Additional Benefits to Sustainability in Higher Education?

The Effect of the American College and University Presidents Climate Commitment on Undergraduate Admissions Outcomes

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April 2016
Honors Thesis
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ABSTRACT

I assess the possible impact that signing a campus climate commitment, specifically the American College and University Presidents Climate Commitment (ACUPCC), has on college attractiveness, which is measured in terms of the number of applications for admission and the SAT test scores of each first-year class. ACUPCC is significant in that it is the first and most widely recognized commitment in pursuit of climate neutrality in higher education, as signatories agree to measure, report, and take steps to reduce greenhouse gas emissions. Using a difference in differences model on a sample of 718 institutions of higher education from 2003-2012 with state time trends and institutional fixed effects, I find that signing ACUPCC significantly increases undergraduate applications for public colleges and universities by about 3.76%. Additionally, signing ACUPCC significantly increases the average 75^{th} percentile of SAT scores and ACT scores scaled to the SAT of the first-year class by 6 points on the sample of 421 institutions of higher education that report scores. I also find that public institutions exhibit a jump in undergraduate applications and student quality that is maintained for each individual year after signing ACUPCC. My results imply that a commitment to sustainability can be seen as a positive college characteristic that might assist broader marketing efforts and that gives prospective students a greater inclination to attend public institutions.

*The author would like to thank Stephen Ellis of Second Nature, Inc. for providing data on ACUPCC membership dates, and Brendt Simpson of Colgate University for providing US News and World Report data.

I. INTRODUCTION

The American College and University Presidents Climate Commitment (ACUPCC), a pledge to eventual carbon neutrality was launched in May, 2007; by the end of 2015, 662 institutions of higher education signed on to the agreement. Upon signing ACUPCC, member institutions commit to measure and report greenhouse gas emissions, while implementing a plan that initiates at least two tangible actions to reduce emissions (i.e. establish a green building policy, source energy from renewable sources, offset air travel emissions, etc.). In addition to the obvious environmental benefits of climate neutrality and these tangible actions, sustainability allows institutions to better serve their students and social mandates along with differentiate themselves from peers. ACUPCC takes this claim a step further, as the agreement states, "We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities" (ACUPCC Implementation Guide 2009 37). According to ACUPCC, a potential general benefit of the commitment is that it will "recruit more and better students" (White 2008 219).

As institutions of higher education are increasingly acting more like businesses, claims that sustainability can draw in new sources of funding or institutional attractiveness in the eyes of prospective students and faculty could provide greater reasoning for institutions to represent themselves as valuing sustainability by committing to climate neutrality. Since costs are associated with the creation of institutional structures to maintain and manage greenhouse gas emission reporting and the required tangible actions, it would be interesting to compared to tangible benefits outside of reduced emissions.

The potential that sustainability could increase applications for admissions and the quality of students attending the institution could prove an external benefit to institutions of higher education striving for climate neutrality. According to a Princeton Review Survey, 60% of respondents at least somewhat consider colleges' commitments to environmental in application and attendance decisions (Princeton Review 2015)[1]. The effect that a climate commitment or sustainability more broadly, has on the quantity undergraduate college and university applications has yet to be analyzed in an empirical study, to my knowledge. In this paper I seek to find whether ACUPCC has an effect on the quantity of undergraduate admission applications and the quality of students attending the institution. I find that signing ACUPCC causes an increase in applications for public institutions of higher education by 3.756%, while there is no relationship between signing ACUPCC and applications for private institutions. Additionally, signing ACUPCC significantly increases the average 75^{th} percentile of standardized test scores in terms of SAT scores of the first-year class by 5.703 points, while there is no impact for private institutions (I will refer to the combined test scores as SAT scores for the remainder of the paper).

My analysis is particularly relevant for colleges in pursuit of sustainability as it can provide motivation to go green for marketing purposes. Marketability is measured by the quantity of first-year student admission applications and the competitiveness of the students attending the institution, with the mindset that sustainability might be a characteristic that increases the school's exposure to prospective students, which could influence the application decision. According to Toma and Cross, a benefit of receiving more applications consists of

[1] The survey includes 9,000 students applying to college and 2,000 parents of college applicants,; 60% responded that having information about colleges' commitment to environmental issues would "somewhat," "very much," or "strongly" to attendance and application decisions.

allowing "admissions officers to do more to bring diversity to a class – racially and ethnically, as well as geographically" (1998 654). By assessing the SAT scores of the first-year class, I explore if sustainability is seen as an attractive trait to prospective students that could cause high achieving students to pay attention to the college when they otherwise might not have. Past literature on sports success, choice models, and eco-marketing suggests that sustainability can be utilized as a marketing tool that would increase the exposure of a college (Chapman 1981; Dauvergne and Lister 2013; Jones 2009; Karpidis and Sartzeektakis 2013; Pope and Pope 2009; Pope and Pope 2014; Schaltegger and Synnestvedt 2015; Stafford 2011; Toma and Cross 1998; Welford 1995). Successful marketing of a college will implicitly increase the number of applicants to the institution while also increasing the competitive qualities of the students who attend. Statements made by ACUPCC that implies that there is a positive causal relationship between sustainability and the marketability of colleges is the hypothesis to be tested (ACUPCC Implementation Guide 2009; White 2008).

I employ a difference in differences model to estimate the impacts of a change in total applications and the 75th percentile of SAT scores of the first-year class by using movement to becoming an ACUPCC signatory as the treatment. I evaluate the impact that the movement has on total undergraduate applications and SAT scores on a sample of four-year colleges and universities, along with the impact on smaller samples of strictly public institutions and strictly private institutions. I find that in the full model, movement to ACUPCC membership is insignificant in relation to applications, while the findings from the public school sample shows that there is a highly significant relationship for that subset of the population of schools. In my first model on the subset of public institutions, I find that applications increase by 3.756%; in my second model that is not subject to sample selection, applications to public schools are still significantly increased by 4.016%. The quality of students attending institutions are similarly impacted by movement to ACUPCC as it increases the 75th percentile SAT score by 5.703 points for the public school sample, and by 6.039 points for public schools in the entire sample, significant at the 1% and 10% levels, respectively. These increases are sustained over time, as I also test and prove that public institutions are not experiencing a quick increase then regression of quantity of applicants and quality of students. These findings imply the lasting effect of a commitment to continually improve the institution's carbon impact, compared to the temporary 1 to 8% increases in applications to institutions experienced within the following two years of basketball and football success (Pope and Pope 2009). This increase thus allows institutions to be more selective in admission decisions for all admission cycles after signing ACUPCC, not just the immediate years following. This is experienced to be true as the quality of students attending the institution increases, indicative of the greater amount of applications received. Overall, an increase of applications by over 3% that is maintained substantially improves the selection pool from which to choose to admit students and thus the increase it quality is complementary to the increased interest in the institution.

i. ACUPCC

Over half of all ACUPCC signatories signed on to the agreement in the year it launched, with 378 becoming members in 2007. Member institutions consist of community colleges, four-year colleges, public and private universities, and specialty focus institutions. See the data appendix for more information on the variation of years of signing between private and public institutions and how my sample of ACUPCC members was created.

According to Sirianni and O'Hara (2014), annual dues to ACUPCC range from $750 to $4,000 and vary based on the type and size of the institution. Each institution creates its own climate action plan within two years of signing the agreement, so the extent of the commitment is very individualized. For example, Oberlin College, the first ACUPCC signatory, pledges climate neutrality by 2025 through ACUPCC (Oberlin College 2016), while the University of Southern Mississippi, which signed in ACUPCC's second year, pledges neutrality "as soon as possible" (The University of Southern Mississippi 2015), and Colby College, which signed in the second year as well, pledged to become carbon neutral by 2015 and achieved it by 2013 (Colby College 2013**)**.

Should a signatory be unable to meet a reporting deadline, the institution is able to submit a request for an extension and still remain in good standing. Those members that do not seek extensions and does not meet a term is considered to be in non-fulfillment and is not in good standing with ACUPCC, but may come back into good standing at any point by taking "required steps" (ACUPCC Implementation Guide, 2009). ACUPCC is thus a commitment mechanism that results in individualized commitments and plans, allowing leeway for the types of tangible actions and timing of climate neutrality goals.

II. RELATED LITERATURE

i. Sustainability in Higher Education

In the face of climate change and a growing recognition of environmental degradation, institutions of higher education are looked to for education leadership on environmental issues and supporting sustainable operations and development (McNamara 2010). Scholars have studied different transformative sustainability action models that move colleges to become successful "sustainability incubators" (Collins and Gannon 2014; McNamara 2010). In a regression analysis, McNamara (2010) finds that the total sustainability support system, total sustainability plan, collaboration with departments, lack of time and lack of money accounts for approximately 55% variation measured in levels of sustainability progress on college campuses in the US, and lack of money came out as most important (2010). McNamara also uses a questionnaire of individuals pushing for sustainability on campuses to find that support from the college or university president is the best strategy to overcome this barrier among others (McNamara, 2010). It is interesting that presidential support is important in overcoming such barriers since a president's signature is necessary for membership in ACUPCC, which is often looked to as an important indication of a sustainable campus.

Stafford (2011) classifies sustainability as a "luxury good" in higher by using the framework to study the corporate adoption of sustainability (Stafford 2011). Stafford also explores if colleges adopt sustainable measures as a means to attract students. When acceptance rate, percent on campus, environmental major, percent out of state, and percent international are proxies for factors of student preferences that relate to sustainability, Stafford found a general lack of significance in the factors and believes that environmental practices are not an important aspect of the college decision (2011). However, "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" (Stafford 2011 349). Stafford's metrics on student preferences were limited and vague. It was also a bold statement to conclude that the college decision would not be affected by campus sustainability when that question was not actually tested via variables that measure college decision. Thus, further

research is necessary that uses new variables to account for student preferences to explore this relationship between college choice and campus sustainability.

Sirianni and O'Hara (2014) further test Stafford's (2011) classification of ACUPCC as a symbolic gesture as they question whether the voluntary Tangible Actions (TAs) that colleges pledge when signing ACUPCC actually lead campuses reduce greenhouse gas emissions. A two-stage method uses panel data with a fixed-effects approach to compare emissions at the point of signing the commitment to emissions two-years later and find that emission reductions result from signing ACUPCC (Sirianni and O'Hara 2014). By analyzing the correlation between the baseline emissions and the choice of TAs through a second stage regression, Sirianni and O'Hara find that many colleges that pledged TAs as green energy are already using it or have cheaper access to those sources, but also that colleges that pledge to improve energy efficiency achieve actual reductions in emissions (2014). Additional evidence suggests that ACUPCC is a symbolic gesture of sustainability, since signing the agreement doesn't lead to higher sustainability grades designated by the Sustainable Endowments Institute (Stafford 2011). ACUPCC has thus been classified as a symbolic gesture of sustainability, as it is a well-publicized initiative that "has been covered in national news outlets including the *New York Times*, *Newsweek*, and *Time* magazine… (and) most signatories to (ACUPCC) issue a press release which is covered by the local, if not national media" (Stafford 2011 353). This finding implies that some colleges and universities might sign ACUPCC partly for its symbolic nature, which is particularly relevant to my research hypothesis because my findings give empirical justification for symbolic sustainability, given claims presented that signing climate commitments would increase the marketability of colleges (ACUPCC Implementation Guide 2009; Princeton Review 2015).

ii. Eco-marketing

Thus far, there is sparse literature on colleges harnessing sustainability as a marketing strategy; especially as eco-marketing is relatively new and still evolving in the corporate setting. Therefore, this literature review focuses on eco-marketing as it has been used for the eco-business. This paper also contributes to literature on eco-marketing as ACUPCC can be seen as an eco-certification for campus sustainability. Growing public familiarity with environmental issues and increased environmentalism has extended the marketing to include eco-marketing as a strand of the process (Schaltegger and Synnestvedt 2015; Welford 1995). Welford (1995) asserts that though public attitudes have been changing to increase public interest in the environment, environmental considerations are not the only attributes consumers consider in products, whether it is a $2 beverage or a $200,000 education. Variation of findings of empirical studies on environmental protection and firm profitability show that variation in conclusions on the economic performance of firms is the result of different samples of the studies (Schaltegger and Synnestvedt 2015). This implies that it might be interesting to explore using different samples of colleges when assessing sustainability's impact on college choice.

The general consensus has been that eco-certifications play a positive role in convincing consumers that products are in fact sustainable (Dauvergne and Lister 2013; Karipidis and Sartzeetakis 2013; Welford 1995). Eco-certifications, labels, and seals are important as an "independent endorsement of the product… which is third party verified (that) can offer companies a selling point which is more credible than any first-party claims they may make" (Welford 1994 167). Eco-labels are also effective to reduce fraud, increase credibility, and increase awareness of environmental considerations to consumers more generally (Dauvergne and Lister 2013; Welford 1994). In a study of consumer choices in the Greek peach market,

Karipidis and Sartzeetakis (2013) find that eco-certifications can be useful in fixing some market failures associated with negative environmental externalities associated with agriculture. They use a survey to find that half of respondents recognize organic food labels and certifications as an important factor when purchasing food (Karipidis and Sartzeetakis 2013). ACUPCC can be seen as an eco-label for colleges, and thus credible endorsement measurements for campus sustainability since information about and implications of ACUPCC are easily accessible on college websites and through various news outlets (Collins and Gannon 2014).

iii. Modelling College Choice

To measure the effect that signing ACUPCC has on undergraduate admissions, related studies on the college choice model are helpful to understand key variables that might draw students to apply to particular institutions. Hossler and Gallagher (1987) provide a three-phase model to breakdown student college choice. The first stage is pre-disposition, in which high school students decide whether or not to continue to post-secondary education. The second stage is the search stage when the student explores the characteristics he or she finds important in a college and will seek out more information about those colleges with the preferred characteristics. In the search phase, students have a consideration set of schools based on some initially interesting characteristics of colleges. After seeking out more information about these institutions, the student comes to a choice set of schools to apply to, which is influenced by interactions of the college's search activities, student search activities, and student preliminary college values (Hossler and Gallagher 1987). My first research question thus focuses on sustainability as an input to choice set. The final stage is choice, which refers to when the student makes a final decision and enrolls in an institution (Hossler and Gallagher 1987). Here, the student has the option to choose out of the schools he or she has been accepted. This decision is seen as a result of the student's choice set entering the final enrollment choice process, focusing on their college values, combined with the college and university courtship activities and admission decision (Hossler and Gallagher 1987). My second research question is focused on this stage as it assesses competitive characteristics of students choosing to attend sustainable colleges and universities.

There is empirical evidence that college athletics have an advertising effect in the quality and quantity of applications (Jones 2009; 2014; Pope and Pope 2009; 2014; Toma and Cross 1998; Smith 2008). Pope and Pope (2009; 2014), Jones (2009; 2014), Toma and Cross (1998), and Smith (2008) study the impact of intercollegiate athletics on admission outcomes. A common assertion is that spectator sports can be the way that people become familiar with colleges by increasing the school's visibility (Toma 2003). Smith (2008) assesses whether there is an advertising effect from big-time college basketball success on the quality of applications in an attempt to justify economic expenditure on athletics. He finds that it does little to increase the academic quality of applicants, which is proxied with the quality of the first-year class instead of applicants the prior year (2008). Smith (2008) finds that the impact of having a breakout season is significant on the SAT scores of the following first-year class. Toma and Cross (1998) reach a similar conclusion by statistically comparing the admission data from Division I Football championship schools and peer schools. Championships lead to temporary relative gains, which is seen as the result of the increased positive attention from breakout seasons and the memorable or compelling stories that increase attention to the team as a result (Toma and Cross 1998). Similar to Sirianni and O'Hara's (2014) question of the motivation behind and results of college climate commitments, Jones (2014) questions the motivation of universities moving a Division I

Football program to a more popular and competitive sub-division to create an advertising effect for the college. Changing to this sub-division has effectively branded some Florida colleges as football schools, as it increases the school's exposure to more students, and made it more desirable to increase the number of students who have applied (Jones, 2014).

Pope and Pope (2014) draw upon marketing literature to explain the decision-making process that occurs during the search stage (Hossler and Gallagher 1987). Similar to Weiler's (1994) explanation of utility of applying to a college, Pope and Pope (2014) expand upon the search stage to include utility, and add that if a student finds that a specific aspect of the school, which could be sustainability or a competitive intercollegiate sport environment, is important for college life, the student will be more likely to apply. The attention hypothesis is also proposed, which states that students lack information about colleges, so students pay attention to or gain attention by sports success. Jones (2009) expands upon the attention hypothesis by studying the impacts of televised Bowl games and thinking of athletics as an instrument for self-promotion. "The more a potential applicant hears an institution's name, the more likely he is to seek information about the particular institution. More students seeking information may result in more admissions applications" (Jones 2009 12). Pope and Pope (2014) support the attention hypothesis in finding that there is a large difference in admission numbers between colleges that have barely won and barely lost. In my analysis on the impact of a climate commitment, the attention hypothesis might be true due to ACUPCC's symbolic nature. The additional media attention that can come from such an agreement and publicity as a "green" school could allow for certain attributes to be associated with the school that can be utilized for self-promotion. Pope and Pope (2009) find differences for the effect of specific levels of success between the regressions on public and private schools on applications and enrollment in years following seasons. This indicates some inherent differences between public and private schools that might not be captured by observable variables or institutional fixed effects, as the effects of the different nature of the types of schools might be something that changes over time. I will also separate the population between private and public institutions to attempt to better capture the effects.

III. DATA

Other prominent independent variables that have been utilized in these past studies that use applications as the dependent variable include… cost of attendance (Pope 2009; 2014; Smith 2008), percent of students receiving financial aid (Smith 2008), average endowments per student (Monks and Ehrenberg 1999), number of high school diplomas awarded in the state (Jones 2009) number of public high school diplomas awarded in the state (Pope and Pope 2009; 2014), average real state income (Jones 2009; Pope and Pope 2009; 2014), state unemployment rate (Smith 2008), number of students enrolled (Jones 2009; Pope and Pope 2009; 2014; Smith 2008), student-faculty ratio (Smith 2008), average SAT scores of the entire student body (Jones 2009), USNWR ranking (Monks and Ehrenberg 1999), USNWR ranking by quartile (Meredith 2004), Bowl Games and TV ratings (Jones 2009), football and basketball championships (Toma and Cross 1998), the Associated Press college end of season football rankings (Pope and Pope 2009; 2014), and NCAA March Madness rounds (Pope and Pope 2009; 2014). Table 1 below describes my data and where it is sourced; see the data appendix for additional information.

Variable	Source	Unit of Measurement	Years Available
Treatment	Second Nature, Inc.	Binary variable that takes the value of 1 for all years that an institution is an ACUPCC Member.	2007-2015
Total applications	IPEDS	Continuous total number of applications for undergraduate admissions. Measured using natural log multiplies by 100.	2002-2014
75^{th} percentile of SAT scores	IPEDS	Composite Math and Critical Reading SAT score: ranges from 400-1600 and can vary by 10 points.	2002-2014
In-district tuition and fees	IPEDS	Continuous in 2012 US dollars, adjusted using HEPI. Measured using natural log.	2002-2014
Endowment assets per full-time equivalent enrollment	IPEDS	Continuous in 2012 US Dollars, adjusted using HEPI. Measured using inverse hyperbolic sine transformation.	2003-2014
Acceptance rate	IPEDS	Percent of admitted students out of total applicants.	2000-2013
Ranking	Colgate University	Binary variable that takes a value of 1 if the institution is ranked top 100 National Liberal Arts Colleges or National Universities by US News and World Report.	1994-2016
Median state household income	US Census Bureau	Continuous in 2012 US dollars, adjusted using CPI. Measured in thousands.	1984-2014
Public high school diplomas granted by state	NCES Digest of Education Statistics	Continuous in total number of graduates. Measured using natural log.	2002-2012
Division 1-A Football success dummies	ESNP, Sports Reference, Database Sports, NCAA	Binary variables for having a Division I basketball program; Basketball team makes it to March Madness; Basketball team makes it to the Final Four; Basketball team wins the NCAA national championship.	2000-2016
Division 1 Basketball success dummies	ESNP, Sports Reference, NCAA	Binary variables for having Division I-A football program; Football team wins the NCAA FBS championship.	2000-2016

I limit my sample of institutions of higher education only to schools operating in the US, not-for-profit private and public 4-year or above, degree granting with full-time first-time undergraduates, and excluded institutions that offer all programs completely via distance education to have a total of 718 institutions. There is no systematic difference in the types of institutions that were dropped from the dataset, which can be seen in tables 1 and 2 in the data appendix. As of October 5, 2015, the ACUPCC was relaunched as the Climate Leadership Commitment through Second Nature. I will continue to refer to the commitment as ACUPCC as

my study ends in 2012. My quantity dataset is comprised of 718 institutions: 242 public and 476 private institutions, and 226 ACUPCC signatories. The quality dataset further removes institutions from the sample due to the availability of reported SAT and ACT scores to result in 421 institutions; 127 public and 294 private institutions.

I focus on gathering information on basketball and football success since they get the most attention and since past studies have found their significance in relation to my dependent variables. An important aspect of analyzing the effects of college characteristics on student college choice is the timing of when information becomes available to prospective students. Pope and Pope (2009; 2014) lag up to three times to assess the lasting impacts of sports success, while Monks and Ehrenberg lag rankings one admission cycle (1999). I follow Pope and Pope's lagging of up to three years for sports success variables and a variable for the year of signing ACUPCC, while the rest of my independent variables are lagged one admission cycle. Due to the lagged structure of my specifications, data on the diplomas granted for the high school class of 2013 was included with IPEDS and additional data from 2012 that influences applications sent out from fall of 2012 to spring of 2013 for enrollment in fall of 2013. More information on the lagging structure can be found in my data appendix.

I use the inverse hyperbolic sine transformation on endowment per full-time student, due to the potential for zeros. I use the natural log for tuition and fees and public high school diplomas granted by state. Income is measured in thousands. I multiply the natural log of total applications by 100 to interpret the coefficient as a percent and gain more precise estimates. I use the Higher Education Price Index (HEPI) provided by the Commonfund Institute to place tuition and fees and endowment per full-time student into real 2012 US Dollars, as it more accurately indicates changing costs for institutions of higher education. The Consumer Price Index (CPI), provided by the Federal Reserve Bank of Minneapolis, is used to normalize median income into real 2012 US Dollars.

See the data appendix for summary statistics for the quantity and quality datasets, broken down between public institutions, private institutions, treatment group, and control group

IV. METHODOLOGY

My study assesses an impact of signing ACUPCC, a quasi-natural experiment is which signing is not randomly assigned. Based on Meyer's (1995) work, I will classify the study as a quasi-experiment, as the source of variation in the independent variable of interest is not accounted for in the model. As a result of the underlying lack of random variation, I will address potential issues and threats to the validity of the approach and how I have accounted for some of these threats.

I use a difference in differences method with state time trends and institutional fixed-effects on a panel of data for institutions from 2003 to 2012. The treatment group consists of ACUPCC signatories after they have signed the agreement, while the control group consists of institutions that have never signed ACUPCC. I exploit the variation in the time of signing ACUPCC, as the agreement was formalized in 2007 but institutions can join at various times. The empirical specifications for my underlying model is as followed...

1. $$Admissions\ Outcome_{it+1} = \beta_0 + \beta_1\ Treatment_{it} + \beta_2\ College\ Quality\ \&\ Selectability_{it} + \beta_3\ Cost_{it} + \beta_4\ College\ Resources_{it} + \beta_5\ State\ Characteristics_{it} + \gamma_i + \eta_t + \varepsilon_{it}$$

Admissions outcomes for the above equation and all following equations are either the quantity of applications or the quality of students. The dependent variable of the model for

quantity is the natural log of the number of first-time, degree/certificate-seeking undergraduate students who applied for admission by institution *(i)* to enroll in the fall semester of *(t+1).* Thus, the students underwent the process of applying to college in the fall of year *(t)* through the winter and spring of year *(t+1).* The dependent variable for quality is the 75th percentile scores of the composite Math and Critical Reading SAT for first-year, first-time, degree/certificate-seeking undergraduate students in the fall of semester *(t+1)*, so those students applying would translate to the scores of the same pool of students who are accepted to and attend the institution. Since the year that institutions sign ACUPCC varies, the treatment term used in my study is a binary variable that takes the value of 1 the year that the individual institution *(i)* signs ACUPCC, along with a 1 for each year *(t)* following. The empirical model uses state time trends and institutional fixed effects; thus β_1 represents the average treatment effect of signing this particular climate commitment on undergraduate student applications. Since college application season and the academic calendar do not follow the typical calendar year, I created a lag structure in the model for all variables. Thus, ACUPCC membership in year *t* was included if an institution signed ACUPCC between September 1 of year *(t-1)* and August 31 of year *t*.

In order to control for observable differences between the control and treatment group and possible outside conditions that that would be correlated with the applications an institution receives, an additional vector of explanatory variables is included. The following variables are included: published tuition and fees for in-district students in academic year of Fall *(t-1)* through Spring *t*; endowment assets per full time enrollment by year end *t*; acceptance rate for the entering class of fall of *t*; inclusion in US News and World Report's Top 100 Liberal Arts Colleges or National Universities published in year t; seven NCAA Division I football and basketball dummy variables measuring the presence of a team and its success with three lags beginning the football season of fall of *t* and basketball season that ends in winter of *t*; the number of public high school graduates in the state where the institution is located in *(t+1)*; and the median household income in the state where the institution is located in year *(t).*

γ_i represents the institutional fixed effects for institutional characteristics that do not vary over time. η_t represents the state time trends, which accounts for macro-level trends that could impact the amount of applications these institutions receive, such as economic recessions or changing social values. ε is the symbol for the random error term, or residual, that accounts for additional variance in total applications that is not accounted for by the independent variables in the model.

Equation (2) specifies the regression model using the same time and institutional fixed effects as equation (1) but changes the independent variables of interest...

2. $Admissions\ Outcome_{it+1} = \beta_0 + \beta_{1a}\, Year\ of\ Signing\ ACUPCC_{it} + \beta_{1b}\, One\ Year\ After\ Signing_{it} + \beta_{1c} Trend\ for\ two\ to\ five\ years\ after\ signing_{it} + \beta_2\, College\ Quality/Selectability_{it} + \beta_3\, Cost_{it} + \beta_4\, College\ Resources_{it} + \beta_5\, State\ Characteristics_{it} + \gamma_i + \eta_t + \varepsilon_{it}$

where β_1's represent the short-run and long-run effects that signing ACUPCC has on applications. The use of year dummy variables in this equation is especially of significance as it equalizes the difference between signing in 2007 versus signing ACUPCC in 2010. The additional variables borrowed from equation (1) helps to control for other variance in the dependent variable.

While the difference in differences models holds for institutional and time effects, it could be argued that the lack of randomization in the treatment variable poses threats to the

validity of the findings due to the likely endogenous nature of signing ACUPCC, since it takes a conscious choice and a concerted effort (Meyer 1995). Threats to validity have already been combatted in the above stated model by including additional explanatory variables to control for some variation, along with the year fixed effects to account for trends in outcomes. Meyer (1995) also describes the use of treatments that are higher-order interactions to extend difference in differences methods. He writes that "this approach is suitable if the treatment group differs from the comparison group along several dimensions, and it may have the advantage of removing any trends along these other dimensions of the data" (Meyer 1995 157). Following this approach I interact my independent treatment variable to assess the effect on different portions of the population, which can be seen in equation (3).

3. $Admissions\ Outcome_{it+1} = \beta_0 + \beta_{1a}(Treatment_{it} * Public_{it}) + \beta_{1b}(Treatment_{it} * Private_{it}) + \beta_{2a}(College\ Quality/Selectability_{it} * Public_{it}) + \beta_{2b}\ College\ Quality/Selectability_{it} * Private_{it}) + \beta_{3a}(Cost_{it} * Public_{it}) + \beta_{3a}(Cost_{it} * Private) + \beta_4\ College\ Resources_{it} + \beta_5\ Sports_{it} + \beta_6\ State\ Characteristics_{it} + \gamma_i + \eta_t + (\eta_t * Public_i) + \varepsilon_{it}$

To examine heterogeneous treatment effects by type of institution, I create new treatment terms with a dummy for the institution being a public school and a second interacted treatment that represents only private institutions so that coefficients β_{1a} and β_{1b} become my key parameters of interest. For example, β_{1a} would thus be interpreted as the effect of treatment on private institutions relative to public and private institutions in the control group. Since public school and private schools have previously been treated differently in similar studies (Pope and Pope 2009) and others have found that they are affected differently by my explanatory variables (Meredith 2009), I also include interacted control variables with the public school dummy in order to account for differing effects of certain explanatory variables on the dependent variable. In the second, more sophisticated model, I include separate tuition and fees control variables for public and private schools, along with public school year dummies in addition to overall year dummies to allow for national trends to affect these institutions differently.

V. RESULTS

i. Results: Quantity

Table 1 shows the results of Equation 1 estimated using a fixed effects model on three different samples. Figures 12-19 in the data appendix show that there are two pools of normal distributions of tuition and fees, and that they differ based on the type of institution (whether it is public or private). As a result of these different samples and the inherent differences between the offerings, attractiveness and nature of public institutions compared to private, the second and third regressions in Table 1 separate the population sample between only public institutions in the original sample, and then only private institutions. As Table 1 indicates, a different effect of ACUPCC membership is experienced between public and private institutions. There is an increase of 3.756%, which is significant at the 1% level, ceteris paribus, for the sample of public institutions, while there is no significant change in applications for all institutions or just the private school sample. The differing relationships of additional explanatory variables and applications between public and private institutions show that there could be a difference in the college choice model when students are choosing between public and private universities.

In Table 2, I regress Equation 2 on the quantity of applications received. These results differ from the regressions in Table 1 because I assess the short-run impact that ACUPCC has on

student applications to enroll that next year and the year after, and then the long-run impact up to five years following signing. As displayed in Figure 1, there seems to be a quick increase in applications, and then a sudden decrease in the years following signing ACUPCC for public institutions. This "blip" effect might indicate that there is initial excitement and media coverage immediately after ACUPCC is signed that draws in students to pay attention to the institution and thus apply. I find that again, applications to private institutions stay relatively steady and are not significantly impacted by signing ACUPCC. However, ACUPCC membership causes a significant increase for public institutions the year after signing by 3.80%, which is maintained as applications continue to rise by 1.02% for each year after the initial jump. This provides further evidence that ACUPCC is causing more students to take interest in public schools and not private.

Initial concerns of omitted variables and trends exist in a model that uses the entire sample. The initial model treats public and private institutions as experiencing the same relationships with explanatory variables and time trends. It is apparent in Table 1 through the coefficients and significance of the variables that they are impacted differently. Table 3 estimates the effects of Equation 3 in a fixed effects model that accounts for interactions between the public and private dummies and the control variables.

The results in Figure 3 show that within the population of all institutions in the sample, the effect of the treatment on public institutions is highly statistically significant, at the 5% level, and increases applications by 4.016%. When interacting control variables with the private and public dummies to account for different relationships, tuition and fees and acceptance rate from the previous year are the only variable that affects applications in a statistically significant way, along with different state trends for public institutions. These results follow closely the implications of the initial results in the model on public institutions in Table 1; when considering colleges, students base their decisions on different aspects and are influenced by variables alternatively when considering public versus private schools. These results provide further evidence that applications to public schools are increased by over 3% by signing ACUPCC, as this regression is on a sample that is not subject to potential selection issues and still upholds the findings in Table 1.

ii. Robustness: Quantity

A potential concern is that the institutions that eventually sign ACUPCC are fundamentally different from those that are not members and would receive a greater amount of applications even before ACUPCC existed. In order to test this hypothesis, I ran the regression in Equation 3 with the interacted versions of the treatment, control variables, and trends for the years 2003-2006 to assess pre-ACUPCC applications in a way that does not introduce further sample selection biases. Since the variable of interest is becoming an ACUPCC member by 2012, which does not change over time, I change my specification method from fixed effects to random effects. I include two regressions in Table 4, one that includes the treatment interactions and the state time trends interactions, and a second that adds in the control variables. The results show that ACUPCC members start out receiving more applications before 2007, which is significant at the 1% level in the regression without controls, and the impact ranges from 37.5% for private institutions to 43.8% for public institutions. When controls are added into this robustness regression to mimic the regression in Table 3, I find that applications to private institutions are higher by 23.4% if they ever sign ACUPCC, maintaining high statistical significance, while applications to public institutions are greater by 23.7%, held significant at the

5% level. These results indicate that the treatment and control groups are different even before ACUPCC came into fruition. My main results come from a model that uses fixed effects, which controls for different levels of applications in the pre-treatment time period. While institutions are thus fundamentally different, my fixed effects method controls for these leveled differences to produce unbiased main findings.

I also test the effect that signing ACUPCC has on only ACUPCC members by exploiting variation in year of signing. Table 5 shows two extremes of Equation 1 without controls or time trends (Part A.), and then with state time trends (Part B.). I find that, the treatment increases applications between 27.3% and 33.7% for all three sample selections, which is significant at the 1% level in Part A. Similarly, there is evidence of significance in Part B with state time trends for public institution; ACUPCC increases applications by 2.89%, held significant at the 10% level. These results show that control variables and trends change the way that the treatment effects applications. The magnitude of coefficients for the regressions with time trends back up my main findings as they are similar those in Table 1. This indicates that though the significance might not be as great for the sample of ACUPCC institutions, which is likely due to the fact that the sample size is smaller by over 100%, the relationship between signing ACUPCC and applications generally holds when the control group is only other ACUPCC institutions.

iii. Results: Quality

In Table 6, I regress Equation 1 on the quality of students who decide to attend the institution, measured by the 75th percentile SAT scores of first-time, degree-seeking first-years and the 75th percentile of ACT scores scaled to the 1600 SAT composite score. While this measure of quality represents the 75th percentile of students rather than the scores for all students, most other literature use the 75th percentile scores as well (Pope and Pope 2009; 2014). 25th percentile scores were tested but the treatment was not significant, so my study thus follows previous literature by using 75th percentile as a measure of student quality. I find that the quality of students are impacted similarly as quantity of students who apply for admission as a result of signing ACUPCC; the 75th percentile of SAT scores are increased by 5.703 points for public institutions, held significant at the 1% level, while the scores are also increased by 3.267 points for the entire sample of institutions, statistically significant at the 10% level. Again, the impact on private schools is insignificant. The separation of the three samples exhibits that they experience differing significance and magnitude of various control variables, which furthers the assertion that public and private schools have inherent differences as the quality of student is impacted differently by these control variables in the separate sample settings. Mainly, there is a trade-off between variables that are significant for public institutions and those that are significant for private institutions. Table 8 shows the regression of Equation 3 on student quality. A 6.039-point increase at the 10% significance level is seen to boost the 75th percentile of SAT scores. This regression mimics that in Table 3, and similarly supports the main findings in Table 6 as the magnitude of points only differs by .336.

The results of Equation 2, which assesses the short-run and long-run impacts of signing ACUPCC, on student quality is exhibited in Table 7. The sample of all institutions and public institutions are affected similarly, though the results for public institutions are significant at the 1% level and the results for the entire sample is less significant at 5%; private institutions see no change by signing ACUPCC. Compared to the significance of results in the quantity regressions, student quality mainly exhibits greater long-run effects than short-run effects. The impact of signing ACUPCC increases 75th percentile composite SAT scores by 2.150 points each year after

two years since signing ACUPCC, significant at the 5% level, while the impact of one year after signing is a 5.087 point increase, significant at the 10% level.

Additionally, all institutions show a long-run increase of 1.504 points, held significant at the 10% level. These magnitudes and significance could imply that the power of signing ACUPCC on public institutions is so great that it carries over the effect for the entire sample. The size and significance of the results are consistent with the findings in Table 1 as well.

iv. Robustness: Quality

I run the same robustness regressions for the quality of students as I do for the robustness regressions for quantity section. Table 9 shows the results of regressions to test if scores of top tier first-year students are different for ACUPCC schools compared to control institutions before ACUPCC on the entire sample of institutions, which Figure 9 in the data appendix might provide evidence toward. While my first regression that includes only the interacted treatment variables and state trends shows that public and private schools that sign ACUPCC have higher SAT scores by about 68 points each, held significant at 5% for public institutions and 1% for private institutions, there is no significant increase in applications for public institutions when the regression includes institutional, state, and sports controls. This second regression on the 75^{th} percentile of SAT scores indicates that private institutions that sign ACUPCC start out with higher SAT scores of 46.17 points, significant at the 1% level, while public ACUPCC institutions have similar SAT scores to non-ACUPCC institutions before the agreement existed. This robustness regression further strengthens the significance of the boost in SAT scores exhibited after signing ACUPCC for public institutions in the fixed-effects model as the results in Table 8 could not possibly be picking up an overall trend of higher SAT scores for ACUPCC schools regardless of the agreement that were not accounted for in fixed effects. This provides further evidence that ACUPCC drives real changes in the quality of students who attend the institution.

Table 10 shows the results of the robustness test that restricts the sample to ACUPCC members and uses the variation in year of signing to assess the quality of students. I use the same regressions as the quantity robustness tests on only ACUPCC institutions but replace the dependent variable with quality to find that the treatment has a significant impact on SAT scores for ACUPCC institutions in all samples, held at the 1% level, while there is no significance associated with signing ACUPCC in the regression with state time trends. These specific robustness regressions are more difficult to interpret, as the lack of significance could easily be the result of a power issue. For example, only 54 institutions and thus 540 observations are included in the regressions for the public sample and 51 separate state trends are added in regressions in part B. This situation reduces the power of the relationships between independent and dependent variables, and can take away available degrees of freedom to result in significance. However, these results generally tell a similar story as those for the quantity regressions; the treatment on its own is extremely statistically significant for ACUPCC institutions and drives up scores even more, while the treatment is not or less significant for ACUPCC institutions when state time trends are included.

Additional robustness regressions for both quantity and quality can be found in Appendix B.

v. Discussion

The findings of maintained increases in quantity and quality of students interested in ACUPCC institutions, seen in Tables 2 and 6, refute the attention hypothesis for sustainability in higher education. The attention hypothesis has been used by Jones (2009) to explain the effect of media coverage on student applications; constantly hearing the name of an institution would increase the number of students who seek information about the university and ultimately apply. Once students are given information about the institution, the institution will be added to the menu in the search stage; if the institution's characteristics are favorable to the student, he or she will then apply (Hossler and Gallagher 1987). This attention hypothesis in relation to the search stage would imply the promptness of media coverage and thus applications, whereas I find more lasting impacts of the agreement.

An increase of SAT scores by over 5 points is economically significant as it indicates a general increase in aptitude among students who choose to attend the institution. This shows that admissions staff was able to take advantage of the increase in overall applications to admit higher quality students. It also indicates that sustainability does in fact attract higher quality students to apply and attend, rather than simply more applications from the same type of student. The average increase by 5 points seen for public institutions does not translate to full-scale increases in actual scores, as scores can vary in increments of 10. However, these 5 points can still impact the reporting of scores, as averages and percentiles are reported in increments of 1 unit on college websites and brochures. This can increase the perception of the institution to be a high achieving school that increasingly raises the standards of academic expectations. Attracting these higher quality students who are accepted to attend the school shows that sustainability is still seen as a positive characteristic past the attention component and search phase. Students can be attracted to attend a sustainable institution as it might have more opportunities available to students and because student values might be reflected by the values of the institution as a whole, which could offer greater academic and civic potential for the student.

The different results for public and private institutions are initially counterintuitive; one might think that students applying to public institutions, which tend to have higher tuition and fees, as displayed on page 11-12 of the data appendix, have greater mobility to apply to institutions and attend them based on their preferences. Based on the student choice model proposed by Hossler and Gallagher (1987), the search stage is where students narrow down a focus of institutions from feasible to desirable. My findings of the significant increase in applications caused by ACUPCC membership in public institutions could indicate that additional applications are received because more students find them desirable. Since public institutions are likely more feasible based on costs than private, sustainability might not be knocking down walls in the private sphere to make those institutions more feasible, even if they are highly desirable. This follows the idea that private institutions might already have mechanisms in place for marketing, as they must draw in students for their academics, additional opportunities and experiences, rather than through low costs alone. For public institutions, having a commitment to climate neutrality could open up new opportunities for students. Upon signing ACUPCC, institutions must invest in infrastructure, such as staff members, to report carbon emissions each year. In some cases, students are the ones putting these reports together. The additional opportunities related to sustainability means additional attractiveness to the institutions and students might see them in a new light. The difference between public and private institutions might be that private institutions have more opportunities in place for students so that adding opportunities from ACUPCC are nominal when compared to the options offered at private institutions. This would thus lead to an increase in applications, as students view commitment to

climate neutrality as a positive attribute that can stand for many additional opportunities that the public school might offer.

VI. CONCLUSION

My analysis on the effect of ACUPCC on undergraduate admission applications and the standardized test scores of first-years show that public and private institutions experience different admission outcomes caused by the commitment. In expanding literature on factors that feed into the college choice, my findings follow those of Pope and Pope (2009) in that admission applications to and quality of students interested in public and private institutions are impacted differently by key variables. Public institutions exhibit a positive and statistically significant increase in applications in the time following signing the commitment that is sustained in the long-run, defined as the period after two years of signing, and the short run. Similarly, public institutions exhibit a statistically significant increase in SAT scores by about 5 points, which is also maintained in the long-run. My findings hold that sustainability is an important college characteristic in both the search and choice stages. The magnitude of the increases in quantity and quality for public institutions is complementary, as an application pool is likely increased by the type of students who apply, as those who are actively interested in the institution and end up attending are more academically competitive.

Thus, ACUPCC causes public institutions to be viewed more favorably in the eyes of prospective students. The increase in quantity is connected to an increase in quality. My findings show that these are complementary effects, as a larger pool of applicants allows more students for admissions to choose from to allow admittance, thus boosting the quality of students who are admitted. Additionally, these increases in quantity and quality of students for public institutions that sign ACUPCC supports the ideas proposed in the text of ACUPCC that the recognition as a "green" school attracts more and brighter students. The implications can be far reaching, as additional applications can be seen as an external benefit to the adoption of sustainability on college campuses and can aid in marketing efforts to draw in interest from prospective students.

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APPENDIX A.

Table 1. Results from Equation 1 on quantity; first with the entire population sample, second limited to public institutions in the sample, and third limited to private institutions in the sample.

VARIABLES	(1) Log of Applications times 100	(2) Log of Applications times 100 Public	(3) Log of Applications times 100 Private
Treatment	0.918	3.756***	0.490
	(1.103)	(1.256)	(1.626)
Log of tuition and fees	-6.298	-14.237***	10.260*
	(3.839)	(4.883)	(6.041)
Log of endowment per student	-0.724***	-0.443*	-0.274
	(0.220)	(0.238)	(0.331)
Top 100 ranking dummy	7.892***	6.284	6.902**
	(2.493)	(4.145)	(3.107)
Acceptance rate	-57.253***	-23.408***	-65.507***
	(3.017)	(3.912)	(4.009)
Median state income in thousands	0.090	0.142	-0.033
	(0.154)	(0.174)	(0.215)
Log of diplomas granted in state	22.750**	12.345	21.655
	(10.313)	(11.623)	(14.340)
Constant	-10,213.811***	-9,786.701***	-9,158.721***
	(515.052)	(732.450)	(723.178)
Observations	7,180	2,420	4,760
R-squared	0.448	0.561	0.447
Number of Institutions	718	242	476

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends are also included in the model of the regression above.

Table 2. Results from Equation 2 on quantity; first with the entire population sample, second limited to public institutions in the sample, and third limited to private institutions in the sample.

VARIABLES	(1) Log of Applications times 100	(2) Log of Applications times 100 Public	(3) Log of Applications times 100 Private
Year of signing	0.753	1.041	1.091
	(1.564)	(1.584)	(2.362)
One year after signing	0.592	3.803**	-1.314
	(1.597)	(1.641)	(2.421)
Long-run time trend for after signing (2-5 years)	-0.195	1.019*	-0.320
	(0.482)	(0.575)	(0.705)
Log of tuition and fees	-6.104	-14.196***	10.391*
	(3.840)	(4.894)	(6.045)
Log of endowment per student	-0.723***	-0.418*	-0.284
	(0.220)	(0.239)	(0.331)
Top 100 ranking dummy	7.862***	6.230	6.957**
	(2.494)	(4.151)	(3.109)
Acceptance rate	-57.250***	-23.603***	-65.495***
	(3.018)	(3.916)	(4.010)
Median state income in thousands	0.074	0.150	-0.044
	(0.155)	(0.176)	(0.216)
Log of diplomas granted in state	21.957**	16.647	21.072
	(10.416)	(11.754)	(14.469)
Constant	-10,308.434***	-9,814.941***	-9,241.575***
	(519.903)	(749.091)	(730.522)
Observations	7,180	2,420	4,760
R-squared	0.448	0.561	0.447
Number of Institutions	718	242	476

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends are also included in the model of the regression above.

Table 3. Results from Equation 3 on quantity.

VARIABLES	(1) Log of Applications times 100
Treatment on Public	4.016**
	(1.826)
Treatment on Private	0.437
	(1.446)
Log of tuition and fees on Public	-14.413**
	(7.118)
Log of tuition and fees on Private	9.818*
	(5.358)
Acceptance rate on Public	-22.948***
	(5.693)
Acceptance rate on Private	-65.278***
	(3.562)
Log of endowment per student	-0.333
	(0.225)
Top 100 ranking dummy	7.057***
	(2.520)
Median state income in thousands	0.054
	(0.153)
Log of diplomas granted in state	17.646*
	(10.195)
D1 basketball dummy	12.063**
	(5.896)
D1 basketball dummy lagged one year	6.407
	(7.059)
D1 basketball dummy lagged two years	-2.798
	(6.656)
D1 basketball dummy lagged three years	-2.237
	(5.295)
March madness dummy	0.703
	(1.500)
March madness dummy lagged one year	2.582*
	(1.507)
March madness dummy lagged two years	0.940
	(1.490)
March madness dummy lagged three years	0.579
	(1.489)
Final four dummy	-2.241
	(5.304)
Final four dummy lagged one year	-0.573
	(5.127)

Final four dummy lagged two years	0.345
	(4.852)
Final four dummy lagged three years	1.351
	(4.902)
Basketball champion dummy	0.322
	(9.204)
Basketball champion dummy lagged one year	-1.886
	(8.911)
Basketball champion dummy lagged two years	-11.411
	(9.110)
Basketball champion dummy lagged three years	-2.532
	(8.451)
D1-A football dummy	-2.455
	(10.208)
D1-A football dummy lagged one year	1.041
	(24.881)
D1-A football dummy lagged two years	-2.162
	(26.064)
D1-A football dummy lagged three years	16.795
	(15.994)
Football champion dummy	14.529*
	(8.109)
Football champion dummy lagged one year	12.217
	(7.972)
Football champion dummy lagged two years	5.449
	(7.746)
Football champion dummy lagged three years	6.092
	(7.690)
Constant	-9,372.285***
	(555.252)
Observations	7,180
Number of Institutions	718
R-squared	0.471

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends and state time trends for public institutions are also included in the model of the regression above.

Table 4. Results for the robustness regression for the random effects model that tests the impact of signing ACUPCC on quantity before ACUPCC existed; the first regression does not include control variables.

VARIABLES	(1) Log of Applications times 100	(2) Log of Applications times 100
ACUPCC Membership by 2012 on Public	43.773***	23.723**
	(15.456)	(11.079)
ACUPCC Membership by 2012 on Private	37.500***	23.412***
	(10.632)	(7.672)
Log of tuition and fees on Public		16.718**
		(7.320)
Log of tuition and fees on Private		57.034***
		(8.385)
Acceptance rate on Public		-3.733
		(8.903)
Acceptance rate on Private		-36.251***
		(5.383)
Log of endowment per student		-0.081
		(0.232)
Top 100 ranking dummy		13.320***
		(3.758)
Median state income in thousands		0.182
		(0.226)
Log of diplomas granted in state		30.245**
		(13.838)
D1 basketball dummy		16.792*
		(9.461)
D1 basketball dummy lagged one year		37.052***
		(11.679)
D1 basketball dummy lagged two years		10.154
		(10.828)
D1 basketball dummy lagged three years		12.845
		(8.608)
March madness dummy		2.702
		(2.426)
March madness dummy lagged one year		3.184
		(2.387)
March madness dummy lagged two years		1.252
		(2.381)
March madness dummy lagged three years		2.405
		(2.320)
Final four dummy		7.672
		(8.429)

Final four dummy lagged one year		7.021 (8.565)
Final four dummy lagged two years		10.246 (7.642)
Final four dummy lagged three years		6.687 (7.416)
Basketball champion dummy		-6.787 (12.410)
Basketball champion dummy lagged one year		-3.429 (13.871)
Basketball champion dummy lagged two years		-13.546 (15.514)
Basketball champion dummy lagged three years		1.434 (14.027)
D1-A football dummy		25.037 (21.638)
D1-A football dummy lagged one year		-5.758 (25.056)
D1-A football dummy lagged two years		39.654 (31.736)
D1-A football dummy lagged three years		12.627 (20.482)
Football champion dummy		-3.298 (13.471)
Football champion dummy lagged one year		7.444 (12.108)
Football champion dummy lagged two years		-1.576 (12.449)
Football champion dummy lagged three years		4.963 (11.028)
Constant	-9,940.234*** (575.849)	-3,856.682*** (1,090.415)
Observations	2,872	2,872
Number of Institutions	718	718

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends and state time trends for public institutions are also included in the models of the regressions above. Random effects specification used.

Table 5. Results for the robustness regression for Equation 1 on quantity that limits the sample to only ACUPCC institutions. Part A. does not include control variables or state time trends; part B. adds in state time trends.

VARIABLES	(1) Log of Applications times 100 ACUPCC	(2) Log of Applications times 100 Public ACUPCC	(3) Log of Applications times 100 Private ACUPCC
A.			
Treatment	30.697***	27.310***	33.714***
	(0.892)	(1.072)	(1.384)
Constant	833.268***	883.281***	789.101***
	(0.632)	(0.763)	(0.975)
Observations	2,260	1,060	1,200
R-squared	0.368	0.405	0.355
Number of unitid	226	106	120
B.			
Treatment	1.988	2.897*	0.661
	(1.403)	(1.555)	(2.176)
Constant	-10,705.375***	-8,951.539***	-12,401.570***
	(474.255)	(526.830)	(733.109)
Observations	2,260	1,060	1,200
R-squared	0.563	0.659	0.557
Number of unitid	226	106	120

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Regressions in part B include state time trends.

Table 6. Results from Equation 1 on quality; first with the entire population sample, second limited to public institutions in the sample, and third limited to private institutions in the sample.

VARIABLES	(1) 75th Percentile Score SAT 1600 Composite	(2) 75th Percentile Score SAT 1600 Composite Public	(3) 75th Percentile Score SAT 1600 Composite Private
Treatment	3.267*	5.703***	0.414
	(1.820)	(2.202)	(2.568)
Log of tuition and fees	13.637**	18.617**	5.717
	(5.628)	(7.296)	(7.894)
Log of endowment per student	-0.450	0.332	-1.116**
	(0.352)	(0.378)	(0.525)
Top 100 ranking dummy	6.405*	-2.418	8.812*
	(3.829)	(6.147)	(4.644)
Acceptance rate	4.511	-23.140***	13.205**
	(4.765)	(6.909)	(5.958)
Median state income in thousands	-0.270	-0.795***	0.030
	(0.246)	(0.286)	(0.327)
Log of diplomas granted in state	-36.932**	-14.071	-45.948**
	(16.384)	(18.201)	(22.362)
Constant	-285.047	819.928	-1,233.987
	(802.187)	(1,183.843)	(1,027.625)
Observations	4,210	1,270	2,940
R-squared	0.081	0.327	0.074
Number of Institutions	421	127	294

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends are also included in the model of the regression above.

Table 7. Results from Equation 2 on quality; first with the entire population sample, second limited to public institutions in the sample, and third limited to private institutions in the sample.

VARIABLES	(1) 75th Percentile Score SAT 1600 Composite	(2) 75th Percentile Score SAT 1600 Composite Public	(3) 75th Percentile Score SAT 1600 Composite Private
Year of signing	2.039	1.828	2.312
	(2.555)	(2.592)	(3.730)
One year after signing	2.376	5.087*	0.185
	(2.625)	(2.739)	(3.834)
Long-run time trend for	1.504*	2.368**	0.468
after signing (2-5 years)	(0.782)	(1.028)	(1.104)
Log of tuition and fees	13.381**	18.548**	5.466
	(5.637)	(7.317)	(7.905)
Log of endowment per	-0.437	0.424	-1.113**
student	(0.352)	(0.383)	(0.525)
Top 100 ranking	6.568*	-1.461	8.938*
dummy	(3.833)	(6.198)	(4.653)
Acceptance rate	4.533	-23.567***	13.190**
	(4.766)	(6.922)	(5.960)
Median state income in	-0.257	-0.724**	0.020
thousands	(0.247)	(0.291)	(0.328)
Log of diplomas granted	-32.742**	-5.112	-45.605**
in state	(16.466)	(18.193)	(22.501)
Constant	-194.718	1,093.304	-1,196.973
	(807.644)	(1,213.847)	(1,035.813)
Observations	4,210	1,270	2,940
R-squared	0.081	0.327	0.074
Number of Institutions	421	127	294

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends are also included in the model of the regression above.

Table 8. Results from Equation 3 on quality.

VARIABLES	(1) 75th Percentile Score SAT 1600 Composite
Treatment on Public	6.039*
	(3.326)
Treatment on Private	0.392
	(2.318)
Log of tuition and fees on Public	22.506**
	(11.056)
Log of tuition and fees on Private	6.094
	(7.106)
Acceptance rate on Public	-23.302**
	(10.453)
Acceptance rate on Private	13.179**
	(5.370)
Log of endowment per student	-0.521
	(0.365)
Top 100 ranking dummy	6.696*
	(3.832)
Median state income in thousands	-0.212
	(0.244)
Log of diplomas granted in state	-37.132**
	(16.275)
D1 basketball dummy	-8.499
	(9.364)
D1 basketball dummy lagged one year	9.983
	(11.129)
D1 basketball dummy lagged two years	8.945
	(10.226)
D1 basketball dummy lagged three years	-19.733**
	(8.328)
March madness dummy	2.021
	(2.284)
March madness dummy lagged one year	1.708
	(2.295)
March madness dummy lagged two years	2.360
	(2.255)
March madness dummy lagged three years	2.045
	(2.257)
Final four dummy	3.209
	(7.865)
Final four dummy lagged one year	2.142
	(7.451)

Final four dummy lagged two years	1.877
	(7.215)
Final four dummy lagged three years	2.474
	(7.380)
Basketball champion dummy	7.659
	(13.794)
Basketball champion dummy lagged one year	6.615
	(13.445)
Basketball champion dummy lagged two years	7.692
	(14.638)
Basketball champion dummy lagged three years	9.881
	(12.927)
D1-A football dummy	7.653
	(16.143)
D1-A football dummy lagged one year	-7.415
	(30.803)
D1-A football dummy lagged two years	-22.005
	(35.284)
D1-A football dummy lagged three years	26.284
	(27.606)
Football champion dummy	-1.253
	(11.229)
Football champion dummy lagged one year	-5.109
	(10.795)
Football champion dummy lagged two years	-13.242
	(10.403)
Football champion dummy lagged three years	-9.956
	(10.335)
Constant	-582.064
	(838.669)
Observations	4,210
Number of Institutions	421
R-squared	0.120

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
State time trends and state time trends for public institutions are also included in the model of the regression above.

Table 9. Results for the robustness regression for the random effects model that tests the impact of signing ACUPCC on quantity before ACUPCC existed; the first regression does not include control variables.

VARIABLES	(1) 75th Percentile Score SAT 1600 Composite	(2) 75th Percentile Score SAT 1600 Composite
ACUPCC Membership by 2012 on public	68.196**	15.762
	(31.126)	(21.644)
ACUPCC Membership by 2012 on Private	68.390***	46.169***
	(17.150)	(11.680)
Log of tuition and fees on Public		50.159***
		(12.332)
Log of tuition and fees on Private		105.827***
		(12.680)
Acceptance rate on Public		-30.555
		(19.834)
Acceptance rate on Private		11.546
		(8.943)
Log of endowment per student		0.202
		(0.394)
Top 100 ranking dummy		40.191***
		(6.163)
Median state income in thousands		-0.013
		(0.409)
Log of diplomas granted in state		-18.074
		(24.359)
D1 basketball dummy		7.451
		(19.255)
D1 basketball dummy lagged one year		42.009*
		(23.474)
D1 basketball dummy lagged two years		6.468
		(17.363)
D1 basketball dummy lagged three years		-14.834
		(13.910)
March madness dummy		3.254
		(4.191)
March madness dummy lagged one year		-0.173
		(4.097)
March madness dummy lagged two years		3.494
		(3.908)
March madness dummy lagged three years		3.181
		(3.786)
Final four dummy		3.981
		(14.421)

Final four dummy lagged one year		-6.598
		(13.436)
Final four dummy lagged two years		6.739
		(12.680)
Final four dummy lagged three years		-4.477
		(11.663)
Basketball champion dummy		2.790
		(18.615)
Basketball champion dummy lagged one year		1.583
		(19.907)
Basketball champion dummy lagged two years		-4.606
		(24.992)
Basketball champion dummy lagged three years		-2.117
		(22.960)
D1-A football dummy		3.595
		(28.754)
D1-A football dummy lagged one year		3.054
		(33.337)
D1-A football dummy lagged two years		68.092**
		(33.818)
D1-A football dummy lagged three years		-
Football champion dummy		-22.657
		(22.163)
Football champion dummy lagged one year		-5.567
		(16.400)
Football champion dummy lagged two years		-4.449
		(17.271)
Football champion dummy lagged three years		-8.822
		(14.829)
Constant	97.036	10,389.661***
	(947.074)	(1,753.104)
Observations	1,684	1,684
Number of Institutions	421	421

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

State time trends and state time trends for public institutions are also included in the model of the regression above. Random effects specification used.

Table 10. Results for the robustness regression for Equation 1 on quality that limits the sample to only ACUPCC institutions. Part A. does not include control variables or state time trends; part B. adds in state time trends.

VARIABLES	(1) 75th Percentile Score SAT 1600 Composite ACUPCC	(2) 75th Percentile Score SAT 1600 Composite ACUPCC Public	(3) 75th Percentile Score SAT 1600 Composite ACUPCC Private
A.			
Treatment	8.766***	13.699***	4.834**
	(1.272)	(1.602)	(1.882)
Constant	1,239.054***	1,200.324***	1,269.767***
	(0.904)	(1.148)	(1.329)
Observations	1,220	540	680
R-squared	0.041	0.131	0.011
Number of Institutions	122	54	68
B.			
Treatment	3.497	3.820	2.621
	(2.148)	(2.511)	(3.189)
Constant	-881.562	-2,698.433***	385.524
	(724.646)	(848.524)	(1,073.914)
Observations	1,220	540	680
R-squared	0.246	0.428	0.223
Number of Institutions	122	54	68

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Regressions in part B includes state time trends.

Figure 1. Bar graph of average applications received by ACUPCC members, relative to year of signing, separated for public and private institutions.