example, the industries lobbying efforts influenced the suppliers of public policy thereby creating favorable legislation for the industry level participants. This opened up more market

strategy opportunities to the firms. Therefore, one can see the importance on not just studying the effects of social and political strategies and their implication alone but also integrating them with the results on technological innovation adoption provided by the resulting market strategies. Integrating the social and political strategies together unlocks opportunities at the market level.

Why are social and political strategies important in the study of technological innovation adoption? Research on innovation adoption has implicated the media as the primary method of diffusing information about new technology into the market (Rogers, 1962, 1995). The mass media serves two roles in the process of innovation adoption. First, they serve as purveyor of information. In this role, the media simply introduce the audience to a new technology that the public has not been exposed to in the past. According to Everett Rogers, the media fill the role of objective third party supplier of information by simply providing coverage about a new technology.

Sociocultural Segment & the Media.

The sociocultural segment is concerned with society's attitudes and cultural values (Hitt, et al., 2012). Society and culture influence a wide variety of behaviors from how we view others in society, how we eat, what our body type should look like, which products we buy, how we raise our children, how we should feel about political candidates to which firms are environmental friendly and how we should feel about social value creation (Stangor & Leary, 2006; Stangor, Swim, Sechrist, DeCoster, Van Allen & Ottenbreit, 2003). Social psychology literature is full of characterizations of stakeholders, as individual groups, who seek to be unified in their belief structure and remain a part of an "in-group" (Stangor, et al., 2003; Stangor & Leary, 2006). The media plays a key role in influencing these perceptions among a variety of

stakeholders including customers, public policy makers and the public at large (Deephouse, 2000; Pollock & Rindova, 2003). This next section discusses how the media, play a key role in creating these perceptions.

Recently, the use of media has been shown to influence public opinion by providing informational signals about legitimacy and perceptions concerning issues at firms (Fombrun & Shanley, 1990; Pollock & Rindova, 2003; Zavyalova et al., 2012). Whether it's for a firm, industry or novel technology, the media plays a role in shaping social perceptions and influencing public opinion (McCombs, 1981; McCombs & Shaw, 1972; Westphal & Deephouse, 2011). When the mass-media chooses to cover a topic - it frames it either positively or negatively, (McCombs, 1981) which creates social perceptions about quality, legitimacy, reputation and value. Hayward and colleagues (2004) showed how the positive coverage contributed to the celebrity status of CEOs. This process of relying on the media and outside infomediaries to assist in perception formation reduces ambiguity, uncertainty and riskiness resulting in a more favorable impression about the firm, product or technology (Anand & Peterson, 2000; Heath & Tversky, 1991; Pollock & Rindova, 2003). Taken together, the media actually creates collective social perceptions (McCombs, 1981) which influence "in-group" evaluations of novel technologies and acceptability. These social perceptions can lead to the creation of value for the firm as sociocultural factors begin to impact stakeholders' behavior and the decision to adopt the technology. In Deephouse (2000), the positivity of the media coverage played a role in producing higher financial returns for banks. Thus we can conclude that the media plays an important part in the sociocultural market.

Harnessing the power of media coverage can provide a competitive advantage for new firms entering the market. Westphal and Deephouse (2011) examined the interpersonal

influence of firm CEO's on key information intermediaries revealing that internal resources can influence firm reputation and other social approval assets. Again, invoking research from the resource-based view, the ability to control the perception formation of your firm or product is a valuable resource for the firm (Barney, 1986; Wernerfelt, 1984). "The firm's ability to influence media coverage can be consequential for how the firm manages stakeholder impressions and their approval of firm actions" (Zavyalova et al., 2012:8). Firms engage in strategic actions in social markets by attempting to influence media coverage through the submission of information subsidies in the form of press releases (Kennedy, 2008; Rindova, Pollock & Hayward, 2006; Westphal & Deephouse, 2011). Through the use of these *"information subsidies",* prepackaged written pieces of information about firms' activities (Rindova, Pollock & Hayward, 2006: p. 62), firms can influence how and when the media covers and frames their firm specific information. Press releases are sent to the media when an organization wants publicity. "Press releases are a standard tool for soliciting the attention and legitimation that media coverage brings to new products" (Kennedy, 2008; p. 274). We see this same effect in the venture capital community. New firms seeking to provide cues of legitimacy to the venture capital community rely on the inclusion of certain information about their firms to achieve funding (Kirsch, Goldfarb & Gera, 2009). The literature has begun to expose the effects of these subsidies on performance in the strategic literature (Rindova, Pollock & Hayward, 2006; Westphal & Deephouse, 2011; Zavyalova et al., 2012). While it is easy to understand why firms would engage in these social market strategies with the media, it is important to understand why these independent third party objective purveyors of information would use biased "press releases" produced by the firm to influence their coverage.

Drawing from social exchange theory helps explain why the media provides specific coverage about a firm or its technology. Publishing involves the investment of many hours of journalistic fact finding in order to continue to write and publish articles of interest for the readership. With deadlines to meet, journalists rely on being provided information by private sources and access to employees for the generation of new articles (Kennedy, 2008). The journalists also seek quotes from "experts" that validate points in their articles (Shoemaker & Reese, 1996). The media receives benefits such as access to information which facilitates the job of the journalist, access to corporate executives and prewritten information packets. Thus an exchange happens whereby the firm provides information and access and the media provides coverage. This happens for several reasons. First, psychology research reveals that a moral and social obligation for returning a favor exists in the relationship between firms and the media (Cialdini & Goldstein, 2004). If firms provide access to information and executives at a firm, the media will feel obligated to provide coverage on their behalf. This feeling of reciprocity generates actions by the media with hopes of increasing the likelihood of access to information in the future. Second, both the firm and the media outlet seek to maintain a positive relationship in order to satisfy their individual goals (Emerson, 1976). The firm's action in the exchange relationship includes providing information about the firm and access to corporate executives (Westphal & Deephouse, 2011). In return, the media utilizes these press releases and provides increased amounts of media attention and positivity of tenor of the coverage (Deephouse, 2000; Pollock & Rindova, 2003, Zavyalova et al., 2012). As reasoned above, the firm benefits by receiving a greater volume of coverage which results in familiarity, salience, legitimacy, reputation building and value creation.

Extant literature has shown that journalists can influence firm performance (Westphal & Deephouse, 2011). Thus, I argue that a firm can take an active role in the formation of impressions in the sociocultural segment by engaging in a social market strategy of influencing the media through a social exchange process. Formally stated:

> *Hypothesis 1: An increase in social market strategic actions dedicated to influencing media coverage has a positive effect on the adoption of a technological innovation.*

The mass-media exposure provides the most rapid form the diffusion of information available (Rogers, 1962). Firm actions directed at influencing the media result in an increase in the coverage of information regarding the firm. It is the articles about the firm or technology which builds a familiarity and salience. This information facilitates the process of stakeholder perception formation, legitimacy, uncertainty reduction and value creation. This mediation process model has been included as Figure 8. Therefore, I predict that the effects seen on technological innovation adoption change rates are the result of media provided attention more than the strategic actions themselves. I hypothesize:

> *Hypothesis 2: Media attention mediates the relationship between media influencing social market strategic actions and the adoption of a technological innovation.*

Political Segment & Corporate Political Activity.

The political segment of the general environment represents an arena where laws and regulations govern interactions between corporations and their environment (Holburn & Zelner, 2010; Oliver & Holzinger, 2008). The laws created in this arena govern firm behavior and affect firm actions. These laws can include antitrust regulations, industry deregulation, employment issues, environmental concerns, free trade and taxation policy. For instance, the Sarbanes-Oxley

Act of 2002 is a set of standards developed in the political segment governing all publically traded companies. This regulation altered firm actions such as corporate board responsibilities, auditor independence, and additional financial disclosures among other restrictions. This act caused firms to behave differently via their corporate governance mechanisms; subsequently, affecting firm profitability.[15] With the political markets playing a role in the economic survival of firms, researchers have found that firms that are highly dependent on the government regulations tend to be more politically active (Bondardi, Hillman & Keim, 2003). Firms invest resources into this arena in order to play a role in the development of these policies. Therefore, firms have developed political strategy and political capabilities in order to shape policy outcomes for their own benefit (Bonardi, Holburn & Vanden Bergh, 2006; Holburn & Zelner, 2010; Holburn & Vanden Bergh, 2008; Oliver & Holzinger, 2008). This political strategy is known as corporate political activity or CPA. Building on research concerning the influence of *Corporate Political Activity or CPA*, corporation's attempts to shape government policies in ways favorable to the firm (Baysinger, 1984; Hillman, Keim & Schuler, 2004), this work empirically examines the effectiveness of a firm's strategies on technological innovation adoption. I provide a more detailed picture of the dynamic inter-relationship between the resource-based view (innermost shell) and the environmental perspective (outermost shell). Figure 2 presents the process model which will be investigated and tested in this essay.

The public policy literature provides a rich source of research investigating corporate political strategy and its effect on public policy (cf. Arnold, 1990; Austen-Smith & Wright, 1994; de Figueiredo & Edwards, 2007, de Figueiredo & de Figueiredo, 2002; Milbrath, 1963; Moe 1980). Firms engage in corporate political activity actions to affect the public policy

[15] Results from an FEI 2007 survey indicated that the average cost of compliance with the Sarbanes-Oxley act was $1.7 million for firms with average revenues of $4.6 billion.

environment in a way favorable to the firm (Baysinger, 1984), by seeking to influence or manage a variety of stakeholders, the general public, suppliers and political entities (Baron, 1995; Hillman, Keim & Schuler, 2004; Lux et al. 2011). This is typically accomplished through lobbying (deFigueiredo & Tiller, 2001), campaign contributions (de Figueiredo & de Figueiredo, 2002) and contributing to industry political action groups and trade associations (Schuler, Rehbein & Cramer, 2002). Firms engage in CPA in order to accomplish two primary purposes: 1) influencing the creation of legislative changes (deFigueiredo & Tiller, 2001; Hillman, Keim & Schuler, 2004) and 2) the creation of economic benefit for the firm (Bonardi, Hillman & Keim, 2003; Bonardi et al., 2006; Capron & Chatain, 2008; Holburn, 2001; Oliver & Holzinger, 2008; Shaffer, 1995).

It may be helpful to picture the components of a political market between the firms and policy makers as a market of supply and demand (Bonardi et al., 2003; Bonardi et al., 2006; Hillman & Keim, 1995). The firms represent the demanders looking for changes in public policy that will provide economic benefit to the firm. Public policy makers are the suppliers providing legislation changes that will open up opportunities for firm profitability. The demanders use their resources such as campaign contributions, constituent votes and information subsidies in order to persuade the suppliers to supply favorable policy. The suppliers, politicians in this case, value the financial resources and votes necessary for their reelection (Mueller, 2003). In return, the suppliers exchange the creation of beneficial policy for the firms. "The high investment made in lobbying and the high return to lobbying, lend credence to the argument that there is an important empirical justification for believing that lobbying can have a large impact on policy outcomes" (de Figueiredo, 2002; p 6.). Influencing the legislative changes is the first step in the process.

Influencing Legislative Changes

Firms implement political market strategies in order to create market opportunities for their firms. In industries regulated by government, the government serves as a key nonmarket stakeholder that has an impact on competition in the market. We see this effect in industries that are strongly affected by macro economic policies (Getz, 1997; Stigler, 1971). In line with existing theoretical literature, actions in the political markets heavily influence the market strategies and the development of these business opportunities (Bonardi, et al., 2003). This phenomenon is witnessed in multiple industries that are regulated by government interaction. It is extremely salient in highly regulated industries. As firms seek to influence beneficial legislative change and legislators seek to remain in office, we see a social exchange form among the participants.

Policy makers need money to run their election campaigns. Over the past 5 election cycles, campaigns for President, Senate and House candidates have spent over $18 Billion.[16] The business sector is all too anxious to provide campaign contributions to these policy makers. In 2010, the finance and insurance sector contributed $318 BB to campaigns, the health care sector contributed $146 BB and the energy sector - $75BB (Opensecrets.org, 2012). By investing monetary funds into the campaigns of elected officials (Baron, 1996; de Figueiredo & Edwards, 2007) and engaging in lobbying actions (Baron, 2004; de Figueiredo & de Figueiredo, 2002; de Figueiredo & Edwards, 2007; Hillman & Keim, 1995; Lux et al., 2011), corporations with private interests can influence beneficial legislative policy decisions that will help the industry at large. For example, Baron (1995) places the total contributions of the energy sector

[16] Opensecrets.org is a non-profit organization that tracks federal, state and local spending. Campaign spending includes: 2010 $3.648 BB, 2008* $5.285 BB, 2006 $2.852 BB, 2004* 4.147 BB & 2002 $2.181 BB (* indicate a Presidential election year)

to candidates in the 2000 election at $21.6 MM. In return, the Department of Energy values the subsidies provided by legislation for the sector in 1999 at $1.7 BB (Baron, 1995: 2).

Drawing from social exchange theory, both the firm and the policy makers seek to maintain a positive relationship in order to satisfy their individual goals (Emerson, 1976). Individual firms exchange financial political contributions for votes towards favorable policy, thereby, maximizing their self-interests (Shaffer, 1995). These firms engage in CPA in order to pursue their self-interests, create value for their particular firm and gain private benefits (Olson, 1965). In return, politicians typically exchange policy favors for these resources which will increase their electoral prospects (de Figueiredo & Snyder, 2002; Bonardi et al., 2006). Therefore, in an attempt to gain critical campaign financial resources, these elected officials will accept campaign contributions and become influenced by lobbying efforts in order to preserve their individual government positions in future elections. Similarly, firms engage in local level corporate political activity to benefit their individual firm objectives.

This is particularly prevalent where firms engage in activities in heavily regulated industries. Resource dependency theory suggests that corporations that rely heavily on the burdens imposed by public policy will engage in corporate political activity (Hillman et al., 2004; Schuler, 1996). In this case, favorable public policy is the resource firms require to compete in the market (Porter, 1981). Once public policy benefits have been achieved, firms will exploit these resources in order to maximize their position in the market and obtain a competitive advantage (Barney, 1986; Porter, 1991).

Therefore in proposing why individual firms will engage in certain local corporate political activity, I submit:

> *Hypothesis 3: An increase in corporate political activity will increase the probability of beneficial policy changes for that firm.*

Firm level affects

While research on changes in legislation is actively produced in the public policy domain, there is a paucity of research regarding the relationship of these political strategies and their effects on firm level performance (Bondardi et al., 2006; Getz, 1997). Some of the existing research on the performance effects of firms engaging in CPA include making corporate interests known to policy makers (Keim & Baysinger, 1988), reducing costs (Kaufman, Englander & Marcus, 1993), minimizing competition and increasing firm control (Getz, 1993) and recreating the competitive landscape (Bonardi et al., 2006). I acknowledge that this limited supply of literature supporting the assumption that firms engage in corporate political activity in order to obtain increased firm performance is a cause of concern.

Stigler's (1971) theory of economic regulations draws upon several reasons why firms engage in CPA. First, as argued above, the government can provide a direct subsidy of money. With the example provided concerning renewable energy, the Federal Production Tax Credit allows the industry to compete with other non-subsidized energy producing industries. This creates a negative affect for substitute products such as oil, natural gas, wood and coal. These benefits apply to the entire renewable energy industry and are viewed as industry level benefits. In order for firms to directly benefit from CPA, I invoke social exchange theory to explain the process.

The results of the exchange of financial resources and public policy provide economic benefits to the firm in the form of increasing opportunities in the market subsequently affecting firm performance. Firms engage in both short and long-term contribution strategies by investing financial resources to campaign contributions and lobbying efforts targeted at influencing regulatory outcomes (Austen-Smith, 1993, 1995). The goal of engaging in these activities is for

the public policy changes to have in impact on market level strategic decisions involving resource availability, limitations of competition or increases in demand conditions (Bonardi, et al., 2006). For example, de Figueiredo & Silverman (2006) measure the returns provided by lobbying by tracking the amount of educational earmarks received by universities due to their lobbying of the Senate Appropriations Committee. The increase in earmarks represents additional resources received by a specific university as a result of influencing regulatory legislators. They found that the returns on the investment of lobbying efforts at the university were 11-36 times the expenditures for the activity (p. 30). Given the difficulty of measuring performance outcomes and corporate political activity, these authors have taken a broad approach towards providing the practical application of engaging in these strategies.

As proposed by resource-based view scholars, corporations carefully select how to allocate their resources in order to maximize their returns. They invest in political markets by allocating firm resources to these political activities when these political activities generate higher returns than using these same resources invested in other activities (Lux et al. 2011; Williamson, 1981). When it comes to creating value for the firm, CPA is evaluated using the transaction cost approach to resource allocation (Williamson, 1981). This is accomplished by increasing access to opportunities (de Figueiredo & Silverman, 2006) or reducing the opportunities of competitors in the market (Capron & Chatain, 2008). Firms engage in the political markets in order to assist them in increasing their access to opportunities.

Firms that are prepared to take advantage of these opportunities can gain competitive advantages by being the first mover in that market (Lieberman & Montgomery, 1988). This results in two benefits for the focal firm. First, these firms can gain immediate economic benefits from the changes in policy by being prepared to capitalize on such changes. Second,

focal firms can preempt other competitor from entering the market by capturing the first mover advantage. While outside of the prevue of this investigation, firms that can capture the property rights of land in developing areas of wind generation are likely to obtain a competitive advantage over other competitors. When it comes to property rights, this preemptive action can buffer a firm from competition by controlling the specific assets (Capron & Chatain, 2008). These reasons support the assertion that CPA has a direct impact on firm performance through a variety of mechanisms.

In sum, firms commit resources to corporate political activity as a calculated strategic activity intent on creating value for the firm by providing economic benefit. Stated more formally I submit the following hypothesis:

> *Hypothesis 4a: An increase in corporate political activity will increase the likelihood of technological innovation adoption.*

While the underpinnings of corporate political activity as an influencer on firm performance has been explicated above, it is the public policy itself has also been shown to predict changes in firm performance (Bonardi et al., 2006; Carpon & Chatain, 2008; de Figueiredo & Silverman, 2006). Therefore, I predict that the effects seen in the increased probability of technological innovation adoption changes are the result of the policy changes more than the corporate political activity itself. Figure 7 highlights the mediated process between corporate political activity and technological innovation adoption through regulatory policy changes. I hypothesize:

> *Hypothesis 4b: Policy changes will mediate the effects of corporate political activity on the likelihood of technological innovation adoption.*

Alignment of stakeholder interests.

As levels of environmental turbulence and change are elevated, the need for a framework that deals with multiple stakeholders has emerged. Contemporary stakeholder theory defines stakeholders as "any group or individual who can affect or is affected by the achievement of the firm's objectives" (Freeman, 1984:25). We know from extant research that strategic stakeholders can affect the firm and that their interests must be managed (Donaldson & Preston, 1995; Freeman, 1984; Jones & Wick, 1999; Rowley, 1997; Rowley & Moldoveanu, 2003). These stakeholders include participants from several sectors of the general environment including the media, public opinion consumers, customers, advocacy groups, employees, shareholders and the government. As proposed by Donaldson & Preston (1995), the firm engages in individual relationships with each of the various stakeholders, identifying, analyzing and addressing pertinent issues to each of these groups (Mitchell, Agle & Wood, 1997; Rowley & Moldoveanu, 2003). Firms must be able to manage the interests of these groups in order to achieve their goals more successfully (Freeman, 1984; Frooman, 1999; Rowley, 1997). More specifically, firms that can successfully contract with *all* of their stakeholders will have a competitive advantage over firms that do not (Jones & Wick, 1999). While the stakeholder management literature is abundant, a framework for managing multiple stakeholders simultaneously has yet to emerge.

Donaldson and Preston (1995) proposed a two-way interaction between the firm and the stakeholders whereby each party receives some benefit from the interaction and firms need to manage potential conflict stemming from divergent interests and constituent groups in order to maximize their performance (Freeman, 1984: Frooman, 1999). We see examples of the application of social exchange theory to stakeholder theory. Rowley (1997) expanded our

understanding of stakeholder theory by proposing a theoretical model which discusses the interconnectedness of stakeholders in the model. While these various stakeholder groups operate independently, they are embedded directly and indirectly within interconnected networks of relationships with each other and with the focal organization (Frooman, 1999; Rowley, 1997). This creates a complex problem of managing multiple interests simultaneously. Firms capable of building a *collaborative stakeholder relationship* as part of their business strategy will be a defining characteristic of successful companies.

Extant research convincingly makes the case that stakeholder management is an important factor in a firm success. Using qualitative criteria, firms need to identify who and what really counts. Using the criteria proposed by Mitchell, Agle & Wood (1997), those stakeholders that possess power, legitimacy and urgency are worthy of stakeholder management. These authors go on to emphasize the importance of two particular groups worthy of management, social and political groups. Therefore, using Mitchell, Agle and Wood's criteria, the interests of both of these groups needs to be managed simultaneously. To my knowledge, no studies have been done which investigate the alignment of these multiple stakeholder interests.

The government policy makers provide beneficial legislation to the focal organization and these elected officials receive campaign contributions in return (de Figueiredo & Edwards, 2007). The media provides media attention for the technology and favorable coverage in return for information subsidies and corporate access (Rindova et al., 2006; Westphal & Deephouse, 2011). I argue that when the interests of these stakeholders are aligned with the objectives of the firm, the firm will realize an increase in the likelihood of having their technological innovation adoption at a rate greater than firms that do not engage in multiple stakeholder alignment. Stated more formally:

Hypothesis 5: The interaction of beneficial regulatory policy change and positive media attention will produce higher levels of technological innovation adoption compared to firms not pursing this alignment.

METHODOLOGY

Research Setting: US Wind Energy Industry

I am testing my hypothesis using data from the United States wind energy industry from 2000 to 2009. Renewable energy initiatives are an appropriate context for this study for several reasons. First, these initiatives have a strong social construction of markets element. The greening technologies field is an emerging industry and currently lacks an identity (Bansal & Roth, 2000; Forbes & Kirsch, 2010; Russo, 2003; Samdahl & Robertson, 1989). Therefore, there are strong sociocultural driving forces that have been influencing its legitimacy and value. The media are important at forming initial perceptions in this emerging industry. Second, renewable energy has relied on political regulatory policy for its survival since its inception (Adelaja & Hailu, 2008; Gipe, 1995). Macro level economic public policy has been a major driver of this industry. The federal production tax credit and the renewable portfolio standards have leveled the competitive landscape with "dirty" fuels since the inception of the tax credit in 1992. Therefore, this industry is ripe with opportunity to study lobbying, campaign contributions and other corporate political activity. Third, due to its nascent status of this industry, stakeholders and social movements are jockeying for control in the renewable energy industry (Sine, Haverman & Tolbert, 2005; Sine & Lee, 2009). Accordingly, management and strategy scholars have recently been using the wind energy industry as a research context for investigating emerging industries, social movements, entrepreneurship and the social implications that affect and influence the adoption of these technologies (Russo, 2003, Sine &

David, 2003; Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). Finally, this emerging industry is going through major changes. Over the past 20 years, 32 of the 50 states have enacted legislation governing renewable portfolio standards in their states. Media coverage of renewable energy is at an all-time high and the public acceptability over the exploitation of this technology remains undecided. Therefore, the wind industry allows me to study how firms attempt to influence both political figures and the media and how this influence can ultimately affect the rate of adoption of an innovation.

In order to study the dynamic nature of firm influence on non-market actors and the process of constructing meaning of novel technologies, I use a variety of samples, subsamples and methodologies in this essay. First, I developed a longitudinal panel using a wide range of sources. To maintain accuracy, I collected data on *all* wind projects either proposed or commercially operation during this period through the American Wind Energy Association (AWEA). AWEA, a non-profit organization which promotes wind energy as a clean source of electricity, tracks up-to-date information on a variety of aspects for all proposed and operational wind farms. Through a membership arrangement with AWEA, I accessed the complete list of wind farm projects from their database. Where appropriate, I verified AWEA information using wind developers websites and company press releases. I further supplemented this information with articles in periodicals and other wind farm directories in order to construct a complete panel dataset. The database includes all wind development projects from 2000-2009, for which I tracked information on corporate political activity and attempts to influence the media made by development firms.

I chose the decade from 2000 to 2009 due to the rapidness of growth of the wind industry in the United States during that time. Figure 9 highlights the history of wind farm installation

capacity since 1990. The chart clearly shows the rapid proliferation of the industry beginning in 2000. The period of 2000-2009 was also a period of expansion for new wind farm proposals and the number of new wind generating plants providing commercial energy into the power grid. Figure 10 shows the rates of both proposed and installed wind generated power plants by year across the Unites States from 2000-2010. Accordingly, I drew my sample for this research project from the decade which included the largest amount of proposal and installation activity (2000-2009).

Sample Construction. In order to construct the sample, I collected information from various data sources included the lobbying tracking database provided by the Center for Responsive Politics via their interactive website known as *"opensecrets.org"*, the State political contributions database known as the Institute of State Politics via their website known as *"followthemoney.org"*, the American Wind Energy Association (AWEA), the Department of Energy (DOE), the U.S. Census Bureau, the Database of State Incentives for Renewable Energy (DESIRE) and Lexis/Nexus. Since I am testing a variety of hypothesis at different levels of analysis, multiple sample sets had to be constructed.

In order to construct this sample, I needed to identify all of the wind power developers that had developed projects in the United States and all of the wind projects themselves. First, using a database from AWEA, I identified a list of 628 operational wind projects and 361 proposed wind projects. This was a comprehensive list of wind farms beginning with projects installed in 1970 through those proposed by May 2011. AWEA's information is considered by industry experts to be one of the most complete lists of installed and proposed wind farms available and has been used in academic work on renewable energy as well (Bird et al., 2005;

Sine & Lee, 2009). AWEA's information on installed wind farms included complete information regarding project name, amount of electricity, developer and location information among other important key factors. This provided me with a master list of both proposed and installed wind projects across the United States. Several subsets of data were taken from this master panel to test various hypotheses. A longitudinal panel data on 390 proposed or commercially operational wind farms in the United States observed between 2000 and 2009 was used.

As some proposed wind farms are being tracked by AWEA well before any filings with the Federal Energy Commission activities, some of the information contained in this database lacks project name or proposed capacity. This information is important to this study as my unit of analysis is project level adoption. Of the total proposals, 51 of the proposed projects in the database lacked this information and were removed from the dataset.

For your convenience, a visual breakdown of the complete dataset construction has been attached as Table 3.

A wind project can consist of a single wind turbine located on a residential property or a 600 turbine mega-farm producing commercial renewable energy. Individual wind projects ranging from 1 turbine to 8 turbines used for residential purposes which are not supplying electricity into the electrical grid have less stringent zoning requirements and subsequently require minimal community and political input in order to receive approval (Gipe, 1995). Referring to AWEA's definition of a *Wind Power Plant*, a commercial wind farm generates in excess of 20 MW of electricity which it sells into the electricity grid (AWEA, 2009).[17] As of May 2011, AWEA had records of 368 commercially operational wind power plants generating over 20 MW of electricity and 255 proposed wind power plants in the United States that meet

[17] Proposed projects with less than 20 MW account for 517.51MW of the total proposed 62135.87 MW (.00833).

this criteria. The focus of my study is on commercial wind projects which require both community and political input for their adoption, projects producing less than 20 MW have been removed from the sample.

As illustrated previously, wind energy has seen its largest period of proliferation between 2000 and 2009. Accordingly, the sample was gathered from 10 years of data on projects from the years 2000 through 2009. In order to meet the qualifications for this sample, projects had to have been proposed after January 1, 2000. I began by removing projects that were commercially producing electricity prior to this date. Next, I conducting a search on Lexis/Nexis for each of the remaining projects to determine when the first article was published or press release was made announcing the project to the general public. Additionally, I cross referenced a sample of projects with the Federal Energy Regulatory Commission (FERC) filings to supplement these findings and found near perfect correlation (0.97) between the press release announcements and the FERC filing years. Of my original sample, 41 projects with wind generation of greater than 20MW were either already operational or proposed prior to this sample period beginning January 1, 2000. This included 30 projects from California, 4 projects from Texas, 3 projects from Iowa, 2 projects from Wyoming and 2 projects from Minnesota. These observations were dropped from the sample leaving 356 operational and 247 proposed wind power plants.

I wanted to limit the potential effects of right censoring of my data. As this study investigates the effects of a firms influence on achieving commercial viability of their innovations, it was important to allow each wind power project ample time to become commercially operational. Through a number of conversations with wind power executives, data analysts at AWEA, wind association representatives and academic investigators of wind energy, I ascertained that the average production time required for a wind farm to become operational

after approvals have been granted is approximately 12 months[18]. Since the sample gathered was being right censored at December 31, 2009, I removed all projects that were proposed in the period from January 1, 2009 to December 31, 2009. This resulted in a reduction of 20 proposed wind power plants leaving 227 proposed wind plants in the sample.

On occasion, wind farms are implemented in multiple phases. For instance, Grand Ridge Wind Farm in Illinois received the approvals for all three phases of the development during the initial project evaluation. As the subsequent phases of Grand Ridge were constructed, no further approvals were required from the zoning board or the community at large. The media impact and political wrangling for the approval of all phases of the Grand Ridge Wind Farm happened prior to the implementation of the first phase. As the purpose of this study is to evaluate how both social factors such as market sensemaking and the influence of political actions affect the likelihood of the adoption of a new and novel technology, I am seeking to measure the initial reaction by the market and local politicians to information specifically related to the specific project announcements in order to investigate how this information influences their decisions to support the approval of the wind power plant. Therefore, I removed all projects that were termed, "phase II" or higher or "expansion" in the project name. This resulted in a total reduction of 117 wind power plants including 94 operational and 23 proposals from the sample (see appendix). Following this adjustment, the sample stands at 272 operational and 204 proposals.

This manuscript uses a Cox proportional hazard model to test both the probability that a wind farm will become operational and the time it takes from the date of announcement to commercial operation. In order to track the date of announcement, I identified this date by the

[18] I want to acknowledge the help of General Electric Energy Solutions, Philip Warburg and the Renewable Energy Alliance of Landowners for their knowledge and assistance in understanding the siting and construction process of wind energy power plants.

earlier of one of two methods. First, in keeping with traditions of prior wind power research (Sine & Lee, 2009) I tracked entry of proposal using the required Federal Energy Regulatory Commission (FERC) *Notice of Intent* filing form for firms producing electricity and selling it across state lines. Additionally, I tracked the date upon which the first news article appeared in any newspaper across the United States. Of the remaining sample of 445 wind projects, 32 installed wind power plants and 23 proposals tracked by AWEA did not have either a FERC *Notice of Intent* or any media coverage. Unfortunately, without this information, it was impossible to track when the project would have been announced and these projects had to be dropped from the sample.

The resulting sample included a total of 390 wind power plant projects of which 218 were operational and 172 were in the proposal phase. The summary of this sample construction is included as Table 3.

Dependent Variable

The objective of this research is the application of social and political market strategies and their subsequent effect on the adoption of an innovation. I use several dependent variables in this study. The first dependent variable is *technological innovation adoption*. Also included in the dependent variable set is the mediating variable, *media attention*. This variable becomes a dependent variable in the mediated model (Baron & Kenny, 1986; MacKinnon, 2004). I use the *renewable portfolio standard* as the dependent variable in the study of political market strategies. This represents a local level of engagement in which firms can have a direct impact on local legislation and on their performance.

Technological Innovation Adoption. To capture technological innovation adoption, I measured the probability and speed that a wind farm project will become commercially viable. This is operationalized from the time of its announcement to when it first provides electricity into the power grid. I created a dichotomous variable to measure the date upon when the wind power project was "adopted" by the community and a date upon which the project was "announced".

As for the announcement date, I used a variety of methods to track this information. As have a number of past researchers studying emerging technology, firms or segments of the energy sector (Russo, 2001; Sine, Haverman & Tolbert, 2005; Sine & Lee, 2009), I used information from the Federal Energy Regulatory Commission filing date as a method of coding the date of announcement. Under Section 210 of the National Energy Act of 1978 (Public Utilities Regulatory Policies Act), wind developers could construct nonutility facilities for the production of wind power in the United States (Sine & Lee, 2009). Part of the requirements for satisfying these new regulations included the filing of a *Notice of Intent* with the Federal Energy Regulatory Commission, the first step in proposing a commercial wind farm. In accordance with prior research (Russo, 2001; Sine & Lee, 2009), this information provided a starting point to track viable wind farms. Then, I cross referenced the complete list of operational wind farms using the AWEA database. The AWEA database provided a more complete set of operational wind farms that were not located on the FERC database. In evaluating the differences, I found that FERC filings only accounted for wind farms that would be selling power across state lines. Therefore, I deferred to the AWEA database as it provided a more thorough list of operational projects and better represented the study of actual innovation adoption in our study. The AWEA information included the quarter and year that the wind farm was brought online.

Finally, using the Lexis/Nexis database, I located the original press releases submitted by the project developers and the first article written in the media as determinants of announcement data. Research in finance and accounting has used the first date of publication in the Wall Street Journal as the date of announcement for tracking everything from stock behavior and board of directors' reactions to managerial motives and turnover. First, I tracked the first quarter and year that the first article was published or press release was made concerning a specific wind project. This was accomplished by searching the Lexis/Nexus database using the keywords of the particular wind project name across all newspapers published in the United States. I was careful to search for both the terms "project" and "farm" in the name of the wind farm as coverage differed depending on the source. For example, some newspapers referred to the "Grand Ridge Wind Farm" and others referred to this same project as the "Grand Ridge Wind Project". Finally, I coded the quarter and year that the first article was published. I found an extremely high correlation between the dates of the press release and AWEA (0.97), and subsequently was able to construct a fairly robust announcement date.

As for the "adoption" date of when the project became commercially viable, I drew from prior literature in energy policy. Market acceptance has been categorized in energy policy journals as the date on which the plant becomes commercially viable (Gipe, 1995, Neij, 1997; Wolsink, 2007) and accordingly, this dichotomous variable received the value of "1" on the date that it was officially providing electricity in the grid, and "0" otherwise. This information was tracked primarily using the date included in the American Wind Energy Association database but was verified by cross referencing the press release from the wind project developers. Again, I found very high correlations of these sources with the AWEA database.

Media Attention. To examine how the media reacts to the submission of firm information subsidies, I followed prior research by tracking the number of articles being written about the event as a measurement of coverage (Deephouse, 2000; Jonsson & Buhr, 2011; Pollock & Ridova, 2003; Rinova et al., 2007; Zavyalova et al., 2012). Since the media transmits information to audiences, affects cognitive processes, facilitates comprehension and influencing the liking of the innovation, the mere exposure of media provided information may have an influence on their performance (Zajonc, 1968).

As has been done in prior literature, I measured media attention by performing a numerical count of the total number of articles concerning each wind project written during the period from when it was first announced through when either the project became commercially viable or the sampling period ended (Deephouse, 2000; Pollock & Rindova, 2003). Newspaper articles, whether received digitally or in-press, are a primary source for the public to obtain information. Stempel (1991) found that 67.3% of participants in a nationwide survey claimed to get their news about local businesses from the local newspapers (see also Deephouse, 2000; Palmgreen & Clarke, 1977). In a recent survey by Nielsen Ratings done in 2011, content in newspaper articles ranked as the third highest trusted source of information after recommendations by friends and consumer opinions (Nielsen Global Trust in Advertising Survey, Q3, 2011)[19]. Therefore, I believe that newspaper articles, especially local publications, are a great method for understanding what information stakeholders are being exposed to and how this media attention could shape stakeholder perception concerning a new technology. I queried Lexis-Nexis for the project name using their databases for all local and national news publications. Again, I was careful to search for both the terms *"project"* and *"farm"* in the

[19] This survey was conducted on 28,000 internet respondents in 56 countries. Newspaper content was seen as more trustworthy than television, magazines and radio. However, this survey was conducted in the context of advertising as opposed to the influence of news content.

name of the wind farm as coverage differed depending on the source. First, articles were collected on each individual wind project for entire sample period yielding a total of 2,675 articles. Next, the articles were separated out by project and then by quarter to fill in longitudinal panel data for articles per project-quarter. In situations where projects had not yet become adopted, I counted articles until the end of my sampling period: December 2009.

Regulatory Policy Change - Renewable Portfolio Standard. Similar to my measure of regulatory policy change at the federal level, I measure state level policy change as the month and year that legislation enacting a *Renewable Portfolio Standard* was put into place in each state. Specific to the renewable energy sector, I followed prior research in energy policy suggesting that the State-level renewable portfolio standard is the best theoretically and empirically useful tool for stimulating the proliferation of renewable energy (Bird et al. 2005; Fershee, 2008; Wiser, Bolinger & Barbose, 2007; Yin & Powers, 2010).

A Renewable Portfolio Standard (RPS) is a state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date (US DOE, 2010). It provides states with a mechanism to increase renewable energy generation using a cost-effective, market-based approach that is administratively efficient. [20] Currently, 32 of the 50 states have renewable portfolio standards of varying degree in place. To track the initiation of this legislation, I used a comprehensive source of state, local, utility and federal incentives program database known as the Database of State Incentives for Renewables & Efficiency (DSIRE) to track the enactment of the various renewable portfolio standards across

[20] Information regarding the definition and state renewable portfolio standards was gathered through the US Department of Energy and the Environmental Protection Agency.

all states. [21] Table 4 shows the comprehensive list of states with an RPS in place, the conditions of the RPS and the date on which the legislation for the RPS was enacted.

To test Hypothesis 4a and parts of the mediated model in Hypothesis 4b, my dependent variable was the State's *renewable portfolio standard.* I operationalized the regulatory outcome of RPS for state specific policies by including a dichotomous indicator variable for states with renewable portfolio standards. Because of the precision of this information I was able to track the month and year that RPS became enacted in each state across the 10 year sample period. As indicated in Table 4, all but 3 states enacted this legislation during the sample period providing an appropriate time period to study this phenomenon. In testing hypotheses using the state RPS, these three states were dropped from the sample resulting in a reduction of sample size by 13 wind project.[22]

Independent Variables

Information Subsidies. I measure firm actions that attempt to influence media coverage by counting press releases made by each developer. Firms supply the media with prewritten packets of information concerning facts about their product or actions (Westphal & Deephouse, 2011; Kennedy, 2008; Rindova & Pollock, 2006). These subsidies take the form of press releases sent by the firm to the various media outlets. Extant research has shown that the media uses information as provided by press releases as a source in their reporting (Carroll & McCombs, 2003; Kennedy, 2008). These press releases are viewed as information that is

[21] DSIRE is funded by the US Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE), primarily through the Office of Planning, Budget and Analysis. The website is administered by the National Renewable Energy Laboratory, which is operated by the Alliance for Sustainable Energy, LLC.

[22] The states that had renewable portfolio standard in place prior to January 1, 2000 included: Connecticut – 4/29/1998, New Jersey – 1/1/1999, Wisconsin – 4/28/1998. This resulted in the loss of 13 projects of the 390 in the master panel.

important to the firm and will be used by the media to cover actions of the firm (Carroll & McCombs, 2003). Thus, firms issuing press releases are taking a proactive approach to seeking media attention and influence the coverage about their firm or product. Firms thus engage in the exercise of issuing press releases in order to provide information to the social market about their technological innovation. This action is geared toward facilitating the adoption of the new technology.

Employing technique from the prior literature for tracking press releases, I use the Business Wire and PR Newswire Database, two leading sources for press releases (Zavyalova et al., 2012). For the 390 wind projects in the sample, 2,312 press releases were made by wind project developers concerning these projects. Press releases are great sources of information to measure influence that firms exert on the media. These written packets of information highlight the positive aspects of the firm or product (Kennedy, 2008). I operationalize these information subsidies as a continuous count variable. Using the software Lexis-Nexis to track press releases from the Business Wire and PR Newswire databases, I created a measure of quarterly project press releases.

Corporate Political Activities. To measure the amount of corporate political activities that firms engage in, I used a common measure for CPA, the total amount campaign contributions firms made to various political figures (see also Austen-Smith, 1987, 1995; de Figueiredo & Edwards, 2007). Business represents the largest and fastest growing segment of financial contributions to political campaign committees (Kaiser, 2009). Because I am interested in the effects of all *corporate political activities* rather than in the effects of any single political action, I constructed a variable that captures a series of political firm actions aimed at achieving

policy influence via the access firms receive by providing campaign contributions to legislative figures (Baron, 1996; Kaiser, 2009).

Following prior research in political strategies and public policy, I obtained data on corporate political activities through campaign contributions and lobbying activities through the Institute of Money and State Politics and *followthemoney.org* (e.g. de Figueiredo & de Figueiredo, 2002; de Figueiredo & Edwards, 2007; de Figueiredo & Tiller, 2001). I included aggregated lobbying dollars invested at the federal level by each firm in the development of the explanatory variable *corporate political activities-PTC* for measuring federal level activity. I used state campaign contributions for the measurement of *corporate political activities – RPS* for testing the project level hypotheses.

To code for CPA among individual firm projects, I proceeded accordingly. I began with the list of 390 wind projects and 165 wind development companies shown in Table 2. I matched the developers to their respective projects including information about the State where the project had been proposed. I then referenced *opensecrets.org* and created a list of political contribution by each developer over the period of the sample. I then parsed out the contributions of each developer by state and by political figure. This provided me with a list of all campaign contributions made by each developer to each political candidate over each month from 2000 to 2009. I then aggregated the data to the quarterly level of contributions and aggregated the contributions in each state. This provided me with a total amount of campaign contributions made by each developer in each state over the period of the sample. On 24 occasions, wind developers had multiple projects in the proposal stage in the same state during the same period. In order to allocate the state's campaign dollars, I divided funds equally among these projects. I took the total amount of quarterly/state political contribution dollars made by that firm and

divided it by the number of projects that the firm currently had in the proposal stage in that state (*$/n)*.

Control Variables

There are many alternative explanations that could explain the results of my hypotheses. Therefore, I have created three groups of variables which will control for some of the possibilities. First, I control for local marketplace characteristics of the communities where the wind power plant is being proposed (de Figueiredo & Silverman, 2006; Kassinis & Vafeas, 2006). These controls will include demographics, political ideologies and population. The second group will control for firm specific characteristics that may explain the amount of lobbying and campaign contributions made by the firm and how active their public relations are with local media. These controls will include the experience of the firm (Hansen & Mitchell, 2000; Hart, 2001; Hillman, Keim & Schuler, 2004; Meznar & Nigh, 2003; Hillman, 2003). Finally, I try to control for the institutional ideologies of the legislative policy makers at the time of their decision. The theory of legislative control of regulatory policy explicates that legislative ideologies play a role in regulation and procedural enactments (McCubbins, 1985). This measure will control for certain political parties support for a social value creation agenda in the legislative branch.

Demographics. In an attempt to control for the heterogeneity among stakeholders in different locations and their preferences towards social value legislation, I focused on local marketplace characteristics (Kassinis & Vafeas, 2006). The decision to adopt legislation concerning greening technologies is extremely sensitive to the political ideology of the residents in these communities (Bansal & Roth, 2000; Bird et al., 2005; Yin & Powers, 2010). To account

for the possibility that local residents are driving the change in legislative policy, I include *demographics* as a control variable measured by the citizen's political ideologies. The adoption of a new technology can be heavily influenced by the political ideology of the residents of each individual state. Democratic majorities in the state legislature are significant antecedents of the state-level renewable portfolio standards being enacted and could certainly have an affect on adoption rates (Yin & Powers, 2010). Democratic majorities possess political views concerning environmental and financial policies which influence the adoption of a sensitive innovation such as renewable energy. Therefore, it is important to control for these political ideologies in my study. Using the Berry and colleagues (1998) measure for citizen political ideology, I controlled for political heterogeneity among citizen groups in the community. This is a very common measure for citizen ideology in the political literature (e.g. Berry, Fording & Hanson, 2003; Bradbury & Crane, 2002; Norander, 2001). This measure tracks the liberal-conservative nature of the constituents in a congressional district in regards to electing officials and voting on local referendums (for more information see Berry, Rindquist, Fording & Hansen, 1998). The lower the number on the spectrum, the more conservative the constituents are in their voting preferences.

Population. Another marketplace characteristic that can affect how quickly legislation is enacted or perceptions are formed is population. Prior research has indicated that population density and county characteristics often affect the location of both pollution creating energy plants (Kassinis & Vafeas, 2006) and wind farms (Russo, 2003; Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). In Russo's (2003) piece on the proliferation of wind energy as an emerging industry, he identified county zoning and land use laws as well as state population as important contributors to siting decisions. I used the same method employed by both Sine, Haveman &

Tolbert (2005) & Russo (2003) using data from the U.S. Census Bureau for 1989 and 2009 to chart state level population in millions.

Substitute Market. The existence of substitutable electricity creates a threat to the adoption of wind power as a source of electricity (Porter, 1980). Accordingly, the market for coal, natural gas and other sources of substitutable electricity could affect the adoption of wind power (Sine, Haveman & Tolbert, 2005; Sine & Lee, 2009). The price of substitutable electricity will impact the concentration of suppliers and subsequently the motivation of the market to adopt this new technology (Porter, 1980). I controlled for the prices of available substitutes using Sine & Lee (2009) variable avoided costs for the production of electricity using coal. In 2009, coal provided 45.9% of the net generation of electricity in the United States.[23] I gathered the information of the average coal price for each state between the years 1989-2009 using the United States Department of Energy, Energy Information Administration (US EIA)[24]. The average price of coal was measured at the State level in dollars/10^6 Btu.

Firm Experience. With a process as difficult as receiving community stakeholder approvals for a large-scale wind project, the learning curve for firms and experience of managers/firms can have a substantial impact on the probability of adoption (cf. Childs, 1972; Hambrick & Mason, 1984; Porter, 1980). In line with existing research, the age and experience of the firm can predict the involvement of corporate political activity (Hillman, Keim & Schuler, 2004). I "operationalized" firm experience as the number of projects that a firm has installed prior to proposal. This variable was measured as a count variable.

[23] Source: Energy Information Administration, Form EIA-923, "Power Plant Operations Report". Other sector generation included Nuclear (20.9%), Hydro (7%), Gas (22.1%) and Petroleum/Other (4.2%).
[24] Source: Energy Information Administration, http://www.eia.doe.gov/emeu/states/_seds.html ; see documentation at: http://www.eia.doe.gov/emeu/states/_seds_tech_notes.html

Institutional Ideologies. I also control for the possibility that certain legislative bodies are more prone to enacting legislation than others (Austen-Smith 1985, 1987; de Figueiredo & Silverman, 2006). In accordance with prior research on lobbying, I controlled for the majority representation in control (de Figueiredo & Edwards, 2007; de Figueiredo & Tiller, 2001) of the House of Representatives during each quarter in the sample. At the local state level, I tracked and coded the political party of the Governor of each state that the wind power plant was being proposed during the period of the sample.

I gathered data for this variable using the U.S. Census Bureau's *Statistical Abstract of the United States*. This variable had been coded as a categorical variable in line with existing research by de Figueiredo & Silverman (2006). I coded for the federal and state level. The federal coding scheme applied a zero if the majority of the house was Democrat and a one if Republicans were in control of the house. The state level coding scheme resulted in a zero if the Governor of the state was Democrat and a one if the Governor of the state was a Republican. In several instances, the Governor of the state was an Independent candidate. In these scenarios, I coded the Independent candidate as a 0.5.

Year Dummies. Finally, in order to control for possible effects of any exogenous shocks due to the economy, other potential Federal level legislation that have been proposed or the increasing trend toward the adoption of green technology, I created year dummy controls for each of the 10 years in the dataset.

Estimation Procedures

This is a longitudinal panel study consisting of pooled time series data. Proper specification of the model involves choosing the correct econometric technique for converting theory into a regression model. Therefore, selecting the appropriate functional form model

specification is the first step towards minimizing biases and inconsistencies. This is a study where the dependent variable is adoption of a technological innovation. This dependent variable provides a binary event indicator that represents a moment in time that the innovation is adopted. As such, the proportional hazard model is an ideal estimation procedure (Hellman & Puri, 2000). I contemplated using a probit regression analysis to evaluate the adoption of these wind farms. Given that adoption is a binomial response variable, the probit analysis could certainly have been instituted to test if my covariates increased the probability of project adoption. The pooled time series data included not only if the technological innovation became adopted but also the precision of which quarter and year that the innovation was adopted by the community. Prior research which included such precision of data has elected to employ the Cox proportional hazard model for their analysis (see also, Kennedy & Fiss, 2009; Rao et al., 2011; Westphal & Zajac, 1994). The concept of speed of decision making has been shown as a mediating variable between the environment and firm performance (Baum & Wally, 2003). Therefore, the Cox model allows me to maximize my findings using this precision.

In selecting this model specification, I also considered that it is a continuous-time hazard model with multiple time variant independent variables. Prior research which included such precision of data and similar variable characteristics has employed the Cox proportional hazard model for their analysis (see also, Kennedy & Fiss, 2009; Rao et al., 2011; Westphal & Zajac, 1994). These reasons supported the model specification for the Cox proportional hazard model. The Cox model is an extremely flexible model with respect to time dependence. This model is a 'survival analysis' tool which allows me to model the time it takes for the adoption of either a public policy change or technology adoption to occur. The word survival is used somewhat generically. In the management rubric, the use of survival analysis can apply to an event history

analysis, not limiting itself to actual survival. I employed a Cox proportional hazard model with year fixed effects to capture several likelihood occurrences. First, the model allowed me to test my measure of technological innovation adoption - the likelihood that a wind project would become adopted by stakeholders. It also was an appropriate test for testing the likelihood that legislation would be enacted as a result of campaign financing. I used the *stcox* procedure in the Stata statistical package (Stata, 2012).

I ran a Cox proportional hazard model to test if the covariates including information subsidies, media attention, corporate political activity and regulatory policy change explain any of variance in the rate of innovation adoption. This model has been used in prior literature to test adoption rates. Westphal & Zajac (1994) used the Cox model to test adoption of long-term incentive plans and Rao, Greve & Davis (2001) employed it to investigate adoption of media coverage. The Cox model allows for testing continuous-time event history analysis with time-varying covariates, as is the case with this study (see also Allison, 1984 & Yamaguchi, 1991). This model has numerous features that deal with issues such as left and right censoring and hazard shape. This was an important point of this analysis as my campaign contribution data is left censored by the beginning of the sampling period and right censored for the enactment of the legislation. This model makes quality estimates with samples that are both right and left censored (Hellman & Puri, 2000; Tuma & Hannan, 1984). This model also makes no assumptions about hazard shape over time; subsequently there are no assumptions of underlying distribution of adoption times (Cleves, Gould, Gutierrez, 2004). Finally, using a Cox model as opposed to a nonparametric analysis allows for the inclusion of control variables. There are other survival analysis tools such as the Weibull, Gompertz and Bayesian; however the very

flexible Cox model is the dominant survival analysis model used in statistics (Cleaves et al., 2004; Yamaguchi, 1991).

The concept of survival in measuring technological innovation adoption and strategic action in social markets defined as the project becoming commercially operational and the duration of time it took to achieve this status or the enactment. The survival function $\lambda_i\,(t)$ is defined as the probability that the project takes *(t)* periods or longer to become adopted. The specifications of the Cox proportion hazard model that I ran are as follows:

$$\lambda_i(t) = \lambda_0(t)e^{Xi(t)\beta}$$

where $\lambda_i(t)$ is the hazard rate of wind project i, $\lambda_0(t)$ is the baseline hazard rate and $Xi(t)\beta$ are the information subsidy and political contribution covariates and regression parameters. I report both hazard rates in the results of all of my analysis.

Hypothesis 1 tests the direct effect of firm actions dedicated to influencing the media on technological innovation adoption. Since this test uses both proposed and adopted wind projects, the Cox proportional hazard model is the most appropriate method for testing this.

Hypothesis 2 tests the ability of media attention to mediate the effect between firm actions dedicated to influencing the media and technological innovation adoption. The mediation pathway from information subsidies to technological innovation adoption through media attention was tested using the recommended methodology of MacKinnon and colleagues (2002). The MacKinnon model is an extension of the three condition mediated model (Baron & Kenny, 1986). First, the independent variable information subsidies must be related to the dependent variable, technological innovation adoption, in the absence of the mediator, media attention. Second, the primary independent variable, information subsidies, must be related to

the mediated variable, media attention. When controlling for information subsidies, media attention is associated with technological innovation adoption and the association between information subsidies and technological innovation adoption is no longer statistically significant. This would represent a full mediated model. If the significance between information subsidies and technological innovation adoption is reduced by the introduction of the mediating variable, this would indicate a partial mediation. This mediated model has been presented as final analysis results in Figure 8. The Cox model is used in this analysis.

Hypothesis 3 tests the direct effect of corporate political activity on the probability of regulatory change at the state level. In order to test this hypothesis, I used the full panel dataset for campaign contributions across all firms for each year in the sample from 2000-2009. I employed a Cox model to test this hypothesis.

Hypothesis 4a tests the probability that regulatory policy will result in increase in the rate of technological innovation adoption. The dependent outcome variable in this hypothesis is a dichotomous variable resulting in either adoption of the wind power project or failure to adopt. Because of the precision of the quarter and year data of my sample, I employ the use of the Cox proportional hazard model.

Hypothesis 4b tests the ability of regulatory policy changes to mediate the effect between corporate political activity and technological innovation adoption. The mediation pathway from corporate political activity to technological innovation adoption through policy change was tested using the recommended methodology of MacKinnon and colleagues (2002). The MacKinnon model is an extension of the three condition mediated model (Baron & Kenny, 1986). First, the independent variable corporate political activity must be related to the dependent variable, technological innovation adoption, in the absence of the mediator, regulatory

policy change. Second, the primary independent variable, corporate political activity, must be related to the mediated variable, regulatory policy change. When controlling for corporate political activity, regulatory policy change is associated with technological innovation adoption and the association between corporate political activity and technological innovation adoption is no longer statistically significant. This would represent a full mediated model. If the significance between corporate political activity and technological innovation adoption is reduced by the introduction of the mediating variable, this would indicate a partial mediation. This mediated model has been presented as final analysis results in Figure 7.

Hypothesis 5 test if the interaction between media attention and regulatory change has a higher effect on the hazard ratio of likelihood of adoption than by adding the coefficients of both main effect variables. The Cox model is used in the analysis

RESULTS

Descriptive statistics and correlations on the variables included in the analysis are presented in Tables 5 and 6. An examination of the bivariate correlations revealed in Table 6 does not indicate any major issues of collinearity. In fact most pair-wise correlations were well below 0.10 and only one of these correlations illustrated in Table 6 is over 0.50. Therefore, I found no need to address any potential multicollinearity issues and did not conduct a variance inflation factor analysis (VIF).

I now turn to the testing of my hypotheses. The results of the tests are reported in Tables 7 and 8. Model 1 includes entry of the series of control variables. First, I provide the results for firm influence on the sociocultural segment. To test Hypothesis 1, which suggests that the increase in the amount of information subsidies sent to the media will impact the technological innovation adoption via the increase likelihood of innovation adoption, I employed the Cox

model. The results of Model 2 in Table 8 reveal several interesting findings. First, firms sending out packets of information about their wind power projects to the public via press releases are seeing an increase in the probability and speed of adoption, lending support for Hypothesis 1 ($\lambda_i(t) = 1.13$, $p < 0.01$). The hazard ratio of 1.13 suggests that firms which send additional press releases to the media in order to influence coverage in the social market can increase the likelihood of having their innovation adopted by the community by 13% over firms that do not engage in social market actions. This supports existing literature concerning effectiveness of press releases (Kennedy, 2008). The Chi-Squared difference test between Models 6 and 8 showed marginal significance ($\chi^2 = 3.34$; $p < 0.05$); however the results for *information subsides* were robust across all models providing support for this hypothesis. Hypothesis 1 is thus supported. Next, I move on to testing the mediated relationship between information subsidies, media attention and technological innovation adoption in hypothesis 2. Since the first condition of finding an association between information subsidies and technological innovation adoption has been met, I move onto the second condition from the Baron & Kenny (1986) model. Model 3 of Table 7 reveals that an association between information subsidies and media attention exists ($\lambda_i(t) = 1.44$, $p < 0.05$). Since the purpose of press releases is to encourage media attention, this association is important for the mediated relationship and represented in prior literature (c.f. Kennedy, 2008). These findings lend support for existing literature on the effectiveness of information subsidies on media exposure. The next and final stage of the Baron & Kenny (1986) model is to investigate how the inclusion of the mediating variable changes the hazard ratio when included in the full model. Model 4 reveals that inclusion of media attention into the model reduces the hazard ratio of information subsidies on technological innovation adoption from 1.13 to 1.10. This results in a partial mediation of the effects of information subsidies on

technological innovation adoption; this provides support for hypothesis 2 (Baron & Kenny, 1986; MacKinnon et al., 2002). Interpreting the result of the mediated model suggests that media attention suppresses some of the effect of firm actions in social markets but supports the concept that firm actions may have a positive effect on technological innovation adoption. However, this partially mediated model provides some interesting insights into the management of media influence in the social markets. Firms that send press releases out to the media show an overall increase in the percentages of innovations that become adopted by 10% overall, given that the media provides coverage. It also reveals that the actions that firms take in order to have the technological innovations adopted are not just to provide indirect effects on adoption through the media but also suggest that these actions have a potent effect even without the accompanying media attention. These results could be caused by the universal access to press releases across public information sources.

In hypothesis 3, I test the effects of corporate political activity at the firm level to see if it affects policy changes in their local markets. For this, I turn to a series of Cox models with results presented in Table 8. Unfortunately, I find no support for this hypothesis indicating that dedicating financial resources at the firm level does not influence the changing of regulations in their market ($\lambda_i(t) = -0.99$, $p > 0.10$). While surprising, further investigation into the public policy literature reveals a trend in the difficulty of connecting campaign contributions and legislative changes (Ansolabehere, de Figueiredo & Snyder, 2003). There are several possible reasons why I fail to find support for this hypothesis. Campaign contributions may be provided by firms in order to gain access to politicians and not necessarily beneficial policy changes. Firms could also give to campaigns in order to remove political agents hostile to their cause. Instead of viewing campaign contributions in order to favorably affect legislation it could be a

more defensive posture. Whatever the reason, this hypothesis supports this line of policy research that campaign contributions do not buy legislative votes. Hypothesis 4a evaluates the effect of the corporate political activity at the state level on the likelihood that their technological innovation will become adopted. In order to test for this, I run the Cox model using technological innovation adopted as the dependent variable and CPA as the independent variable. In Model 5, the main effect variable CPA does not provide any support that firms spending financial resources on supporting political candidates receive any increase in the likelihood that their projects will become adopted ($\lambda_i(t) = -0.99$, $p > 0.10$). While not significant, this model implies some interesting findings. First, it challenges the assumption that the approval of large scale development projects is influenced by private money. These contributions may be more difficult to track and may have a more prolonged effect of a longer period of time. In line with existing public policy speculation, campaign contributions and lobbying efforts are difficult to connect to firm related outcomes (de Figueiredo & Edwards, 2007). Politicians are extremely careful to remove any implications that campaign contributions are a method of vote buying by firms in order to achieve their individual outcomes (de Figueiredo & Edwards, 2007). Second, if the desired outcome is to have their innovation adopted, firms could allocate these financial resources in a more appropriate setting (Williamson, 1981). Hypothesis 4b presented a mediation model whereby, the change in policy would mediate the relationship between corporate political activity and technological innovation adoption. According to MacKinnon et al. (2002), each condition of the mediation process must be met in sequential order. Therefore, without an initial association between corporate political activity and technological innovation adoption, there can be no support for a mediated relationship. While it would not result in a mediated relationship, I still ran the data analysis to

investigate if support exists for the association of campaign contributions and regulatory change. Model 6 investigates if corporate political activity is correlated with regulatory change. I fail to find support for this relationship. Further results concerning the hazard ratios for this mediated relationship have been illustrated in Figure 7.

Finally, Model 7 tests to see if the interaction of aligning the interests of the media and the interests of legislative policy makers would result in a higher hazard ratio than when the interests of both parties were not aligned. In order to test this hypothesis, I ran the full model including the interaction term as Model 7. This provided me with a hazard ratio of 1.04. While not significant, I still wanted to compare the results with the individual stakeholder models. I compared the hazard ratio of 1.04 against the ratio illustrated in Model 2 which measured social market actions alone and found that providing the media with information subsidies increased the likelihood at a far higher rate (1.13) than with the interaction of political parties. This finding could simply indicate that the majority of the variance is being influenced by the sociocultural aspect versus any alignment of interests. This indicated that the alignment of stakeholder interests did not increase the likelihood of adoption and hypothesis 5 is not supported.

Robustness Checks

Alternative operationalizations of corporate political activity. I simply found it hard to believe that firms invest billions of dollars per year in trying to influence legislation but to no avail. Therefore, I conducted a series of robustness checks for this variable. Extant literature is split on lagging the outcome variable regulatory policy change (cf. Bonardi et al., 2006; de Figueiredo & Edwards, 2007). Therefore, I retested the hypothesis using a time lag of 6 months and 1 year and did not find support. Next, wind development firms engage in multiple *corporate*

political activities including campaign contributions and lobbying efforts across numerous states simultaneously (Ainsworth, 1993: Austen-Smith, 1993). This cumulative effort at influencing officials at both the state and federal levels plays an important role in the creation of renewable portfolio standards regulations and in the adoption of individual wind power plants (Bird et al., 2005). Therefore, in order to affectively map these political activities on changes in RPS legislation, it is important to measure contributions from each individual wind utility company across all political figures in all states simultaneously. I then tried using federal lobbying data as well as constructing the measure for total corporate political activity in the dataset by summing the total campaign contributions made by each wind farm developer with the total amount of lobbying expenditures made by each developer for each calendar quarter in the panel set. Neither of these variables provided support for this hypothesis.

Endogeneity Concerns. Since the relationship between media coverage of wind project proposals and their adoption by stakeholders is fundamental to this research, I needed to investigate the possibilities that the probability of media coverage was not equal among all wind project proposals. *Endogeneity* in media related studies translates into the media's position as affecting and being affected by the outcome variable. It is unlikely that all innovations have the same probability of receiving media attention. This endogeneity problem could exist because something other than the innovation itself is causing the media coverage. This creates the possibility of an omitted variable bias and the implications of *endogeneity* could cause the outcomes to suffer from biased coefficient estimates (Hamilton & Nickerson, 2003). I sought to empirically control for any selectivity problems in the analysis of project adoption. For this, I employed Lee's (1983) methodological solution based off of Heckman's (1979) work on using a two-stage estimation model. This model has been successfully used in other media related

"adoption" research and seemed to be logical (cf. Rao et al., 2001). Specifically, Rao et al. (2001) used this method on a longitudinal panel data Cox model.

First, running this two stage model required an instrumental variable. This variable needed to be related to media coverage yet unrelated to the adoption of the technological innovation. I chose the bankruptcy of newspapers as my instrumental variable. From the period of 2005 to 2009, over 120 newspapers have declared bankruptcy. Of these 120, 16 newspapers had subscriptions of 100,000 or more in cities across the United States. I created a dichotomous dummy variable for newspapers that have declared bankruptcy during the sampling period. I found that newspaper bankruptcy represented a reasonable instrumental variable ($p = .08$) for including in the Heckman two-stage model. In the first stage of the Heckman analysis, I performed a probit regression to evaluate the likelihood that the innovation would receive media coverage. I included the following variables in this first stage probit regression: industry year effects, experience of the firm proposing the project, exposure to prior projects within that county and press release volume. Each one of these variable could potentially affect the likelihood of the innovation receiving media coverage.

CONTRIBUTIONS

This research contributes to the growing body of media influence research in the organizational literature. This research highlights how social markets, through the media, provide access and interpretation of information (Aldrich, & Fiol, 1994; Pollock & Rindova, 2003). Yet little research has been done to see if the firms themselves play a role in how the media in these markets obtains and frames their information. The primary contribution of this research is that it reveals the importance of firms taking an active role in social markets using the

media as a tool to facilitate perception formation about their technological innovation. These findings concerning the influence of firms on the sociocultural segment are extremely enlightening. The findings build on the existing work concerning managing media impressions through press releases by revealing a correlation between the issuing of press releases and the amount of media attention. This growing body of literature on the social construction of markets using the media has recently seen great acceptance in academic journals (Jonsson & Buhr, 2011; Zavyalova, 2012; Westphal & Deephouse, 2011). This paper contributes by building on the work of Kennedy (2008), Westphal & Deephouse (2011) and Zavyalova et al., (2012) by showing that firms may play a part in creating their own social acceptance. The practical implication that firms can take an active role in how the media portrays their innovations, which subsequently affects the rate of technological innovation adoption, is a valuable insight into innovation diffusion and acceptance.

While not finding support for firm actions in political markets dedicated to facilitating innovation adoption, the paper does make some marginal contributions to the public policy literature. This paper provided an empirical setting to evaluate how firms influence policy changes through campaign contributions. Building on the de Figueiredo and Edward's argument (2007), there is a blind spot in the prior literature of political influence as it attempts to directly link financial contributions to legislators and private firms revolving around the improprieties of "vote-buying" (de Figueiredo & de Figueiredo 2002). This paper addresses this blind spot by empirically testing for the linkage between private firms and vote buying. It confirms existing policy theory that it remains extremely illusive to link corporate political activity with vote buying (Getz, 1997). This paper provides another context to meet this call by empirically testing how firms engaging in political contributions can have an effect on beneficial regulatory policy

changes in the renewable energy industry. The negative results contribute to policy literature which challenges the efficacy of corporate political activity. de Figuieredo & de Figueiredo (2002) acknowledge the difficulty in "tracking the money". Failure to find support could imply that there are many back room negotiations that limit the ability to substantiate the cause-effect relationship of "vote buying".

This paper also makes a contribution to the renewable energy and social value creation literature by evaluating sociocognitive perception formation and stakeholder alignment in this sector. In the renewable energy industry, government policy makers pass legislation in an attempt to spur the development of additional renewable energy producers (Yin & Powers, 2010). While theoretical assertions about how these new policies will enhance the growth of renewable energy, limited research to date have quantitatively analyzed the empirical impact of renewable energy government policy changes on renewable development (see Menz & Vachon, 2006). While each of these studies found support for this assumption, all three studies used cross-sectional data precluding any ability to predict causality and potentially increasing the possibility of overstatement of coefficients. This study contributes to this line of inquiry by using a panel data approach which provides a more predictive ability than the blunt approach of cross sectional data. Additionally, the use of panel data allows me to track the changes in policy and perception formation as a dynamic process.

Finally, this research integrates many streams of literature to explain the interaction between the internal resources of a firm (Barney, 1986; Rumelt, 1991) and the external general environmental segments (Porter, 1981; Schmalensee, 1985). The paper combines aspects from the organizational research on infomediaries, resource-based view, social exchange theory, industrial organizational economics, political strategies and corporate political activity. The

paper set out to investigate how internal resources of a firm can be deployed to affect the sociocultural and political environmental factors. This paper shows that firms engaging in social and political strategies may achieve a more rapid innovation adoption through enhancing positive media coverage; however, investing financial resource in influencing favorable regulatory policy change may not provide an increase in the probability and speed of technological innovation adoption. This manuscript informs both the strategic literature on social and political strategies (see, e.g., Baron, 1996; Getz, 2007; Bonardi, Holburn & Vanden Bergh, 2006; Bonardi & Keim, 2005) and organizational research on the influence of informediaries (Deephouse, 2000; Kennedy, 2008, Pollock & Rindova, 2003). Theoretically, it demonstrates how strategic intervention in sociocultural markets can potentially enhance a firms competitive positioning and future access to resources. It begins to answer the question of how much do these nonmarket actors influence the adoption of an innovation, in particular innovation adoption. This paper contributes to the strategic management literature by providing a model that integrates these different perspectives.

Limitation and Future Research

Estimating the returns of strategies such as corporate political activities and social market strategies such as the influence of the media are difficult for a several reasons. Challenges exist in matching press releases with media coverage. It is difficult to decipher if specific press releases are being covered by specific articles without manually matching data. Another challenge in measuring media effects is the possibility of endogeneity (Pollock & Rindova, 2003; Rao, 2004). It is difficult to understand if the media is driving the adoption of wind technology or if wind technology is just a newsworthy topic. Parsing out the purpose of why the media chooses to cover a wind farm adoption creates issues.

A promising approach to future research could build upon understanding more details about how press releases affect media attention. This study limited the variable of interest a count of press releases but the positivity of the tenor of these press releases and the issues being presented by the firm in these press releases may provide valuable insight into why the media chooses to cover projects in certain ways. Additionally, this research included longitudinal data. Using longitudinal data could allow a shift in focus to seeing if changes in press release characteristics align with changes in media coverage of a project. This shift would allow investigation of the truly dynamic modeling of the process. The concept that firms can influence social markets by sending out press releases is a fascinating area of study. Future research can dig deeper into understanding the social exchange between firms and the media and the effects that this relationship can have on innovation adoption and firm performance.

As for policy outcomes, the benefits of these regulatory changes are spread out across the industry. This makes that allocation of precision for these changes difficult to match with specific projects or firms. The information on the political side is difficult to apply to specific projects. Firms are constantly pursuing multiple agendas and to make the assumption that specific campaign contributions are directed at specific wind projects may be erroneous. Furthermore, corporate political activity comes in many forms. This essay used campaign contributions, with lobbying as a robustness check. However, PAC donations (Austen-Smith, 1993), grassroots organizations (Sine & Lee, 2009) and other noise make it difficult to measure causality. These measurement issues make it difficult to empirically measure the CPA and media outcomes.

Measurement error is also a problem in tracking campaign contributions. At the federal level, the expiration of the federal tax credit coincided with the election year. I could not

identify any method of instrumentally controlling for the election cycle. Therefore these results need to taken with a grain of salt. Some of the wind development companies also engage in other segments of the energy industry including oil, natural gas and solar. It is difficult to separate out which segment of the energy industry the campaign contributions were directed. Therefore, while I am attempting to investigate the changes in regulations related to renewable energy, I may be picking up contributions directed at increasing the substitute segments of the industry.

While always a challenge, this study is conducted in a single industry setting. This raises the questions of generalizability across other settings. In particular, this study investigates the effects of political strategies on the changes in government regulations. I would expect the significance of this role to be less in industries that are not as regulated by government policy (Baron, 1991; Bonardi et al., 2006; Getz, 1993). More specifically, I investigate this phenomenon in the renewable energy sector. Social value creation industries are heavily subsidized by federal initiatives and heavily popularized by the media. This may cause problems in transferring these findings to other industries as well.

The renewable portfolio standards offer several degrees of stringency in their application across states. I used the enactment of the legislation; however, the variable has other factors that could be examined. The levels of financial contribution and lobbying efforts could be associated with RPS over a spectrum of stringency factors such as percentage of energy that must be produced by renewable wind and date upon which it must be enacted.

Tracking political money is a very difficult task. While the Center for Responsive Politics and *followthemoney.org* go through great lengths to uncover all possible forms of campaign contributions and lobbying interests, most of this money comes from individual donors

(de Figueiredo & Snyder, 2002). Corporations can give funds known as "soft" money to parties, which skirts the federal contribution limits. This "soft" money protects the anonymity of the corporations giving thus making it empirically difficult to conclusively show association between campaign contributions and changes to legislation. Along these lines, I tracked campaign contribution as opposed to lobbying dollars as a measurement for corporate political activity. While the two had a high correlation from the period of 2000-2009 (.85) it could be the lobbying efforts that were driving these results.

While I tried to test for this in my robustness test, establishing a time lag between corporate political dollars spent and legislative policy changes enacted is a messy process. One of the difficulties with conducting empirical research on CPA is the establishment of a cause-effect relationship between dollars received and beneficial regulatory change (de Figueiredo & Edwards, 2007). Legislatures expend significant effort to remove the appearance of any improprieties that might establish this cause-effect relationship. Connected political money with legislative changes is also a difficult endeavor. It is difficult to assign short term versus long term agendas to corporate political giving. The results of favorable change may be present; however, they may be hidden over years or decades of contributions being made.

CONCLUSIONS

In this essay I aimed at expanding the role that the firm plays in managing external third party stakeholders such as media and the government in innovation adoption. In particular, firms engage in social market actions aimed at influencing the coverage of their technological innovations and political markets aimed at creating beneficial legislation. The findings from this research have implications across a variety of areas including infomediary theory in

management, public policy theory regarding corporate political activity, diffusion and innovation adoption theory and practical applications.

For media researchers, this study highlights the importance for firms to take an active role in managing their perception in social markets. Infomediary theory has begun to examine the influence of press releases on media coverage (Kennedy, 2008; Zavyalova et al, 2012). This research has implications in this area as it provides empirical support for the association between firm actions and media attention. This research switches the focus of the media away from viewing it as a reflection of reality and shifts focus to the media as an active market force that firms attempt to manage for their benefit. These findings can broaden our understanding of infomediary theory in management by seeing the interrelatedness between internal firm actions and external media coverage.

The field of public policy can also benefit from some of the findings of this research. Scholars continue to pursue causal connections between corporate political activity and regulatory change or corporate political activity and firm performance. While this research fails to find any of these associations, the implication on public policy support the existing finds that corporate political activity may not play a role in changes in regulations.

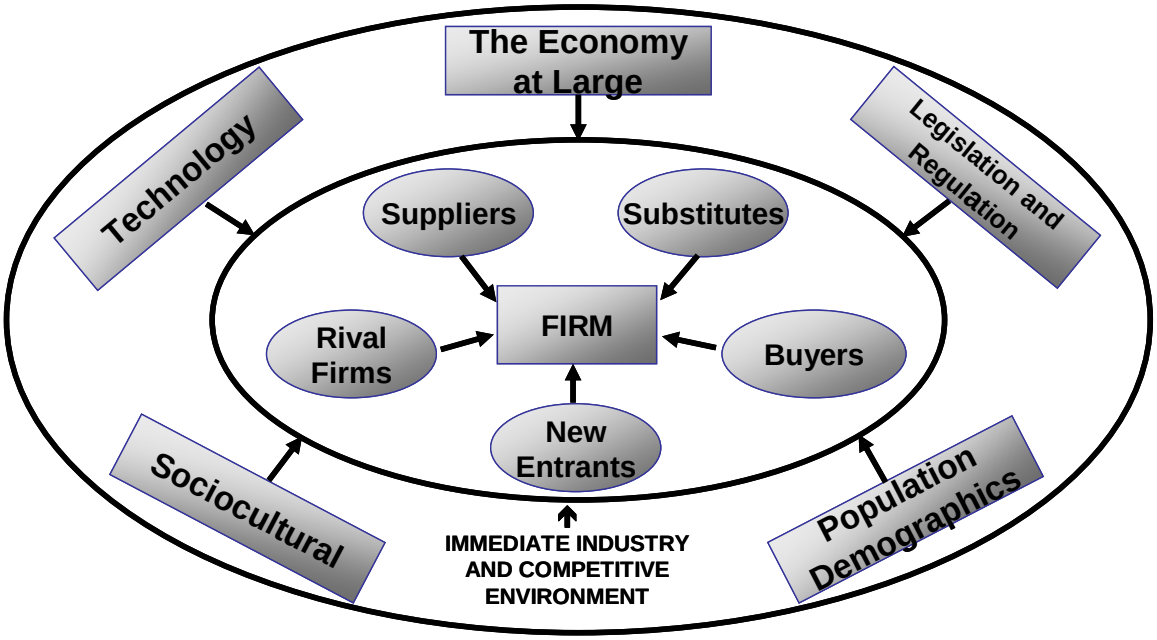
This research also has implication for diffusion theory. The sociological view of diffusion theory acknowledges the pervasive power that the media provides in diffusing information about a technological innovation (Rogers, 1995). This research implies that not all media coverage about a technological innovation will increase the likelihood of adoption. Extant research in this area took the viewpoint that "all media coverage is good for diffusion." This research illuminates characteristics such as issue diversity and economics which actual retard the diffusion of these innovations. Therefore, the research has implications on diffusion theory by

providing findings about the information that is diffused and its effect on technological innovation adoption. These implications will draw attention to a more specific interpretation of media coverage in diffusion theory.

Finally, there are practical implications for this research. This research draws attention to firm actions in social markets and the beneficial effect that they can have on the adoption of their technological innovations. As the battle for legitimacy ensues in the public eye, firms need to engage in productive actions directed at increasing the likelihood that their innovations will become adopted. This research implies that an active campaign of press releases and information provisions to the media may results in more rapid adoption. This research also has practical information for a firm's actions in the political markets. Resource based theory would indicate that a firm can gain a competitive advantage by utilizing their resources better than the competition (Barney, 1991). This research implies that funds spent in the political markets may not lead to beneficial legislative changes or increases in technological innovation adoption. Therefore, managers may way to reconsider spending capital towards political objectives.

FIGURE 1

Nested Design of External and Internal Environments



Adapted from Hitt, Ireland & Hoskisson, *Strategic Management Competitiveness and Globalization*, 2012

FIGURE 2
Research Model

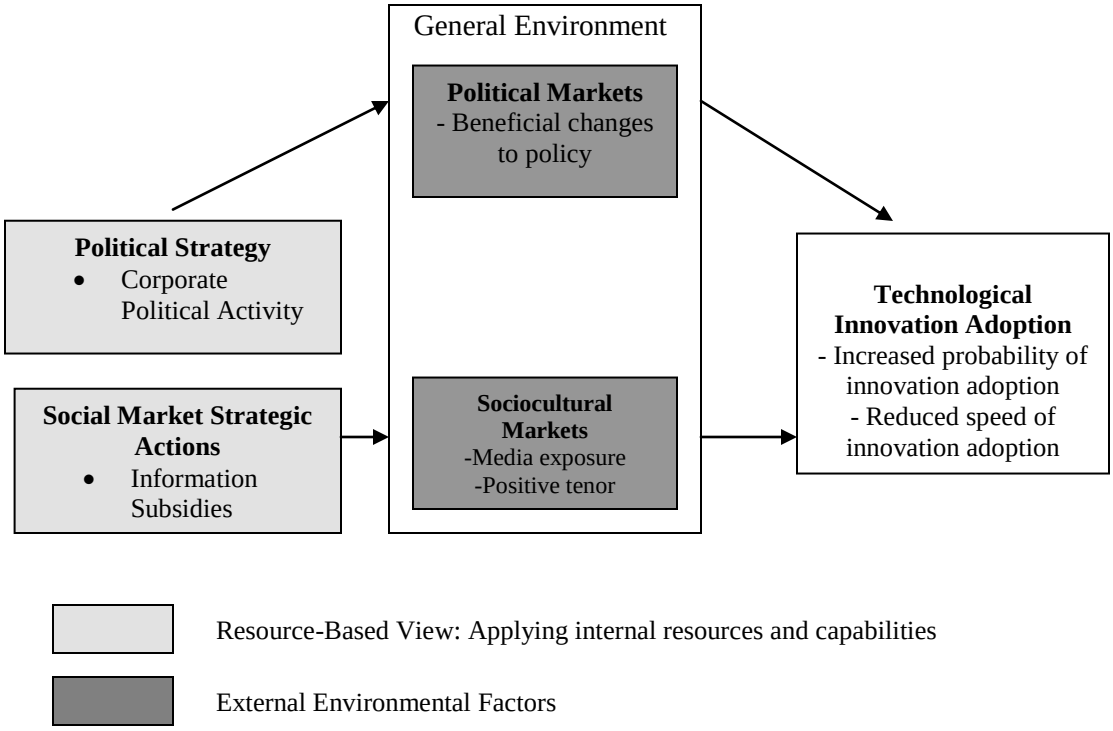
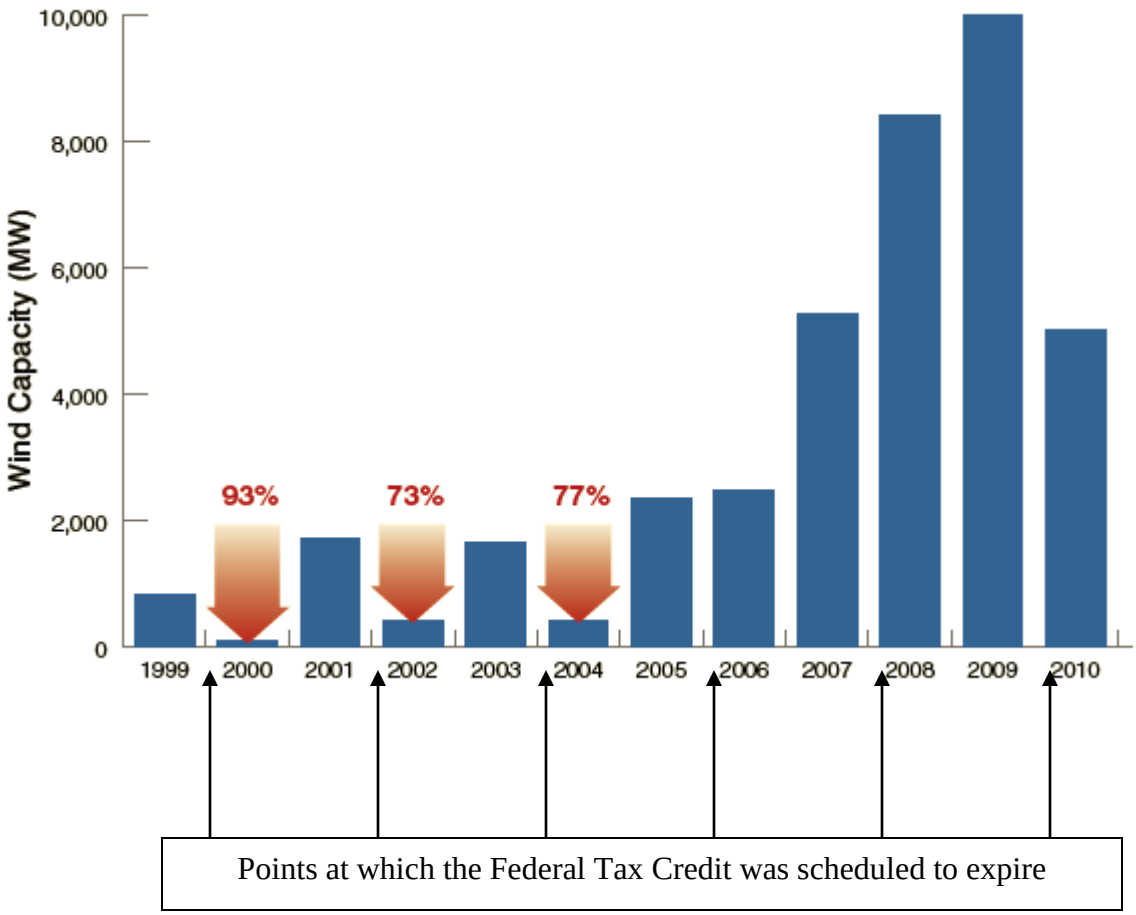
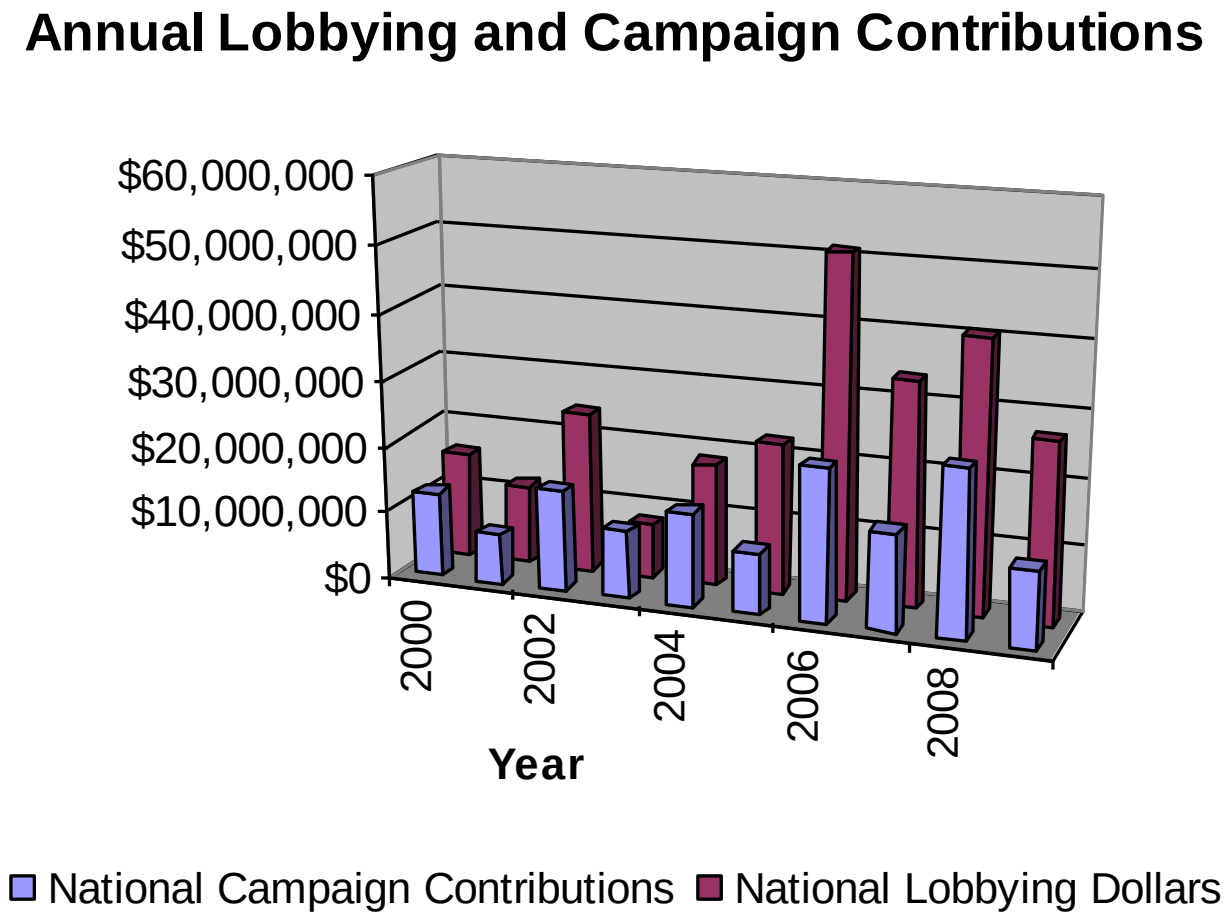


FIGURE 3
Lack of Stable Market Conditions Created by the Boom-Bust Cycle of Wind



Source: American Wind Energy Association

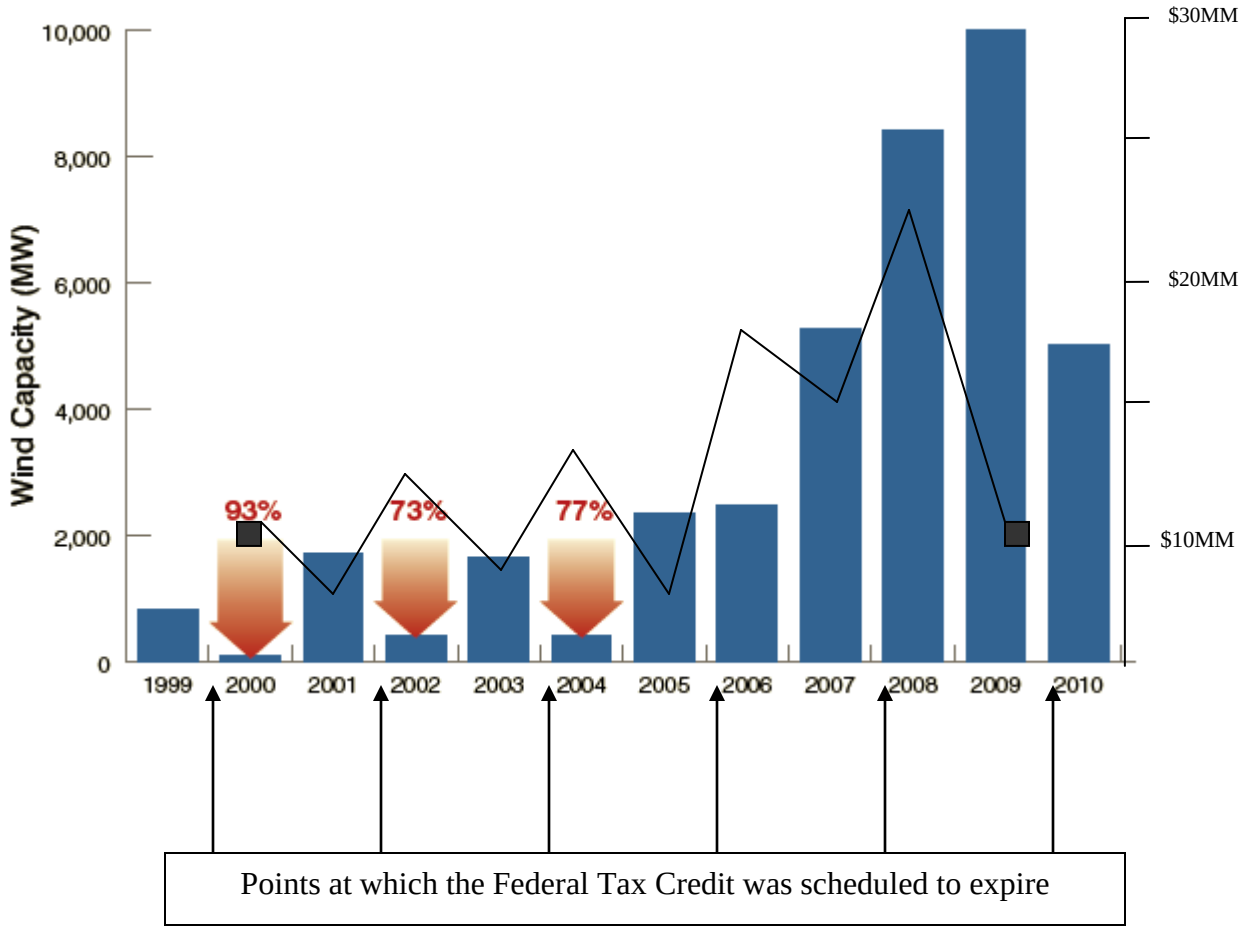
FIGURE 4



Source: Aggregated from information gathered from the Center for Responsive Politics

Figure 5

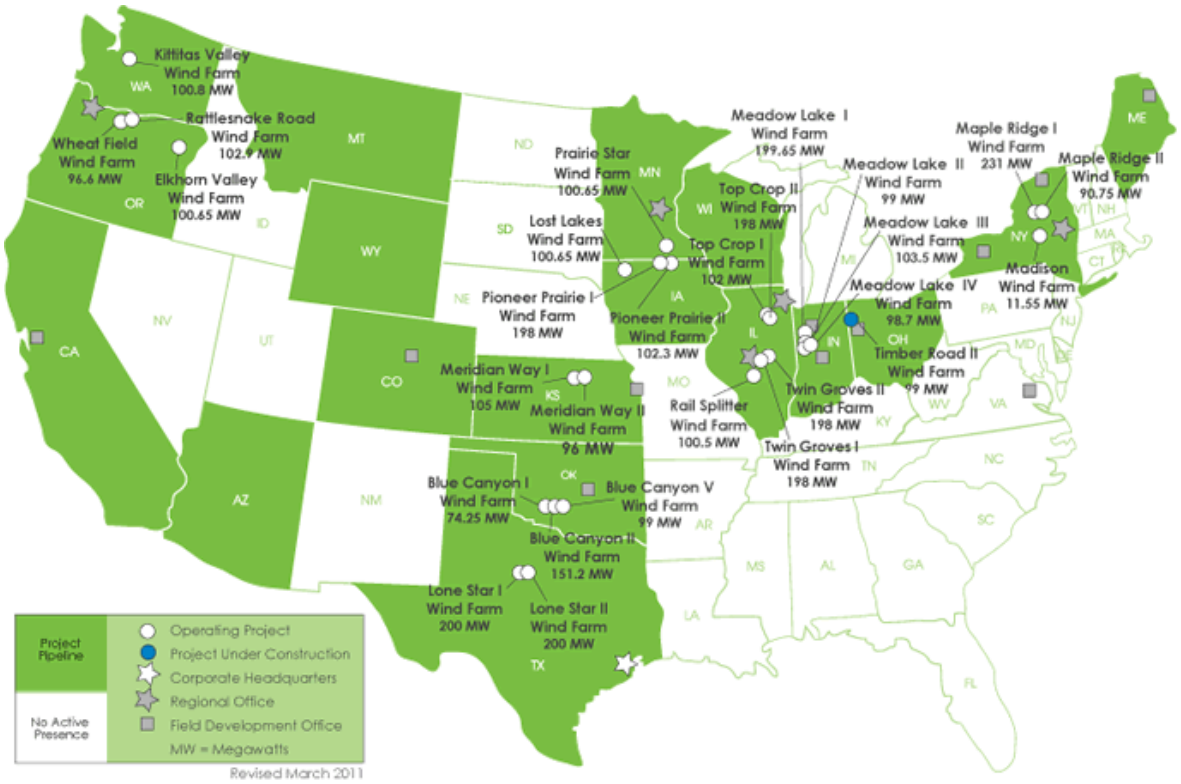
Graph of Corporate Political Activity, Federal Legislation & The Boom Bust Cycle



Source: Aggregated financial contributions from the Center for Responsive Politics
Production Tax Credit information from Database of State Incentives for Renewables & Efficiency

= National Campaign Contributions

FIGURE 6
Map on Installed Wind Projects for Horizon Wind Energy



Source: www.horizonwind.com/projects/whatwevedone/ accessed May 15, 2012.

Figure 7

Mediated Process Model of Political Strategy on Technological Innovation Adoption through Regulatory Policy Change

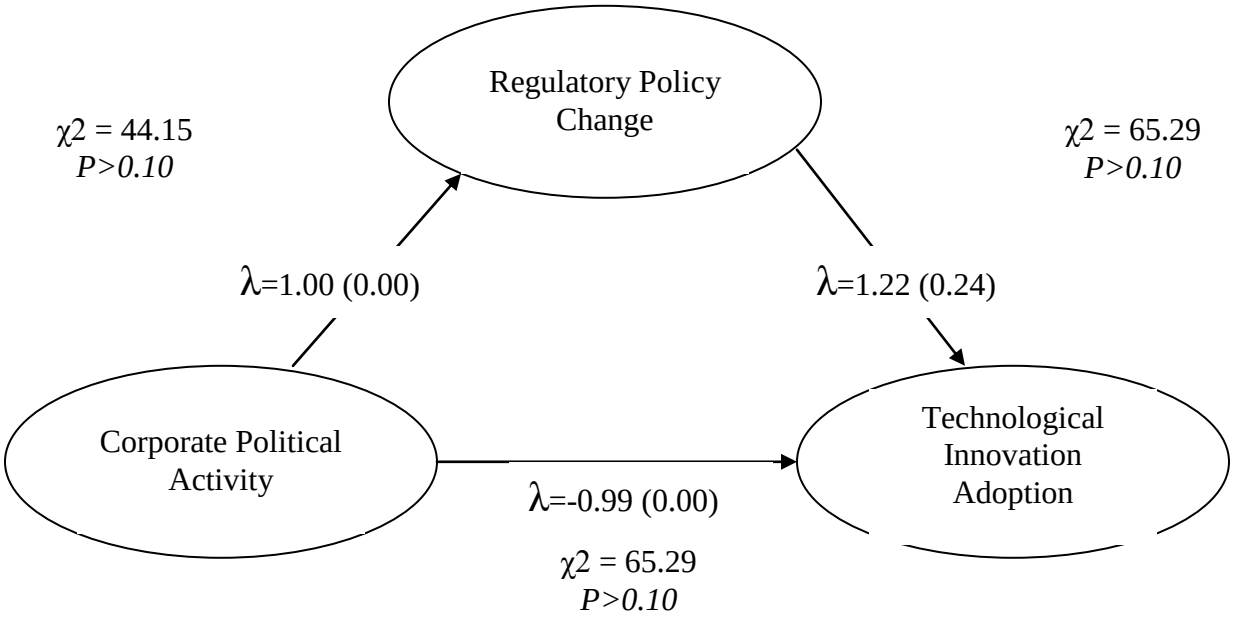


FIGURE 8

Mediated Process Model of Nonmarket Strategy on Innovation Adoption through Media Exposure

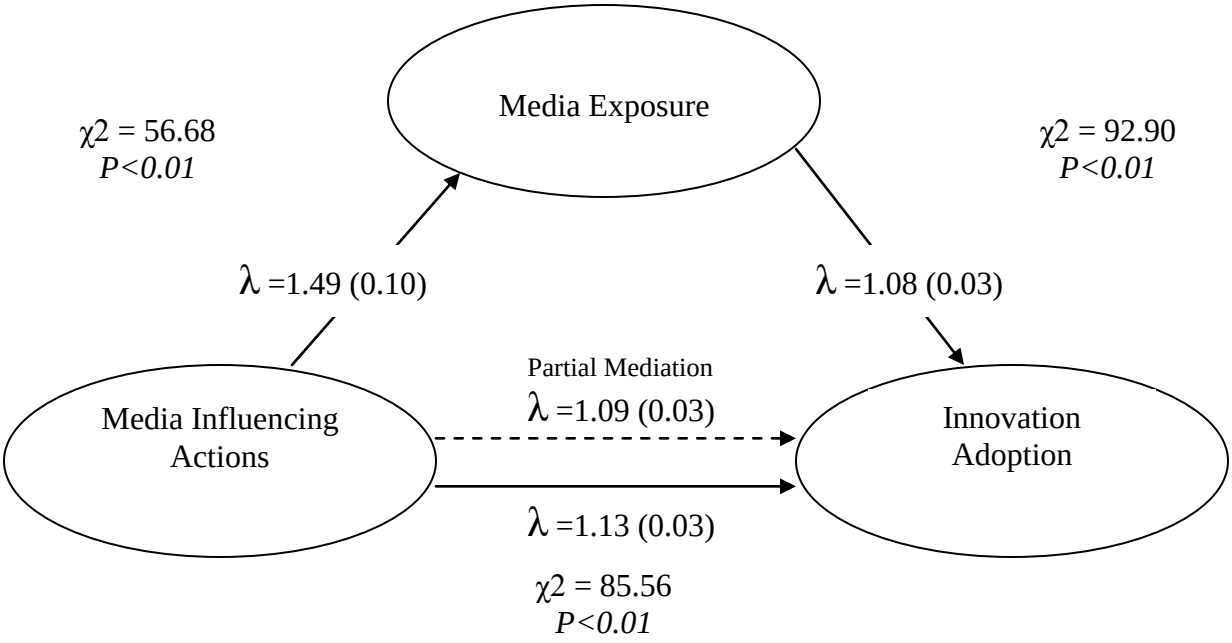
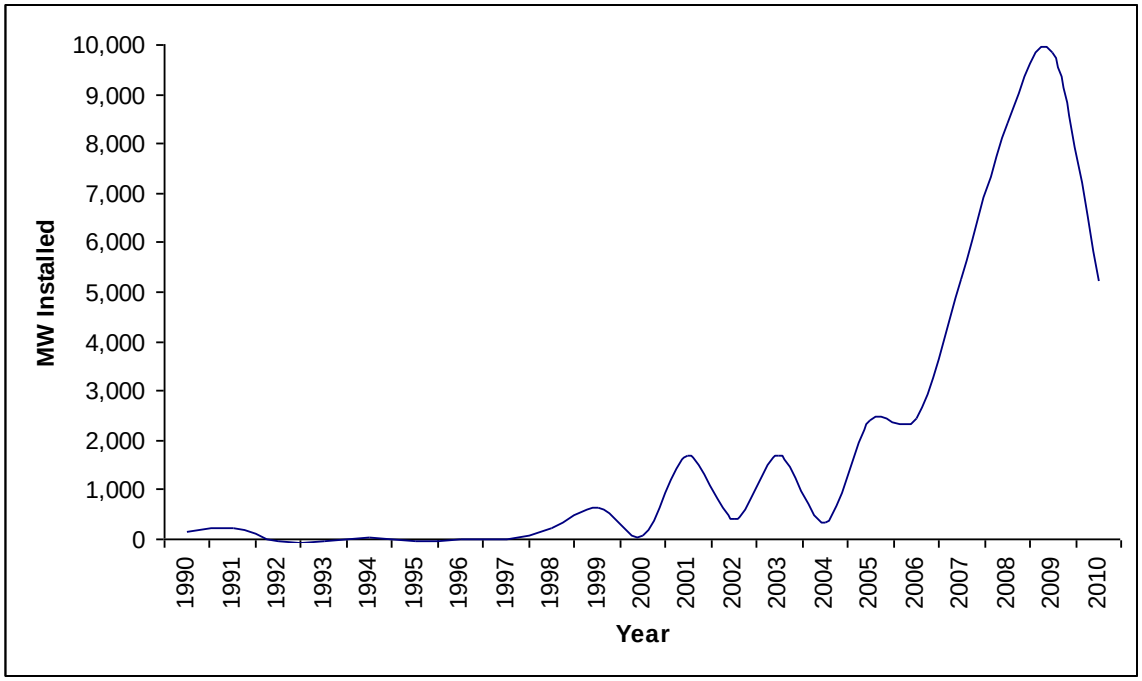
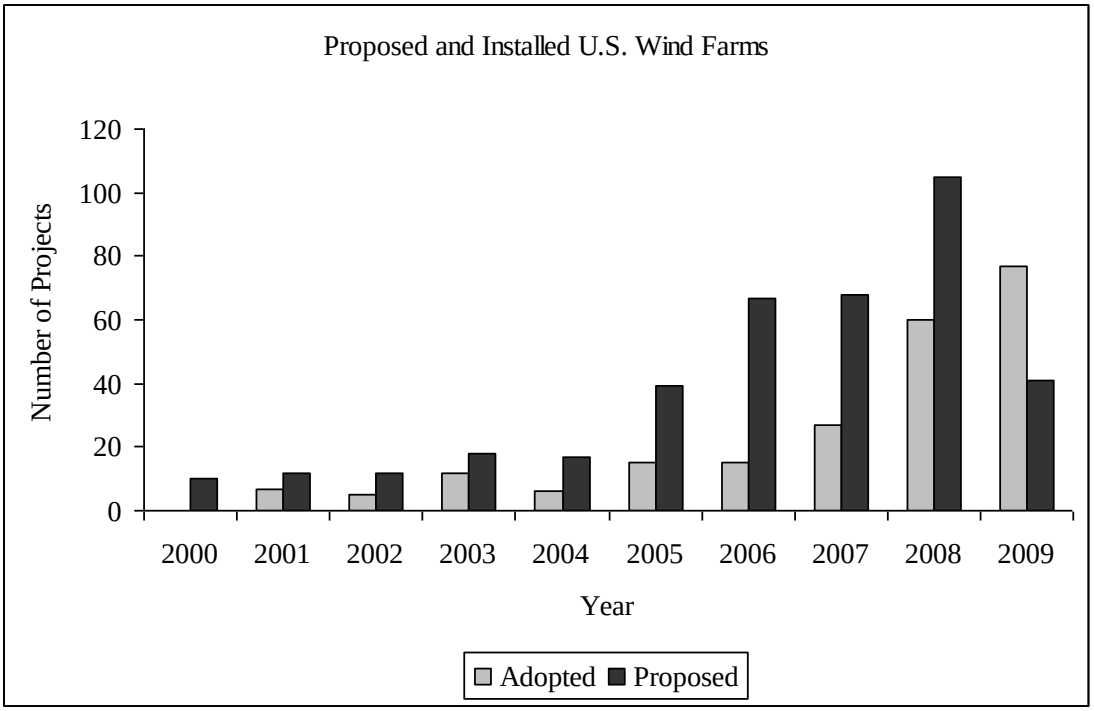


FIGURE 9
Net Annual Addition of Installed Wind Energy in United States, 1990 – 2010



Source of data: United States Department of Energy

FIGURE 10



Source: American Wind Energy Association

TABLE 1
A Description of General Environmental Factors

Factor	Description
Demographic segment	Population size Age structure Geographic distribution Ethnic mix Income distribution
Economic segment	Inflation rates Interest rates Trade deficits or surpluses Budget deficits or surpluses Personal savings rate Business savings rates Gross domestic product
Political/Legal segment	Antitrust laws Taxation laws Deregulation philosophies Labor training laws Educational philosophies and policies
Sociocultural	Effects on society Workforce diversity Attitudes about the quality of work life Shifts in preferences regarding product and service characteristics
Technological segment	Product innovations Applications of knowledge Focus of private and government-supported R&D expenditures New communication technologies
Global	Important political events Critical global markets Newly industrialized countries Different cultural and institutional attributes

An adaptation from Hitt, Ireland & Hoskisson, *Strategic Management Competitiveness and Globalization*, Cengage Learning, 2012

TABLE 2
Wind Power Development Companies

Acciona Energy
AES
Airtricity
Alaska Wind Power
Allco Wind Energy
Alliant Energy (interstate Power and Light)
Altamont Power, LLC
American Electric Power
American National Wind
American Pro Wind
Apollo Energy
Atlantic Renewable Energy
Babcock and Brown
Baryonyx Corporation
Basic Electric
Blue Diamond Ventures
Blue Water
BP Alternative Energy
Caithness Energy
Can(n)on Power Corporation
Cape Wind
Carlson and Associates
Castle & Cooke
Catamount Energy Corporation
Chermac Energy
Cielo Wind Power
CIRI
Citizens Energy Corporation
Clipper Windpower
Columbia Winds LLC
Community Wind or Community Energy
CPV (Competitive Power Ventures)
Crownbutte Wind Power LLC
Dakota Wind Energy
Deep Water Wind
Delsea
DisGen
DKRW Energy
Dominion Energy
Duke Energy
EcoEnergy
EcoHarmony
Edison Mission Group
Emerging Energies
Emmet County Energy LLC
Endless Energy
Enel North America
Energy Northwest
Enron Wind Corporation
EnXco
E.On Climate and Renewables
Eurus
Everpower Renewables
First Wind
Florida Power & Light Company
Foresight Energy
FPC Services
Freedom Wind Energy
Gaelectric Development
Gamesa Energy
Goodhue Wind LLC
GreenHunter Wind Energy LLC
Green Mountain Power
Higher Power Energy LLC
Horizon
Iberdrola Renewables
Independence Wind LLC
Infinite Energy Resources
International Wind Companies
Invenergy
John Deere Wind
Juhl Energy Development
JustWind
Juwi
JW Great Lakes Wind of Cleveland
Kaheawa Wind Power
Kenetech
Last Mile Electric Cooperative
Little Rock Wind LLC
LIPA
Los Angeles Department of Water and Po
LotusWorks-Summit
M-Power
M&N Wind Power
Mackinaw Power
Mainstream Renewable Power
Mesa Power
MidAmerican Energy
Midwest Renewable Energy Projects
Minnesota Power
Montgomergy Energy Partners
Nacel
National Wind
NaturEner USA
Navitas Energy
Nebraska Public Power District
NedPower
Nevada Wind
NextEra
Noble Environmental Power
Norfolk Wind
Northwest Ohio Wind

TABLE 2
Wind Power Development Companies (cont)

NRP Energy
Oak Creek Energy
Oklahoma Gas and Electric
Orion Energy Group
Otter Tail Power Company
Pacific Renewable Energy Generation LLC
Pacificorp
Padoma
Patriot Renewables
Penn Energy Trust LLC
Pinnacle Wind Force (US wind force)
Pintler Power
Portland General Electric
Powerholdings
Powerworks
PPM Energy
Prairie Wind Energy
Puget Sound Energy
Radial
RES Americas
Reunion Power
Revolution Energy
Ridgeline Energy
Ridgewind Power Partners LLC
Rocky Mountain Power
Root River Wind LLC
Rosebud Sioux Tribe
Sacramento Municipal Utility District
Sagebrush
SeaWest
Sempra Energy
Shell Wind Energy
Shirley Wind LLC
Sierra Renewables
Southwest Wind Consulting
Spinnaker
St. Lawrence Windpower, LLC
Superior Renewable Energy
Synergics
Tasco Engineering
Tenderland Power
Terra-Gen Power LLC
Tomen
Trade Wind Energy
TransCanada Power Mktg Ltd
UPC Wind Management
Upstate New York Power Corporation
US Windforce
Valero Energy Corporation
We Energies
Western Wind Energy Corporation
Westar Energy
West Butte LLC
Wind Capital Group
Windkraft
Wind Energy Systems Technology Inc.
WindForce
Windland
Wind Rose
Wisconsin Power and Light Company
York Research
Zilkha Renewables
Zond Systems

Source: American Wind Energy Association

TABLE 3
Sample Data Reduction

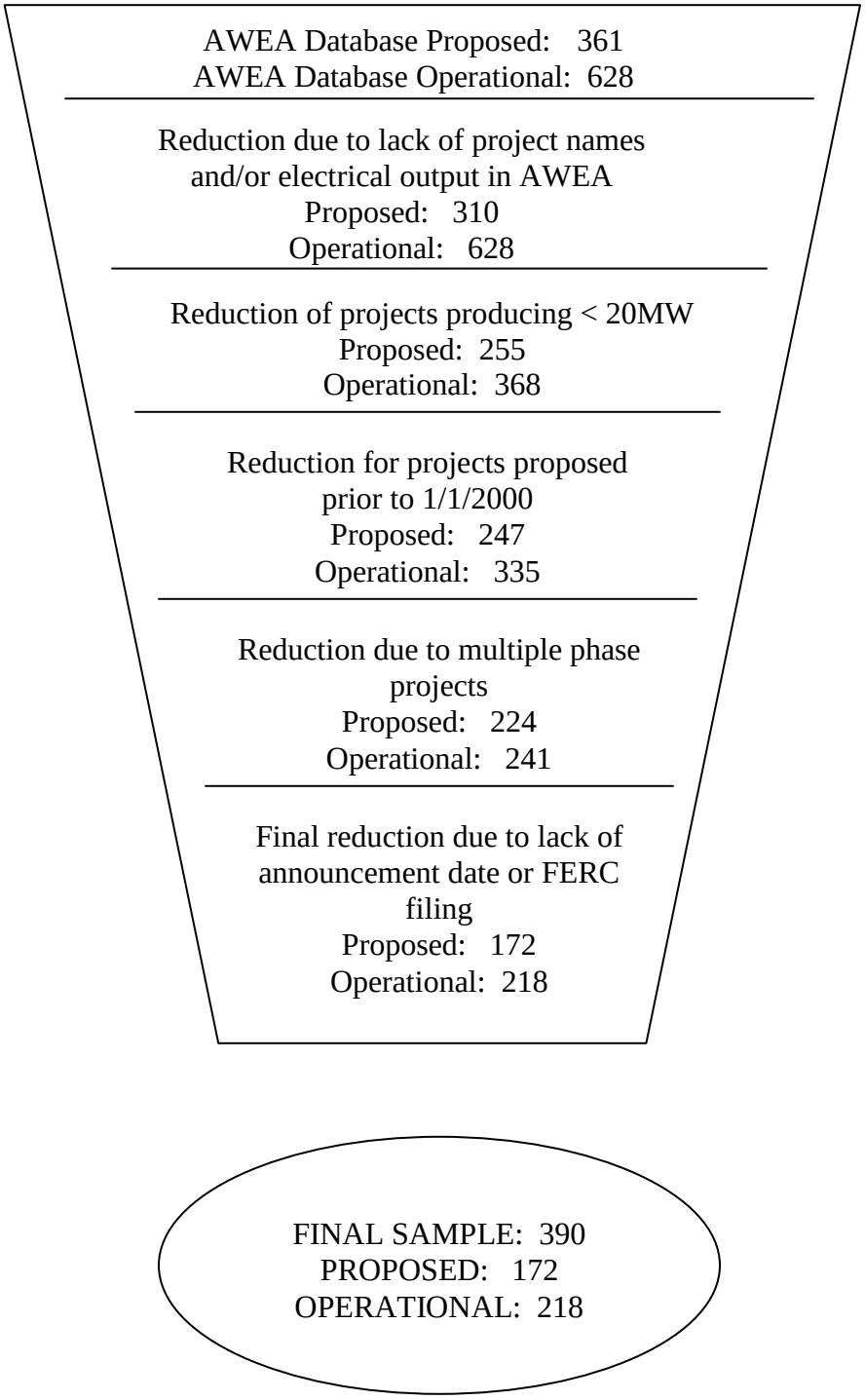


Table 4
Renewable Portfolio Standards

State	Amount	Year	Date Enacted
Arizona	15%	2025	3/30/2001
California	33%	2030	9/12/2002
Colorado	20%	2020	11/2/2004
Connecticut	23%	2020	4/29/1998
District of Columbia	20%	2020	1/1/2005
Delaware	20%	2019	7/21/2005
Hawaii	20%	2020	6/25/2001
Illinois	25%	2025	6/22/2001
Massachusetts	15%	2020	11/19/2007
Maryland	20%	2022	5/26/2004
Maine	40%	2017	11/5/2004
Michigan	10%	2015	10/6/2008
Minnesota	25%	2025	1/1/2003
Missouri	15%	2021	6/26/2007
Montana	15%	2015	4/28/2005
New Hampshire	23.80%	2025	5/11/2006
New Jersey	22.50%	2021	1/1/1999
New Mexico	20%	2020	3/1/2004
Nevada	20%	2015	6/17/2005
New York	24%	2013	9/24/2004
North Carolina	12.50%	2021	8/20/2007
North Dakota*	10%	2015	3/23/2007
Oregon	25%	2025	6/6/2007
Pennsylvania	8%	2020	11/30/2004
Rhode Island	16%	2019	6/29/2004
South Dakota*	10%	2015	2/21/2008
Texas	5,880 MW	2015	12/16/2000
Utah*	20%	2025	3/18/2008
Vermont*	10%	2013	6/14/2005
Virginia*	12%	2022	4/2/2010
Washington	15%	2020	11/7/2006
Wisconsin	10%	2015	4/28/1998

Source: Recreated from information provide by http://www.epa.gov/chp/state-policy/renewable_fs.html and US department of energy http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#chart *voluntary RPS.

TABLE 5

Descriptive Statistics[a]

Variable	Mean	s.d.	Min.	Max
1. Technological Innovation Adoption	0.07	0.25	0	1
2. Regulatory Policy Change - RPS	0.76	0.43	0	1
3. Media Attention	0.78	1.96	0	25
4. Corporate Political Activity	1389.77	8423.45	0	209000
5. Information Subsidies	0.07	0.25	0	24
6. Demographics	60.56	14.69	17.52	93.28
7. State Population/10^6	11.3	1.25	0.494	37
8. Substitute Markets	1.70	0.58	0.66	4.01
9. Firm Experience	3.66	3.89	0	21
10. Institutional Ideology	0.41	0.49	0	1

[a] n = 3426

TABLE 6

Pairwise Correlations[a]

Variable	1	3	4	5	6	7	8	9	10	11
1. Technological Innvation Adoptior	1.00									
2. Regulatory Policy Change - RPS	0.01	1.00								
3. Media Attention	0.07 *	-0.02	1.00							
4. Corporate Political Activity	0.02	0.06 *	-0.03	1.00						
5. Information Subsidies	0.08 *	-0.02	0.40 *	-0.01	1.00					
6. Demographics	-0.04 *	0.40 *	0.02	-0.06 *	0.02	1.00				
7. State Population/10^6	-0.02	-0.14 *	-0.10 *	-0.04 *	-0.08 *	0.16 *	1.00			
8. Substitute Markets	-0.01	0.24 *	0.06 *	-0.04 *	0.06 *	0.56 *	-0.14 *	1.00		
9. Firm Experience	0.09 *	0.15 *	0.03	-0.01	0.03 *	0.11 *	0.02	0.01	1.00	
10. Institutional Ideology	0.01	-0.14	-0.05 *	0.02	-0.03	-0.20 *	0.26 *	-0.11 *	0.01	1.00

[a] **n = 3426**

*** *p* < .05**

TABLE 7

Results of Fixed-Effects Cox Proportional Hazard Rate Analysis for Adoption of Wind Farms[a]

Variables	Technological Innovation Adoption Model 1	Technological Innovation Adoption Model 2	Media Attention Policy Change Model 3	Technological Innovation Adoption Model 4
Demographics	-0.98 ** (0.01)	-0.99 ** (0.00)	1.01 ** (0.02)	-0.98 ** (0.00)
State Population/10^6	-1.00 (0.01)	-1.00 (0.00)	-0.99 (0.01)	-1.00 (0.01)
Substitute Markets	-0.94 (0.14)	-0.84 (0.14)	-1.21 (0.25)	-0.89 (0.13)
Firm Experience	1.09 ** (0.02)	1.09 ** (0.02)	-0.96 ** (0.09)	1.03 ** (0.05)
Institutional Ideology	1.08 (0.17)	1.08 (0.16)	1.06 (0.03)	1.09 (0.02)
Information Subsidies		1.13 ** (0.03)		1.10 ** (0.03)
Media Attention			1.44 ** (0.09)	1.08 ** (0.03)
Year fixed effects	Yes	Yes	Yes	Yes
χ^2	64.04	65.29	41.91	66.37
Log-likelihood	-1095.27	-1094.65	-329.13	-1094.10

[a] n = 2999. Standard errors are in parentheses. Year dummies were included in the analysis but are ommitted from the table

$^{\dagger} p < .10$

$*p < .05$

$**p < .01$

TABLE 8
Results of Cox Proportional Hazard Rate Analysis for Adoption of Wind Farms
Hazard Rate Analysis for Operational Wind Farms Continued[a]

Variables	Technological Innovation Adoption Model 5		Regulatory Change Model 6		Technological Innovation Adoption Model 7	
Demographics	1.01 **	(0.01)	-0.98 **	(0.00)	-0.98 **	(0.00)
State Population/10^6	-1.00	(0.01)	-1.00	(0.00)	-1.00	(0.00)
Substitute Markets	1.22	(0.31)	-0.79	(0.13)	-0.77	(0.12)
Firm Experience	1.10 **	(0.03)	1.09 **	(0.02)	1.09 **	(0.02)
Institutional Ideology	1.20	(0.33)	1.11	(0.17)	1.11	(0.17)
Corporate Political Activity	-0.99	(0.00)	1.00	(0.01)	1.00	(0.00)
Regulatory Policy Change - RPS					1.23	(0.26)
Info Subsidies x Reg Policy Change					1.04	(0.05)

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