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Abstract

Much prior research on organizations and the natural environment has either focused upon the relationship between environmental and financial performance and whether, in fact, it “pays to be green.” Such research assumes that firms are more likely to undertake environmental initiatives if the initiatives have positive financial return, but this assumption has not been sufficiently tested. In fact, research in the behavioral view of the firm as well as that in institutional theory would suggest that other factors that are likely to affect adoption of environmentally friendly initiatives beyond the financial return they offer. We hypothesize that controlling for financial return, firms will be more likely to implement energy-saving initiatives when these initiatives are less disruptive to the firms’ routines, when they have been adopted by a greater number of other firms, and when the firms are located in areas that place greater emphasis on environmental issues. We find support for these hypotheses using Department of Energy data from the Industrial Assessment Center program.
INTRODUCTION

Much of the academic work that examines firms’ interactions with the natural environment has attempted to determine whether there is a link between environmental and financial performance - whether, in fact, it ‘pays to be green.’ While conclusive evidence remains elusive, reviews of the literature suggest that, at least under some circumstances, there is a positive association between financial and environmental performance (Berchicci and King 2007; Etzion 2007). Implicit within this literature is the assumption that firms will pursue those environmental improvements that are profitable. Or, as King and Lenox (2002) describe, if it does in fact pay to be green, yet firms differ in their degree of environmental stances, then some managers must be missing out on profitable opportunities.

Certainly, opportunities to improve environmental performance are more likely to be undertaken if they present firms with profitable opportunities. Profit, however, is not a sufficient condition for firms to make environmentally friendly investments. Scholars have long recognized that there are significant factors that can prevent firms from making profit-maximizing investments. Research in the tradition of the behavioral view of the firm, for example, argues that firms operate in a routinized manner, so that they tend to replicate past practices unless significant forces cause them to reconsider their practices (Cyert and March 1963; Nelson and Winter 1982; Hannan and Freeman 1989). Similarly, institutional theory suggests that beliefs and ideologies can constrain organizational actions (Dacin 1997), so that firms may eschew profit-maximizing activities in order to maintain legitimacy with institutional actors.
In this paper, we contribute to research on both organizations and the natural environment and the behavioral view of the firm by examining factors that influence firms’ likelihood of investing in environmentally friendly technologies. By combining insights from behavioral and institutional theory, we develop a better understanding of how differences in institutional environments can affect firms’ likelihood of undertaking what appear to be profitable investment opportunities. In doing so, we extend research that has argued that institutional and economic arguments can provide complementary explanations for organizational actions (Dacin 1997; D’Aunno, Succi, and Alexander 2000).

In addition to contributing to the convergence of institutional and behavioral theory (Argote and Greve 2007), our findings contribute to the burgeoning research on organizations and the natural environment and to practical knowledge about how to make improvements in energy efficiency. While much literature focuses on new technologies such as emergence of new energy sources, more ‘mundane’ solutions such as improved energy efficiency are a major piece of the puzzle (Yergin 2011). The little work that has been done in this area has tended to focus on investment return (Anderson and Newell 2004; DeCanio and Watkins 1998), yet there is mounting evidence that even profitable energy efficiency initiatives are often not undertaken (McKinsey, 2009). Thus, it is both theoretically interesting and substantively important to develop a better understanding of the incentives and impediments to firms’ enacting energy saving techniques.

We begin by outlining behavioral factors that affect whether an energy efficiency initiative will be adopted. We further suggest that the influence of these behavioral factors is moderated by institutional forces. We test our hypotheses using data from the Department of Energy’s Industrial Assessment Center (IAC) program data. The final sample includes over
12,000 energy assessments and more than 60,000 energy-savings recommendations from these assessments. Most importantly for our analysis, the IAC data include information about both the expected financial return of a given recommendation and, through follow-up by the DOE, whether that recommendation was implemented. Thus, the data allow us to examine factors that affect implementation of energy saving initiatives, controlling for the expected financial return of those initiatives.

**THEORY AND HYPOTHESES**

Over the past twenty years, scholarly and practitioner interest in the relationship between business and the natural environment has risen significantly. The largest portion of this work examines whether in fact, it ‘pays to be green’; that is, whether there is a positive relationship between environmental improvement and financial performance. This provocative line of work dates back to at least the “Porter Hypothesis” in which Michael Porter and Klaus Van der Linde (1995) argued that more stringent regulation could cause companies to become more innovative and efficient, and thus there was a possible ‘win-win’ in environmental and financial performance. There are numerous studies that have attempted to untangle this relationship and these studies have been well summarized elsewhere (Etzion 2007). While studies have documented a positive relationship between environmental and financial performance, causality remains difficult to ascertain. That is, while environmental improvements can lead to financial gain, (Hart and Dowell 2011), it is also possible that good financial performance creates slack resources with which firms can improve environmental performance.

If it can indeed pay to be green, yet companies differ in their degrees of commitment to environmental performance, there are two potential explanations. First, it could be that managers
are, for some reason, unable to perceive the potential for profiting from environmental improvements. King and Lenox (2002) investigate this, and find that some elements of environmental improvements do indeed appear to be more difficult for managers to perceive. They demonstrate that managers appear to systematically under-invest in waste prevention, as waste prevention requires greater tacit knowledge and provides benefits that are more difficult to predict relative to more concrete actions like end-of-pipe pollution control technologies (Hart 1995).

Second, it may be that it only pays to be green for certain firms. This view is consistent with the resource-based-view of the firm, and its application to environmental issues, the natural resource-based view (NRBV) (Hart 1995; Hart and Dowell 2011). The NRBV suggests that firms can profit by developing environmental capabilities that draw on resources that are rare, valuable, and difficult to imitate or substitute for (Hart 1995). Most importantly, the ability to profit from environmental initiatives may depend upon the presence of complementary assets (Christmann 2000).

In this paper, we argue that it is instructive to turn the ‘pays to be green’ question around and ask, instead, if environmental improvements pay, will firms pursue them? This question may at first seem naïve, for if an environmental initiative provides positive return for an organization, it would seem rational to expect that the organization would pursue it. However, we suggest that both internal and external factors explain why an organization may not pursue a project that has both positive projected financial return and environmental benefits. Developing an understanding of these factors and how they impede or promote adoption of profitable environmental initiatives has both important theoretical and practical implications.
Two theoretical perspectives are particularly important in understanding whether firms will undertake profitable environmental initiatives. First, behavioral theory (Cyert and March 1963; Argote and Greve 2007) provides a foundation for understanding why organizations act in routinized ways, and thus may not undertake profitable initiatives that are disruptive to current operating procedures. In addition, behavioral theory suggests that aspiration levels affect an organization’s likelihood of changing (Greve 1998). When an organization’s performance falls below its aspiration level, it is more likely to undertake search for new solutions (Audia and Greve 2006).

Second, institutional theory is well-suited to explaining how demands that go beyond technical requirements such as financial performance influence firm decisions (DiMaggio and Powell 1983; Ingram and Clay 2000). Because of its emphasis on social influences, institutional theory has been widely used to examine firms’ environmental strategies (Lounsbury 2002; Delmas and Toffel 2012; Lewis, Walls, and Dowell 2012). Institutional arguments suggest that firms are more likely to make proactive environmental investments if they are subject to pressures from powerful actors such as state regulators or salient stakeholders (Delmas and Toffel 2012). Institutional theory helps to explain how non-market pressures can impede or encourage organizational decisions such as adoption of environmentally friendly initiatives. Holding such pressures constant, characteristics of the initiative itself, and of the organization contemplating the initiative will also affect adoption. Thus, holding the profitability of an initiative constant, a firm that has institutional pressures on it to increase its sustainability will be more likely to make an environmental investment.

Our theory building consists of developing a model of energy efficiency adoption in which behavioral factors affect the likelihood that a given initiative will be adopted, controlling
for the financial return that the initiative promises. This follows from much recent work in organizations and the natural environment in which institutional forces are given prominent roles in explaining environmental choices (Lounsbury 2002; Delmas and Toffel 2012). We extend this research by considering how institutional pressures can increase the perceived benefits and/or reduce the perceived costs of undertaking environmentally friendly actions.

**Behavioral Theory and Environmental Initiatives**

Although behavioral theory has not been widely used as a foundation for understanding business’s environmental initiatives, there are several elements of the theory that are particularly valuable for this purpose. First, behavioral theory emphasizes the tendency for firms to be characterized by inertia, so that they tend to maintain current practices. This can provide a baseline explanation for lack of attention to environmental improvements, and also why certain events such as external threats to legitimacy (Hoffman and Ocasio 2001) or acquisitions (Berchicci, Dowell, and King, 2012) can act as catalysts for undertaking environmental initiatives.

Second, behavioral theory suggests that changes are characterized by problemistic search, such that search tends to be expanded when firms face performance below aspirations (Cyert & March; Greve 1998). In the case of environmental matters, problems can be defined broadly – for example, environmental issues at the firm or industry level can reveal the need to undertake search for improvements (Bansal and Roth 2000; Coll 2012; Hoffman and Ocasio 2001). Alternatively, institutional changes can define performance that was previously acceptable as being unacceptable, effectively increasing aspiration levels.

Finally, behavioral theory suggests that learning and attention issues can dominate decisions. Firms will tend to undertake options that require little additional knowledge, which is
a form of local search (Gavetti and Levinthal 2000). Similarly, having attention focused on an issue increases the probability that the firm will act (Ocasio 1997; Hoffman and Ocasio 2001; Sharma 2000). For environmental initiatives, the more that a new initiative requires drastic changes in the firm’s current way of operating, and therefore moves it back up the learning curve, the less likely that the initiative is going to be undertaken. Conversely, having attention focused on environmental issues will increase the likelihood that the firm will make an investment to improve environmental performance.

The elements described above form a baseline for developing hypotheses about the conditions under which a firm will undertake an environmental initiative. We begin by considering the degree to which a given initiative will disrupt current operations. All else equal, greater disruption of routines will impede implementation of an initiative. As a long tradition in organizational ecology demonstrates, the more that a change in practices involves changes to core features of the organization, the less likely the organization will be to undertake it, and the more disruptive that change will be (Hannan and Freeman 1989; Barnett and Carroll 1995).

In environmental initiatives, one indication of disruption the degree to which the initiative requires multiple processes to change simultaneously. In energy savings initiatives specifically, the degree of disruption will be greater if the initiative involves changes to individual behavior, or routines at the group level, as opposed to those that involve changes in equipment and are relatively invisible to most groups in the organization.

Thus, we predict that implementation of a given initiative will depend in part on the degree to which it disrupts the organization’s routines:

**H1: The more that an energy-saving initiative disrupts current routines, the less likely it will be implemented.**
Prior research in the environmental-financial performance literature has frequently used aggregate measures of both dimensions of performance. For example, several studies have linked environmental performance data from ratings agencies to financial performance metrics such as overall firm ROA (for reviews of such studies see Margolis & Walsh 2003; Orlitzky, Schmidt, & Rynes 2003). While such studies are valuable in assessing whether firms that are better environmental performers are also superior in their financial performance, they do not allow for detailed examination of the myriad factors that create both environmental and financial performance. For example, knowing that a firm has a high rating from KLD (one of the most prominent social ratings agencies) for having strengths in pollution prevention does not give significant information about the decisions that the firm made in order to earn such a rating.

Even when more disaggregated measures of environmental and financial performance are utilized, prior studies have only a limited understanding of the decisions that the firm may have made in order to achieve a given level of environmental performance. For example, the Toxics Release Inventory (TRI) has become one of the most important sources of environmental performance data and has spawned numerous studies of environmental performance (Konar and Cohen; King and Lenox 2001; Doshi, Dowell, and Toffel 2012). The TRI provide chemical-level data about a facility’s use and disposal of toxic chemicals, as well as a number of important control variables and can create a very detailed account of a facility’s pollution prevention efforts. King and Lenox (2001) use the TRI data to examine whether managers appear to systematically miss profitable opportunities, and find that there does appear to be a tendency to under-invest in pollution prevention. They cannot, however, examine the individual decisions that create a facility’s degree of pollution prevention. Thus, they cannot rule out, for example, that a given facility invests less in pollution prevention than would appear optimal because it
lacks the complementary assets necessary to derive profit from that investment (Christmann 2000), or because that investment, at the moment it was available to the firm, appeared too risky.

Examining energy savings at the level of the initiative, we can consider not only the expected return of that investment but also can estimate the effect of the risk involved in the investment.¹ For any firm considering an investment in environmental improvement, there is not only the expected cost and return of the investment to consider, but also the degree of uncertainty in both the financial return and effectiveness of the initiative. An initiative which carries significant uncertainty over its financial and/or environmental performance is likely to have low legitimacy. This lack of legitimacy can in turn affect the degree to which it is likely to be implemented (Delmas and Toffel 2008).

Conversely, there may be a momentum to environmental initiatives such that the more that a given initiative has been implemented previously, the more that it will be seen as a legitimate means of reducing energy consumption. This greater legitimacy should in turn decrease the perceived risk of implementing an initiative. Thus, we predict that, controlling for the expected financial return of the initiative, the more that a given initiative has been recommended previously, the more likely that it will be implemented.

H2. The more times that a given initiative has been recommended in the past, the greater the probability that it will be implemented.

While greater uncertainty of an initiative reduces the likelihood that it will be implemented, there are factors that mitigate moderate the effect of uncertainty. In general, behavioral theory suggests that a manager’s risk preferences depend upon the firm’s current

¹ We use the term risk here in the sense that we can assign some estimate of probability to the outcome of the investment (Knight 1921; McGrath 1997).
performance (Greve). Thus, a firm that is currently performing below aspiration levels is more likely to undertake a risky initiative than if the firm is currently performing at an acceptable level (Greve; Deephouse and Wiseman 2000).

In the case of energy saving initiatives, aspiration levels can be affected in two ways. First, greater economic pressures can affect a firm’s risk tolerance, such that it is willing to explore riskier options (March 1991; Deephouse and Wiseman 2000). This is related to the behavioral theory concept of problemistic search, in which a firm undertakes a broader and more thorough search for solutions when performance falls below its desired levels (Greve 1998). Second, environmental pressures can also trigger aspiration levels. Firms, or even entire industries can be subject to pressures to improve environmental performance, due to either well-publicized incidents or sustained environmental problems (Hoffman and Ocasio 2001). These pressures may embolden firms to take on environmental initiatives that might otherwise be considered too risky.

We expect, therefore, that firms will be more willing to implement energy-saving initiatives if they are under greater pressures to improve performance on either financial or environmental dimensions:

H3a: The greater the financial pressure on a firm, the less that the risk of an initiative affects the probability it will be implemented.

H3b: The greater the environmental pressure on a firm, the less that the risk of an initiative affects the probability it will be implemented.

Institutional Forces and Energy Efficiency Initiatives

Prior work on environmental strategy has argued that institutional forces play an important role in shaping the degree to which firms undertake sustainability initiatives (Cho and
Holding the degree of profitability constant, then, firms under greater institutional pressure to improve environmental performance are more likely to implement recommendations to reduce energy.

Institutional pressures can be manifested in a number of ways. Much of the existing research has focused upon the effect of pressures emanating from salient stakeholders. Studies demonstrate, for example that actors such as powerful shareholders or regulatory bodies can influence firms’ environmental actions (Eesley and Lenox 2006; Delmas and Toffel 2008; Lewis et al. 2012).

We focus here instead on the broader institutional setting in which a firm is immersed. Neo-institutional theory suggests that organizations are subject not only to technical requirements for performance, but also institutional requirements with an elaboration of requirements to which they must adhere if they are to maintain legitimacy (Suchman 1995). Such requirements differ between industries (Meyer and Rowan 1977) and across geographical areas (Lounsbury 2007; Sine and Lee 2009). For example, in some geographical settings, there will be greater recognition of opportunities and expectations of environmental performance due to the norms and cultural logics in which the organizations are embedded (Sine and Lee 2009).

Our initial argument with regard to institutional forces is therefore relatively simple. First, as we detail above, we suggest that the degree to which an organization attends to environmental issues is influenced by how strong the institutional forces are for such issues (Delmas and Toffel 2012; Doshi et al. 2012). Second, institutional forces differ across geographical regions (Sine and Lee 2009). Thus, we suggest that energy savings initiatives are more likely to be implemented in areas of greater institutional pressures.
H4. The stronger the environmental norms are in a given region, the greater the probability that an energy savings initiative will be implemented.

Data and Methods

The data used for this study are obtained from the US Department of Energy’s Industrial Assessment Centers (IAC) program, which began in 1976. Our data cover the years 1981 through 2006, because control variables on which we depend are available only for this period. This program provides free energy audits (or assessments) for small- and medium-sized manufacturing firms through a network of universities. More than 50 universities have participated in the IAC program since its inception. The energy audits are performed by engineering faculty and students from the participating universities. In fiscal year 2010, the IAC program budget was $3.87 million and 386 assessments were performed (DOE 2011).

Firms may contact the IAC expressing their interest in a free energy assessment, or alternatively the IAC may reach out to potential firms. Firms are eligible for the free energy assessment if they meet select criteria such as whether their products fall within standard industrial classification codes 20 through 39, whether their gross annual sales is less than $100 million, whether their employee count is less than 500, whether their annual energy bills between $100,000 and $2 million and provided they have no professional in-house staff to perform the assessment (Muller et al. 2004). A few large firms which do not meet these criteria have also been assessed under the IAC program and on special request of DOE, but we do not include these in our analysis. Typically firms are assessed under the IAC program if the plant is within 150 miles of the host campus.
The typical assessment process starts with collection of data on the firm’s energy usage. This is followed by a site visit by the IAC team which involves interviews with the plant management, plant tours and collection of operational data. The plant tours can uncover some energy efficiency opportunities. For instance, a former IAC director mentions that: “In some plants we hear a constant hiss which indicates compressed air is leaking out, and stopping these leakages can save energy.” After the visit the team analyzes the operational data and identifies other energy saving recommendation. The IAC team then provides the firms with a written report which details the recommendations to improve energy efficiency across the firm. After 6 to 9 months the plants are again contacted by the IAC to determine which recommendations have been implemented or will be implemented in the next one year.

All information related to the recommendations and their implementation status is uploaded using standardized templates on a public database maintained by the Center for Advanced Energy Systems at Rutgers University. Information on the data maintained in the IAC database and on the IAC assessment process are available in “The DOE Industrial Assessment Database Manual” (Muller et al. 2004). As of 2012, the database has information on 15,000 assessments with over 115,000 recommendations.

In our study, we use the data from the IAC database for the years 1981-2006. We adjusted all monetary figures for inflation, scaling to year 2006 US dollars using the producer price index for finished goods using the WPUSOP3000 series provided by the Bureau of Labor Statistics (BLS 2008). We exclude 778 recommendations which have payback values greater than 9 years, 44 recommendations that involve additional costs and do not provide any positive savings, and 8 recommendations which have negative costs for implementation as these are all outliers and possibly errors: including them would not change our conclusions. Further we
exclude 8,424 records from our analyses which pertain to firms that do not fall within sic codes 20 to 39 and whose gross sales is in excess of 100 million dollars. Overall the data pertaining to 89,299 recommendations are used in the analysis. However, some observations are not included in specific analyses due to missing data and these are indicated where we present our results. Table 1 provides descriptive statistics for our data.

**Dependent Variable**

This section defines the various measures we use. The dependent variables in our analyses are indicators which represent whether a recommendation is adopted or not. The IAC data include a field in which the plant indicates that whether a given recommendation has been implemented, is in the process of being implemented ("pending", in the terminology used at IAC), or was not implemented. For the purpose of this study, we eliminate the partly-implemented initiatives and those for which the IAC is unable to determine implementation status.

**Independent Variables**

We have two sets of independent variables. The first are those that represent the behavioral theory variables outlined in H1-H3b, and the second are those that represent the institutional forces in H4. The behavioral variables come principally from the IAC data. We supplement these data with League of Conservation Voters data for our measure of institutional pressures.2

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2 In this current draft, we use only the LCV data. In future versions of the paper we will complement these data with additional indicators of environmental pressures at the state level.
Initial work in organizational ecology and change measured disruption in terms of how ‘core’ a given change was to the organization (Barnett and Carroll 1995), with the idea that the more core the change was, the greater the likelihood that it would cause changes that rippled through the organization. For example, changes to the central mission of an organization (say, moving from non-profit to for-profit status) would cause multiple other changes and reset the organization’s ‘liability of newness’ (Stinchcombe 1965).

At the heart of these studies is the idea that some routines are more difficult to change or implement than others. In this paper, we follow this idea and divide routines into three categories that follow Nelson and Winter’s (1982: 14-16) original classification of routines into investing, operational, and search. In order to do so, we classify each recommendation into one of these categories. Investment recommendations involve capital purchases that add equipment but leave operational practices relatively unchanged and for which the equipment required is standard. Operational routines involve recommendations that pertain to the existing stock of plant and equipment, and other factors of production which cannot be augmented in the short term, and therefore change the way the firm operates more than what it operates. Finally, Search recommendations involve implementation of a solution that need to be customized for a specific plant. Appendix I provides examples of recommendations and the classifications we have used. Overall, we expect that recommendations that involve search and the attendant novelty to the firm are less likely to be implemented relative to those that involve investment or operational routines.

Prior Adoption

Hypothesis 2 argues that the greater the number of prior adopters of a given recommendation, the higher the likelihood of implementation. We create Prior Adopters as a
time-varying count of the number of times a given recommendation has been implemented in the past five years. We use the five year window rather than an unlimited window to account for the possibility that there is a fashion element to energy-savings initiatives such that initiatives that once were popular but have fallen out of fashion will not impact adoption.

**Industry Environmental and Financial Pressures**

Hypotheses 3a and 3b argue that adoption rates increase when firms are under financial or environmental pressures. As the IAC data do not allow identification of the establishments, we do not have firm-level measures of such pressures, and must proxy for them using industry-level variables. We measure financial pressure using *Average Operating Income*, which we calculate at the four digit SIC level using Compustat data. We proxy for environmental pressures using the ‘environmentally sensitive industry’ indicator following prior research (Cho and Patten 2007; Reid and Toffel 2009). The variable *Environmentally Sensitive Industry* takes on a 1 for firms that are in industries with substantial environmental issues, and therefore which are presumed to be under greater pressure to demonstrate improvement.

Following H3a and H3b, we expect a negative coefficient on *Average Operating Income* and a positive coefficient on *Environmentally Sensitive Industry*.

**Regional Environmental Pressures**

In Hypothesis 4, we suggest that regional environmental norms create an institutional environment that either encourages or discourages adoption of energy saving initiatives. We proxy for the environmental expectations in a region using the Congressional Scorecard published annually by the League of Conservation Voters (LCV) (see also Delmas and Toffel 2004). The LCV measures each congressional representative’s voting record on environmental issues each year, and creates a scorecard representing the percentage of times that
a representative has voted in a pro-environmental manner. We aggregate these to the state level for each year. We then create two indicator variables: High LCV is equal to 1 if the state is at or above the 75th percentile of LCV, and Low LCV is equal to 1 if the state is at or below the 25th percentile.³

Control Variables

Economic Characteristics of a Recommendation – We use two variables to control for the economic characteristics of a recommendation: Payback and Implementation Cost. Payback represents the simple payback for a recommendation. Cost represents the implementation costs for a recommendation and includes cost of equipment and installation costs. Following Anderson and Newell (2004), we use the logarithmic form as it improves the model’s fit with the data; using the linear form provides similar results. We note that Anderson and Newell (2004) also include the quadratic of payback and cost, and include controls for savings generated by the recommendation. We omit these to keep the model parsimonious, but including them does not change our results.

Variance of Payback of a Recommendation Type – To capture the uncertainty related to the returns for a recommendation, we compute the variance of payback of a specific type of recommendation i as \[ \sum_{j \in J(i)} [(Payback)_{ij} - (Average Payback)_i]^2, \] where J(i) represents all firms that were given recommendation i. This variable is not a perfect measure of the uncertainty related to the returns as it also captures the underlying heterogeneity of the firms in the dataset, but as long as there is some recommendation-specific component to this overall variance, this measure will be correlated with the uncertainty associated with a recommendation type.

³ We have replicated the results that follow with other specifications for this variable and the results are the same in sign and significance.
We control for the order in which recommendations appear in the report as Muthulingam et al. (2012) find that the order of appearance impacts adoption. To control for this, we include *Serial Position of a Recommendation*. We control for *Total Number of Recommendations in an Assessment* because research highlights that choice is affected by the number of options provided to decision makers (Benartzi and Thaler, 2007, Gourville and Soman, 2005).

We control for temporal factors that could affect adoption with two variables. First, we control for the *Assessment Year* by using indicator variables for the year the assessment was done. This will generate fixed effects that control for general macroeconomic factors that might influence the degree to which a recommendation is attractive. Second, Stern and Aronson (1984) point out that expenditures that fit into the present budget cycle require fewer approvals. For most firms in the US, budgeting and financial reporting conform to fiscal calendars (Oyer 1998). The 1998 Survey of Small Business Finances by the Federal Reserve Board finds that for nearly 85% of small firms in the US, the fiscal year coincides with the calendar year. Consequently, to capture the impact of budgetary cycles we use indicator variables to identify the specific calendar quarter in which the assessment was done.

We control for a number of other firm-level variables that might affect adoption. We control for sales, as firms with greater sales may have greater capacity to implement initiatives. We also control for number of employees and facility size in square feet because larger facilities may either have greater capacity for initiatives or conversely have greater complexity and thus may be less likely to implement a given recommendation.

*Methods*
As the dependent variable for our analysis is binary, we use a probit estimation. As discussed above, the average IAC audit results in approximately 7 recommendations. Thus, the implementation decision for a given recommendation is not independent of the other decisions that the audited facility faces. To correct for this, we cluster the observations within the facility. We note that a fixed-effect specification is not possible because most of our independent variables do not vary over the choices for a given firm.

Results

Table 1 contains the descriptive statistics and correlation coefficients for the variables. The average estimated implementation cost across all recommendations is US$19,117 while the average estimated annual savings is US$17,791. Thus, the average estimated simple payback period across all the recommendation is just over a year.

Table 2 provides the results of the probit estimation. Model 1 contains only the control variables. As expected, the longer the payback period for a given recommendation, the less likely it will be implemented. We also find that higher variance in payback reduces the probability of implementation. Consistent with Muthulingam et al. (2012), the serial position of the recommendation also matters, as recommendations that are later in the list are less likely to be implemented (note that Table 1 shows that serial position is not correlated with payback or cost of the initiative).

Model 2 includes the measures of disruptiveness of the recommendations. We include Operating Processes and Search Processes, which makes Investments the omitted category. We find mixed support for Hypothesis 1, as recommendations that require search and novelty are less likely to be implemented, which supports our hypothesis, but those that change operating
procedures are actually more likely to be implemented than those that require investments but cause relatively little disruption.

Model 3 adds the count of the number of times that a given initiative had been implemented in the prior five years. The coefficient on this variable is positive and significant, indicating that as recommendations become more common, they are more likely to be implemented, controlling for the financial return they offer. This result supports Hypothesis 2.

In Model 4, we include Average Operating Income and Environmentally Sensitive Industry to test H3a and H3b respectively. We find that greater industry profitability reduces the likelihood of an initiative being adopted, which is consistent with H3a. We find that being in an environmentally sensitive industry has no significant effect on implementation. We return to these findings in the discussion of our results.

Finally, Model 5 includes the indicator variables for regional environmental norms. We find that being located in a region with weak environmental norms reduces the probability of implementation. Being in a region with high environmental norms, however, does not increase implementation likelihood beyond being in a more moderate region. Thus, we find support for institutional norms differing by region, but that beyond some minimum level of environmental concern, increasing degrees of environmental norms has little influence on whether a facility implements a given initiative.

**Discussion and Conclusion**

We find a number of significant influences on adoption of energy-saving initiatives. In fact, controlling for the degree to which a given initiative provides financial return, we find that both behavioral and institutional factors affect the likelihood that an initiative will
be adopted. Our results both extend the research in environmental management that examines whether it ‘pays to be green’ and provide further evidence of the joint influence of economic and institutional factors in organizations’ decisions.

From the ‘pays to be green’ perspective, our findings suggest that managers are, in fact, leaving profitable opportunities on the table (King and Lenox 2002). However, at least in the realm we examine, it is not because these opportunities are invisible to the managers. Rather, the managers make decisions that are consistent with behavioral theory, as they choose to implement initiatives that cause less disruption in the firm’s operation, and which have greater certainty of providing the expected financial return. Moreover, there is an element of problemistic search in the firm’s implementation of energy-saving initiatives, as firms that operate in more profitable industries are less likely to implement initiatives at a given level of profitability.

Moreover, we find that institutional norms matter even after controlling for financial return. Those firms located in areas in which environmental norms are weak are less likely to implement initiatives. Thus, as researchers search to understand heterogeneity in firms’ environmental performance (Bansal and Roth 2004), it is important to consider the degree to which firms are embedded in regions with differing environmental expectations.

While we find a significant effect of regional institutional norms, we do not find that operating in an environmentally sensitive industry influences adoption behavior. Prior studies have demonstrated that firms in such industries tend to exhibit similar behaviors, including increased environmental disclosure (Cho and Patten 2007) and being more sensitive to shareholder resolutions (Reid and Toffel 2009). We believe that our non-result can be attributed to the difference between our setting and those previously studied. In particular, prior studies
have considered actions that are visible to stakeholders, and indeed are largely aimed at increasing legitimacy in the face of pressures. Here, however, we study actions that are largely invisible to stakeholders, and thus the firms we observe do not use them to build legitimacy so much as to improve their environmental and financial efficiency. Thus, they appear to be unconsciously affected by local environmental norms, such that on average, initiatives are less likely to be implemented in areas with weak environmental expectations. But, the managers are not consciously seeking to legitimate their actions with stakeholders or pressure groups.

Our findings also point to the importance of jointly considering environmental and economic issues in trying to develop an understanding of environmental issues. We find that as practices become legitimated their probability of being implemented increases. There is a long tradition of studying adoption of practices in institutional theory. Early studies suggested that adoption was first driven by economic criteria but once a practice had gained legitimacy it diffused through mimicry and fashion, rather than due to technical merits (Tolbert and Zucker 1983). More recent studies have demonstrated that practices can pass through both of these phases and return to technical criteria once they have fallen out of fashion (David and Strang 2006). Our study contributes to this discussion by demonstrating that legitimacy matters even controlling for the direct economic effects of a practice.4

We acknowledge that our findings are preliminary and are limited to energy savings initiatives in small and midsize firms. We believe, however, that these initiatives provide an important setting in which to observe how economic and institutional issues combine to affect environmental decisions in firms. There is a long-standing belief that energy-efficiency investments can be both profitable and environmentally beneficial (Frieden and Baker 1983;

4 Note that in the next version of this paper we will consider interactions between the technical and the institutional, and temporal effects.
McKinsey 2009). From an economic standpoint, the solution to energy inefficiency is to provide information to consumers to increase their incentive to make energy-saving investments (Allcott and Greenstone 2012). Our research suggests that even when businesses are provided with information that suggests that behavioral and institutional factors matter, and that efficiency will not be improved without taking such factors into account.
References


Audia and Greve 2006


Barnett and Carroll 1995


Coll 2012


Dacin 1997


Deephouse and Wiseman 2000


Table 1: Summary Statistics and Correlation

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Clustered Standard Errors, + p<0.10, *p<0.05, ** p <0.01, *** p <0.001