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WILL FIRMS GO GREEN IF IT PAYS? THE IMPACT OF DISRUPTION, COST, AND EXTERNAL FACTORS ON THE ADOPTION OF ENVIRONMENTAL INITIATIVES

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Research summary: *Research on the link between financial and environmental performance implicitly assumes that firms will pursue profitable environmental actions. Yet, clearly, factors beyond profitability influence firms' environmental choices. We treat these choices as organizational change decisions and hypothesize that adoption of environmental initiatives is influenced by a combination of profit, level of disruption caused, and external influences. We test our hypotheses by examining firms' choices regarding implementation of energy-savings initiatives. We find that degree of disruption, number of prior local adopters, and strength of environmental norms affect the adoption decisions. In addition, the effect of disruption is amplified by the implementation costs, but is mitigated by the number of prior local adopters.*

Managerial summary: *Often, in trying to improve firms' environmental performance, academics and stakeholders have focused on actions that simultaneously improve environmental and financial performance. This assumes that firms will undertake projects that offer such dual benefits. We consider what might prevent firms from pursuing such 'win-win' initiatives. We focus on how the degree of disruption of an energy-saving initiative affects its probability of adoption. We find that firms are significantly more likely to adopt moderately profitable, but easy initiatives than more profitable but disruptive ones. We also examine internal and external factors that moderate the effect of disruption. Our findings suggest that in order to incentivize firms to improve environmental performance, it might be more beneficial make these activities less disruptive than to make them more profitable.*

INTRODUCTION

A significant body of research has investigated the relationship between financial and environmental performance. 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 (Barnett and Salomon, 2006; Margolis and Walsh, 2003). That is, there is some evidence that it can, indeed, 'pay to be green' (Berchicci and King, 2007). In one sense, this result is promising, because it suggests that firms can simultaneously improve financial and environmental performance, and that a prescription for reducing business' impact on the environment is to make managers more aware of this linkage (Esty and Winston, 2009).

However, finding a positive association between financial and environmental performance raises a puzzling, and potentially troubling question: Why do some firms potentially miss out on profitable opportunities that are socially legitimate and even desired (King and Lenox, 2002)? We believe

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that one way to begin to answer this question is by bringing more research to bear on what is actually required to implement environmental initiatives. Prior research has largely examined the relationship between aggregate measures of environmental performance and financial performance. These aggregate measures, however, provide little information on the profits a firm can obtain from a given environmental initiative, and we lack sufficient understanding of the relative impact of profits compared to other factors in influencing the adoption of environmentally-friendly initiatives. In this study, we analyze firm decisions regarding implementation of individual initiatives, which enables us to better isolate factors that influence firms' decisions to become more environmentally friendly. Anecdotal accounts of business' environmental decisions suggest that such decisions are often fraught with uncertainty, which makes it challenging, even for businesses that harbor good intentions on environmental issues, to implement such initiatives (see, e.g., Schendler, 2009).

Our paper also contributes to the literature on organizational change. Prior research on change from a routine-based perspective has examined the effects of change, and has studied how the disruptions from changes (labeled *process effects* in this literature) may offset the benefits that accompany the changes (Barnett and Carroll, 1995; Hannan and Freeman, 1989; Le Mens, Hannan, and Polos, 2015). We argue that it is fruitful to examine how such disruption, together with external factors, combine to affect the likelihood that a change will be undertaken in the first place, and that the importance of disruption has been understated, as presumably only changes in which the disruption is expected to be worth experiencing will be undertaken. In addition, we emphasize that the degree of disruption that a given initiative offers is at least partly perceptual, and that external and internal factors can influence the degree to which disruption becomes salient in the decision to implement the initiative. Thus, a given initiative that is considered to be too disruptive in one situation may be seen as worth pursuing in another.

We test our hypotheses using data from the Department of Energy's (DOE) Industrial Assessment Center (IAC) program, which includes over 12,000 energy assessments and more than 88,000 energy-savings recommendations that resulted 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

A significant body of research has attempted to determine what, if any, relationship exists between financial and environmental performance. So many studies have been undertaken on this topic that there are several reviews (Berchicci and King, 2007; Etzion, 2007; Margolis and Walsh, 2003) and meta-analyses of the relationship (Margolis, Elfenbein, and Walsh, 2007; Orlitzky, Schmidt, and Rynes, 2003), and most recently, replication efforts of prior findings (Zhao and Murrell, 2016). Despite this volume of research, there is as yet no consensus on whether, or to what degree, firms can profit from environmental initiatives. There is, however, significant evidence that such a positive relationship can exist (Berchicci and King, 2007), indicating that at least in some circumstances, firms appear to be under-investing in environmental performance. If environmental and financial performance levels are positively related, but firms differ in their degree of environmental proactivity, then (at least) three explanations exist. First, the positive relationship is only found under certain circumstances, such as when there is 'low hanging fruit' that can easily and profitably be harvested (Hart, 1995) or when the firm possesses complementary assets that allows it to profitably undertake environmental improvements (Christmann, 2000). Second, it may be that the ability to perceive profitable opportunities in environmental improvements depends upon tacit knowledge that not all managers possess (King and Lenox, 2002).

Third, there may be circumstances when a firm possesses the required capabilities and recognizes the profit available from an initiative, yet still chooses not to implement it. This study focuses on the last situation, as we consider factors that are likely to influence the adoption of environmentally-friendly initiatives, controlling for the profit that the initiatives offer. In order to explore these factors, we model the decision regarding adoption of an initiative as a form of organizational change, in which the profit expected

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from a given change needs to be weighed against the disruption that the change presents. In doing so, we extend prior routine-based accounts of organizational change (see, e.g., Barnett and Carroll, 1995; Dowell and Swaminathan, 2000; Kim, Swaminathan, and Teo, 2015), which emphasizes that change efforts have both content and process effects. The content effects are the improvement in financial position or survival prospects that the firm will enjoy after the change is enacted. So, for example, an environmental initiative such as we examine could result in reduced cost and risk for the firm (Bansal and Roth, 2000; Hart, 1995), or could reduce the pressures it experiences from stakeholders (McDonnell, King, and Soule, 2015). The process effects involve the disruption to the firm's routines and relationships that arise during the change effort. These effects are generally expected to be felt most strongly early on, and diminish as the firm settles into the new routines (Barnett and Carroll, 1995). For environmental initiatives, these effects are driven by changes in individual and group behaviors as well as the implementation of unfamiliar technologies. For the remainder of the paper, we use process effects and disruption interchangeably, as the process effects we focus on are disruptions to routines, which is consistent with most organizational change research that stems from organizational ecology (see, e.g., Hannan *et al.*, 2006).

Content effects of environmental initiatives

The content effects of environmental initiatives are represented by the degree to which they are expected to improve the firm's financial position or legitimacy. An initiative that promises significant financial benefits, of course, is more likely to be undertaken than one that is unprofitable. Such 'win-win' opportunities are the focus of the literature that examines the relationship between financial and environmental performance (Margolis and Walsh, 2003), and, not surprisingly, this literature finds evidence that initiatives with significant financial benefits are more likely to be undertaken (see, e.g., Anderson and Newell, 2004).

However, what has been overlooked so far is whether alternative factors might affect firms' decisions to engage in environmentally-friendly initiatives and create limits to the incentives provided by the content effects. Therefore, we focus our hypotheses on the influence of the process effects and external factors such as prior adopters and local norms on the probability that a given initiative is adopted, controlling for the financial returns such initiatives may offer. We then return to the content effects as we consider how they interact with process effects to influence the likelihood of adoption of an initiative.

Process effects of environmental initiatives

Prior research has demonstrated that process effects can be significant when firms undertake major changes, and that they can overwhelm the benefits that the change may bring (Barnett and Carroll, 1995; Dowell and Swaminathan, 2000). However, less is known about how anticipated process effects might prevent change from occurring in the first place. Yet, it is likely that managers do anticipate and attempt to avoid process effects. For example, work dating back as far as Cyert and March (1963) has demonstrated that managers frequently settle for local solutions, which allow them to maintain current operating routines (Gavetti, 2012; Stuart and Podolny, 1996). Settling for more familiar choices is a way of minimizing process effects of change, as these effects increase with the degree of disruption that the change brings to a firm's routines (Kattila and Ahuja, 2002).

Process effects are likely to accompany environmental initiatives because they frequently involve changes in either technology or routines. Such changes can be difficult for firms to undertake, as they force members of the firm to reconsider the patterns of the work that they perform (Rerup and Feldman, 2011). In addition, the benefits from environmental initiatives can depend on factors that are outside the firm's control, such as commodity prices (e.g., energy prices, regulatory changes). The uncertainty over future benefits may also make the disruption that the changes represent more salient. Therefore, when managers consider whether to adopt a given environmental initiative, they weigh the perceived process effects against the projected content effects of that initiative.

The idea that the degree of disruption affects the likelihood of an initiative being adopted offers the potential to make at least three contributions. First, we can assess the degree of profit needed in order to overcome a given amount of disruption, which has not, to our knowledge, been assessed. Second, by setting the baseline effects of disruption, we can then consider how external factors

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might act to influence adoption rates, holding both profit and disruption constant. Finally, while organizational scholars have noted for decades that firms do not necessarily act to maximize profits and that other factors are often critical in strategic decisions (Cyert and March, 1963), much of the literature on organizations and the natural environment has failed to account for this. For example, studies that assess the degree of under-investment in energy efficiency cite the need for education of managers or consumers in order to increase efficiency investments (Jaffe, Newell, and Stavins, 2004), under the assumption that such investments would be made once the potential profit were revealed.

We expect, therefore, that greater levels of disruption lead to lower probabilities of adoption for environmental initiatives:

Hypothesis 1 (H1): Controlling for the expected profit an environmental initiative presents, the greater the disruption the initiative creates, the lower the probability that it will be adopted.

Role of the external environment

Process effects that accompany a potential change are not fixed, but vary according to the firm's current position, and two firms can view the same change initiative as having different degrees of disruption, because they may start with market positions or technologies that are different (Dowell and Swaminathan, 2006; Haveman, 1993). In addition, the influence of process effects can depend on managers' perceptions of the degree to which a change will cause disruption. These perceptions, in turn, will depend in part on the firm's external environment, such that a given initiative that is considered to be too disruptive in one circumstance may not be considered so in another.

Recent research has demonstrated that community norms continue to exert a significant influence even in an increasingly connected world (Marquis and Battilana, 2009). Yet, while there is widespread acceptance that local norms affect firm decisions, there is still uncertainty over the degree to which factors such as the institutional environment and the degree of local acceptance of a practice actually matter when the economics of that practice are also considered (Lee and Lounsbury, 2015). Thus, it is worthwhile to examine what role the firm's environment plays in affecting the decision whether to adopt a given initiative, and why it may have an influence even controlling for the content and process effects described above.

The influence of local norms may be especially important for decisions that involve social responsibility (Marquis, Glynn, and Davis, 2007), because such decisions involve not only an evaluation of whether something is economically and strategically valuable, but also an assessment of whether it is worthwhile in a social sense. Thus, environmental initiatives that go beyond regulatory requirements are likely to be strongly influenced by institutional norms because they are at the discretion of the firm's management and involve both social and financial considerations. Biggart and Lutzenhiser (2007), for example, suggest that these initiatives are especially likely to be socially influenced, and that for such decisions, 'the structure of a community and its social norms can have critical impact on who makes the decision and the bases on which it is made (p. 1075).' This perspective suggests that norms can influence the perceived value of a given environmental initiative, and thus potentially impact the likelihood that a given initiative is adopted.

Overall, then, we expect the level of environmental norms to affect the probability an initiative is adopted.

Hypothesis 2 (H2): Controlling for the financial return of a given environmental initiative, the stronger the environmental norms are in a given region, the greater the probability that the initiative will be adopted.

One of the key reasons that firms do not adopt environmental initiatives is that the benefits and costs of those initiatives are seen as highly uncertain (Anderson and Newell, 2004), which may lead firms to place higher discount rates on the cash flows that stem from environmental projects (Berchicci and King, 2007). Uncertainty, in turn, stems in part from the managers' perceptions of the efficacy of a given project. Schendler (2009), for example, details the lengths to which he was forced to go to convince managers that compact fluorescent bulbs would actually reduce energy consumption significantly relative to incandescent lighting.

As much prior research has demonstrated, perceived uncertainty decreases as the number of adopters increase (Kennedy and Fiss, 2009; Palmer, Jennings, and Zhou, 1993). However, not all adoptions will be equally impactful. In particular, we expect that prior local adopters have the most influence implementation decisions. Managers can more easily learn of an initiative's effectiveness from other local firms that have implemented it, and can gain a richer understanding of the initiative through such contacts. In addition, prior local implementations can convince a manager that a given practice is appropriate in their setting (Williams, 2007). Finally, increased local adoption will also create a network of vendors and outside parties who may be involved in selling, installing, and servicing of the materials involved with the initiative which can facilitate the adoption of such initiatives. Thus, we expect:

Hypothesis 3 (H3): Controlling for the financial return of a given environmental initiative, the more local adopters of that initiative, the higher the probability that it will be adopted.

Interaction of disruption with other factors

Thus far, we have considered the direct effect of disruption, environmental norms, and local adopters in affecting the likelihood that an initiative will be implemented. These factors, however, not only independently impact the likelihood of implementation, but also may have a moderating influence on the effect of disruption on adoption. We consider how economic and institutional factors might moderate the effect of disruption, and begin by examining how financial factors will moderate the influence of disruption. We focus on the interaction between cost and disruption because prior research suggests that an environmental initiative's cost is more influential than financial savings in influencing environmental decisions (Anderson and Newell, 2004). Costs have a larger influence because they are more certain and experienced sooner than the benefits, which can accrue over a long period and may depend upon factors such as energy prices that are outside the firm's control.

We expect that the impact of an initiative's costs increases with the degree of disruption that the initiative creates. Greater disruption creates uncertainty over whether the change will eventually provide the promised performance improvements, because higher the disruption a change engenders, the more complex and uncertain the change outcome is. Second, and perhaps more pertinent, the disruption is experienced in the near-term (Kim *et al.*, 2015), which is also when the financial costs are borne. Thus, when a firm is faced with a highly-disruptive initiative, the cost of that initiative is likely to be more salient and the initiative will seem less attractive relative to those that are either less expensive or less disruptive. All else equal, a given level of cost, therefore, is likely to impede implementation of more disruptive initiatives to a greater degree than less disruptive ones:

Hypothesis 4 (H4): The cost of an environmental initiative moderates the relation between disruption and the probability of adoption, such that higher costs will reduce the probability of adoption for highly disruptive initiatives more than for less disruptive initiatives.

We also expect that the strength of local environmental norms will moderate the influence of disruption on adoption. Local norms affect the degree to which people in a local area consider the environmental benefits of an action when making decisions (Sexton and Sexton, 2014). The effect of norms is to change the way people make decisions, so that in areas where a norm is strong, actions consistent with that norm are simply taken for granted (Tilcsik and Marquis, 2013). For example, in areas with strong environmental norms, there are higher levels of clean energy entrepreneurs, suggesting that norms reduce the perceived risk of entrepreneurship (Sine and Lee, 2009). Similarly, community logics can moderate the effect of broader forces. Lee and Lounsbury (2015), for example, find that in communities with strong proenvironmental logics, firms pay greater attention to environmental issues and are less influenced by market forces in their environmental decisions.

In areas with strong environmental norms, the degree of disruption of an initiative may be less of an impediment to adoption. Thus, local environmental norms may reduce the degree to which disruptiveness affects firms' decisions as to whether to implement an initiative:

Hypothesis 5 (H5): The environmental norms in a region moderate the relation between disruption and the probability of adoption, such that the stronger the environmental norms, the less the negative impact of disruptiveness on the probability of adoption.

Finally, the number of prior local adopters also has the potential to moderate the initiative's degree of disruptiveness. When the number of local adopters increases, the initiative becomes more familiar to prospective adopters, and uncertainty decreases. As more local adopters have implemented a given initiative, prospective adopters see not only that the initiative can work, but more specifically that it will work within their specific context (Williams, 2007). The effect of local adopters is likely to be felt most strongly for the more disruptive initiatives. These initiatives are the ones that create the most uncertainty for firms, and as such, will especially benefit from the proof that local adopters provide. We expect, then, that the impact of disruptiveness on the likelihood that a given initiative is adopted will decrease as the number of local adopters of that initiative increases:

Hypothesis 6 (H6): The number of local adopters of a given initiative will moderate the relation between the disruption and the probability of adoption, such that more local adopters the lower the negative effect of disruptiveness on the probability of adoption.

EMPIRICAL SETTING, DATA, AND METHODS

While there are many dimensions to environmental performance, we focus upon energy savings initiatives; that is, those changes in behaviors, routines, and equipment that reduce a firm's energy consumption. A firm's decision as to whether to implement an energy-savings initiative represents an interesting and appropriate setting for at least two reasons. First, while energy savings initiatives are rarely 'core' to the firm, in the way that ecological studies of change have used that term, they run the gamut from simple, inexpensive initiatives, which can be seamlessly integrated into an existing firm's routines, to much more customized and elaborate changes, which require significant changes to a firm's routines and force the firm to deal with new technologies and vendors. Therefore, the degree of process effects should differ widely among the various initiatives.

Second, many energy-savings initiatives have high returns on investment, with firms recouping the costs of the projects within a one- or two-year time frame (Anderson and Newell, 2004). Many of these projects, therefore, appear to fall into the category that business and environment scholars have labeled 'low-hanging fruit.' that is, environmentally-friendly initiatives that should be easy for firms to implement because they do not require tradeoffs with economic performance (Hart, 1995). Yet, there is evidence that firms continue to operate far from the frontier for energy efficiency, and that there are apparently many profitable energy-savings opportunities available for firms (Anderson and Newell, 2004; Granade *et al.*, 2009; Schendler, 2009).

Studying energy savings initiatives is also advantageous because they have been the focus of prior studies, primarily from an economics perspective (Anderson and Newell, 2004; Jaffe *et al.*, 2004), though recent studies have examined the effect of behavioral factors (Muthulingam *et al.*, 2013). Thus, we can control for key factors that have been found to affect the adoption of such initiatives. Moreover, our findings can contribute to the question of why firms seem to under-invest in energy savings, which has vexed both economists and practitioners (e.g., Granade *et al.*, 2009; Jaffe *et al.*, 2004).

The data used for this study are obtained from the DOE's IAC program provides free energy audits (or assessments) for small- and medium-sized manufacturing firms (SIC 20-39) 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. Manufacturing firms are eligible for the free energy assessment if their gross annual sales are less than \$100 million, and they have fewer than 500 employees, with annual energy bills between \$100,000 and \$2 million (Muller, Muller, and Glaeser, 2004). Typically, firms are assessed under the IAC program if they are within 150 miles of the host campus.

The typical assessment process starts with the IAC collecting information on the firm's energy usage. This is followed by a site visit where the IAC team interviews plant management personnel, tours the plant, and collects operational data. The plant tours uncover 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.' The IAC team then provides the firms with a written report which details the recommendations to improve energy efficiency across the firm. The IAC program tracks the adoption status of these recommendations over a two-year period.

We use the data from the IAC database for the years 1981–2006, because the control variables on which we depend are available only for this period. We adjust all monetary figures for inflation, scaling to year 2006 US dollars using inflation data from Bureau of Labor Statistics (BLS, 2008). After excluding outliers (paybacks greater than 9 years, recommendations with negative costs, and those that have costs but zero savings), and records for 'special' audits of firms outside the core SICs and firm size limits, we perform our analysis on 88,977 recommendations stemming from 12,269 audits. We note that this database has been used previously by Muthulingam *et al.* (2013) and Anderson and Newell (2004) and we control for their findings in our analysis.

Dependent variable

The dependent variable in our analysis is an indicator variable that takes a value of 1 if a given recommendation was implemented, and is 0 otherwise. As mentioned earlier, the IAC program only follows up with the firms for a period of two years to ascertain whether the energy saving recommendations were implemented or not. This is because the DOE believes, based on its experience of working with firms, and on the fact that most recommendations have attractive expected financial returns (the average payback of recommendations in our data is just over a year as shown in Table 1), if recommendations are not implemented within two years then they are unlikely to be adopted in the future. As a result, we infer that the two year window is a reasonable period to assess adoption of the recommendations.

Independent variables

Our hypotheses consider how disruption in routines can affect the adoption of the energy saving initiatives, and how economic and institutional factors moderate the effect of disruption. Since our hypotheses are steeped in the routine-based literature on organizational change (Dowell and Swaminathan, 2000; Hannan and Freeman, 1984; Nelson and Winter, 1982), we measure disruption using the categorization of search routines developed initially in Nelson and Winter (1982). We divide the energy-savings initiatives into three categories of increasingly disruptive types of changes: operational characteristics, standard investment, and customized investment representing.

The first level of disruption involves changes to the firm's operational routines. These routines involve the execution of regular operational procedures in the firm's day-to-day production (Zollo and Winter, 2002). In the context we study, energy-savings initiatives can cause relatively short-term changes in routines and behaviors, such as repairs to existing equipment that reduce energy waste, or can have longer-term implications for operations, such as changes in the maintenance schedule for equipment. In either case, the energy saving initiative involves a change that can be accomplished with existing equipment. Moreover, changes in operating routines do not, in general, change the firm's relationship with outside stakeholders such as suppliers. Finally, while such changes may require learning and behavioral changes, they do not require irreversible investments in new equipment, and therefore are likely to be seen as the least disruptive form of energy initiatives in our sample.

In contrast, investment in standardized capital equipment may lead to greater process effects because unlike operational characteristics, which involve changes to operational procedures or maintenance of existing equipment, standardized investment involve replacement of existing equipment with new equipment. Therefore, such investment presents a greater risk of failure, and involves longer-term changes to the organization's routines. Even with off-the-shelf technologies, there is potential for managers and workers to distrust the capability of new equipment to adequately fulfill its role (Schendler, 2009). In addition, new equipment could render some skills obsolete, for example by replacing manual processes with automated ones, or by significantly changing the maintenance and repair skills required.

Finally, we consider the case in which the energy savings initiative requires investment in capital equipment that must be customized to some degree. Such investments represent increased risk to the firm, as they are more likely to require ongoing adjustments and follow-up. For instance, customized investment can include initiatives such as installation of furnace insulation equipment that is fitted exactly to a given factory's specifications. In addition, of the three changes we consider, customized investment are the most likely to change the firm's internal and external relationships.

Table 1. Descriptive statistics

	Variable	Mean	Std dev	Min	Max	N
(1)	Implementation Status (1 = Implemented)	0.503	0.500	0	1	88,977
(2)	Payback (in years)	1.053	1.284	0	8.999	88,977
(3)	Implementation Cost (in dollars)	11,660	48,122	0	1,000,000	88,977
(4)	Annual Savings (in dollars)	13,255	44,053	1	990,250	88,977
(5)	Variance of Payback	1.302	0.822	0	27.58	88,939
(6)	Serial Position of a Recommendation	4.692	2.968	1	29	88,977
(7)	Environmentally Sensitive Industry	0.179	0.384	0	1	88,977
(8)	Operational Characteristics	0.408	0.491	0	1	88,977
(9)	Customized Investment	0.142	0.349	0	1	88,977
(10)	Prior Adopters Local	27.82	46.66	0	358	88,977
(11)	Prior Adopters Non-Local	631.88	997.22	0	4916	88,977
(12)	Sierra Club Membership per Capita	0.00224	0.00406	0.00029	0.05250	88,635

To classify the initiatives, we begin with the 680 sub-categories of energy saving recommendation types defined by the DOE. Two energy efficiency experts who were blind to our hypotheses independently classified the recommendations into the three categories described above. One of the energy efficiency experts worked for over 30 years on issues related to resource efficiency and has worked with several organizations on energy efficiency including the American Council for an Energy-Efficient Economy. The other energy efficiency expert was a general manager in a firm that has provided energy efficiency solutions to manufacturing firms across the United States, Europe, and Asia. The raters were provided descriptions of the three types of routines that follow Nelson and Winter's 1982: 14–16) discussion of routines, as well as with examples of energy saving recommendations that conform to the three types of routines. To support the classification efforts, the raters were also provided examples of the 680 sub-categories of the actual recommendations made by the IACs to various firms in the IAC program. The details of the actual recommendations coupled with the examples of classification enabled the raters to classify the recommendations based on their experience with similar initiatives. The kappa statistic of the inter-rater agreement between these two raters is 0.78, which is quite high; Landis and Koch (1977) suggest that scores between 0.61 and 0.80 represent substantial agreement. The differences in classification were resolved jointly by the two raters.

Overall, there were 36,304, 40,061, and 12,612 energy saving recommendations related to operational characteristics, standard investment, and customized investment, respectively. We used these to create three indicator variables: *Operational Characteristics, Standard Investment* and *Customized Investment*. We perform the analysis using *Standard Investment* as the excluded category and thus support for Hypothesis 1 would be indicated by a positive coefficient on *Operational Characteristics* and a negative coefficient on *Customized Investment*. (Table A1 in Appendix S1 provides examples of energy saving initiatives that were classified into each of the three types. Table A2 in Appendix S1 provides further detail on these classifications.)

In Hypothesis 2, we suggest that regional environmental norms create an institutional environment that affect the adoption of energy saving initiatives. To test this, we require a time- and location-varying measure that reasonably proxies the strength of environmental norms in the area in which the firm operates. The independent variable we use to evaluate H2 is *Sierra Club Membership Per Capita*. This represents the annual count of Sierra Club members in the state in which the facility operates scaled by the state population. Ideally, we would have more fine-grained data that would allow us to test for more localized effects, but such data are not available for the length of our analysis period. Our measure is similar to measures used in prior studies of institutional norms (Delmas and Montes-Sancho, 2011; Maxwell, Lyon, and Hackett, 2000; Sine and Lee, 2009). Most important for our purposes, Sine and Lee (2009: 129) detail the Sierra Club's transition from an organization that was primarily concerned with environmental conservation to one in which energy issues were paramount.

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Hypothesis 3 suggests that the number of local adopters of a given energy saving initiative affects the probability that the focal firm will adopt it. In order to demonstrate that the local adopters matter and that our results do not simply reflect greater adoption across a wider area, we split prior adopters into local and non-local. For a specific energy saving initiative recommended by an IAC, *Prior Adopters Local* is the cumulative count of the number of times a particular energy saving initiative has been implemented in the past when it was recommended by the same IAC. *Prior Adopters Non-Local,* meanwhile, is defined similarly but counts recommendations by other IACs. Support for H3 is indicated by a significant and positive coefficient on *Prior Adopters Local*. In addition, we expect a significantly smaller coefficient on *Prior Adopters Non-Local*. In additional analyses, we examined other definitions for prior adopters, such as the number of times a given recommendation has been made in the past (regardless of whether it was adopted) or the number of times a given recommendation has been made in the past five years, and we find that our results remain essentially the same.

Hypothesis 4 examines how the interaction between the implementation costs of an energy saving initiative and its associated disruption potential affects the implementation of the initiative. We create an interaction of the logarithm of the implementation costs (i.e., *ln(Cost)*) with *Operational Characteristics* and *Customized Investment.* We expect that the latter coefficient is negative and significantly greater than the coefficient on the former.

In Hypothesis 5, we examine how the interaction of regional environmental norms and the disruption potential affects the adoption of energy saving initiatives. Consequently, the independent variables we use to evaluate H5 involve interaction of *Sierra Club Membership Per Capita* with *Operational Characteristics* and *Customized Investment.*

Hypothesis 6 examines how the interaction of legitimacy and the disruption potential affects the adoption of energy saving initiatives. Consequently, the independent variables we use to evaluate Hypothesis 6 involve interaction of *Prior Adopters Local* with *Operational Characteristics* and *Customized Investment.* As we detail below, we recognize that interaction effects in non-linear models are not simply evaluated by examining the significance on the coefficient on the interaction term, as this be misleading (Hoetker, 2007), so in addition to the Probit regression we perform, we also graph the results to assess whether there are significant interactions as predicted in Hypothesis 4 to Hypothesis 6.

Control variables

We attempt to control for factors that could affect the likelihood of adoption, and more importantly, that are related to our key independent variables. Our controls are at the levels of the initiative, the firm, and the external environment.

Economic characteristics of a recommendation

Clearly, economic characteristics of the initiatives will influence adoption. Additionally, since cost is likely to increase with an initiative's degree of disruption, it is important to control for costs in order to be more certain that any effect of disruption is not simply capturing difference in costs among the categories. When the IAC provides recommendations, they include the estimated energy savings and the financial value of those savings, as well as the adoption costs (equipment and installation) for the recommendation. We use this information to create the variables: *ln(Cost)* and *ln(Savings)*. Cost represents all the implementation costs associated with equipment, installation, training, etc. of the energy saving initiative. Savings denotes the expected annual savings from implementing the energy saving initiative. Following Anderson and Newell (2004), we normalize cost and savings so that their mean equals 1 and 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 adoption costs and annual 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 $\sum_{j \varepsilon J(i)} [(\text{Payback})_{ij} - (\text{Average Payback})_i]^2$, where J(i) represents all firms that were given recommendation i. Thus, a higher value on this represents a recommendation that has less certainty over its financial return. We expect this uncertainty to reduce the probability that the recommendation is adopted.

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We control for findings from past research on these data, including *Serial Position of a Recommendation* and *Number of Recommendations* received (Muthulingam *et al.*, 2013), as studies have highlighted that decisions are affected by the number of options provided to decision makers (e.g., Benartzi and Thaler, 2007; Gourville and Soman, 2005).

We include a number of indicator variables that control for elements of the initiative or the conditions under which the implementation decision is being made.

Assessment quarter

Stern and Stern and Aronson (1984) point out that expenses that can be included in the annual budget cycles require fewer approvals. For most small firms, such as those in our sample, the fiscal year coincides with the calendar year. Thus, we include indicator variables for the quarter in which the assessment occurred.

Recommendation type

We include indicator variables for each of the 25 different mutually exclusive major categories of recommendation type as indicated by the IAC.

Assessment year

We include indicator variables for calendar year in order to account for general macroeconomic conditions and other factors that might influence decisions across the firms.

IAC fixed effect

We use indicator variables to control for the specific IAC that performed the assessment. Given that the IAC provide energy assessment to firms which are typically located within 150 miles from the IAC, the IAC fixed effects control for factors such as (1) the regulatory pressures in the state where the IAC is located, (2) the level of environmental activism in the geographical region of the IAC, and (3) tax incentives or policies that may be prevalent in the local region of the IAC.

Industry effect

We include an indicator variable for the firm's two-digit SIC to account for industry-specific shocks that might influence adoption (e.g., regulatory changes or general economic conditions in the industry).

Firm level controls

We control for sales, as firms with greater sales may have greater capacity to implement initiatives. We also include the 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

The dependent variables used in our analyses are binary variables which indicate whether a recommendation is adopted or not, and hence we use probit models to evaluate our Hypotheses. As discussed above, the average IAC audit results in multiple recommendations. Thus, the adoption 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. Thus, we use a standard probit model with error terms clustered at the firm level. In our data, a fixed-effect specification is not possible because most of our independent variables do not vary over the choices available to a given firm.

RESULTS

In Tables 1 and 2 we provide the descriptive statistics and correlations for our data. From Table 1 we observe that, in aggregate, nearly 50 percent of recommendations are adopted. The correlations from Table 2 suggest that the probability of adoption does depend in part on the level of disruption, as those recommendations relating to operational characteristics are positively correlated with the dependent variable while those related to customized investments are negatively correlated.

Table 3 provides the results of the probit estimation. In the models presented in this table we control for the economic characteristics using the logarithm of cost and savings as well as those factors found to influence adoption in prior studies. All the control variables are consistent with expectations and prior findings from Muthulingam *et al.* (2013) and Anderson and Newell (2004).

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Table 2. Correlations

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Implementation Status (1 = Implemented)	1.000										
(2)	Payback (in years)	−0.128	1.000									
(3)	Implementation Cost (in dollars)	−0.042	0.123	1.000								
(4)	Annual Savings (in dollars)	−0.045	0.002	0.541	1.000							
(5)	Variance of Payback	−0.100	0.411	0.093	0.060	1.000						
(6)	Serial Position of a Recommendation	−0.047	−0.011	−0.010	0.002	−0.069	1.000					
(7)	Environmentally Sensitive Industry	−0.012	−0.004	0.022	0.033	0.005	0.017	1.000				
(8)	Operational Characteristics	0.116	−0.315	−0.043	−0.026	−0.553	0.048	0.001	1.000			
(9)	Customized Investment	−0.149	0.117	0.107	0.129	0.210	0.033	0.019	−0.340	1.000		
(10)	Prior Adopters Local	0.141	0.088	−0.030	−0.063	0.089	−0.063	−0.014	−0.105	−0.212	1.000	
(11)	Prior Adopters Non-Local	0.115	0.103	−0.031	−0.066	0.110	−0.098	0.007	−0.109	−0.234	0.669	1.000
(12)	Sierra Club Membership per Capita	0.011	0.019	0.003	0.005	0.028	0.012	−0.003	−0.019	0.011	−0.008	0.014

In Model 2, we include the measures for the disruption of routines. We include ‘Operational Characteristics’ and ‘Customized Investment,’ which makes ‘Standard Investment’ the omitted category. We observe that the coefficients for ‘Operational Characteristics’ is positive and significant ($\beta = 0.19283$, p = 0.000) and that the coefficient of ‘Customized Investment’ is negative and significant ($\beta = -0.32051$, p = 0.000), demonstrating support for Hypothesis 1. In Model 2, if we take an average recommendation which relates to ‘Operational Characteristics’ and change it to ‘Standard Investment’ then the overall probability of adoption drops from 0.563 to 0.490, which represents a 12.97 percent drop in the overall probability of adoption. Similarly in Model 2, if we take an average recommendation which relates to ‘Customized Investment’ and change it to ‘Standard Investment,’ then the overall probability of adoption increases from 0.369 to 0.490, which represents a 32.79 percent increase in the overall probability of adoption. In the online supplement to this paper, we graph the results of Model 2, examining how implementation rates for the three types vary as the net profit (payback period) changes. The results indicate that disruption appears to be even more of a factor than economic return in predicting the probability of adoption, because the line for operational initiatives is strictly above that of standardized investment, which in turn is strictly above that of customized investment; in other words, managers in this setting appear to prefer the less profitable, but less disruptive initiatives to the more profitable, but more disruptive ones.

In Model 3, we include the variable ‘Sierra Club Membership per Capita.’ The coefficient for this variable is positive and significant ($\beta = 5.50888$, p = 0.016). This result supports H2 and suggests that being located in a region where there is high institutional pressure on firms increases the likelihood of adoption of energy saving initiatives. However, the overall impact of norms is relatively small, as a one standard deviation increase in ‘Sierra Club Membership per Capita’ increases the probability of adoption of energy saving initiatives by 1.67 percent (i.e., from 0.5038 to

Table 3. Probit results of adoption of energy efficiency recommendations.

	Dependent variable: Implementation Status (equals 1 if recommendation is implemented, 0 otherwise)								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
ln(Cost)	−0.01571	−0.01206	−0.01213	−0.0137	−0.0187	−0.0137	−0.01453	−0.01566	−0.01963
	(0.00121)	(0.00122)	(0.00122)	(0.00123)	(0.00196)	(0.00123)	(0.00123)	(0.00123)	(0.00195)
ln(Savings)	−0.00154	0.00273	0.00263	0.00916	0.01194	0.00921	0.01001	0.00876	0.01215
	(0.00369)	(0.00375)	(0.00376)	(0.00378)	(0.00380)	(0.00378)	(0.00378)	(0.00378)	(0.00381)
Variance of Payback	−0.12682	−0.04723	−0.04715	−0.06952	−0.06598	−0.06953	−0.04929	−0.04218	−0.0371
	(0.00733)	(0.00713)	(0.00715)	(0.00761)	(0.00756)	(0.00761)	(0.00738)	(0.00732)	(0.00727)
Serial Position of a Recommendation	−0.0271	−0.02676	−0.02686	−0.02379	−0.02364	−0.02377	−0.02327	−0.02369	−0.0233
	(0.00180)	(0.00181)	(0.00181)	(0.00182)	(0.00182)	(0.00182)	(0.00182)	(0.00182)	(0.00182)
Customized Investment		−0.32051	−0.32053	−0.22615	−0.24907	−0.22607	−0.31503	−0.26663	−0.31631
		(0.01783)	(0.01785)	(0.01818)	(0.02023)	(0.01984)	(0.01956)	(0.02087)	(0.02425)
Operational Characteristics		0.19283	0.19161	0.21573	0.27235	0.21044	0.13138	0.11461	0.14264
		(0.01294)	(0.01296)	(0.01316)	(0.01661)	(0.01434)	(0.01444)	(0.01429)	(0.01892)
Sierra Club Membership per Capita			5.50888	5.61257	5.56151	4.78277	5.65142	5.5794	5.5794
			(2.29115)	(2.30779)	(2.31147)	(2.52510)	(2.30149)	(2.30314)	(2.30314)
Prior Adopters Local				0.0026	0.00262	0.00261	0.00179	0.00276	0.00276
				(0.00016)	(0.00016)	(0.00016)	(0.00017)	(0.00016)	(0.00016)
Prior Adopters Non-Local				0.00010	0.0001	0.0001	0.0001	0.00005	0.00006
				(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Interactions: Customized Investment × ln(Costs)					−0.01721				−0.01601
					(0.00376)				(0.00379)
Interactions: Operational Characteristics × ln(Costs)					0.01147				0.00984
					(0.00234)				(0.00233)
Interactions: Customized Investment × Sierra Club Membership per Capita						0.03028			0.61716
						(3.17536)			(3.22858)
Interactions: Operational Characteristics × Sierra Club Membership per Capita						2.43973			1.72635
						(2.67824)			(2.66735)
Interactions: Customized Investment × Prior Adopters Local							0.01133		0.01528
							(0.00168)		(0.00198)
Interactions: Operational Characteristics × Prior Adopters Local							0.00392		0.00212

Table 3. Continued

	Dependent variable: Implementation Status (equals 1 if recommendation is implemented, 0 otherwise)								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
							(0.00029)		(0.00034)
Interactions: Customized Investment × Prior Adopters Non-Local								−0.00026	−0.00093
								(0.00015)	(0.00018)
Interactions: Operational Characteristics × Prior Adopters Non-Local								0.00019	0.00013
								(0.00001)	(0.00001)
Controls									
Number of Recommendations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recommendation Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assessment Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assessment Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IAC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Firm Level Controls (Sales, Plant Areas, Employees)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-PseudoLikelihood	−58, 745	−58, 275	−58, 074	−57, 351	−57, 315	−57, 351	−57, 218	−57, 208	−57, 121
Firms	12, 263	12, 263	12, 185	12, 185	12, 185	12, 185	12, 185	12, 185	12, 185
Number	88, 921	88, 921	88, 579	88, 579	88, 579	88, 579	88, 579	88, 579	88, 579

Standard errors are in parentheses.

0.5122). We return to this in the discussion and conclusion.

In Model 4 we add the variables 'Prior Adopters Local' and 'Prior Adopters Non-Local' to test H3. The effect of 'Prior Adopters Local' is positive ($\beta = 0.0026$, $p = 0.000$), as is that for 'Prior Adopters Non-Local' ($\beta = 0.0001$, $p = 0.000$). However, a Wald test indicates that the coefficient for 'Prior Adopters Local' is significantly larger than the coefficient of 'Prior Adopters Non-Local' at $p < 0.001$. Comparing the average marginal effects, we find that the impact of each additional local adopter on the probability of adoption is 25.82 times larger than the impact of each non-local adopter. These results support Hypothesis 3 and provide evidence that local adoption has a higher impact on the adoption rate of energy saving initiatives than non-local adoption.

Model 5 includes the interaction of 'Operational Characteristics' and 'Customized Investment' with 'ln(Cost).' We see that the coefficient of 'Operational Characteristics × ln(Cost)' is positive and significant ($\beta = 0.01147$, $p = 0.000$), whereas the coefficient of 'Customized Investment × ln(Cost)' is negative and significant ($\beta = -0.01721$, $p = 0.000$). This provides initial support for Hypothesis 4, which indicates that increase in implementation costs has a more detrimental effect on the adoption of more disruptive energy saving initiatives. We are cautious in interpreting this result, given that it can be difficult to interpret interaction effects in nonlinear regression models (Hoetker, 2007). Therefore, in the online supplement to this paper we follow the approach used in Staats and Gino (2012: 1154) and plot the net effect of the interaction (i.e., we plot the main effects coupled with the interaction terms for multiple values of ln[Cost]). This figure A2 in Appendix demonstrates that cost has a greater impact on more disruptive initiatives, providing additional evidence to support H4. The figure shows that cost has relatively little influence on the adoption of the less-disruptive operational changes, but as cost rises, the probability that a more disruptive change is implemented falls substantially.

Model 6 includes the interaction of 'Operational Characteristics' and 'Customized Investment' with 'Sierra Club Membership per Capita.' We see that the coefficients of the interactions terms of disruption of routines with local norms are not significant. We also graphed the results of the interaction (not shown) and confirmed that there is no significant moderating effect of Sierra Club Membership on disruption. Thus, we find no support for Hypothesis 5.

Model 7 includes the interaction of 'Operational Characteristics' and 'Customized Investment' with 'Prior Adopters Local.' We see that the coefficients of the interaction terms 'Operational Characteristics × Prior Adopters Local' (and 'Customized Investment × Prior Adopters Local' are both positive and significant (Operational, $\beta = 0.00392$, $p = 0.000$; Customized, $\beta = 0.01133$, $p = 0.000$). However, a Wald test indicates that the coefficient for 'Customized Investment × Prior Adopters Local' is significantly larger than the coefficient of 'Operational Characteristics × Prior Adopters Local' at $p < 0.001$. This provides support to Hypothesis 6, which indicates that an increase in number of local adopters has a greater impact on the adoption of more disruptive energy saving initiatives. Figure A3 in the Appendix shows how the effect of the number of local Prior Adopters differs depending upon the degree of disruption of an initiative. We did not hypothesize the interaction between disruption of routines and non-local adopters, but we include that in Model 8 to give a more complete accounting of the relationship. We find no effect of non-local adopters on the impact of disruption, indicating that the degree of local adoption has greater influence. Finally, in Model 9 we include all the interaction effects, and our results maintain.

Robustness and extensions

The results presented thus far provide significant evidence that firms' choices regarding energy savings initiatives are influenced by several factors beyond the financial effects of the initiatives available to them. There are, however, limitations to our findings and potential alternative explanations that we have attempted to address both conceptually and empirically. One of our central claims is that we have controlled for the expected financial return of the initiative in assessing the effect of disruption, uncertainty, and local norms. We thus wanted to ensure that our findings are robust to different specifications for the financial return of the initiatives. First, we replaced our separate benefits and costs measures with the payback period (number of months until savings exceed costs), and found our results maintain. We then included the quadratic terms for the economic characteristics as per Anderson and Newell (2004). In all these additional tests our results are substantially the same.

A significant limitation of our data is that we have relatively sparse information on the companies that receive the IAC recommendations. In particular, we do not have a measure of firm-level profitability available. This is potentially a significant factor in the company's decision as to which (if any) initiative to implement, though the direction of the effect of profitability is unknown. Less profitable firms could be less likely to implement any initiatives because of capital constraints, or alternatively, being further away from their aspiration-level of performance, they may be more likely to adopt a given initiative (Greve, 1998). Lacking such firm-level measures of aspiration levels, we attempt to address this issue in two ways. First, we control for average industry profitability using data from Compustat. We assume that firms that are in industries with low average profits may have fewer investment alternatives, and therefore might be more likely to adopt energy-savings initiatives. We found no effect, however, nor did inclusion of this variable affect our other results.

Second, we replicated the analysis in Model 2 using fixed-effects models at the firm level. This analysis should control for all firm-level factors that do not vary across the initiatives a given firm is offered, which would include the firm's current level of profits. The results show that our findings for the level of disruption of a given initiative are unchanged with the fixed-effects model, which indicates that while we cannot directly control for many firm-level variables, they are not driving our results. We cannot use this specification for any of the other models because the relevant independent variables for H2–H6 are fixed for a given firm.

DISCUSSION AND CONCLUSION

In this paper, we examine firms' decisions whether to implement energy savings initiatives that are recommended to them. We find that, controlling for the expected financial return of a given initiative, the implementation decision is influenced by how disruptive the initiative is to the firm's current routines, how many times other firms have implemented the same initiative, especially those firms that are geographically proximate, and how strong the environmental norms are in the firm's area. Moreover, we find that the effect of disruptiveness itself depends upon other factors; specifically, we find that the cost of an initiative amplifies the effect of disruption, while the number of prior local adopters dampens the effect of disruption.

Our results have implications for research in the areas of business and the natural environment and organizational change, as well as implications for managers and policy makers. For research on business and the environment, our results speak to the literature on the relationship between environmental and financial performance. While many studies have attempted to examine whether it 'pays to be green' (Berchicci and King, 2007), our study considers whether firms 'go green if it pays.' That is, we explicitly examine the degree to which greater profitability increases the likelihood of adopting environmentally-friendly initiatives relative to other aspects of the initiatives. We do find that both costs and benefits influence adoption, with costs seeming to have a more significant effect, consistent with Anderson and Newell's (2004) findings. However, we also find in this setting that disruptiveness not only matters even when taking these costs and benefits into account, and in fact in this setting, disruption has a greater influence than profit (see Figure A1 in Appendix S1). Our results suggest that there is a limit to which profit will motivate firms to undertake environmentally beneficial initiatives if those initiatives are disruptive or untested, or if the firms are located in areas with weak environmental norms.

While our setting is energy-savings initiatives, we believe that our core results are generalizable beyond this context. We argue that the decision as to whether to adopt a given initiative is a function of the expected net financial effects it brings, as well as the degree to which the change will be disruptive to the organization, and that the degree of local adoption and the fit of the initiative with local norms will influence the decision. These factors are likely to be important beyond energy savings or even environmental settings. We also demonstrate that these factors interact in complex ways, so that an initiative's cost combines with the disruptiveness to further reduce the likelihood of adoption, while the number of local adopters dampens disruption's effect. Despite our confidence that our findings generalize beyond energy-savings initiatives, we are cognizant that any empirical study provides only initial evidence toward the findings it provides, and that significant results in one setting are only suggestive, not definitive. Further research could consider other settings and additional, related measures, especially for disruption and norms.

While we observe a direct effect of environmental norms on adoption of initiatives, norms have a relatively small effect on adoption, and we do not find that norms reduce the effect of disruptiveness. There are three potential explanations for this, which we cannot separate with our data, but which are worthy of further investigation. First, while we follow prior work in using Sierra Club membership to proxy for environmental norms (Maxwell *et al.*, 2000; Sine and Lee, 2009), it is possible that this measure is too coarse for our purposes. Recent research, for example, has demonstrated that local environmental norms operate on a more fine-grained basis than the state-level proxy that we employ (Lee and Lounsbury, 2015).

Second, it is possible that the relative weak effect of environmental norms may be due to our dependent variable of energy savings initiatives. These initiatives are largely unobservable, and thus provide less legitimacy benefits than other actions that the firm might undertake (e.g., product certification). Recent work in economics, for example, has discussed 'conspicuous conservation' (Sexton and Sexton, 2014), in which consumers in areas of strong environmental norms place greater value on purchases that are visibly 'green.' We might expect that more visible initiatives such as launching environmentally-friendly products might be influenced to a greater degree by norms than the less visible energy-savings initiatives we study.

Finally, it is possible that norms play a relatively weak role here because, as we have emphasized in the paper, we are able to directly measure expected economic benefits of the initiatives and because these benefits are relatively easily quantified. For many social and environmental decisions, these conditions do not hold, and when there is significant uncertainty over the economic benefits of a given action, institutional pressures and norms have a significant impact on adoption (Oliver, 1991; Palmer *et al.*, 1993). Future research could examine settings where either the decision was more visible to stakeholders or the benefits and costs less measurable to see how disruption and institutional norms matter in those circumstances.

Beyond the business and environment literature, our results have implications for research on organizational change. There is a significant body of prior work that demonstrates that organizational change causes disruption, and in fact that at times the process effects of change outweigh the content effects (Amburgey, Kelly, and Barnett, 1993; Dahl, 2011; Dowell and Swaminathan, 2000). This work, however, has examined process and content effects in retrospect, and with only rough proxies for the content effects. Dowell and Swaminathan (2000), for example, examine the effect on survival as firms move to new product configurations, and are forced to assume that the new configuration offers superior profits, but at the cost of disruptive process effects. We are able to control for the profit (content effect) that a firm expects, and thus assess the impact of the disruption on their choice. We find evidence that in considering available choices, firms are particularly sensitive to these process effects. Thus, studies that assess the effects of changes that have actually been attempted (Dowell and Swaminathan, 2000; Kim *et al.*, 2015) are actually observing the 'tip of the iceberg,' as many changes are foregone due to the expected process effects that accompany them.

Moreover, our findings suggest that process effects are not fixed for a given initiative. Prior work has shown that process effects are lower when the change enacted is more 'local,' such as when a firm already employs a technology that is similar to the one it adopts (Dowell and Swaminathan, 2006). We extend this by finding evidence that the influence of process effects is moderated by economic and institutional factors. For example, we find that effect of disruptiveness is moderated by both the cost of the initiative and the number of prior local adopters. These results suggest that the influence of process effects is not fixed for a given change, but instead varies with both aspects of the change itself and of the external environment in which the firm is embedded.

Finally, our results have implications for both practitioners and policy makers. Practitioners are increasingly under pressure to consider the 'business case' for sustainability (Esty and Winston, 2009), by finding opportunities for profitable environmental and social initiatives. Our results reinforce, however, that it is not simply the financial return that drives adoption, but rather that doubt over the efficacy of the initiatives and concerns about disruptions they may cause prevent businesses from being more energy efficient (Schendler, 2009). This suggests that in order to get an initiative adopted, it may be more effective to focus on less disruptive initiatives, even if they offer less profit, than by emphasizing the financial returns available. Moreover, understanding how the number of prior adopters and norms reinforce or discourage these

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decisions is also important in getting initiatives adopted.

For policy makers, we suggest that these results imply that programs that seek to make environmental initiatives more profitable may need to be supplemented with programs that help firms find less-disruptive ways of implementing them. The idea that environmentally-friendly programs will be adopted if they are profitable is widespread, based upon the economic rationale that firms are unlikely to systemically overlook profitable opportunities (Berchicci and King, 2007; King and Lenox, 2002; Walley and Whitehead, 1994). But, as our results show, firms may not simply be overlooking these opportunities, but rather choosing to maintain stability rather than disrupt operations in order to pursue the opportunities.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix S1. Description of Classification of Initiatives and Figures Pertaining to Results.