

# HOW GREEN IS YOUR CAMPUS? AN ANALYSIS OF THE FACTORS THAT DRIVE UNIVERSITIES TO EMBRACE SUSTAINABILITY

SARAH L. STAFFORD

*I examine the factors that influence the adoption of sustainable practices by institutions of higher education (IHEs) in the United States. Using data from the Sustainable Endowments Institute, I conduct an ordered probit analysis on 180 IHEs. The results show that size and wealth are significant factors in the adoption of sustainable practices and that stakeholders such as faculty, alumni, and the surrounding community also play an important role. I find no evidence that institutions adopt sustainability to attract students. Also, in contrast to the findings of similar studies on for-profit entities, there is no evidence that regulatory pressures encourage campus sustainability. I also examine the factors that affect the institutions' decision to sign the Presidents Climate Commitment (PCC), a largely symbolic gesture. The results for the PCC are quite different than those for overall sustainability. Most importantly, neither wealth nor size are significant factors in that decision. (JEL Q2, L3)*

## I. INTRODUCTION

Much has been written on corporate sustainability and the factors that affect it, both in the academic literature and in the popular media. The literature on sustainability efforts at institutions of higher education (IHEs) is much smaller, although colleges and universities can also pose significant environmental liabilities. Like many corporations, IHEs consume large quantities of energy and water.<sup>1</sup> In addition, IHEs generate significant volumes of solid wastes, including toxic and hazardous wastes.<sup>2</sup> Also like corporations, IHEs currently face significant pressure to adopt sustainable practices. However, while corporations and IHEs face similar challenges in deciding whether to adopt sustainable practices, there are many reasons why sustainability efforts on campuses may depend on different factors than corporate sustainability efforts. Obviously, the non-profit nature of most IHEs suggests that campus leaders can make

investments in sustainable practices that corporations would not find profitable. Additionally, the types of stakeholders that have an interest in sustainability efforts vary significantly across IHEs and corporations. Although companies may be pressured to adopt sustainable practices by consumers and investors, IHEs must respond to the concerns of students, faculty, and alumni.

The goal of this article is to examine campus sustainability efforts to determine the factors that drive IHEs to adopt sustainable practices. Given that recent congressional education bills have included provisions for the establishment of sustainability programs in the Department of Education, we are likely to see increased government efforts to promote sustainable practices on campuses in the future.<sup>3</sup> A more complete understanding of the factors that drive campus sustainability will be essential for crafting

3. See, for example, H.R. 4137, the College Opportunity and Affordability Act, passed on February 8, 2008.

*Stafford:* Department of Economics, College of William and Mary, PO Box 8795, Williamsburg, VA 23185. Phone 757-221-1317, Fax 757-221-1175, E-mail slstaf@wm.edu

1. For example, Connecticut College consumed 120MMBtus of energy per student in 2004 (Cabaniss 2006), whereas Yale University (2005) used 6 million gallons of water across campus in 2004.

2. The University of Georgia, for example, is responsible for a \$1.6 to \$2.6 million cleanup of hazardous and toxic waste at a former waste disposal site on the campus (<http://www.epa.gov/Region2/p2/college/protect.htm>).

## ABBREVIATIONS

BLM: Bureau of Land Management  
EMS: Environmental Management System  
IHE: Institution of Higher Education  
IPEDS: Integrated Postsecondary Education Data System  
LEED: Leadership in Energy and Environmental Design  
PCC: Presidents Climate Commitment  
SEI: Sustainable Endowments Institute

effective policy on this issue. This knowledge should also help increase the effectiveness of private groups that are trying to promote campus sustainability.

The analysis uses the same **general framework that has been used to study corporate adoption of sustainable practices to highlight similarities and differences between the factors** that affect corporate and campus behavior. Thus in addition to helping design programs to promote sustainability at IHEs, this study will also provide insight into the differences in environmental decision making at non-profit and for-profit entities more generally.

In Section II, I present a brief summary of the related literature and outline a conceptual framework for my analysis. Section III discusses the analytical approach in detail, describing both the data and the econometric model used in the analysis. I then present the results of the analysis and discuss the policy implications of my findings before concluding.

## II. RELATED LITERATURE AND THE CONCEPTUAL FRAMEWORK FOR THE ANALYSIS

**The majority of the literature on campus sustainability is directed toward people who want to increase sustainable practices on particular campuses or at IHEs in general.**<sup>4</sup> The general focus of these articles is on why sustainability is important or how it can be implemented at IHEs. This literature includes many case studies of successful sustainability programs. Additionally, there are few studies that take a more aggregate approach to understanding the factors that influence the success of sustainability initiatives. For example, based on 7 years of experience in implementing sustainable practices at IHEs, Sharp (2002) identifies a number of approaches to sustainability that have proved to be most **successful including management support, effective communication, partnerships with students, and continuity.** Looking at the issue from the opposite point of view, Velazquez, Munguia, and Sanchez (2005) identify **barriers** to implementing sustainable practices on campus. The authors find that the factors that are most frequently cited as impeding campus **sustainability initiatives** are a **lack of awareness and interest** in

sustainability, the organizational structure of the institution, lack of funding, and lack of support from administrators.

This article takes a very different approach. Instead of looking at particular examples of successful practices to determine what factors have contributed to the success of sustainability initiatives, I look more broadly at the general characteristics of IHEs to determine what underlying factors may be driving campuses to adopt sustainable practices. Thus, this study is more closely related to empirical studies on sustainable practices in the corporate world than it is to the literature on sustainability in higher education.

### A. Empirical Findings on Corporate Sustainability

Although there is no widely accepted definition of corporate sustainability, the term is generally used to describe practices that reduce a company's environmental impact and promote improvements in environmental quality. Additionally, for most people sustainability requires companies to go beyond mere compliance with current environmental regulations. Thus, the literature on corporate sustainability focuses primarily on corporate adoption of voluntary environmental initiatives.

For example, Khanna and Anton (2002) analyze the factors that affect whether firms adopt environmental management systems (EMSs). Adopting an EMS is a voluntary step that firms can take to improve their environmental performance both in terms of achieving compliance with environmental regulation and moving beyond regulatory requirements. Khanna and Anton find that firms that face a stronger threat of environmental liabilities and firms that face more stringent environmental regulation are more likely to adopt EMSs. The authors also find that firms in closer contact with their customers and firms that are more exposed to adverse stockholder and community reactions are more likely to adopt EMSs. Finally, the authors find that more innovative firms (as measured by R&D expenditures) are more likely to adopt EMSs, but they only find weak evidence to support the theory that market competition affects adoption.

In a similar study, Potoski and Prakash (2005) examine the characteristics of facilities that become ISO 14001 certified—a process that requires facilities to adopt a number of practices

4. Although there has not been a recent formal review of the literature on campus sustainability, AASHE maintains a list of publications on campus sustainability on its website <http://www.aashe.org/resources/publications.php> (accessed May 26, 2009).

that should increase environmental performance. The authors find that facilities with higher levels of environmental exposure (i.e., higher levels of pollution) are more likely to join ISO 14001 as are facilities facing more stringent environmental regulations. The authors also find that larger facilities are more likely to join as are facilities located in highly educated communities. The finding that community characteristics affect environmental performance is echoed in a paper by Gunningham, Kagan, and Thornton (2004). In this analysis, the authors examine the extent to which “social license” determines the environmental performance of for-profit firms. They define social license as the demands on and expectations for businesses that emerge from “neighborhoods, environmental groups, community members, and other elements of the surrounding civil society” and suggest that it may drive for-profit firms to go beyond the level of environmental performance required by environmental regulations.

The three papers described above demonstrate the range of results that have been found in the empirical literature on corporate sustainability. [Readers who are interested in a more comprehensive review of this literature should refer to Khanna and Brouhle (2009) for a general survey.] Although the results of the empirical analyses vary across programs and the universes being analyzed, as a whole these studies show that corporate adoption of sustainable practices depends on many different factors, including a company’s potential liability from environmental damage (based on size and level of pollution), the stringency of environmental regulations, the likelihood of fines for environmental violations, the environmental preferences of consumers, and the environmental concerns of the community.

### *B. Conceptual Framework for the Analysis*

For-profit firms and IHEs have very different objectives. By definition, for-profit firms seek to maximize profits. In contrast, IHEs have multiple goals such as providing high quality education to students, promoting research in numerous disciplines, and enhancing the general welfare of their community. The standard economic approach to modeling the objective function of the IHE is to create a value function that translates the outputs of a university—teaching, research, and service—into some ultimate measure of value that the IHE

seeks to maximize (Hopkins and Massy 1981). It is clear that institutions care about both the quality and quantity of each output, although the relative weight of each output and the importance of quality relative to quantity in the value function is likely to differ significantly across IHEs. The specification of a particular institution’s value function will depend on the underlying preferences of many individuals including the institution’s governing board, its administration, alumni and donors, faculty, and students. As Clotfelter (1996, 23) explains, “a university simply is many things to many people.” Additionally, the outputs of a university are generally hard to measure both in terms of quantity and quality. Therefore to provide a conceptual framework for the empirical analysis, I use the following reduced-form model which is a simplified version of the model offered in Martin (2005).

Let  $V(Y)$  be the institution’s value function, where  $Y$  is a vector containing the outputs of the university—teaching, research, and service. As these outputs are produced jointly, the joint production function can be represented as  $Y = F(X)$ , where  $X$  represents the vector of inputs. The inputs include students, faculty, staff, buildings, libraries, etc. The IHE must maximize its value function subject to its production function and its budget constraint, that is,  $R(Y, X) - C(X) > 0$ , where  $R(\cdot)$  is the institution’s revenue function and  $C(\cdot)$  the institution’s cost function.

Some outputs contribute directly to revenues because they command a market price. For example, the more students that an IHE educates, the greater its tuition revenue. Some research or public service may also directly increase revenue if it is conducted under a grant or contract. However, much research and service will have at best an indirect effect on revenues. Teaching (both in terms of quantity and quality) will also have an indirect effect on revenues because it will affect the number and generosity of alumni and other donors, as well as the willingness of students (and their parents) to pay for that teaching.

As is true for for-profit firms, market competition will affect the level of revenue the IHE will receive for its output. IHEs can increase their level of competitiveness by increasing the quality of their output or by offering additional inducements to the consumers of their outputs. For example, students may be willing to pay a higher tuition if the campus is environmentally

sustainable. The alumni may be more willing to donate to an institution that adopts a needs-blind admission policy. Thus, the revenue function can also depend on the inputs to the production process. The last piece of the model is the cost function. The cost function of an IHEs is not necessarily different from that of a for-profit firm, although it may be slightly more complex than a standard cost function given that Cohn, Rhine, and Santos (1989) find that the cost function of IHEs generally exhibit both economies of scale and economies of scope.

In contrast to the value-maximizing IHE, a for-profit firm would maximize its profits  $\pi = R(Y, X) - C(X)$  subject to its production function  $Y = F(X)$ . Despite the significant difference in objective functions, adoption of sustainable practices will have some of the same impacts on IHEs and for-profit firms. For both IHEs and for-profit firms, implementation of sustainable practices is likely to increase costs in many areas, at least in the short run. For example, switching to renewable energy sources over traditional energy sources is likely to increase energy costs while building LEED-certified buildings can lead to higher design and construction costs.<sup>5</sup> However, costs could decrease for both IHEs and for-profit firms if implementing sustainability decreases future operating or regulatory costs. Another similarity is that for both firms and IHEs, sustainable practices can increase revenues: for-profit firms may be able to charge a higher price for their product or receive cheaper capital from investors, whereas IHEs may be able to increase tuition or receive more donations if they are environmentally conscious.

Despite the many similarities, there are also likely to be significant differences. One primary difference is that sustainable practices can increase an institution's value function directly because sustainable practices are part of the institution's contribution to the public. Additionally, to the extent that students and faculty care about the environment, sustainable practices may help an institution to attract higher quality students and faculty, thus increasing the quality of an institution's teaching and research. Another important difference is that in a dynamic setting, IHEs are likely to have a smaller discount factor, that is, to weigh future

gains more heavily, than a for-profit firm would. As Creighton (1998) points out, "the fact that most institutions of higher learning plan to exist well into the next century makes long-term thinking and investment... prudent." Additionally, unlike many executives of for-profit firms, university administrators are less likely to have the same financial incentives to focus on short-term, as opposed to long-term performance, if for no other reason than it is much more difficult to judge a university's "performance" in the short run. Thus, IHEs may be more likely to invest in sustainable practices that have a long-term impact than for-profit firms.

In summary, although many of the same basic factors should affect the adoption of sustainable practices at both for-profit firms and IHEs, it is likely that the relative importance of the factors will differ significantly. For example, although environmental regulations and fines for environmental violations apply equally to IHEs and corporations, I would argue that the reputational effects of an environmental violation could be more significant for a university than it would be for an industrial plant because the public is likely to hold universities to higher standards than they would a plant. Similarly, one could argue that "social license pressures" will be more intense for IHEs than for corporations, as many stakeholders will have higher demands or expectations for IHEs, particularly public institutions.

I also anticipate that students could have more influence on the adoption of sustainable practices at IHEs than consumers have on for-profit firms because of the continuous, long-term nature of the relationship between the student and the institution—a relationship that often extends well beyond the student's 4 years on campus. Also, students may have stronger preferences for the environment than the average customer of a corporate entity. I also think that overall IHEs are likely to be less influenced by financial considerations than for-profit firms both because they may be able to take a longer term view than for-profit firms and because IHEs may have a mission that includes service to the community. Encouraging sustainability and leading by example may be one way in which an institution achieves this mission.

### III. ANALYTIC APPROACH

To conduct this analysis, it is necessary to find a way to measure the extent to which

5. LEED stands for Leadership in Energy and Environmental Design. LEED certification is issued by the U.S. Green Building Council.



IHEs have adopted sustainability. For the last several years, the Sustainable Endowments Institute (SEI), a non-profit group “engaged in research and education to advance sustainability in campus operations and endowment practices,” has evaluated the implementation of sustainable practices on campuses in North America. In particular, the SEI produces a College Sustainability Report Card covering the IHEs with the largest endowments in the United States and Canada.<sup>6</sup> SEI uses a combination of publicly available data (e.g., the institution’s website, media coverage, data from EPA and the U.S. Green Building Council) and campus responses to a survey administered by SEI to evaluate campus sustainability. For this analysis, I used the 2008 report card (issued in 2007) which graded IHEs in eight categories: Administration, Climate Change and Energy, Food and Recycling, Green Building, Transportation, Endowment Transparency, Investment Priority, and Shareholder Engagement. For each of these categories of sustainable practices, institutions earn points based on their policies for the “indicators” selected by SEI for that category. For example, in the Climate Change and Energy category there are six indicators: whether there is a carbon emissions inventory, the type of commitment the IHE has made toward emissions reduction, the use of energy-efficient technologies, the types of energy conservation programs that are in place, whether the institution purchases renewable power, and whether there has been investment in renewable energy technology. The maximum points an institution can gain for each indicator varies across indicators and categories.

For each category, the institution is given a numerical grade which is then converted to a full letter grade—A to F with no plusses or minuses—according to a predetermined scale. The institution’s overall sustainability grade is a non-weighted average of its letter grades in each of the eight individual categories and includes plusses and minuses. As shown in the grade distribution presented in Figure 1, 6 institutions—Carleton, Dartmouth, Harvard, Middlebury, the University of Vermont, and the University of Washington—achieved an overall grade of A–, whereas 4 received a failing grade of F and an additional 19 scraped by with the minimum passing grade of a D–.

The indicators used by SEI for the 2008 report card encompass a wide range of practices, some of which will have a more direct or immediate effect on an institution than others. For example, in the Food and Recycling category IHEs receive points for buying from local farmers, eliminating the use of Styrofoam containers in dining halls, composting food and landscaping wastes, and increasing recycling rates on campuses. Institutions also receive points for completing a carbon emissions inventory, adopting sustainability-related mission statements, and providing internet resources on sustainability—practices which have a much less direct impact on environmental performance. However, to receive a high grade, an institution would have to do more than just make general commitments to sustainability. For example, all six of the institutions receiving A– have recently built a structure on campus that received LEED certification and incorporate locally grown food in their dining halls, and five of the six purchase or generate significant quantities of energy from renewable sources.

The letter grades awarded by the SEI provide an ordinal measure of an institution’s sustainability practices that can be used in the analysis. Because each grade represents an underlying range of numerical scores, the appropriate econometric model for the analysis is an ordered probit. The ordered probit model uses a limited dependent variable framework with a latent variable  $G_i^*$  that represents the true sustainability grade of institution  $i$ .  $G_i^*$  is determined as follows:

$$G_i^* = \beta' x_i + \varepsilon_i$$

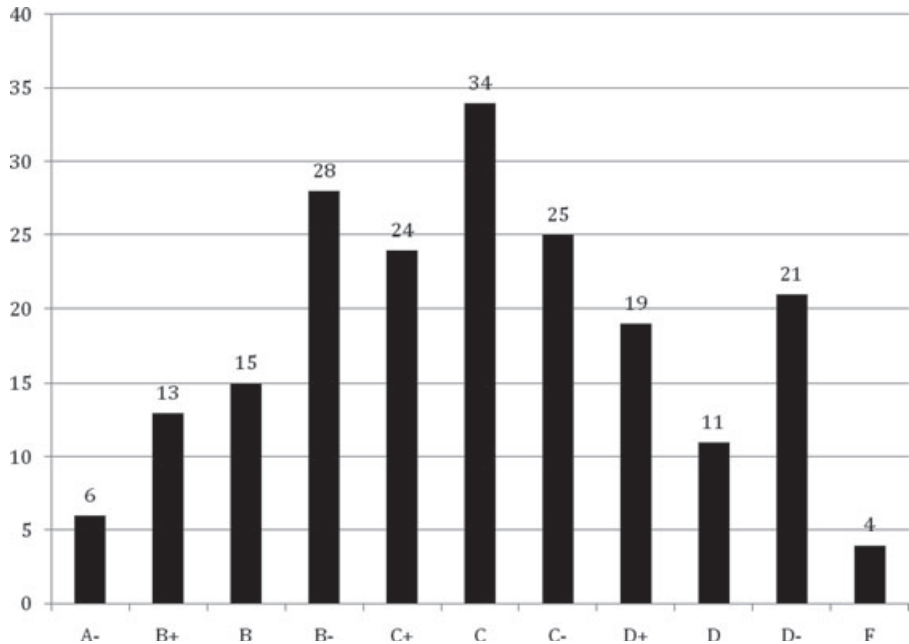
where  $x_i$  is a vector containing the explanatory variables for institution  $i$ ,  $\beta$  the vector of parameters to be estimated, and  $\varepsilon_i$  a random error term that is assumed to follow a standard normal distribution.<sup>7</sup> In this model, the true grade  $G_i^*$  is not observed but the letter grade  $K_i$  is observed. The ordered probit model assumes that  $K_i$  depends on the true grade  $G_i^*$  as follows:

$$(1) \quad K_i = \begin{cases} A & \text{if } G_i^* > \mu_A \\ B & \text{if } \mu_A \geq G_i^* > \mu_B \\ C & \text{if } \mu_B \geq G_i^* > \mu_C \\ D & \text{if } \mu_C \geq G_i^* > \mu_D \\ F & \text{if } \mu_D \geq G_i^* \end{cases}$$

6. The SEI Report Cards are available at <http://www.greenreportcard.org> (accessed May 25, 2009).

7. See Wooldridge (2002) for a more detailed discussion of this model.

**FIGURE 1**  
Overall Sustainability Grade Distribution



where the  $\mu$ 's are thresholds that determine the ordinal intervals of the scale and must be estimated. (If there are also plus and minus grades, there would be additional entries in the equation above and additional  $\mu$ 's to be estimated.) In this model, the probability that institution  $i$  has a grade of B would be:

(2)

$$\begin{aligned} \text{Prob} [K_i = B] &= \text{Prob} [\mu_A \geq \beta'x_i + \varepsilon_i > \mu_B] \\ &= \Phi(\mu_A - \beta'x_i) - \Phi(\mu_B - \beta'x_i) \end{aligned}$$

where  $\Phi$  is the standard normal cumulative distribution function. The other probabilities are defined analogously. The parameters  $\beta$  and  $\mu$  can then be estimated by maximum likelihood.

As discussed in Section 2, one would reasonably expect several different types of factors to affect an IHE's decision to implement sustainable practices. I have identified four broad categories of factors—regulatory pressures, financial constraints, student preferences, and stakeholder influences—that I think should have a significant effect on the adoption of campus sustainability. Note that these categories are generally analogous to the four basic categories of factors that affect corporate adoption

of sustainable practices (regulatory pressures, financial and market constraints, consumer pressure, and pressure from other stakeholders) discussed in the literature review.

Table 1 lists the explanatory variables used in the analysis along with the variables' means and standard deviations. Because the 2008 Report Card was published in 2007, each institution's grade is based on practices and information from 2005 to 2007. I have tried to match the explanatory data to this general period. Unless otherwise noted, the institutional data are for the 2005–2006 school year and were collected from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). I have loosely organized the variables into the four categories listed above along with a fifth category of "Other Factors," although arguably some variables could fit into more than one category.

A. *Regulatory Pressures*

All IHEs in the United States are likely to be subject to some form of environmental regulation. For example, if the IHE has a chemistry department with laboratories either for

**TABLE 1**  
Explanatory Variables Used in the Analysis

Variable Name	Description	Mean	SD
Regulatory pressures			
Regulatory budget	State budget for environmental programs normalized by number of regulated facilities	9.51	8.72
Enforcement actions	Number of environmental enforcement actions in the state per thousand regulated facilities	3.58	2.24
Inspection rate	Number of hazardous waste inspections in the state normalized by number of hazardous waste facilities	0.02	0.01
Total students	Number of students (all levels), in thousands	14.76	13.13
Financial constraints			
Tuition	Average annual tuition and fees net of financial aid, in thousands	14.38	6.58
Percent on financial aid	Percent of students receiving some form of financial aid	73.49	15.37
Public	Dummy variable equal to 1 if the institution is public	0.36	0.48
Endowment	Institution's endowment (in billions) normalized by the number of full-time students	0.23	0.34
High research activity	Dummy equal to 1 if the facility is classified as "very high" or "high" research activity by the Carnegie Commission	0.61	0.49
Electricity cost	Average state electricity cost (\$per million BTUs) in 2007	29.46	9.62
Student preferences			
Acceptance rate	Percent of applicants accepted for enrollment	54.16	22.62
Top 50 national	Dummy equal to 1 if the institution is a top 50 National University in the 2007 <i>U.S. News &amp; World Report</i> rankings	0.24	0.43
Top 50 liberal arts	Dummy equal to 1 if the institution is a top 50 Liberal Arts Institution in the 2007 <i>U.S. News &amp; World Report</i> rankings	0.22	0.41
Percent on campus	Percent of total students living on campus	0.58	0.30
Environmental major	Dummy equal to 1 if the school has an environmental sciences or studies major	0.30	0.46
Percent out of state	Percent of students who reside out of the state	0.48	0.28
Percent international	Percent of students who are not U.S. residents	0.04	0.03
Stakeholder influences			
Full-time faculty	Percent of faculty that are full-time	90.32	7.01
Alumni giving	Percent of alumni who give to the institution	27.46	14.37
Size relative to county	Total students divided by county population (in thousands)	0.99	0.97
County population	County population (in millions)	0.86	1.96
County percent with bachelor's	Percent of residents in the county with bachelor's degree (or higher)	25.81	10.45
Environmental org. revenues	Revenues of environmental organizations in the state, normalized by the population of the state	7.69	6.70
Federal land	Percent of area of state that is federal land	8.26	14.21
Percent Kerry	Percent of voters in state who voted for Kerry in 2004	49.52	7.62
Other factors			
School growth rate	Percent increase in total students from 1990 to 2005	10.23	40.06
Percent women	Percent of students that are women	52.58	11.33
Religious	Dummy equal to 1 if the institution has a religious affiliation	0.21	0.41
State system	Dummy equal to 1 if SEI grade for state system	0.04	0.19
South	Dummy equal to 1 if the institution is in a southern state	0.23	0.42
New England	Dummy equal to 1 if the institution is in New England	0.15	0.36
Southwest	Dummy equal to 1 if the institution is in a southwestern state	0.08	0.28
West	Dummy equal to 1 if the institution is in a western state	0.12	0.33

teaching or research purposes, it is subject to some form of hazardous waste regulation. Additionally, any IHE with a power plant is likely to be subject to regulation under the Clean Air Act. In the United States, environmental regulations vary across states, with the federal government

setting minimum standards that states can add to if they wish. Just as regulatory stringency has been shown to increase the adoption of sustainable practices by corporations, one might expect IHEs in states with more stringent environmental regulations to be more likely to adopt

sustainable practices.<sup>8</sup> However, it is difficult to measure regulatory stringency directly as there are many different facets of state environmental regulations. Thus, I use the variable *Regulatory Budget* as a proxy for a state's environmental stringency. This variable measures the state expenditures on environmental and natural resource programs according to the 2006 Survey of State Government Finances.<sup>9</sup> It is normalized by the number of facilities in the state that are subject to federal environmental regulation.<sup>10</sup>

In addition to regulatory stringency, the degree to which a state enforces regulations will affect the adoption of sustainable practices if IHEs are motivated by a desire to avoid environmental violations. *Enforcement Actions* measures the number of enforcement actions taken against environmental violators in the state in 2006 for every 1,000 federally regulated facilities in the state. The number of enforcement actions in 2006 was downloaded from the EPA's Enforcement and Compliance History Online database.<sup>11</sup> *Inspection Rate* is a related variable that measures the number of hazardous waste inspections in 2005 in the state, normalized by the number of hazardous waste facilities.<sup>12</sup> If regulatory pressures are significant drivers of campus sustainability efforts, *Enforcement Actions* and *Inspection Rate* should both have a positive effect on an institution's sustainability grade. One might also expect those IHEs that have the greatest environmental exposure to be more likely to adopt sustainable practices. Because the level of environmental exposure is directly related to the size of an institution, I use *Total Students* as a proxy for environmental exposure and expect a positive relationship.

8. See, for example, Henriques and Sadorsky (1996), Khanna and Anton (2002), and Khanna et al. (2007).

9. Available at <http://www.census.gov/govs/www/state.html> (accessed February 27, 2008).

10. EPA's Facility Registration System is a database of all facilities in the United States subject to federal environmental regulation. Data on the number of regulated facilities in each state was taken from the October 2008 version of the database.

11. Available at <http://www.epa-echo.gov/echo/> (accessed October 27, 2008).

12. Data on the number of hazardous waste inspections and facilities in each state was taken from the February 2008 version of EPA's RCRAInfo database. I use the hazardous waste program for two primary reasons. First, because environmental regulations are media-specific, it is difficult to obtain an overall environmental inspection rate. Second, the hazardous waste program is one of the largest environmental programs covering approximately 680,000 facilities in the United States and as discussed above most IHEs in the United States are subject to hazardous waste regulation.

## B. Financial Constraints

Financial constraints should be a significant factor in an IHE's adoption of sustainable practices, just as financial pressures affect whether a corporation adopts a voluntary environmental program. However, the nature of the financial constraints faced by IHEs is very different from that faced by corporations. The revenues for IHEs come primarily from tuition, donations, and research activities. Public institutions also receive state funding. The variable *Tuition* captures the average annual tuition and fees per student, net of financial aid. I expect tuition to be positively related to an IHE's sustainability grade, as higher tuition will increase the financial resources available for implementing sustainable practices. I also include the variable *Percent on Financial Aid*, which I expect to have a negative effect on an IHE's sustainability grade, as spending on financial aid decreases the funds available for other activities in an institution.<sup>13</sup> To account for the fact that public institutions are likely to receive some state funding in addition to tuition revenues, I include the dummy variable *Public*. One might also expect community pressures to be stronger for public institutions than private institutions and thus public institutions to invest more in sustainability than private institutions. However, public institutions may be more constrained by state procurement rules than private institutions, so it is not clear ex ante what the coefficient's sign should be.

To capture donations to an institution that support its operations, I include the institution's *Endowment* as reported in the SEI 2008 Report Card, normalized by the total number of full-time students. I expect this variable to have a positive effect on the institution's grade as a higher endowment implies fewer financial constraints. To capture the ability of an institution to supplement their revenues with research funding, I use the dummy variable *High Research Activity* which indicates whether an institution is classified by the Carnegie Commission on Higher Education as conducting a high or very

13. This variables includes all sources (federal, state, and institutional) and types (need-based, merit, and athletic) of aid. Given that institutional requirements for need-based aid are likely to be more generous than federal and state requirements and that federal and state merit-based aid programs are minimal, the percent of students on institutional aid is likely to be close to the percent of students on any form of aid.



high level of research.<sup>14</sup> Because institutions with high levels of research activity are likely to receive more external funding through grants than less active institutions, I expect this variable to have a positive effect on the implementation of sustainable practices. Finally, I include *Electricity Cost* to measure the extent to which an institution might adopt sustainable practices, particularly those that conserve energy, as a result of financial pressure, and I expect institutions in states with higher average electricity costs to be more likely to adopt sustainable practices.<sup>15</sup>

### C. Student Preferences

Because IHEs compete for students, student preferences should have an effect on campus sustainability efforts just as consumer preferences affect corporate practices. Student preferences are difficult to measure, particularly because the preferences of potential students matter as much or perhaps more than the preferences of current students. Moreover, there is very little publicly available data on student preferences across institutions.<sup>16</sup> To address similar limitations with consumer preference data, analyses of corporate environmental performance have focused on market conditions as a proxy for consumer preferences. The more competitive a market is, the more a company will have to adjust its practices to be in line with consumer preferences. Analogously, one might expect institutions that have to compete for students to be more responsive to student preferences than schools that are in high demand.

*Acceptance Rate* is one of the measures of an institution's competitive position. I expect institutions with higher acceptance rates (i.e., schools that are less selective) to be more likely to adopt sustainable practices because the high acceptance rate indicates a need to attract more applicants. According to a 2006 MTV/CBS news poll of Americans aged 13–24, when asked to name the most important problem their generation will face in 20 years, respondents

most often chose the environment and 81% stated that actions need to be taken immediately to counter global warming.<sup>17</sup> Thus, most college applicants are likely to be very concerned about this environment and one method of attracting applicants might be to implement sustainable practices.

The next two variables are dummies indicating whether the institution was highly ranked in 2007 by *U.S. News & World Report*. The rankings differentiate between national institutions and liberal arts institutions: national institutions offer masters and doctoral degrees, while liberal arts institutions emphasize undergraduate education and award at least 50% of their degrees in the arts and sciences. The dummies indicate whether the institution is ranked in the top 50 for each category. Because top-ranked schools should attract more qualified candidates than lower ranked schools, they might be under less pressure to attract students with sustainability initiatives. Alternatively, top-ranked schools might feel more pressure to keep their ranking.

I expect students who live on campus to exert more pressure on an institution to adopt sustainable practices, particularly practices that affect residence halls and food services. The variable *Percent on Campus* reflects the percent of total students who live on campus according to the Barron's 2005 Profile of American Colleges, and I expect this variable to be positively related to the institution's sustainability grade. Because student pressure is likely to grow as students learn more about environmental issues and sustainability, the analysis includes the variable *Environmental Major* which indicates whether an IHE has an environmental studies or science major for the 2007–2008 school year.<sup>18</sup> I also expect this variable to have a positive effect on an institution's adoption of sustainable practices. Finally, I include two variables to measure the geographic diversity among the student body, *Percent Out of State* and *Percent International*.<sup>19</sup> One might expect students who attend college out of state or in a different country to have

14. The technical details for classifying institutions in these categories can be found at <http://www.carnegiefoundation.org/classifications/index.asp?key=798> (accessed February 28, 2008).

15. Data on the average retail price of electricity by state for 2007 was taken from "State Energy Data 2007: Prices and Expenditures" published by the Energy Information Administration of the Department of Energy.

16. For example, the National Survey on Student Engagement captures experiences rather than preferences.

17. Results available at [http://www.mtv.com/thinkmtv/about/pdfs/mtv\\_environment\\_poll.pdf](http://www.mtv.com/thinkmtv/about/pdfs/mtv_environment_poll.pdf) (accessed February 28, 2008).

18. These data were collected from the Peterson's website in December 2007.

19. These data were taken from the 2009 Edition of the Princeton Review's *The Best 368 Colleges*, published in 2008. For those schools not included in the list of the best 368 colleges (approximately 20 institutions), we collected the data from the Princeton Review website in December 2009.

a less parochial perspective than students who remain in state. Such students might be more attuned to global environmental issues and exert more pressure on administrators to adopt sustainable practices.

#### D. *Stakeholder Influences*

Students are not the only group that might influence an IHE to adopt sustainable practices. Other key stakeholders include the faculty, the alumni of the institution, and the community surrounding the institution. To capture faculty influence, I include the variable *Full-time Faculty*, which measures the percent of the faculty that have full-time as opposed to adjunct positions. Full-time faculty are likely to remain at the same institution for a longer time and thus may be more involved in administrative decisions. However, I have not been able to find any empirical evidence on whether faculty in general are supportive of sustainability. In my own campus there are mixed views about the relative importance of implementing sustainable practices, given all the other goals of the university. Thus, I have no prior expectation on the sign of the coefficient on this variable. To measure alumni involvement, I use *Alumni Giving*, which measures the percent of alumni who annually give money to the institution.<sup>20</sup> I also have no prior expectation about how alumni might influence an IHE's adoption of sustainable practices.

To measure community pressure, I include several county- and state-level variables. The first, *Size Relative to County* is the ratio of total students at the institution to the total population of the county in which the institution is located.<sup>21</sup> Institutions that make up a large percentage of a county's population may be more subject to community pressure than institutions that represent a smaller portion of the local economy, so I expect a positive coefficient on this variable. Of course, the size variable will also depend on the overall size of counties—which varies widely across states—so I also include *County Population* as an explanatory variable. One might also expect community pressure for institutions to adopt sustainable practices to be

greater in areas that are more highly educated. Thus, I also include *County Percent with Bachelor's* to measure the education level in the county and I expect it to have a positive effect on the adoption of sustainable practices.

Of course, not all individuals will think that sustainability should be a high priority of IHEs. To measure community preferences for environmental quality, I include several state-level variables. *Environmental Organization Revenues* measures the total revenues collected by environmental organizations in the state in 2005, normalized by the state population.<sup>22</sup> Individuals that contribute more to environmental organizations should also put more pressure on IHEs to implement sustainable practices, so I expect this variable to have a positive coefficient. The next variable, *Federal Land*, measures the percent of land in a state that is federally owned.<sup>23</sup> This variable is a proxy for the importance of natural resources to a state and thus I expect it to be positively related to an IHE's sustainability grade. The final community variable, *Percent Kerry*, measures the percent of voters in the 2004 presidential election who voted for John Kerry, the Democratic candidate.<sup>24</sup> I also expect this variable to have a positive effect on an IHE's sustainability grade.

#### E. *Other Factors*

There are a few additional factors that one might reasonably expect to affect an institution's decision to adopt sustainable practices, but which are more difficult to categorize. *School Growth Rate* measures the percent increase in the total student body from 1990 to 2005. Schools that have grown significantly over that time period are likely to have built new buildings and thus have had more opportunities to incorporate energy-efficient measures (for which

22. Data on environmental group revenues were obtained from the National Center for Charitable Statistics' Guidestar Database.

23. These data were developed by the Bureau of Land Management (BLM) using data from 1995 and are available at <http://www.blm.gov/natacq/pls97/1-3-97h.html> (accessed March 3, 2008). The BLM no longer provides this data in its *Public Land Statistics* publication.

24. These data are available from the Federal Election Commission at <http://www.fec.gov/pubrec/fe2004/tables.pdf> (accessed February 29, 2008). I experimented with other measures of state ideology such as the measures developed in Berry et al. (1998), but found *Percent Kerry* to have the greatest explanatory power. Additionally, the state-level measure of *Percent Kerry* had more explanatory power than an analogous county-level measure.

20. These data were collected from the *U.S. News & World Report* 2007 rankings. For each institution, the variable measures the average percentage of living alumni who gave to their school during 2004–2005 and 2005–2006.

21. The county-level data used in the analysis was taken from the 2007 County and City Data Book available on the Census Bureau's website <http://www.census.gov/statab/ccdb/ccdbstcounty.html>.

they receive credit) on campus than schools that have not expanded. *Percent Women* controls for variation in the student bodies of IHEs and is included because there appears to be a general sense that women are more interested in the environment than men, although the empirical evidence on this point is quite mixed.<sup>25</sup> *Religious* indicates whether an institution has a religious affiliation. I include this variable because religious institutions may face different constraints than secular institutions. For example, dining hall policies may be dictated by religious beliefs rather than environmental concerns. Although such constraints may affect an institution's practices, I have no specific expectation as to whether sustainability will be more or less difficult to adopt.

For the next variable, *State System*, I expect a positive effect on the sustainability grade. For some state university systems (such as the University of California), SEI only provided a single grade which, although based primarily on an evaluation of the flagship campus, does include practices on other campuses as well. I believe that notable practices at non-flagship campuses will be used to increase the flagship university's grade but that a lack of practices at these other campuses will not result in a lower grade. Thus, I expect the grade for institutions representing state systems to be upwardly biased. I also added dummy variables for various regions of the United States (South, New England, Southwestern, and Western) with the Midwest as the omitted region.

#### IV. RESULTS

SEI 2008 report card included the 200 institutions in the United States and Canada with the highest overall endowments. Only 180 institutions are included in this analysis. First, because much of the data for this analysis were collected from the U.S. Department of Education's IPEDS database, the five Canadian institutions are not included. Second, for an additional 15 institutions data on some key institutional or locational characteristics were missing.<sup>26</sup> The institutions

were excluded from the analysis and marked in Table 2 with an asterisk.

The results for the ordered probit regression are presented in column 1 of Table 3. Because the explanatory variables include state variables, I estimated robust standard errors clustered by state. First, consider the variables that measure the regulatory pressures faced by the IHE. Neither of the coefficients on *Regulatory Budget* nor *Enforcement Effort* is significant. Although the coefficient on *Inspection Rate* is significant, it is negative. I had expected a high inspection rate to prompt institutions to adopt sustainability, but it might be the case that states that focus their resources on compliance inspections have fewer resources available to help institutions go beyond compliance and adopt a wide range of sustainable practices. Note that these results contrast with the results from most studies of for-profit corporations where regulatory pressures do play a significant role in the adoption of sustainable practices.

The coefficient on *Total Students* is significant and has the expected positive sign. This result is consistent with the belief that IHEs with more environmental exposure will be more likely to adopt sustainable practices. It may also be the case that large IHEs are better able to achieve economies of scale in adopting sustainable technologies than smaller institutions. This result is consistent with the findings of the corporate sustainability literature but is not consistent with the view that small institutions are in a better position to implement sustainable practices than large institutions because they are more nimble and it is easier to achieve consensus on particular ideas.<sup>27</sup>

Several of the financial constraint variables, *Tuition*, *Percent on Financial Aid*, *Public*, and *Endowment*, have positive and significant coefficients. The positive coefficients on both *Tuition* and *Endowment* are consistent with expectations. These two variables are arguably the most important two financial constraints, as they most directly measure an institution's wealth level. Not surprisingly, wealthier institutions are more likely to adopt sustainable practices. The positive coefficient on *Percent on Financial Aid* suggests that financial aid does not necessarily

25. See Torgler, Garcia-Valinas, and Macintyre (2008) for a discussion of the evidence.

26. This includes four institutions located in the District of Columbia for which there are no state data. There does not appear to be any systematic explanation for who is missing data, as the remaining 11 omitted institutions include both large and small schools and both public and private institutions.

27. See, for example, comments from President David Hales of the College of the Atlantic reported on the Chronicle of Higher Education's website <http://chronicle.com/blogs/architecture/1249/college-of-the-atlantic-is-the-first-institution-to-achieve-climate-neutrality> (accessed May 28, 2008).

**TABLE 2**  
Sustainability Grades from SEI's 2008 College Sustainability Report Card

Agnes Scott College	C	Grinnell College	B	Rollins College	D+
American University <sup>a</sup>	D+	Hamilton College	C+	Rush University	D-
Amherst College	B	Harvard University	A-	Rutgers University	C
Arizona State University	B-	Haverford College	C	Saint Louis University	D-
Auburn University	D+	Howard University <sup>a</sup>	F	Samford University	F
Bates College	B-	Illinois Institute of Technology	D	Santa Clara University	B-
Baylor University	C-	Indiana University	C	Sewanee	C
Berea College	C+	Iowa State University	C	Smith College	B-
Berry College	D+	Johns Hopkins University	B-	Southern Methodist University	C-
Boston College	C	The Juilliard School <sup>a</sup>	F	Southwestern University	D+
Boston University	C	Kansas State University	D+	Spelman College	D-
Bowdoin College	B-	Lafayette College	D-	St. John's University (NY)	C-
Brandeis University	C	Lehigh University	D+	St. Lawrence University	B-
Brown University	B+	Louisiana State University	C-	St. Olaf College	C-
Bryn Mawr College	C+	Loyola Marymount University	D+	Stanford University	B+
Bucknell University	C-	Loyola University of Chicago	C-	Swarthmore College	B-
California Institute of Technology	C	Loyola University of New Orleans <sup>a</sup>	D-	Syracuse University	B-
Carleton College	A-	Macalester College	B	Texas A & M University	C-
Carnegie Mellon University	B-	Marquette University	D-	Texas Christian University	D+
Case Western Reserve	C	Massachusetts Institute of Technology	B+	Texas Technology University	D
Claremont McKenna College	C-	McGill University <sup>a</sup>	B-	Trinity University (TX)	D-
Clark University	B	Miami University	D+	Tufts University	B+
Clemson University	C+	Michigan State University	B	Tulane University <sup>a</sup>	C
Colby College	C+	Middlebury College	A-	Union College (NY)	C+
Colgate University	D+	Mississippi State University	D	State University of New York	B-
College of the Holy Cross	C	Mount Holyoke College	B-	University of Alabama	D+
College of the Ozarks	D-	National University <sup>a</sup>	D-	University of Alaska <sup>a</sup>	C-
College of William & Mary	D-	New York University	C+	University of Alberta <sup>a</sup>	C
Colorado College	C	North Carolina State University	D	University of Arizona	C+
Columbia University	B	Northeastern University	B	University of Arkansas	C
Cornell University	B	Northwestern University	C+	Univ. of British Columbia <sup>a</sup>	B+
Creighton University <sup>a</sup>	D	Oberlin College	B+	University of California	B+
Dartmouth College	A-	Occidental College	D+	University of Chicago	C-
Davidson College	C-	Ohio State University	C+	University of Cincinnati	C+
Denison University	D	Oklahoma State University	D+	University of Colorado	B-
DePaul University	D-	Olin College of Engineering <sup>a</sup>	D-	University of Connecticut	C
DePauw University	D+	Oregon State University	B-	University of Dayton	D+
Dickinson College	B+	Pennsylvania State University	B	University of Delaware	C-
Drew University	D+	Pepperdine University	D-	University of Florida	B-
Drexel University	C-	Pomona College	B	University of Georgia	D
Duke University	B+	Princeton University	B-	University of Houston	D
Earlham College	C+	Purdue University	C	University of Illinois	B-
Emory University	B-	Queens University <sup>a</sup>	C	University of Iowa	B-
Florida State University	C-	Reed College	C+	University of Kansas	C-
Fordham University	D	Regent University <sup>a</sup>	F	University of Kentucky	C
Franklin & Marshall College	C	Rensselaer Polytechnic Institute	C-	University of Louisville	C+
Furman University	B-	Rhode Island School of Design	C	University of Maryland	C+
George Washington University <sup>a</sup>	D+	Rhodes College	C-	University of Massachusetts	C+
Georgetown University <sup>a</sup>	B-	Rice University	C+	University of Miami	C+
Georgia Institute of Technology	C	Rochester Institute of Technology	D-	University of Michigan	B+
Gettysburg College	D-	The Rockefeller University <sup>a</sup>	C	University of Minnesota	B

*continued*

**TABLE 2**  
Continued

University of Mississippi <sup>a</sup>	D–	University of St. Thomas	C–	Wabash College	D–
University of Missouri	C	University of Tennessee	C+	Wake Forest University	D
University of Nebraska	D+	University of Texas	B–	Washington and Lee University	B–
University of New Hampshire	B	University of Toronto <sup>a</sup>	B	Washington State University	C+
University of New Mexico	C	University of Tulsa	D	Washington University in St. Louis	C
University of North Carolina	B–	University of Utah	C	Wellesley College	C+
University of Notre Dame	C	University of Vermont	A–	Wesleyan University	B
University of Oklahoma	C	University of Virginia	B–	West Virginia University	C–
University of Oregon	B–	University of Washington	A–	Wheaton College (IL)	C–
University of Pennsylvania	B	University of Wisconsin	B+	Whitman College	C–
University of Pittsburgh	C–	University of Wyoming	C	Willamette University	C+
University of Richmond	C	Vanderbilt University	C+	Williams College	B+
University of Rochester	C	Vassar College	B–	Worcester Polytechnic Institute	D–
University of South Alabama	D–	Villanova University	C	Yale University	B+
University of South Florida	D–	Virginia Commonwealth University	D–	Yeshiva University	C–
University of Southern California	C+	Virginia Polytechnic Institute	C–		

<sup>a</sup>Not included in analysis because of missing data.

compete with sustainability for funding as anticipated. Finally, the positive coefficient on *Public* could indicate either that the support that public institutions receive from state governments allows them to invest in more sustainable practices or that these institutions face more social pressure to adopt sustainable measures because they are public institutions.

Interestingly, only two variables proxying for student preferences have a significant coefficient, *Percent Out of State* and *Percent International*. This result is consistent with the idea that students from more diverse geographical backgrounds might also be more aware of and interested in environmental sustainability. However, there is no evidence to support my initial supposition that less selective institutions might use sustainability to try to attract more students. Admittedly, the variables used in this analysis are only rough proxies for student preferences because it is difficult to measure such preferences directly, and the lack of significance could be due in part to multicollinearity. But another explanation for these results is that institutions are not currently using sustainability to increase student interest in the same way that companies are trying to market sustainability to their customers.

In contrast, several of the variables proxying for stakeholder interest are significant. The

coefficient on *Full-time Faculty* is positive and significant indicating that schools with a larger percentage of full-time faculty (as opposed to part-time and adjunct faculty) are more likely to adopt to sustainable practices. This result is consistent with the idea that many individuals prefer to work for employers who value the environment as well as the belief that full-time faculty are in a better position than part-time faculty to demand sustainable practices.<sup>28</sup> The positive and significant coefficient on *Alumni Giving* is consistent with the idea that actively engaged alumni may exert pressure on an administration to become sustainable. Additionally, alumni giving may reflect lower financial constraints as alumni giving will increase an institution's financial resources.

All three county variables have significant coefficients. The positive coefficient on *Size Relative to County* suggests that institutions that make up a large percentage of a county's population are more subject to community pressure, whereas the negative coefficient on *County Population* suggests that there is less pressure in large counties than in small ones. Also,

28. A 2004 Stanford Business School survey of graduating MBA students found that 94% would give up as much as \$13,700 a year of salary to work for a company that made corporate responsibility, including commitment to sustainability, a priority (Esty and Winston 2006, 90).



**TABLE 3**  
Ordered Probit Results for SEI Sustainability Grade

Variable	I: N = 180		II: N = 180		III: N = 145	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Regulatory Budget	0.002	0.016	-0.019	0.016	-0.007	0.015
Enforcement Effort	-0.033	0.060	-0.017	0.048	-0.025	0.050
Inspection Rate	-17.609**	6.847	-20.807**	6.962	-22.564**	6.896
Total Students	0.033**	0.011	0.034**	0.011	0.030**	0.013
Tuition	0.068**	0.030	0.071**	0.034	0.044	0.030
Percent on Financial Aid	0.018**	0.007	0.024**	0.008	0.025**	0.009
Public	0.847*	0.460	1.141**	0.470	0.587	0.410
Endowment	0.985**	0.350	0.990**	0.349	1.160**	0.354
High Research Activity	0.288	0.325	0.137	0.320	-0.241	0.362
Electricity Cost	-0.025	0.016	-0.011	0.014	-0.022	0.018
Acceptance Rate	0.001	0.009	-0.005	0.008	-0.002	0.008
Top 50 National	0.404	0.296	0.347	0.335	0.625**	0.314
Top 50 Liberal Arts	0.199	0.387	0.166	0.443	0.594	0.568
Percent on Campus	-0.538	0.733	-0.514	0.669	-1.210**	0.586
Environmental Major	0.196	0.205	0.125	0.252	0.287	0.269
Percent Out of State	1.204**	0.564	1.192**	0.517	0.995*	0.564
Percent International	6.299**	2.495	5.069**	2.519	8.325**	2.327
Full-time Faculty	0.037**	0.016	0.040**	0.017	0.042**	0.016
Alumni Giving	0.033**	0.012	0.024**	0.014	0.012	0.015
Size Relative to County	0.039**	0.013	0.032**	0.010	0.031**	0.007
County Population	-0.111**	0.062	-0.050	0.059	-0.129*	0.066
County Percent with Bachelor's	0.022**	0.010	0.015*	0.009	0.020**	0.008
Environmental Organization Revenues	-0.004	0.019	0.002	0.018	0.006	0.019
Federal Land	0.033**	0.012	0.020	0.013	0.034**	0.013
Percent Kerry	0.036	0.023	0.027	0.020	0.052**	0.021
School Growth Rate	0.295**	0.124	0.267	0.196	0.086	0.118
Percent Women	0.019**	0.009	0.013**	0.006	-0.003	0.012
Religious	-0.294	0.258	-0.269	0.274	-0.142	0.369
State System	1.482**	0.348	1.243**	0.327	1.217**	0.315
South	-0.131	0.277	-0.136	0.287	0.328	0.265
New England	1.139**	0.412	1.111**	0.386	1.365**	0.389
Southwest	-0.263	0.375	-0.179	0.374	-0.622	0.454
West	-0.624	0.660	0.235	0.673	-0.517	0.656
Campus Survey	—	—	1.476**	0.229	—	—
Dining Survey	—	—	0.620**	0.179	—	—

\*\*Significant at the 95% level; \*significant at the 90% level.

the positive coefficient on *County Percent with Bachelor's* suggests that more educated communities are more likely to pressure institutions to adopt sustainable practices. The positive and significant coefficient on *Federal Land* suggests that an institution's decision to adopt sustainable practices may be related to the presence and importance of natural resources in the surrounding area.

Several of the "other factors" also have a significant effect on an institution's overall sustainability grade. As expected, there is a positive and significant coefficient on *School Growth Rate* indicating that schools that have

grown significantly in the recent past may have had more opportunities to incorporate energy efficient measures than schools that have not expanded. The positive and significant coefficient on *Percent Women* shows that the higher the percentage of women on campus, the higher the institution's sustainability score which is consistent with the popular belief that women are more interested in the environment than men. Also, as expected those institutions that are graded based on the environmental practices of the entire state university system have higher overall grades than single-campus institutions as indicated by the positive and significant

coefficient on *State System*. Finally, the positive and significant coefficient on *New England* indicates that institutions in New England are more likely to adopt sustainable practices than institutions in the Midwest (the omitted region).

One concern in interpreting these results is that much of the data used to develop the SEI grades are self-reported. As mentioned earlier, SEI collects some of the information necessary to grade each institution from some third-party sources such as the EPA and the U.S. Green Building Council, but much of the data comes from the institution itself via its website, institutional press releases, and campus responses to SEI surveys. SEI sends a general survey to both the institution's president and, where applicable, sustainability coordinator and a separate dining service survey to the director of dining services. Of the institutions in this analysis, 110 responded to both surveys, 35 responded to the general campus survey alone, 10 responded to the dining survey alone, and 25 responded to neither. One might expect institutions who respond to the survey to receive higher grades because SEI has more information about sustainability practices at those institutions. Of course, institutions with more sustainable practices are also more likely to respond to the survey. Ideally, I would use an instrumental variables approach to try to deal with the potential for a non-response bias, but unfortunately I have not been able to find any suitable instruments. Thus to better understand how the non-response could be biasing the results, I present two additional ordered probit regressions.

The regression reported in column 2 of Table 3 includes two additional dummies, one indicating whether the institution completed the general campus survey and one indicating whether the institution completed the dining survey. The coefficients on both are positive and significant, as one would expect for both of the reasons discussed above. Note, however, that there is no qualitative change in the signs of any of the significant coefficients for the other explanatory variables, although three variables that were significant are no longer individually significant (*County Population*, *School Growth Rate*, and *Federal Land*). The regression reported in column 3 of Table 3 reports the results of the ordered probit regression only for those institutions which completed the general campus survey.<sup>29</sup> Obviously, there is an issue

of selection bias for these institutions. However, it is interesting to note that the results for this regression are not that dissimilar to the results presented in column 1. Some variables that are not significant for the full sample are significant in the restricted sample and vice versa, but the signs of the coefficients are generally consistent. Overall, the findings are quite similar—financial constraints are significant drivers of the decision to adopt sustainability as are stakeholder interests. Contrary to expectations, regulatory pressures do not have positive effect on overall sustainability and there is no evidence that institutions are attempting to attract students with sustainable practices.

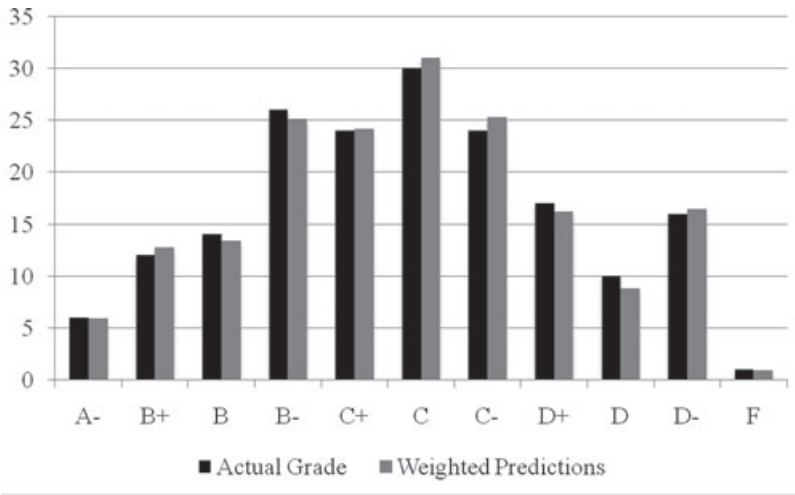
To assess how well the ordered probit regression explains an institution's grade, I use the estimated coefficients to predict each institution's sustainability grade. First, I compute the estimated  $\beta'X_i$  for each institution. Recall that the ordered probit also estimates the "cutoff" points for each grade, the  $\mu$  parameters. Using these parameters, I compute the probability that each institution would receive each possible grade using Equation (2) on page 12. For example, Agnes Scott College (the first institution alphabetically) received a C from the SEI. According to the estimated model, the probability that Agnes Scott would receive a C is 28%, whereas the probability it would receive a C+ is 17% and the probability it would receive a C- is 22%. On the higher end, the probability of receiving a B- is 10%, the probability of a B is 2%, and the probability of a B+ or A- is less than 1%. On the lower end, the probability of a D+ is 11%, the probability of a D is 5%, the probability of a D- is 4%, and the probability of an F is less than 1%. Figure 2 compares the distribution of actual grades with the distribution of predicted grades weighted by the probability of receiving each grade. As you can see, the predicted grades are quite close to the actual grades, although the C's are predicted more often than they actually occur. (Recall that only 180 of 200 institutions are included in the analysis, so the distribution of actual grades varies slightly between Figures 1 and 2.)

It is also important to obtain a sense of the relative size of the effects that each of the

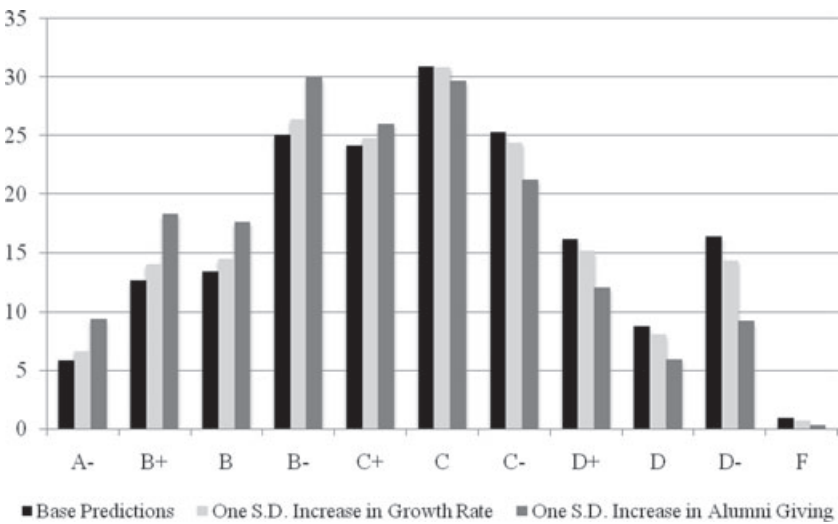
29. There are some statistically significant differences between the respondents to the general survey and those

that did not respond. I conducted  $t$  tests on the difference between the means for each of the explanatory variables, and found that 5 of the 31 have a statistically significant difference (at the 95% confidence level): respondents have a lower *Percent on Financial Aid*, higher *Endowment*, *Percent Out of State*, and *Alumni Giving* and are more likely to be in the *Top 50 National* group.

**FIGURE 2**  
Actual versus Predicted Grades



**FIGURE 3**  
Effect of Increase in Selected Explanatory Variables



explanatory variables has on the overall sustainability score. As is the case with an ordinary probit, the coefficients in an ordered probit are not equivalent to the marginal effects of the explanatory variables. The effect a change in an explanatory variable would have differs across institutions depending on the initial starting point. For example, even a significant increase in endowment might have no effect on

an institution that is already receiving an A–, whereas a modest increase in endowment for a school currently receiving a D– could make a substantial difference. However, one can compare the effects of explanatory variables relative to each other. To do this, for each institution I calculate how the predicted probability of receiving each grade changes for a one standard deviation increase in each continuous

explanatory variable. To calculate the effect of binary variables, I first calculate the grade distribution setting the binary variable to 0 and then recalculate the grade distribution setting the binary variable to 1. To illustrate, Figure 3 shows the change in the overall predicted grade distribution for the sample for a one standard deviation increase in *School Growth Rate* compared to a one standard deviation increase in *Alumni Giving*. As shown, for both variables the probability of receiving grades of a C+ and higher increases, whereas the probability of receiving grades of C or less decreases. However, *Alumni Giving* has a much larger effect on the probability distribution than *School Growth Rate*.

To facilitate comparisons across variables, I convert each grade distribution to an average grade using a 4.0 scale (i.e., an A- = 3.7, a B+ = 3.3, a B = 3.0, etc.). Table 4 shows the average grade change for each explanatory variable with a significant coefficient. Of the continuous variables, *Alumni Giving* has the largest effect followed closely by *Federal Land*, whereas *School Growth Rate* had the smallest. Of the two binary variables, *State Systems* has a quantitatively larger effect than *Public*.

As discussed in the previous section, in my opinion the SEI evaluation process does require institutions to be making real investments in adopting sustainable practices, and not merely making symbolic gestures toward sustainability (although admittedly it does give some credit for what could be merely symbolic gestures). Just as the literature on corporate sustainability tries to differentiate between true environmental improvements and “greenwashing” practices (i.e., practices that merely give the appearance of sustainability), I also want to better understand the factors that affect adopting of sustainable practices compared to actions that might appear to be sustainable, but have less impact on an institution’s true environmental performance. To do this, I also examine institutional decisions to sign the American College and University Presidents Climate Commitment (PCC). The PCC is a well-publicized initiative launched in 2007 to persuade presidents of IHEs to commit to making their campuses more sustainable and to reduce campus greenhouse gas emissions.<sup>30</sup> The PCC has partnered with the William J. Clinton Foundation and has been covered in

**TABLE 4**  
Relative Effects of Changes in Significant  
Explanatory Variables

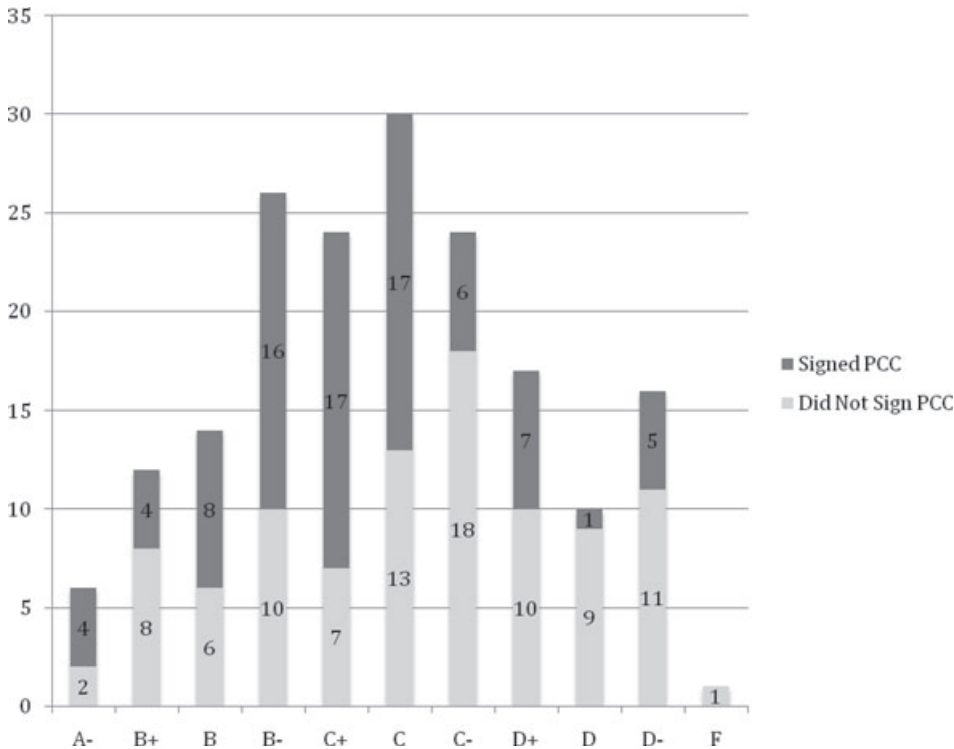
	Average Grade	Absolute Change
Actual Grade	2.074	
Baseline Prediction	2.094	
Increase Inspection Rate One SD	1.960	0.134
Increase Total Students One SD	2.275	0.181
Increase Tuition One SD	2.285	0.191
Increase Percent on Financial Aid One SD	2.208	0.114
All Private to All Public		0.391
Increase Endowment One SD	2.225	0.131
Increase Out of State Percent One SD	2.235	0.141
Increase International Percent One SD	2.171	0.077
Increase Full-time Faculty One SD	2.196	0.102
Increase Alumni Giving One SD	2.293	0.199
Increase Size Relative to County One SD	2.253	0.159
Increase County Population One SD	1.975	0.119
Increase Percent with Bachelor’s One SD	2.185	0.091
Increase Federal Land One SD	2.291	0.197
Increase School Growth Rate One SD	2.132	0.038
Increase Percent Women One SD	2.176	0.083
No State Systems to All State Systems	—	0.658

national news outlets including the *New York Times*, *Newsweek*, and *Time* magazine. Additionally, most signatories to the PCC issue a press release which is covered by the local, if not the national, media.

Presidents who sign the PCC commit to develop “a comprehensive plan to achieve climate neutrality as soon as possible.” Presidents also commit to initiating two or more “tangible actions to reduce greenhouse gases” in the future. Although I am sure that many signatories to the PCC are taking real steps to reduce greenhouse gas emissions, I do not believe that all those signing the PCC are making significant investments in adopting sustainable practices. For example, as shown in Figure 4, 5

30. Information on the PCC is available at <http://www.presidentclimatecommitment.org> (accessed May 26, 2009).

**FIGURE 4**  
Distribution of PCC Signatories



Note: <http://www.presidentsclimatecommitment.org/html/signatories.php> (accessed on January 19, 2009).

of the 16 institutions receiving a D— from SEI were signatories to the PCC as of January 2009, roughly the same percentage of those receiving a B+.

Table 5 presents the results of a probit regression where the dependent variable is equal to 1 if the IHE's president had signed the PCC as of January 2009. The explanatory variables used in this analysis are the same as those used in the ordered probits reported in Table 3 and the standard errors are clustered by state. Note that only four of the coefficients are significant, those on *Inspection Rate*, *Electricity Cost*, *Top 50 Liberal Arts*, and *Federal Land*. Unlike the results for the SEI grade, the coefficient on *Inspection Rate* is positive indicating that institutions in states with higher levels of regulatory enforcement are more likely to participate in the PCC. One possible explanation for this inconsistency could be that regulatory pressures are sufficient to drive institutions to adopt symbolic gestures, but not enough to persuade them to implement sustainable practices that require scarce resources.

The positive coefficient on *Electricity Cost* indicates that institutions in areas with higher electricity costs are more likely to sign the PCC. This result is not surprising as many of the actions that an institution can take to reduce greenhouse gas emissions would also reduce energy consumption.

Note that the coefficient on *Total Students* is not significant. This suggests that there are not significant economies of scale associated with signing the PCC, although there are likely to be such economies of scale with other types of sustainable practices. The most striking result is that neither *Tuition* nor *Endowment* has a significant coefficient in this regression. Thus, while taking real steps to adopt sustainable practices appears to depend largely on financial resources, making commitments to sustainability does not. This suggests that the commitments made under the PCC may not actually result in significant improvements in a campus's environmental performance.



**TABLE 5**  
Probit Results for Decision to Sign the PCC

Variable	Coefficient	SE
Regulatory Budget	0.008	0.018
Enforcement Effort	−0.059	0.052
Inspection Rate	15.152*	8.691
Total Students	−0.008	0.016
Tuition	0.011	0.033
Percent on Financial Aid	0.002	0.010
Public	0.102	0.604
Endowment	−0.678	0.802
High Research Activity	0.385	0.368
Electricity Cost	0.029*	0.016
Acceptance Rate	0.008	0.009
Top 50 National	−0.102	0.366
Top 50 Liberal Arts	1.264**	0.458
Percent on Campus	0.322	0.772
Environmental Major	−0.044	0.306
Percent Out of State	−0.630	0.768
Percent International	−2.860	3.043
Full-time Faculty	0.037	0.027
Alumni Giving	−0.001	0.018
Size Relative to County	0.054	0.104
County Population	0.022	0.082
County Percent with Bachelor's	−0.006	0.011
Environmental Organization Revenues	0.025	0.019
Federal Land	0.043**	0.018
Percent Kerry	0.010	0.025
School Growth Rate	0.006	0.261
Percent Women	0.005	0.006
Religious	0.260	0.410
State System	1.014	0.647
South	0.048	0.303
New England	−0.414	0.287
Southwest	0.189	0.416
West	−1.538	0.942
Constant	−6.285**	2.860

\*\*Significant at the 95% level; \*significant at the 90% level.

## V. CONCLUSIONS

Although there are obviously many factors that drive institutions to embrace sustainable practices, the most consistent and robust finding of this analysis is that sustainability appears to be something of a luxury good in higher education. Larger and wealthier institutions are more likely to adopt sustainability than smaller, less well-endowed institutions. Thus, although in theory IHEs may be able to make long-term investments in sustainability that corporations would not find profitable in the short run, financial resources still play a significant role in the adoption of sustainable practices on campus. In contrast, wealth and size do not appear to

be significant drivers of symbolic gestures of sustainability, as evidenced by the results for the Presidents Climate Commitment.

Although there is clearly a lot of enthusiasm for sustainability among students on many campuses, this study found no evidence that IHEs are currently adopting sustainable practices as a way of competing for students. Admittedly, the variables used in the analysis are only rough proxies for student preferences because it is difficult to measure student preferences directly. But it is also likely that while high school and college students strongly believe that the environment is important, environmental practices do not significantly affect the college selection decision. This is not to say that individual students do not affect campus sustainability efforts—once on campus they may actively work to improve the environment of the campus—but the key is that environmental preferences may not be an important factor in the decision of where to go to college.

In contrast to the findings of the corporate sustainability literature, regulatory pressures do not play an important role in encouraging sustainability on campus, although larger institutions—those with greater environmental liabilities—are more likely to adopt sustainable practices than small institutions. This result may indicate that there are economies of scale in adopting sustainable practices but is inconsistent with the idea that smaller campuses are better able to implement sustainability than large campuses. The finding that regulatory pressure is not an important driver for campus sustainability may be because of the fact that the baseline level of regulatory pressure is much lower for IHEs than for companies in general. However, this difference also implies that if policy makers wish to encourage sustainability on campus, they will need to use different policies than they use for corporations because they will not be able to use regulatory pressure to effect changes in practices.

For IHEs, stakeholders—alumni, faculty, and the community—appear to play a more dominant role in encouraging the adoption of sustainable practices than they do for corporations. This is not to imply that corporate stakeholders, investors and the community, are insignificant factors in corporate sustainability. For example, Khanna and Anton (2002) found that firms that are more dependent on the market for capital are more likely to adopt EMSs, and Welch, Mazur, and Bretschneider (2000) found that

utilities headquartered in state with higher levels of environmental activism are more likely to enroll in the Department of Energy's Climate Challenge Program. However, corporate stakeholders are not a significant factor in many studies of corporate sustainability. In contrast, the results of this study suggest that policy makers may be able to engage IHE stakeholders such as faculty and alumni in helping to increase sustainable practices on campuses. However, **given the findings that size and wealth are important factors in achieving sustainability, it is likely that programs that subsidize campus sustainability efforts or provide technical assistance to smaller institutions might be the most successful at encouraging campuses to adopt practices that actually make an institution more sustainable as opposed to practices that might merely help an institution appear more sustainable.**

Although the specific results of this study obviously apply only to IHEs, the general findings should also be relevant for non-profits in general. I would expect stakeholders to play a more dominant role in environmental decision making at all types of non-profits than they do at for-profit corporations. Additionally, I expect that regulatory pressure will have little effect on the adoption of sustainable practices in the wider non-profit universe. However, I think it is likely that **financial incentives and technical assistance for small institutions could prove to be effective at increasing sustainability** at non-profits in general, as I anticipate the findings that **financial resources and size are important drivers of sustainable practices** that would carry over to other non-profits as well.

## REFERENCES

- Berry, W. D., Evan J. Ringquist, Richard C. Fording, and Russell L. Hanson. "Measuring Citizen and Government Ideology in the American States, 1960–1993." *American Journal of Political Science*, 42(1), 1998, 372–48.
- Cabaniss, A. "Connecticut: College State of the Environment Report for 2005–2006." 2006. Accessed February 10, 2010. <http://www.yale.edu/sustainability/necsc/Sustainability%20Strategy/conncoll%20state%20of%20the%20enviro.pdf>.
- Clotfelter, C. T. *Buying the Best: Cost Escalation in Elite Higher Education*. Princeton, NJ: Princeton University Press, 1996.
- Cohn, E., Sherrie L. W. Rhine, and Maria C. Santos. "Institutions of Higher Education as Multi-Product Firms: Economies of Scale and Scope." *Review of Economics and Statistics*, 72(2), 1989, 284–90.
- Creighton, S. H. *Greening the Ivory Tower: Improving the Environmental Track Record of Universities, Colleges and Other Institutions*. Cambridge, MA: The MIT Press, 1998.
- Esty, D. C., and Andrew S. Winston. *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*. New Haven, CT: Yale University Press, 2006.
- Gunningham, N., Robert A. Kagan, and Dorothy Thornton. "Social License and Environmental Protection: Why Businesses Go Beyond Compliance." *Law and Social Inquiry*, 29(2), 2004, 307–21.
- Henriques, I., and Perry Sadorsky. "The Determinants of an Environmentally Responsive Firm: An Empirical Approach." *Journal of Environmental Economics and Management*, 30(3), 1996, 381–95.
- Hopkins, D. S. P., and William F. Massy. *Planning Models for Colleges and Universities*. Stanford, CA: Stanford University Press, 1981.
- Khanna, M., and Wilma Rose Q. Anton. "Corporate Environmental Management: Regulatory and Market-based Incentives." *Land Economics*, 78(4), 2002, 539–58.
- Khanna, M., and Keith Brouhle. "Effectiveness of Voluntary Environmental Initiatives," in *Governance for the Environment: New Perspectives*, edited by M. Delmas and O. Young. Cambridge, UK: Cambridge University Press, 2009, 144–82.
- Khanna, M., Patricia Koss, Cody Jones, and David Ervin. "Motivations for Voluntary Environmental Management." *Policy Studies Journal*, 35(4), 2007, 751–72.
- Martin, R. E. *Cost Control, College Access, and Competition in Higher Education*. Northampton, MA: Edward Elgar, 2005.
- Potoski, M., and Aseem Prakash. "Green Clubs and Voluntary Governance: ISO 14001 and Firms' Regulatory Compliance." *American Journal of Political Science*, 49(2), 2005, 235–48.
- Sharp, L. "Green Campuses: The Road from Little Victories to Systematic Transformation." *International Journal of Sustainability in Higher Education*, 3(2), 2002, 128–45.
- Torgler, B., Maria A. Garcia-Valinas, and Alison Macintyre. "Differences in Preferences toward the Environment: The Impact of Gender, Age, and Parental Effect." Working Paper 221, Queensland University of Technology, 2008.
- Velazquez, L., Munguia Nora, and Sanchez Margarita. "Deterring Sustainability in Higher Education Institutions: An Appraisal of the Factors Which Influence Sustainability in Higher Education Institutions." *International Journal of Sustainability in Higher Education*, 6(4), 2005, 383–91.
- Welch, E. W., Mazur Allan, and Bretschneider Stuart. "Voluntary Behavior by Electric Utilities: Levels of Adoption and Contribution by the Climate Challenge Program to the Reduction of Carbon Dioxide." *Journal of Policy Analysis and Management*, 19(3), 2000, 407–25.
- Wooldridge, J. M. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT Press, 2002.
- Yale University. "Yale University Environment Report: 1997–1998 through 2003–2004." 2005. Accessed February 10, 2010. <http://www.yale.edu/sustainability/necsc/Sustainability%20Strategy/envreport%20yale.pdf>.