The Effect of College and University Endowment Returns on Financial Aid, Admissions, and Student Composition *

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Abstract

This paper examines how private college and university endowments affect financial aid, admissions selectivity, and the economic and racial composition of incoming students. Because endowment levels are a function of expenditures and alumni giving, both of which are potentially endogenous to the outcomes of interest, the design exploits only variation generated by differential investment returns. Investment returns are highly predictive of changes in endowment levels and generate persistent increases in spending for instruction, student services, and administration. The estimates reveal that colleges and universities that experience greater endowment returns provide modestly more generous institutional aid and have higher freshman yield rates. However, these institutions do not increase the size of incoming cohorts, instead reducing admissions rates and enrolling fewer students eligible for need-based federal aid and students of color. In aggregate, colleges and universities appear to use new endowment wealth to increase spending and to become more selective, resulting in higher U.S. News and World Report rankings, but not to increase the size or diversity of their student populations. These results are important in light of the preferential tax treatment of endowment wealth and interest in increasing access to elite postsecondary education for low-income and minority students.

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I Introduction

Relatively little is known about the causal effect of college and university endowment wealth on financial aid generosity and academic spending, the number of students institutions serve, and the economic and racial diversity of student populations. Institutions report spending an average of two-thirds of endowment income on financial aid and academic programs (NACUBO, 2018).[1] However, it is not known whether reported expenditures offset spending from other revenue sources or translate to real increases in financial aid and academic support and, more specifically, increase access to elite education in general and for low-income and students of color specifically. Shedding light on these questions is informative for understanding institutional objectives and opportunities for low-income students at elite institutions (Pallais and Turner, 2006; Blair and Smetters, 2015). The estimates may also be informative about the effects of taxing endowments (or other approaches to inducing endowment expenditures) on institutional and student outcomes.[2]

In the cross-section, colleges and universities with larger endowments provide more generous grant aid, but are more selective and serve undergraduate populations with lower fractions of Black students and students receiving aid.[3] Exploiting variation over time indicates that colleges and universities with growing endowment wealth have increasing operating expenditures, but do not increase the number or diversity of the students they serve. However, these changes may not represent the causal effects of endowment growth. Variation in endowment levels over time is partially a function of the rate of expenditure of endowment assets (which mechanically attenuates the relationship between endowment levels and spending) and differences in alumni giving, which may reflect changes in actual or perceived college outcomes.[4]

In the seminal paper on spending endowment income, Brown et al. (2014) exploit variation in investment returns to document evidence of "endowment hoarding" in which institutions reduce, rather than

[1]The 2018 NACUBO survey was the first in which institutions reported the extent to which endowment income was allocated to various expenditure categories. Institutions report allocating 49 percent to financial aid, 16 percent to academic programs, 10 percent to faculty, 7 percent to campus operations, and 18 percent to other uses.

[2]See, for example, Hinrichs (2018) and Levine (2018) for discussions of the endowment income tax of 1.4 percent included in the Tax Cuts and Jobs Act of 2017. The tax is relevant to the highest endowment institutions with at least $500,000 of endowment wealth per full-time student.

[3]Baum, Hill, and Schwartz (2018) and Baum and Lee (2019) detail differences across institutions in the fraction of students who are eligible for financial need and the amounts of financial aid received. This reveals that the highest endowment institutions offer more institutional aid and have lower net cost for students from lower-income household, but serve smaller percentages of these high-need students. In the sample used in this study, I find that higher endowment institutions are more selective, have higher yield rates for admitted students, and provide more institutional aid conditional on receipt, but enroll a smaller fraction of Black students and student receiving federal or institutional aid.

[4]Factors such as the age and prestige of the institution are likely to shape endowment levels and alumni giving, as well as other sources of revenue (e.g., from tuition and federal grants), research intensity, the applicant pool, selectivity, and student enrollment decisions.

increase, the rate of endowment spending in the short run if they experience larger negative returns during an economic downturn.[5] Following this approach, and to abstract from endogenous changes in endowment levels, this study exploits variation in investment returns across otherwise similar institutions to examine the impact on expenditure categories, financial aid, admissions, and incoming student composition. Specifically, colleges and universities with the same initial endowment levels per student frequently experience substantially different returns on their assets in both the short- and long-run. Annually, the gap between the 10th and 90th percentiles of investment returns averages approximately 10 percent. These large differences in annual returns generate large differences in cumulative returns over longer periods when some institutions experience better outcomes during both boom and bust periods. Analyses of the data reveal that investment returns are largely retained in the endowment and used to generate a steady stream of future spending.[6] As a result, cumulative prior investment returns have a substantial impact on current endowment levels and operating expenditures. This approach assumes that institutions of the same type (e.g., liberal arts colleges, research universities) with the same initial endowment level per student, difference in investment returns represent a plausibly more exogenous source of variation in endowment levels than do changes due to expenditures or alumni giving.

The empirical design exploits changes within institutions over time in response to endowment returns. Institutions are grouped by type (college or university) and with peers using their baseline U.S. News and World Reports rankings. Within these groups, institutions are balanced in terms of their baseline characteristics (enrollment, spending per student, demographics, admissions selectivity, tuition, and financial aid rates) as well in their pre-trends in these characteristics. The design is replicated using only variation in endowments starting with the Great Recession, the most unanticipated negative shock to returns during the sample period. I examine the robustness of the design to allowing for differential trends in the outcomes as a function of baseline characteristics, pre-trends, and the variance of investment returns. The analysis is based on endowment, expenditure, enrollment, and admissions data reported in the Integrated Postsecondary Education Data System, and is supplemented with endowment data from the National Association of College and University Business Officers and historical U.S. News and World Reports college and university rankings.

[5]The authors also document evidence that, year-to-year, institutions appear to reduce faculty positions but not administration if they experience larger negative returns during economic downturns.

[6]On average, endowments have grown substantially over time, indicating that institutions are growing their endowments and enabling greater future expenditures, rather than preserving the current set of activities as proposed in Tobin (1974).

The analysis reveals that colleges and universities that experience larger investment returns retain a significant fraction of the returns as endowment wealth and, in turn, substantially increase spending on instruction, student services, and administration (i.e., positive and negative investment returns permanently alter endowment levels and thus future expenditures).[7] However, there is no evidence that institutions with endowment growth increase enrollments. That is, increases in spending do not lead to greater overall access to these institutions. Institutions with higher returns do not reduce the list price for tuition or room and board, and only modestly increase institutional aid for those who are eligible. Overall, there is no statistically significant reduction in net cost per student. Further, institutions with high endowment returns do not increase the fraction of entering freshman who receive federal or institutional aid, revealing that they do not increase access for low-income students.[8] These results, which capture the net changes in expenditures, enrollment, and access in response to endowment growth, are not consistent with the uses self-reported by institutions.

Institutions that experience high endowment returns and growth experience significant changes in their freshman admissions. Specifically, they admit fewer students but have higher yields, resulting in not net increase in freshman enrollment. The resulting entering cohorts have, on average, lower fractions of students of color and higher fractions of White and Asian students. The changes in underrepresented students are statistically significant and meaningful in magnitude relative to baseline rates. This is further evidence that institutions do not use endowment wealth to expand access to a more diverse student population. These results are consistent with the concerns of policy advocates that institutions do not use their wealth to expand educational opportunity, and contributes to the academic literature documenting barriers to access to elite colleges for low-income and minority students.[9] Institutions with high endowment returns experience significant gains in their rankings by the U.S. News and World Reports. The improvements in rankings are largest for liberal arts colleges, and are consistent with increased expenditures and greater selectivity which feed directly and indirectly into ranking criteria.

The estimates are robust to wide range of alternative specification and methods of grouping institutions. Results are present for a specification that allows for differential changes over time based on baseline endowment levels, pre-trends in investment returns, baseline outcome levels, and pre-trends in the outcomes.

[7] This is consistent with documented endowment rules, which dictate a specific percent of endowment assets to be spent each year.
[8] Further, a smaller fraction of students are observed taking loans, reflecting the effects of the increased generosity of grants or the increased enrollment of students from households with greater resources.
[9] See De Alva and Schneider (2015), Woodhouse (2015), Nichols and Santos (2016), Meyer and Zhou (2017), and Zinshteyn (2017) for examples of policy interest in the disconnect between endowment wealth and serving low-income and minority students.

To examine if the results are driven by institutions that are more or less willing to take investment risk, I group colleges and universities that have the same variance in returns during the sample period, which produces similar estimates. The design is replicated using only variation in endowments starting with the Great Recession in 2008. This reveals a clear increase in spending in response to higher investment returns, but no increase in enrollment overall or for low-income students, a negative effect on racial diversity, but substantial increases in institutional rankings.

The paper is organized as follows. Section II discusses the data sources and sample and variable construction. Section III presents the empirical design, documents variation in returns across institutions, and presents evidence of balance in the design and first stage effects of investment returns on endowment levels. Section IV presents evidence of the timing of investment returns on expenditures by type, enrollment levels, financial aid, admissions and the composition of incoming freshman, and institutional rankings. Section V concludes.

II Data

The data for this paper are derived from the Integrated Postsecondary Education Data System (IPEDS), endowment reports from the National Association of College and University Business Officers (NACUBO), and historical U.S. News and World Reports rankings. The analysis focuses on private colleges and universities with endowment income between 2001 and 2018, and uses outcome measures reported between 1998 and 2018.

II.1 Endowments, Long-Term Investments, and Returns

IPEDs data include reported endowment levels at the beginning and end of each reporting year starting in 2003. In addition, institutions report their annual investment returns, making it possible to compute each institution's annual percent investment return. NACUBO publishes self-reported endowment levels each year for a subset of high endowment institutions, which are used to verify the accuracy of the IPEDs measures. Some colleges and universities have long-term investment assets that are not part of their endowments. Total long-term investment assets are reported in IPEDs each year and closely mirror endowment levels for most institutions, but serve two important functions. First, they allow the identification of institutions that have substantial investment assets that are not part of the endowment, and thus for which considering endow-

ments alone could produce a biased measure of the effect of endowment returns. Second, they provide an alternate measure of college wealth, extending further back than endowments in IPEDs, which can be used to test the robustness of the estimates to controlling for pre-sample trends.

In the analysis, all measures of college wealth, returns, and other dollar measures (e.g., tuition levels) are adjusted to real 2018 dollars. The primary analysis is based on investment returns measured in percents. This approach provides approximately equal weight to each institution in the sample. Alternative measures, such as investment returns per student, substantially shift the focus to a small number of very wealthy colleges and are considered as robustness checks.

II.2 Outcomes of Interest

A rich set of expenditure, enrollment, financial aid, admissions, and demographic data are merged to the panel of investment returns. Expenditures are reported separately for primary categories such as instruction, academic support, student services, auxiliary enterprises, institutional support (administration), and research.[10] Financial aid measures include the number of freshman receiving federal, state, and institutional grants, loans, and any form of financial aid. These counts are used to compute the percent of students receiving aid of each type. The fraction receiving federal aid sheds light on the fraction of incoming students who are Pell grant eligible, while the fraction receiving institutional aid can reflect both changes in student composition and financial aid generosity. In addition, IPEDs includes the average aid amount, conditional on receipt, for each category, revealing the generosity of institutional aid for eligible students. Colleges and universities report their list tuition and fees and on-campus room and board price, which are used to estimate whether institutions with growing endowment wealth reduce or increase their list prices, providing context for changes in aid levels and net prices. The analysis considers change in the number of first-time undergraduate applicants who are admitted and the yield rate based on the number who enroll. Many colleges report SAT and ACT scores for incoming students, providing an additional measure of selectivity.

Enrollment for each institution is computed as full-time equivalents, with full-time students counting as 1 and part-time students as 0.5. Counts of the race of entering freshman are used to document the percent

[10] Instruction includes expenses directly associated with courses, while academic support includes peripheral components such as libraries, IT support, and academic administrators. Student services include psychological services, student activities, sports, and the registrars office, while auxiliary enterprises include residence halls, dining, and health services. Institutional support captures general administration, management, legal, and public relations. Research expenditures include institutes, research centers, and individual research funds.

of students who are Asian, Black, Hispanic, White, or non-resident alien.[11] I construct two aggregate measures of race to shed additional light on potential changes in the composition of incoming students. The first is a measure of students of color equal to the sum of Black, Hispanic, and American Indian students. The second is a measure of Asian and White students. I merge historical U.S. News and World Reports college and university rankings for each instition and year.[12]

II.3 Sample Construction

The sample in this study is comprised of private, not-for-profit colleges and universities that award bachelors degrees. Specifically, attention is restricted to institutions identified in the Carnegie Classification as prviate research universities and liberal arts colleges. Colleges that primarily award associate's degrees, have narrow specialties (e.g., theology, art, music), and graduate institutes that do not serve undergraduate students are not included. Not all colleges and universities have significant endowments, and this is highly correlated with the institution type. In 2018, research universities and liberal arts colleges had median endowments of approximately $73,000 and $104,000 per student, respectively, while master's colleges and universities and general baccalaureate colleges had median endowments of $21,000 and $17,000. Colleges and universities with very small endowment levels per-student are unlikely to significantly alter their expenditures in response to market-driven variation in investment returns, as their primary revenue comes from other sources (e.g., tuition payments). Only research universities and liberal arts colleges that have modest endowments (of less than $20,000 per student in the first year of the sample period) are excluded.

A small fraction of colleges and universities have substantial long-term investments outside of their endowments. This poses challenges for analyses that consider investment returns as stemming from the endowment. Specifically, if institutionally reported investment returns include returns for assets not in the endowment, then the percent return will be miscalculated. This paper takes two approaches to address this issue. In the primary sample, based on endowment wealth, I exclude the small fraction of institutions (about 5 percent) for which endowment assets represent a modest fraction (less than 70 percent) of over-

[11] Starting in 2010, many colleges started using a "two or more races" category. Any systematic reclassification of race groups across years should be common to all institutions with similar initial demographics and thus accounted for by the inclusion of year fixed effects. In the primary specification, I distribute students classified as two or more race proportionately to the other races at the institution. This has little effect on the estimates relative to using the raw race totals.

[12] The rankings were compiled by Andrew G. Reiter and can be found at the following website: http://andyreiter.com/datasets/. The primary analysis restricts attention to institutions that had a ranking in the baseline year, and assigns the maximum observed ranking to institutions that fall out of the ranking over time. As an alternative, and to include institutions that climb into the ranking over time, I assign all unranked institutions the maximum observed ranking.

all long-term investments in the baseline year. As an alternative, the analysis can be conducted entirely on reported long-term investment assets rather than endowments, providing a robustness check for the endowment measure. Of note is that long-term investments are reported for more years in IPEDS than is endowment wealth, allowing the sample period to be extended without the use of the subset of institutions surveyed by NACUBO.

Finally, a small number of institutions in the sample have multiple campuses and inconsistent reporting of data across years. Specifically, the campuses report merged data in some years and separately for the primary campus in others. Such reporting inconsistencies render changes in outcomes over time spurious, so these institutions are excluded from the analysis.

III Empirical Design

This paper attempts to isolate the causal effect of endowment returns on the generosity of financial aid packages, admissions selectivity, the composition of students who are served by post-secondary academic institutions, and changes in institutional rankings. A primary identification concern is that a college or university can mechanically increase its endowment by, for example, reducing the number of students receiving financial aid, the generosity of aid it provides to eligible students, and by serving fewer low-income students who require financial assistance. This would create a negative relationship between endowment levels and serving a larger or lower-income student population. Alternatively, well-managed colleges and universities that are on an upward trajectory on dimensions such as selectivity and prestige may be more likely to attract new endowment gifts, provide more generous grant aid, and attract a more diverse student body. That is, there are fundamental sources of endogeneity when considering variation in endowment levels over time: 1) the mechanical negative relationship between expenditures and endowment levels; and 2) the likely correlation between an institution's capacity to attract new endowment gifts and its overall trajectory.

Brown et al. (2014) examine how contemporaneous variation in endowment investment returns affect the rate at which the endowment is spent, finding that institutions with larger negative returns tend to reduce the spending rate. They argue that investment returns are "largely exogenous, as the variation arises from historical differences in activities to build and invest an endowment combined with fluctuations in global financial markets." To abstract from the endogeneity issues detailed above, I therefore exploit variation in cumulative endowment returns over time. That is, I examine the impact of market returns on endowment

levels, expenditures, financial aid packages, admissions, selectivity, and student composition. Because many of the outcomes are unlikely to change immediately in response to returns, I consider cumulative investment returns.

Figure 1 presents the distribution of average endowment returns between 2003 and 2018 for the 200 institutions (140 colleges and 60 universities) in the sample. This reveals a wide range of average returns. Notably, there is significant variation in returns across institutions that are very similar in terms of their characteristics. Figure 2 shows that there are large differences in average returns across colleges (top panel) and universities (bottom panel) with the same baseline U.S. News and World Reports rankings. That is, peer institutions experience notably different returns. Similarly, Figure 3 reveals significant differences in returns across institutions with the same baseline endowment levels (measures as endowment per student). [13] Thus, it is not the case that variation in returns stems from richer schools having greater capacity to invest more aggressively and achieve higher returns.

Investment returns varied substantially over time during the sample period. As shown in Figure 3, the period between 2003 and 2007 represents a significant boom, followed by a sharp decline during the Great Recession, and rebound after 2010. While there are large fluctuations in average annual returns across years, significant positive growth is the norm and drives most of the variation over time. For example, between 2003 and 2018, there were 9 years with positive returns exceeding 10 percent, and just one year with endowment losses of 10 percent or more.[14] Notably, the differences in returns across institutions are large. The gap in returns between the 10th and 90th percentile of returns in each year ranges from 8 to 15 percent, indicating that some institutions achieved significantly higher returns in individual years. Some institutions experienced both large losses during the recession and modest rebounds when markets rallied, while other, similar institutions performed above the average during both boom and bust markets. For example, among highly ranked liberal arts colleges with large initial endowments, colleges such as Haverford, Carleton, and Bryn Mawr experienced average annual returns during the sample period of just 4 to 6 percent, while Bowdoin, Grinnell, and Smith had returns of 8 to 10 percent. Importantly, these annual differences generate large cumulative differences in returns over time. As shown in Figure 5, the difference

[13] Lerner, Schoar, and Wang (2008), Dimmock(2012), and Cejnek, Franz, and Stoughton (2017), each note that institutions with larger endowments tend to take riskier investment positions and have higher average returns. This is observable in Figure 3, though there is significant variation in returns across similarly resourced institutions.

[14] Gilbert and Hrdlicka (2015) attribute the high level of returns and risk in university endowments to constraints generated by The Uniform Prudent Management of Institutional Funds Act, which dictates that the future spending power of endowments, rather than initial principal, should be preserved.

in cumulative returns between the 10th and 90th percentile of institutions is more than 100 percent.

III.1 Primary Specification and Control Groups

To exploit the wide variation in returns across otherwise similar institutions, the design groups institions of the same type (separating research universities and liberal arts college) and baseline U.S. News and World Reports rankings. Specifically, in order to restrict comparisons to the most similar institutions, college and universities are placed into groups of 10 institutions based on their rankings baseline year. Thus, for example, research universities such as Yale, Stanford, and Princeton are compared with each other and not other institutions, and likewise for liberal arts colleges such as Swarthmore, Bowdoin, and Middlebury. Making comparisons only within these relatively narrow groups ensures that estimates are based on variation over time between similar institutions.[15]

The primary design examines the effect of differential cumulative returns on each outcome of interest: expenditures, enrollment, financial aid, admissions standards, freshman class socioeconomic and racial diversity, and institional rankings.

$$Outcome_{i,t} = \alpha_i + \alpha_{g,y} + \beta CumulativePercentReturn_{i,t} + \varepsilon_{i,t} \tag{1}$$

The specification includes institution fixed effects and thus exploits only variation in the outcome within the institution over time. Year effects are determined at the college group-by-year level. That is, there are year effects for each group of institutions based on their initial Carnegie classification and ranking group. The coefficient of interest β reflects the effect of cumulative prior investment returns on current outcomes. I document that returns are retained in the endowment, generating a permanent change in future spending as a function of cumulative prior year returns. Standard errors are clustered at both the institution and year levels. If we assume that current outcomes are primarily affect by changes in the endowment level, rather than by prior expenditures, then cumulative prior returns can be used as an instrument for the change in the endowment level.

Differences in cumulative investment returns provide variation in endowment levels that are not a function of potentially endogenous expenditure decisions or alumni gifts. The variation is valid if we assume

[15] Goetzmann and Oster (2015) find that close competitor institutions attempt to mimic each others investment strategies, and often chase the investment strategies of successful competitors. This suggests that competitor institutions have similar investment objectives, providing justification for making comparisons within, rather than across, these groups.

that similar institutions (in terms of type and baseline ranking) have similar goals for their endowments, and variation in returns stems from good or bad luck in investment markets. However, market driven differences in endowment returns are problematic if, for example, colleges that intend to serve smaller fractions of lower-income and minority students in the future successfully allocate their investments to assets that have higher average returns. Concerns of this nature can be at least partially eased by comparing only institutions that are very similar in the baseline period and by accounting for potential differences in pre-trends in investment returns and the outcomes of interest.

The design is balanced in terms of baseline line institution characteristics and pre-trends. Table 1 examines the relationship between a rich set of institutional characteristics and cunumative returns during the sample period (within the baseline ranking groups introduced above). This reveals that cumulative returns are not strongly correlated with baseline expenditures, enrollment, demographics, and other institutional characteristics. Similarly, Table 2 reveals that cumulative returns are not strongly correlated with pre-existing trends in these characteristics. To further ensure that the estimates are not biased by baseline differences and pretrends, the specification is supplemented to include the interaction of year with measures of: 1) baseline endowment per student; 2) the pre-trend in investment returns; 3) the baseline outcome; and 4) the pre-trend in the baseline outcome. Generally, controlling for these baseline differences and pretrends has little effect on the estimates.

As additional robustness checks, I replicate the design while grouping institutions according to their baseline endowment levels, prior trend in investment returns, baseline outcome levels, and pretrends in the outcome levels. These groupings allow flexible year effects based on these differential characteristics. Finally, I group instititions according to the variance in their returns during the sample period. That is, higher returns may be reflective of greater willingness to take investment risk. Grouping colleges and universities with similar variance in investments, but who experienced different positive or negative shocks as a result of taking risks, will reveal if the estimates are being driven by institutions with different risk profiles.

The primary analysis is conducted using all years for which endowment levels are available (starting in 2003). This maximizes statistical power. To test whether the estimates hold for an alternative sample period, I restrict attention to returns starting with the Great Recessions. The recession represents a large, unexpected shock that shaped cumulative returns for years. The average negative shock to investment returns was 20 percent and with a standard deviation of 7.5 petcent, the highest variation across institutions during the sample period. The shock is likely to represent the largest deviation from expected risk and returns. In

addition, the approach allows for the inclusion pre-trend controls for a longer period.

III.2 Investment Returns, Endowment Levels, and Expenditures

This section examines how investment returns affect endowment levels and expenditures. Investment income may be spent in the short run or retained as endowment wealth. If it is retained as endowment wealth, it is likely to affect expenditures in subsequent years, creating a persistent effect of prior year returns. Institutions have spending rules, often stating that approximately 4 to 5 percent of the average endowment over the prior three years will be spent each year, and analyses indicate that the average expenditure rates typically fall close to this target (Hansman, 1990; Sedlacek and Jarvis, 2010; Brown et al., 2014).

If endowment investment returns are spent rapidly, then large changes in outcomes could occur shortly after the returns are realized. Alternatively, if colleges follow their expenditure rules and retain investment returns in the endowment and then spend a percentage of the endowment in each subsequent year, then returns should have a cumulative effect on future expenditures and outcomes. I first examines the extent to which investment returns over the prior five years affect the current year change in endowment level.

$$AnnualPercentEndowChange_{i,t} = \alpha + \sum_{t=0}^{5} \gamma_t AnnualPercentReturn_{i,t} + \varepsilon_{i,t} \tag{2}$$

The annual change in endowment and annual return are measured as percents. The coefficient on the current year return (T=0) reveals the extent to which current investment returns are retained in the endowment. The coefficients on prior years (T=-1 through T=-5) reveal whether, for example, returns are temporarily retained in the endowment and then spent quickly in subsequent years.

Table 3 presents estimates of the effect of investment returns on changes in endowment levels in subsequent years. Column 1 presents a regression of the annual percent change in endowment on the percent return on endowment income in the current and prior five years with no year fixed effects. This suggests that the vast majority of the current investment return is retained in the endowment.[16] There is also no evidence of large negative effects of returns in prior years, indicating that returns are retained in the endowment. Column 2 adds year fixed effects, thus controlling for investment returns and endowment changes that are common across all institutions (e.g., during economic booms and busts) and only exploiting differential returns across institutions in each year. Column 3 controls for year by ranking group fixed effects, therefore

[16] A specification using endowment and investment levels indicates that the endowment increases almost one-to-one with each dollar of investment return. This specification places greater weight on institution with large endowments.

only exploiting differential investment returns across peer institutions. Column 4 additionally controls for baseline endowment levels and pre-trends in investment returns. Each of these specifications reveals a strong effect of the current year returns on the endowment levels and confirms that the returns are retained in the endowment.

These results suggest that cumulative returns shape endowment levels and then, because of spending rules, the higher endowment levels will increase insitutional spending. The following specification is used to estimate how the endowment level and spending vary as a function of cumulative returns in prior years.

$$Log(Outcome_{i,t}) = \alpha_i + \alpha_{g,y} + \beta CumulativeReturnPercent_{i,t} + \sum_{t=0}^{5} \gamma_t AnnualPercentReturn_{i,t} + \varepsilon_{i,t} \quad (3)$$

The specification will reveal whether cumulative prior returns are a sufficient statistic for the change in the endowment level and expenditures. Discounted cumulative returns will be sufficient if investment returns essentially become a permanent part of the endowment.

Table 4 reveals that cumulative prior returns strongly shape endowment levels and that there is no additional benefit of considering specific prior year returns. That is, cumulative returns represent a sufficient statistic for prior returns in each year, with no evidence that recent returns have larger effects on endowment levels than prior returns. Overall, the evidence is consistent with colleges and universities retaining the majority of investment returns in their endowments, such that high investment returns lead to substantial real growth in endowments.[17]

I next explore whether prior year returns, which are retained as endowment wealth, in turn increase future expenditures. If investment returns are retained in the endowment, and then provide a steady income stream used to fund expenditures, then cumulative returns should systematically increase spending. The goal of this exercise is to determine whether we should expect to see large shifts in current expenditures and outcomes in response to recent returns (which would be the case if returns were spent rapidly), or whether returns are retained in perpetuity. Columns 3 and 4 of Table 4 reveal that operating expenditures are a function of cumulative investment returns, and do not vary substantially in response to the most recent returns. That is, as with endowment levels, cumulative returns are a sufficient statistic for the effect of prior year returns on operating expenditures. This is consistent with institutions retaining investment returns in their endowments and spending a percentage of their endowment wealth each year. In summary, the effect

[17] Hoxby (2015) poses that research universities and the most selective college may justify retaining endowment wealth in the context of high market returns because it will open the door to even greater research (and possibly human capital) investment in the future.

of prior investment returns on current college outcomes can be interpreted as the net effect of changing the level of the college endowment and thus altering the future stream of expenditures.

IV Endowment Returns and Institutional Outcomes

IV.1 Expenditures and Enrollment

Little is known about how endowment wealth and income causally affect institutional spending across operating categories. In surveys, colleges and universities report using endowment wealth to fund institutional aid for students. However, such surveys are self-reported and do not take into account crowd-out of other funding sources. That is, documenting the effects of endowment spending that is fungible with spending from other revenue sources (such as tuition payments), is ultimately an empirical question and not an accounting exercise. This section examines the effect of cumulative endowment returns on various categories of expenditures.[18] Understanding the impact of endowment income on spending reveals how colleges and universities use their endowments in practice, and a primary avenue for how endowments may affect the desirability of the institution for potential students. Considering the longer-run effects of endowment wealth is important, as changes in spending and the effects of additional spending are likely to take time to become evident (e.g., due to lags in hiring, expanding academic programs, and altering and institution's perceived quality).

Tables 5 and 6 present the change in core operating expenditures per student overall as well as for each category, including instruction, student services, institutional support, and research. Peer institutions with higher investment returns experience larger increases in expenditures across each category. The changes in operating expenditures are large in magnitude and relative to baseline levels. Estimates based on natural logs indicate significant increases for instruction and student services (including auxiliary enterprises), but even larger increases for institutional support (administration). These estimates are based on comparisons of institutions with the same Carnegie classification and the same baseline ranking. Controlling for baseline endowment levels and trends in returns, as well as the baseline level and trends in spending for each type of expenditure does not meaningfully alter the estimates. In particular, there are significant increases in spending overall and on instruction and student services, but even larger increases for administration. Thus,

[18] Previously, the only causal evidence about the effect of endowment income on spending categories comes from Brown et al. (2014), who find evidence that endowment funds may be used to preserve administrative positions but not faculty positions in the short-run during economic downturns.

the results are not driven by pre-existing trends in spending. The estimates are also robust to grouping institutions by the variance of their investment returns. It important to note that changes in expenditure represent the net effect of higher investment returns. That is, if higher returns alter the tuition that colleges charge or alter other sources of revenue (such as tuition payments or federal grants), the estimated changes in expenditures will reflect these mechanisms.[19] That is, these estimates capture the actual incidence of changes in endowment wealth and spending across categories of operational expenditures.

A natural question is whether institutions with higher returns, which are now able to spend more per student, increase enrollment and thus access to selective higher education. In particular, institutions could expand enrollment while maintaining the quality of faculty and student experience through increased expenditures and physical facilities. Institutions could also expand while maintaining student quality by increasing aid packages and providing an improved student experience. Alternatively, colleges with smaller investment returns might be forced to increase enrollments to generate additional revenue. The estimates in Table 7 indicate that there is no evidence that larger investment returns (and thus larger endowments) lead to increased enrollment. There is a small and statistically insignificant negative effect on total enrollment, undergraduate enrollment, and the size of incoming freshman cohorts.[20] That is, it does not appear that greater endowment wealth leads colleges and universities to provide education to larger numbers of students, as might be afforded by additional infrastructure and increased hiring. These results are robust to controlling for baseline levels and pre-trends in enrollment. Overall, while institutions spend more in response to growing endowments, they do not expand access.

IV.2 Financial Aid and College Cost

Institutions with higher investment returns can maintain expenditures while deriving less revenue from tuition and room and board. This can take the form of smaller increases in list prices that apply to all students or increased aid targeting students from lower-income households, each of which would reduce the net price of college. Greater institutional generosity could also take the form of a smaller fraction of students taking out loans. In addition the fraction of students receiving federal grant aid sheds light on the composition of incoming students, revealing if wealthier institutions increase access to lower-SES students. I examine the

[19] The results are informative for understanding the potential effects of endowment taxes. In response to the tax placed on the largest endowments by the Tax Cuts and Jobs Act of 2017, institutions reported potential cuts to financial aid, as well teaching and research and other operations (Lorin, 2019; Selig, 2020; Seltzer, 2020).

[20] This is consistent with the finding in Bound and Turner (2007) that the most selective public institutions are "least likely" to expand enrollments in response to larger state cohorts.

effect of cumulative endowment returns on list price, the percent of students receiving aid, average aid levels conditional on receipt, and net price.

Colleges and universities could use greater endowment levels to reduce their tuition and room and board prices, thereby reducing the net price without altering aid levels. Alternatively, colleges with higher endowments have greater spending and may become more desirable, which could be used to demand higher prices. The estimates in Table 8 indicate that institutions with greater endowment returns do not reduce tuition or room and board. Thus, it does not appear that colleges and universities use endowment wealth to reduce list prices.

Table 9 reveals that increases in endowment returns result in a statistically significant reduction in the fraction of students taking loans, which could reflect greater institutional generosity. However, there is no evidence that more students receive institutional aid. Indeed, when controlling for pre-trends, there is a statistically significant reduction in the fraction of students receiving institutional aid. This suggests that institutions do not significantly increase the fraction of students receiving aid. There is also a reduction in the fraction of students receiving federal aid, which suggests that wealthier colleges and universities are not enrolling a higher fraction of lower-income students. Table 10 reveals a modest positive increase in the amount of institutional aid conditional on receipt. The lack of an increase in the fraction of students receiving institutional aid, and the modest increase in the amount of aid, suggest that a small fraction of endowment returns are dedicated to financial aid. Indeed, the net price of college does not decrease with greater investment returns and larger endowments. These findings stand in contrast to survey evidence in which colleges and universities claim that endowment wealth is largely dedicated to financial aid.

The financial aid estimates suggest two primary conclusions. First, it appears that larger college endowments lead to only slightly more generous institutional aid packages. Second, the estimates reveal that larger endowments do not cause colleges to serve more low-income students who are eligible for grant aid. Most notably, there is no increase in the fraction of incoming students eligible for Pell grant aid, and, conditional on receiving a Pell grant, the average amount is not higher. Likewise, there is a reduction in the fraction of students receiving any aid or grant aid from other sources. The reduction in students taking loans could reflect increased generosity of institutional aid but also the change in the composition of students toward those who are less likely to need financial assistance.

IV.3 Admissions and Student Composition

This section examines whether or not endowment returns lead institutions to increase the racial diversity of their incoming classes. This could stem from, for example, more generous aid packages, providing a higher quality product that attracts more diverse applicants, or spending on outreach programs. Alternatively, colleges and universities could use increased aid and higher quality to become more selective.

As shown in Table 11, institutions reduce the number of students they admit. The evidence indicates that this result does not stem from pre-existing trends in selectivity. However, the institutions have higher yield rates suggesting an increase in desirability, and resulting in no net increase in freshman class enrollment. Colleges with increased endowments are able to maintain cohort sizes while increasing selectivity through substantially increased yields. The increase in yield rates could stem from numerous factors, including the ability of the institution to offer more generous aid, greater per-student spending on instruction and student services, greater spending on infrastructure projects, and possibly increased prestige due to each of these factors. Evidence of increased selectivity and higher yields is also evident in the admissions scores of students who enroll. Both average SAT and ACT scores increase for incoming cohorts. Overall, the estimates suggest that colleges and universities that experience high endowment returns are able to become more selective, but do not increase the size of their freshman cohorts.

Table 12 presents estimates of the effect of endowment returns on the racial composition of enrolled freshmen. The estimates reveal positive coefficients for Asian and White students and negative coefficients for Hispanic and Black students. Overall, enrollment of students of color decreases statistically significantly and by a non-trivial magnitude relative to baseline rates. This result is robust to accounting for differential changes by baseline racial composition and trends in racial composition. Thus, the evidence consistently shows that private institutions become more selective at the expense of enrolling underrepresented students, and there is no evidence that endowment wealth is used to expand access to minority students. This result is consistent with the finding in the prior section that endowment wealth reduces the fraction of students enrolled who are eligible for federal Pell grant aid.

One potential explanation for the lack of increased enrollment and diversity in response to increased wealth are restrictions on the use of endowment funds or the inability of institutions to convert endowments into liquid assets. However, several analyses of such factors indicate that a significant fraction of endowment wealth is unrestricted and liquid (Conti-Brown, 2011; Brown et al., 2014). That is, endowment are

comprised of both traditional endowments that must be preserved, and other assets that institution have the freedom to spend (Ehrenberg, 2009). The results in this study are also not consistent with an explanation based on restrictions on endowments. Specifically, there is clear evidence that endowment wealth causes increases in spending across a wide range of operational categories and financial aid. This, in conjunction with institutions' freedom to redirect general funds, suggest that wealth could be used to increase enrollment or support more low income and underrepresented students. An alternative explanation is that institutions with increased wealth are unable to attract additional low-income applicants. However, such an explanation is hard to reconcile with evidence of increased selectivity, increased yields, and the potential to allocate resources to recruitment and more generous financial aid packages.

IV.4 Institution Rankings

Increased endowment returns may cause colleges and universities to achieve higher rankings. For example, expenditures feed directly into the U.S. News and World Report rankings, as do faculty resources, student retention, and admissions selectivity. Each of these factors can be directly or indirectly affected by the increased resources associated with endowment returns. Table 13 presents the estimated effect of endowment returns on college and university ranking. Overall, higher returns substantially improve rankings, with the effect largely driven by liberal arts colleges. The effects are largest for lower ranked colleges (those starting between 50 and 100), which makes sense given the limited scope for improvement among the highest ranked institutions in the baseline. The change for research universities has the same sign but is small and statistically insignificant.

It is note worth that higher U.S. News rankings can lead an institution to become more selective (e.g., through increased yield rate for admitted students), and thus the estimated increase in ranking could partially explain the increased selectivity discussed above. That is, the causal effects could run both directions. Overall, there is clear evidence that institutions are able to leverage increased endowment wealth into higher rankings. Indeed, along with increased spending, these effects are the largest and most precisely estimated in the analysis.

IV.5 Great Recession

The Great Recession represents the most unanticipated shock to investment returns during the past 20 years, and significantly shaped cumulative returns in the decade that followed. In order to exploit this, I repli-

cate the design starting with returns during the recession. Tables A1 and A2 reveal that annual returns generate nearly one-to-one changes in endowment levels, and cumulative returns shape endowment levels and expenditures. Increased spending is allocated to instruction, student services, and institutional support (administration), consistent with the full sample period estimates. The analysis reveals no effect of endowment returns on enrollment overall, for undergraduates, or for freshman. Further, there is no evidence of wealthier institutions expanding aid to more students or increasing the amount of they receive. There is no significant change in net prices. Examining the demographics of incoming freshman reveals a reduction in underrepresented student enrollments, and an offsetting increase for Asian and White students. Wealthier institutions are no more likely to enroll lower-income students who are eligible for federal aid. Finally, institutions that experience endowment increases achieve higher U.S. News and World Report rankings, with the results driven by liberal arts colleges. The results are robust to specifications that control for baseline levels and pretrends in the endowments and outcomes of interest. Overall, using variation starting with the Great Recession produces a pattern of evidence that is highly consistent with those using variation for the full sample period.

V Conclusion

There is little causal evidence about how private colleges and universities use their endowment wealth in practice and, specifically, whether they use it to increase the number or diversity of the students they serve. In surveys, institutions note that endowments are used largely to fund institutional aid, ostensibly allowing them to serve a more racially and economically diverse student body. However, institutions' self-reported expenditures from endowment income are unlikely to account for the fungible nature of revenue sources and crowd-out. Further, panel evidence indicates that, while colleges and universities increase institutional aid generosity as their endowments grow, there is no corresponding increase in the diversity of their student bodies. Interpreting this relationship is problematic, however, as institutions that do not provide great aid will mechanically increase their endowments through increased savings.

This study exploits variation in endowments solely generated by cumulative investment returns to examine the effect on student outcomes. Wide variation in returns across institutions reveal that a significant fraction of investment income is retained in the endowment, and this increased wealth generates persistent increases in subsequent spending. However, as these institutions achieve higher enrollment yields, they

become more selective, achieve higher rankings, and ultimately end up enrolling fewer students of color. There is also no evidence that they enroll more low-income students, as the fraction of student receiving federal aid does not increase. The results are robustness to examining the differential returns of institutions with the same baseline endowment, outcome measures, and pretrends.

These estimates provide some of the first evidence of the net effect of endowment income and wealth on institutional spending across categories and the effects of this spending on the population of students served. The pattern of results is informative about the objective functions of private post-secondary institutions, providing evidence of seeking greater selectivity and prestige over serving higher numbers of qualified students and low-income and underrepresented populations. The analysis raises questions about the incentives institutions face for using their wealth to increase educational access.

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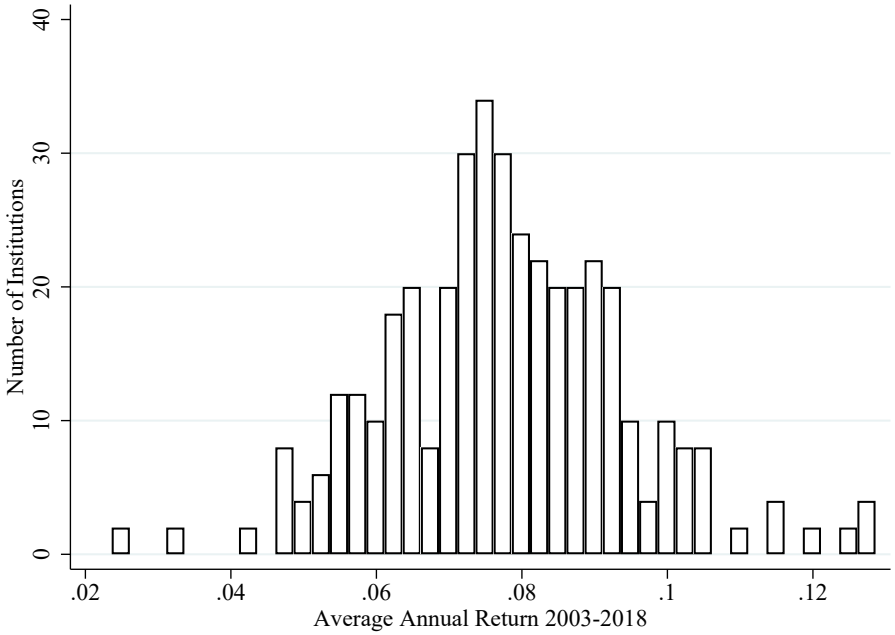
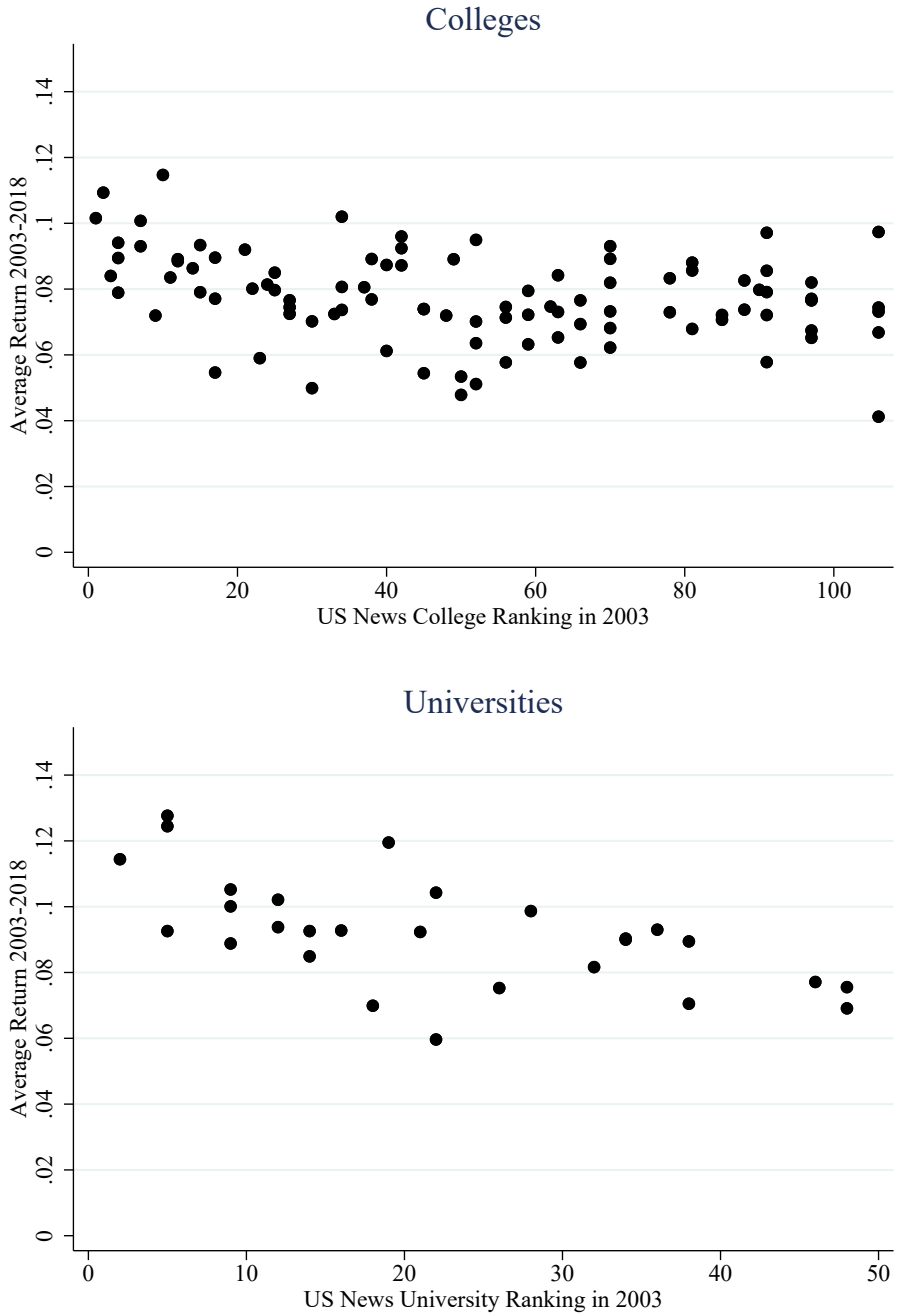
FIGURE 1
Distribution of Average Annual Returns by Institution



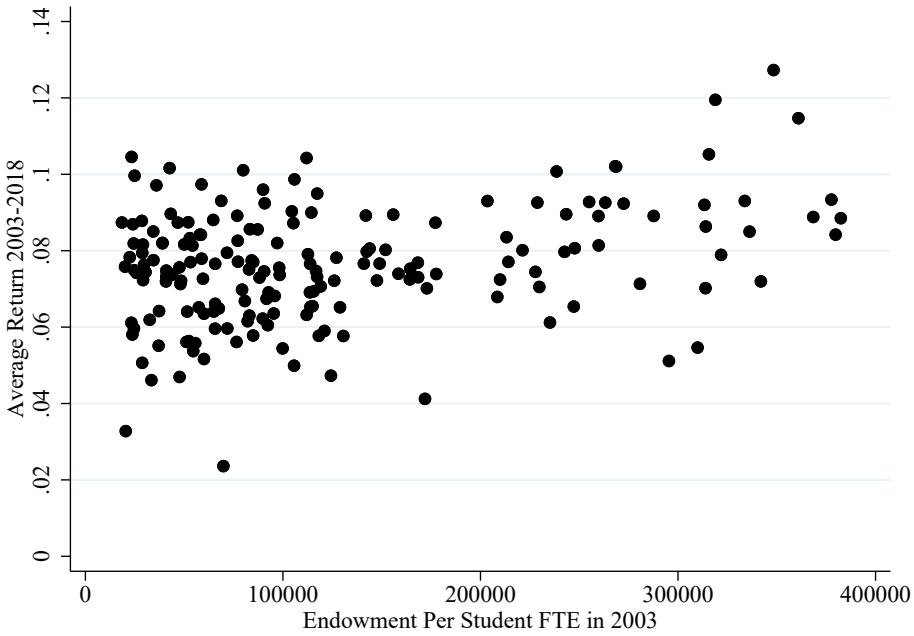
Note: The figure presents the distribution of average annual investment returns for each college and university included in the analysis. Average annual returns are measured from 2003 to 2018. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003.

FIGURE 2
Average Annual Returns by Ranking



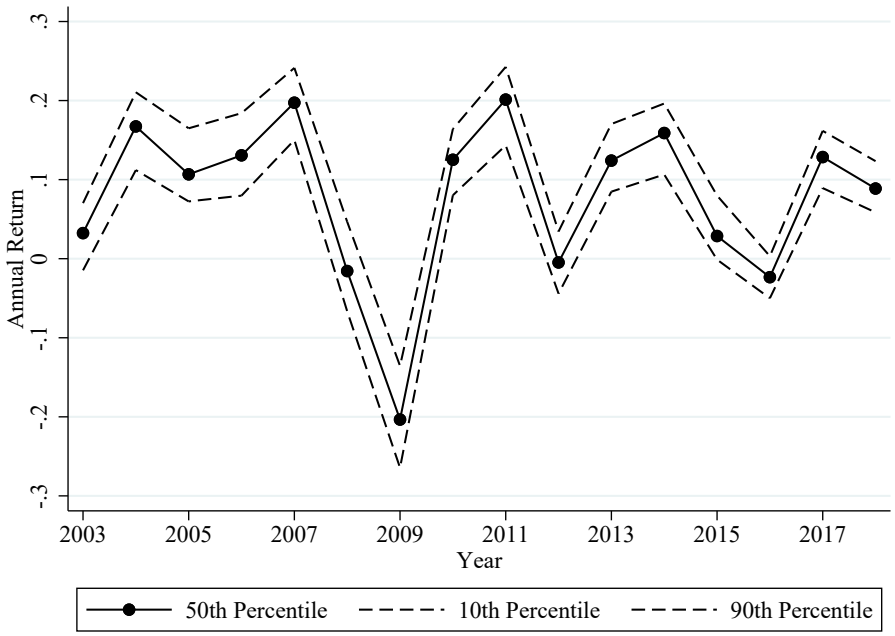
Note: The figures present the average annual investment returns for colleges and universities by their baseline U.S. News and World Reports rankings. Average annual returns are measured from 2003 to 2018. Rankings are measured in 2003. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003.

FIGURE 3
Average Annual Returns by Endowment Per Student



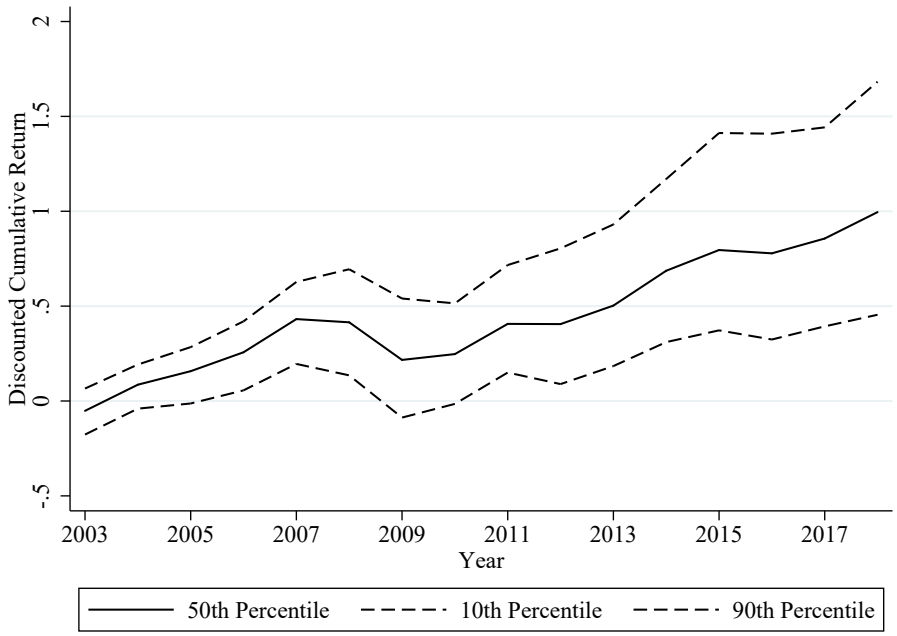
Note: The figure presents the average annual investment returns for colleges and universities by their baseline endowment levels. Average annual returns are measured from 2003 to 2018. Baseline endowment levels per student are measured in 2003. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003.

FIGURE 4
Annual Returns Over Time



Note: The figure presents the endowment returns by year from 2003 to 2018. The 10th, 50th, and 90th percentile of returns are presented in each year for the institutions in the sample. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003.

FIGURE 5
Cumulative Returns Over Time



Note: The figure presents the discounted cumulative endowment returns from 2003 to 2018. The 10th, 50th, and 90th percentile of cumulative returns are presented in each year for the institutions in the sample. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003.

TABLE 1
Cumulative Returns and Baseline Characteristics (within Ranking Groups)

	Coeff	Std Error	Mean	P-value
Expenditures Per Student				
Total	1,832.81	(3,429.96)	57,135.24	0.59
Instruction	1,071.50	(1,089.85)	21,705.80	0.33
Academic support	-468.08	(1,134.49)	5,967.29	0.68
Student service	279.43	(646.53)	6,581.09	0.67
Auxiliary enterprises	420.16	(861.81)	7,980.35	0.63
Institutional support	-628.89	(761.39)	8,988.84	0.41
Research	1,158.68	(1,459.00)	5,911.87	0.43
Enrollment (Full-Time Equivalents)				
Total	-47.84	(480.48)	4,824.33	0.92
Undergraduate	3.93	(346.31)	3,277.21	0.99
Freshman	8.40	(71.59)	791.10	0.91
Freshman Demographics				
Percent Asian	0.69	(0.89)	7.23	0.44
Percent White	-3.19	(3.13)	65.31	0.31
Percent Hispanic	0.45	(0.64)	7.13	0.49
Percent Black	-1.15	(1.73)	6.88	0.51
Admissions				
Admissions rate	-0.57	(2.19)	52.11	0.80
Admissions yield	1.40	(2.12)	30.13	0.51
Median SAT	13.31*	(7.69)	1,249.50	0.09
Median ACT	0.28	(0.25)	27.33	0.27
List and Net Price				
List price	592.05	(980.65)	51,226.01	0.55
List tuition	1,050.51	(861.35)	39,700.17	0.22
List room and board	-458.46	(301.23)	11,525.85	0.13
Net price	1,629.35	(1,100.34)	32,502.40	0.14
Freshman Financial Aid				
Percent receiving aid	-5.09*	(2.86)	81.99	0.08
Percent with loans	-3.39*	(1.79)	53.37	0.06
Average federal aid	143.18	(247.35)	5,662.99	0.56
Average state aid	144.28	(547.20)	4,206.87	0.79
Average institutional aid	552.35	(631.80)	23,053.54	0.38
Average loan amount	-152.77	(331.49)	6,910.33	0.65

Note: This table examines the relationship between college and university characteristics measured in the baseline (2003) and their cumulative investment returns between 2003 and 2018. The first column presents the coefficient from a regression of each characteristic on the discounted cumulative return. Colleges and universities are grouped by their baseline ranking by the U.S. News and World Reports. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 2
Cumulative Returns and Pretrends in Characteristics (within Ranking Groups)

	Coeff	Std Error	Mean	p-value
Expenditures Per Student				
Total	386.23	(550.37)	1,146.57	0.48
Instruction	285.92	(186.22)	413.17	0.13
Academic support	-31.87	(124.47)	192.04	0.80
Student services	121.82	(101.78)	208.90	0.23
Auxiliary enterprises	8.77	(150.97)	28.28	0.95
Institutional support	34.53	(106.60)	222.72	0.75
Research	-11.35	(114.93)	175.53	0.92
Enrollment (Full-Time Equivalents)				
Total	-11.90	(14.69)	63.46	0.42
Undergraduate	-3.94	(11.22)	40.32	0.73
Freshman	-1.66	(2.39)	8.60	0.49
Freshman Demographics				
Percent Asian	0.13*	(0.08)	0.01	0.09
Percent White	-0.38	(0.50)	-0.90	0.45
Percent Hispanic	-0.10	(0.06)	0.07	0.12
Percent Black	0.05	(0.06)	0.07	0.43
Admissions				
Admissions rate	0.67	(0.62)	-1.08	0.28
Admissions yield	-0.00	(0.00)	-0.00	0.80
Median SAT	2.87*	(1.72)	3.73	0.10
Median ACT	0.01	(0.04)	0.01	0.85
List and Net Price				
List price	46.29	(127.15)	1,123.10	0.72
List tuition	58.89	(121.06)	893.19	0.63
List room and board	-12.61	(26.88)	229.91	0.64
Net price	215.27	(205.58)	873.35	0.30
Freshman Financial Aid				
Percent receiving aid	-0.89*	(0.53)	0.59	0.10
Percent with loans	-0.14	(0.56)	-0.55	0.80
Average federal aid	-103.79	(162.68)	116.94	0.52
Average state aid	-142.84	(129.48)	-107.87	0.27
Average institutional aid	67.93	(186.65)	424.18	0.72
Average loan amount	96.44	(117.79)	74.72	0.41

Note: This table examines the relationship between the trend in college and university characteristics prior to the baseline period (2003) and the cumulative investment returns between 2003 and 2018. The first column presents the coefficient from a regression of the pre-trend for each characteristic on the discounted cumulative return. Colleges and universities are grouped by their baseline ranking by the U.S. News and World Reports. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 3
Investment Returns and Changes in Endowments

	Percent Change in Endowment			
	(1)	(2)	(3)	(4)
Percent Return Year T=0	0.898***	0.688***	0.676***	0.671***
	(0.014)	(0.041)	(0.042)	(0.041)
Percent Return Year T=-1	0.031***	0.007	0.003	-0.001
	(0.011)	(0.020)	(0.023)	(0.023)
Percent Return Year T=-2	-0.008	0.041*	0.044*	0.040
	(0.011)	(0.024)	(0.025)	(0.025)
Percent Return Year T=-3	0.005	0.001	-0.006	-0.010
	(0.010)	(0.033)	(0.035)	(0.035)
Percent Return Year T=-4	-0.018**	-0.037	-0.026	-0.030
	(0.009)	(0.027)	(0.029)	(0.029)
Percent Return Year T=-5	-0.042***	0.012	0.010	0.005
	(0.013)	(0.024)	(0.027)	(0.027)
Mean Dep	0.04	0.04	0.04	0.04
Observations	3,486	3,486	3,486	3,486
Year FEs		X		
US News Grp by Year FEs			X	X
Initial Endow by Year				X
Pretrend Endow by Year				X

Note: This table presents estimates of the effect of annual returns on changes in endowment levels. Returns in the current year are identified as T=0 and in the five prior years as T=-1 to T=-5. Columns 2 adds year fixed-effects to account for common changes across all institutions. Columns 3 and 4 include college and university group by year fixed effects, where groups are based on baseline U.S. News and World Reports rankings. Column 4 allows for differential trends across institutions by baseline endowment levels and prior investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 4
Endowment Levels, Spending, and Cumulative Returns

	Log Endowment		Log Expenditures	
	(1)	(2)	(3)	(4)
Cumulative Returns	0.426***	0.408***	0.134***	0.123***
	(0.063)	(0.059)	(0.026)	(0.028)
Percent Return Year T=0	0.129	0.153	-0.063*	-0.048
	(0.106)	(0.104)	(0.036)	(0.042)
Percent Return Year T=-1	0.028	0.053	-0.072*	-0.057
	(0.088)	(0.086)	(0.034)	(0.036)
Percent Return Year T=-2	0.046	0.070	-0.000	0.013
	(0.072)	(0.070)	(0.040)	(0.042)
Percent Return Year T=-3	0.039	0.060	-0.017	-0.007
	(0.069)	(0.064)	(0.038)	(0.039)
Percent Return Year T=-4	0.027	0.047	-0.015	-0.004
	(0.076)	(0.073)	(0.036)	(0.035)
Percent Return Year T=-5	-0.007	0.007	-0.038	-0.027
	(0.068)	(0.064)	(0.040)	(0.040)
Mean Dep	19.64	19.64	10.81	10.81
Observations	3,472	3,472	3,476	3,476
US News by Year FEs	X	X	X	X
Initial Endow by Year		X		X
Pretrend Endow by Year		X		X

Note: This table presents estimates of the effect of cumulative endowment returns on changes in endowment levels and expenditures. Returns in the current year are identified as T=0 and in the five prior years as T=-1 to T=-5. Columns 1 and 3 include college and university group by year fixed effects, where groups are based on baseline U.S. News and World Reports rankings. Columns 2 and 4 allow for differential trends across institutions by baseline endowment levels and prior investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 5
Expenditure Per Student by Category

	Core Expenses	Instruction	Academic Support	Student Services	Aux Enterprise	Institutional Support	Research
College Type Groups							
Cumulative Returns	12,109***	3,953**	351	1,182***	2,605**	2,668***	1,347*
	(3,125)	(1,405)	(865)	(345)	(1,160)	(501)	(728)
Mean Dep	57,135	21,705	5,967	6,581	7,980	8,988	5,911
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	11,576***	4,095.**	5	1,189***	2,566**	2,256***	1,148
	(3,155)	(1,533)	(836)	(368)	(1,106)	(484)	(712)
Mean Dep	57,135	21,705	5,967	6,581	7,980	8,988	5,911
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476

Note: This table presents estimates of the effect of cumulative endowment returns on expenditures for core operating categories. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 6
Expenditure Per Student by Category: Natural Log

	Core Expenses	Instruction	Academic Support	Student Services	Aux Enterprise	Institutional Support	Research
College Type Groups							
Cumulative Returns	0.129***	0.105***	0.089	0.135**	0.121**	0.218***	0.099
	(0.024)	(0.034)	(0.066)	(0.051)	(0.046)	(0.044)	(0.083)
Mean Dep	10.81	9.82	8.40	8.68	8.84	9.01	6.79
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	0.124***	0.127***	0.039	0.119**	0.117**	0.169***	0.087
	(0.022)	(0.033)	(0.073)	(0.050)	(0.046)	(0.037)	(0.069)
Mean Dep	10.81	9.82	8.40	8.68	8.84	9.01	6.79
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476

Note: This table presents estimates of the effect of cumulative endowment returns on expenditures for core operating categories. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 7
Student Enrollment (Full-Time Equivalents)

	Natural Log		
	Total	Undergrad	Freshman
College Type Groups			
Cumulative Returns	-0.028	-0.027	-0.031
	(0.021)	(0.023)	(0.025)
Mean Dep	4,824.33	3,277.21	791.10
Observations	3,476	3,476	3,476
College Type Groups with Endowment and Outcome Baselines and Pretrends			
Cumulative Returns	-0.024	-0.023	-0.029
	(0.021)	(0.022)	(0.024)
Mean Dep	4,824.33	3,277.21	791.10
Observations	3,476	3,476	3,476

Note: This table presents estimates of the effect of cumulative endowment returns on student enrollment. Total, undergraduate, and freshman enrollment are measured in terms of full-time equivalents, with part-time students counting for 0.5 FTEs. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 8
List Price Tuition and Room and Board

	Total List Price	Tuition	Room and Board
College Type Groups			
Cumulative Returns	225.05	-118.73	343.78
	(707.52)	(571.51)	(221.00)
Mean Dep	51,226.01	39,700.17	11,525.85
Observations	3,434	3,434	3,434
College Type Groups with Endowment and Outcome Baselines and Pretrends			
Cumulative Returns	58.51	-119.07	154.94
	(759.49)	(613.89)	(217.86)
Mean Dep	51,226.01	39,700.17	11,525.85
Observations	3,434	3,434	3,434

Note: This table presents estimates of the effect of cumulative endowment returns on list price tuition and room and board. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 9
Percent of Freshman Receiving Aid

	Any Aid	Federal Grants	State Grants	College Grants	Loans
College Type Groups					
Cumulative Returns	-1.188	-1.910	0.229	-2.071	-3.821**
	(1.436)	(1.244)	(2.140)	(1.695)	(1.510)
Mean Dep	81.99	20.88	23.77	76.32	53.37
Observations	3,473	3,473	3,473	3,473	3,473
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	-2.712*	-2.459*	-1.667	-3.543**	-4.218**
	(1.415)	(1.243)	(1.957)	(1.669)	(1.534)
Mean Dep	81.99	20.88	23.77	76.32	53.37
Observations	3,473	3,473	3,473	3,473	3,473

Note: This table presents estimates of the effect of cumulative endowment returns on the rate of receipt of financial aid. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 10
Average Aid and Net Price

	Federal Grants	State Grants	Institutional Grants	Loans	Net Price
College Type Groups					
Cumulative Returns	-246.262	-412.640	1,474.752*	-178.176	121.087
	(284.027)	(262.826)	(757.776)	(296.388)	(809.376)
Mean Dep	5,662.99	4,206.87	23,053.54	6,910.33	32,502.40
Observations	3,473	3,473	3,473	3,473	3,472
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	-90.107	-282.194	1,291.976	-118.323	395.238
	(177.377)	(247.252)	(775.997)	(270.318)	(809.816)
Mean Dep	5,662.99	4,206.87	23,053.54	6,910.33	32,502.40
Observations	3,473	3,473	3,473	3,473	3,472

Note: This table presents estimates of the effect of cumulative endowment returns on average amounts of financial aid received by incoming freshmen (conditional on receipt). Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 11
Admissions Selectivity

	Natural Log			Median Score	
	Admits	Enroll	Yield	SAT	ACT
	(1)	(2)	(3)	(4)	(5)
College Type Groups					
Cumulative Returns	-0.142**	-0.031	3.078*	9.555	0.236
	(0.057)	(0.025)	(1.699)	(9.608)	(0.258)
Mean Dep	7.64	6.35	30.13	1,249.50	27.33
Observations	3,441	3,476	3,441	2,980	2,723
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	-0.144**	-0.022	3.877**	3.202	0.126
	(0.059)	(0.025)	(1.632)	(9.407)	(0.253)
Mean Dep	7.64	6.35	30.13	1,249.50	27.33
Observations	3,441	3,476	3,441	2,980	2,723

Note: This table presents estimates of the effect of cumulative endowment returns on admissions, enrollments, yield rates, and admissions exam scores (when reported by institutions). Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE 12
Race of Incoming Freshman: Percent of Cohort

	Asian (1)	White (2)	Hispanic (3)	Black (4)	Other (5)	White, Asian (6)	Black, Am Ind, Hispanic (7)
College Type Groups							
Cumulative Returns	0.206	2.202*	-1.730**	-0.865	0.187	2.408**	-2.769***
	(0.470)	(1.196)	(0.699)	(0.640)	(0.840)	(1.120)	(0.925)
Mean Dep	7.90	70.33	7.76	7.40	6.62	78.22	15.63
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	0.285	1.618	-1.549**	-0.858	0.390	1.909*	-2.535***
	(0.463)	(1.137)	(0.712)	(0.611)	(0.895)	(1.052)	(0.857)
Mean Dep	7.90	70.33	7.76	7.40	6.62	78.22	15.63
Observations	3,476	3,476	3,476	3,476	3,476	3,476	3,476

Note: This table presents estimates of the effect of cumulative endowment returns on the racial composition of incoming freshmen. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

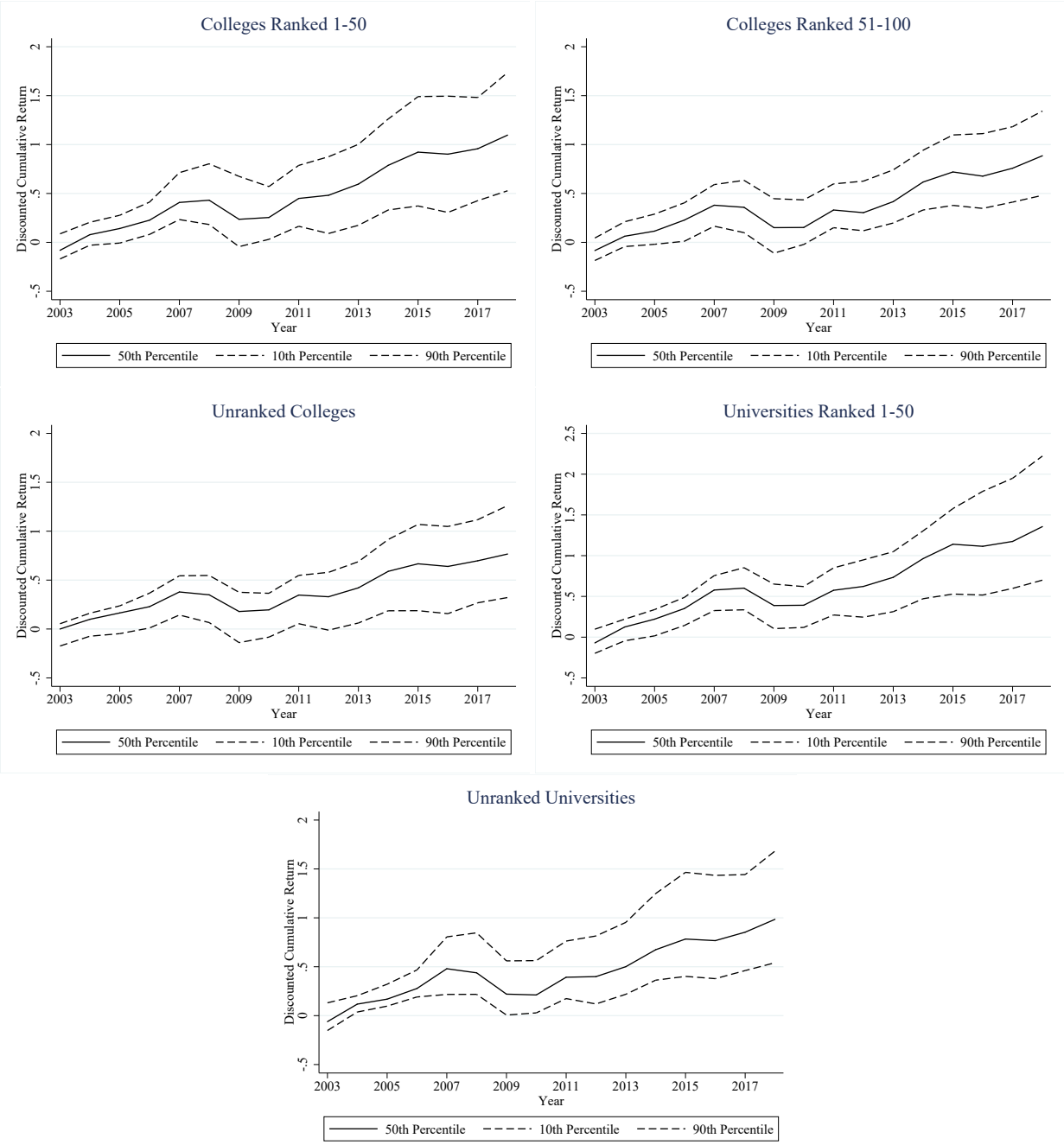
TABLE 13
US News and World Report Ranking

		Colleges (by 2003 rank)				Universities (by 2003 rank)		
	Overall	All	#1-25	#26-50	#51-100	All	#1-25	#26-50
College Type Groups								
Cumulative Returns	-9.704***	-13.945***	-3.085*	-10.692***	-28.357***	-1.116	-1.093	-1.598
	(2.633)	(3.471)	(1.519)	(2.618)	(7.303)	(1.791)	(2.109)	(2.278)
Mean Dep	44.92	52.79	13.65	42.90	80.49	23.99	11.78	40.28
Observations	1,903	1,380	375	347	658	523	299	224
College Type Groups with endowment baseline and pretrends								
Cumulative Returns	-9.949***	-13.679***	-2.826*	-9.263***	-25.137***	-0.715	0.582	-0.436
	(2.824)	(3.494)	(1.473)	(2.873)	(7.179)	(1.943)	(2.316)	(3.582)
Mean Dep	44.92	52.79	13.65	42.90	80.49	23.99	11.78	40.28
Observations	1,903	1,380	375	347	658	523	299	224

Note: This table presents estimates of the effect of cumulative endowment returns on U.S. News and World Reports rankings. Attention is restricted to institutions that are ranked in the baseline year. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student and pre-trend in investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

Appendix

FIGURE A1
Cumulative Returns Over Time by College Type and Ranking



Note: The figures present the discounted cumulative endowment returns from 2003 to 2018 for colleges and universities of differing baseline rankings. The 10th, 50th, and 90th percentile of cumulative returns are presented in each year for the institutions in the sample. Attention is restricted to institutions classified as liberal arts colleges or research universities and with a minimum endowment level of $20,000 per student in 2003. U.S. News and World Reports rankings are measured in 2003.

TABLE A1
Post-Recession: Investment Returns and Changes in Endowments

	Percent Change in Endowment			
	(1)	(2)	(3)	(4)
Percent Return Year T=0	0.862***	0.610***	0.595***	0.598***
	(0.026)	(0.060)	(0.057)	(0.058)
Percent Return Year T=-1	0.031*	0.022	0.020	0.008
	(0.017)	(0.027)	(0.029)	(0.027)
Percent Return Year T=-2	-0.049*	0.026	0.042	0.015
	(0.025)	(0.031)	(0.033)	(0.032)
Percent Return Year T=-3	0.011	0.026	0.022	0.038
	(0.022)	(0.053)	(0.054)	(0.048)
Percent Return Year T=-4	-0.045**	-0.104***	-0.091**	-0.101**
	(0.020)	(0.038)	(0.038)	(0.041)
Percent Return Year T=-5	-0.045***	-0.001	-0.007	-0.040
	(0.016)	(0.027)	(0.028)	(0.027)
Mean Dep	0.03	0.03	0.03	0.03
Observations	2,286	2,286	2,286	2,278
Year FEs		X		
US News Grp by Year FEs			X	X
Initial Endow by Year				X
Pretrend Endow by Year				X

Note: This table presents estimates of the effect of annual returns on changes in endowment levels in the years following the Great Recession. Returns in the current year are identified as T=0 and in the five prior years as T=-1 to T=-5. Columns 2 adds year fixed-effects to account for common changes across all institutions. Columns 3 and 4 include college and university group by year fixed effects, where groups are based on baseline U.S. News and World Reports rankings. Column 4 allows for differential trends across institutions by baseline endowment levels and prior investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A2
Post-Recession: Endowment Levels, Spending, and Cumulative Returns

	Log Endowment		Log Expenditures	
	(1)	(2)	(3)	(4)
Cumulative Returns	0.425***	0.368***	0.194***	0.147***
	(0.074)	(0.077)	(0.042)	(0.044)
Percent Return Year T=0	0.174*	0.214**	-0.085	-0.039
	(0.084)	(0.081)	(0.053)	(0.059)
Percent Return Year T=-1	0.083	0.145*	-0.019	0.032
	(0.100)	(0.079)	(0.053)	(0.062)
Percent Return Year T=-2	-0.010	0.100	0.010	0.078
	(0.095)	(0.079)	(0.066)	(0.062)
Percent Return Year T=-3	-0.021	0.093	-0.019	0.056
	(0.073)	(0.075)	(0.054)	(0.051)
Percent Return Year T=-4	-0.107	0.023	-0.022	0.056
	(0.060)	(0.064)	(0.051)	(0.043)
Percent Return Year T=-5	-0.143**	-0.036	-0.044	0.030
	(0.064)	(0.060)	(0.034)	(0.030)
Mean Dep	19.64	19.64	10.83	10.83
Observations	2,271	2,271	2,274	2,274
US News by Year FEs	X	X	X	X
Initial Endow by Year		X		X
Pretrend Endow by Year		X		X

Note: This table presents estimates of the effect of cumulative endowment returns on changes in endowment levels and expenditures in the years following the Great Recession. Returns in the current year are identified as T=0 and in the five prior years as T=-1 to T=-5. Columns 1 and 3 include college and university group by year fixed effects, where groups are based on baseline U.S. News and World Reports rankings. Columns 2 and 4 allow for differential trends across institutions by baseline endowment levels and prior investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A3
Post-Recession: Expenditure Per Student by Category

	Core Expenses	Instruction	Academic Support	Student Services	Aux Enterprise	Institutional Support	Research
College Type Groups							
Cumulative Returns	21,891**	7,282*	314	1,598**	5,140*	3,278**	4,278*
	(8,617)	(3,551)	(783)	(642)	(2,523)	(1,371)	(2,248)
Mean Dep	58,831.62	22,409.66	6,159.57	6,946.37	8,118.56	9,275.26	5,922.21
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	19,707**	7,254*	-944	1,245*	4,268**	2,971**	3,604*
	(7,504)	(3,413)	(977)	(640)	(1,535)	(1,065)	(1,901)
Mean Dep	58,831.62	22,409.66	6,159.57	6,946.37	8,118.56	9,275.26	5,922.21
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274

Note: This table presents estimates of the effect of cumulative endowment returns on expenditures for core operating categories in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A4
Post-Recession: Expenditure Per Student by Category: Natural Log

	Core Expenses	Instruction	Academic Support	Student Services	Aux Enterprise	Institutional Support	Research
College Type Groups							
Cumulative Returns	0.179***	0.169**	0.100	0.163	0.240**	0.161*	0.125
	(0.038)	(0.055)	(0.082)	(0.102)	(0.084)	(0.077)	(0.104)
Mean Dep	10.83	9.85	8.42	8.74	8.86	9.03	6.77
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	0.160***	0.167**	0.066	0.116	0.231**	0.132*	0.085
	(0.037)	(0.055)	(0.079)	(0.094)	(0.082)	(0.061)	(0.098)
Mean Dep	10.83	9.85	8.42	8.74	8.86	9.03	6.77
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274

Note: This table presents estimates of the effect of cumulative endowment returns on expenditures for core operating categories in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A5
Post-Recession: Student Enrollment (Full-Time Equivalents)

	Natural Log		
	Total	Undergrad	Freshman
College Type Groups			
Cumulative Returns	-0.058	-0.047	-0.048
	(0.033)	(0.032)	(0.032)
Mean Dep	5,034.70	3,399.08	818.50
Observations	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends			
Cumulative Returns	-0.050	-0.041	-0.050
	(0.034)	(0.032)	(0.032)
Mean Dep	5,034.70	3,399.08	818.50
Observations	2,274	2,274	2,274

Note: This table presents estimates of the effect of cumulative endowment returns on student enrollment in the years following the Great Recession. Total, undergraduate, and freshman enrollment are measured in terms of full-time equivalents, with part-time students counting for 0.5 FTEs. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A6
Post-Recession: List Price Tuition and Room and Board

	Total List Price	Tuition	Room and Board
College Type Groups			
Cumulative Returns	184.051	84.665	99.385
	(931.605)	(806.352)	(281.307)
Mean Dep	55,181.12	42,916.94	12,264.18
Observations	2,264	2,264	2,264
College Type Groups with Endowment and Outcome Baselines and Pretrends			
Cumulative Returns	-99.496	-7.001	-176.102
	(957.561)	(822.970)	(282.310)
Mean Dep	55,181.12	42,916.94	12,264.18
Observations	2,264	2,264	2,264

Note: This table presents estimates of the effect of cumulative endowment returns on list price tuition and room and board in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A7
Post-Recession: Percent of Freshman Receiving Aid

	Any Aid	Federal Grants	State Grants	College Grants	Loans
College Type Groups					
Cumulative Returns	0.527	1.897	-0.397	-1.548	-0.737
	(1.780)	(1.883)	(2.791)	(2.356)	(2.264)
Mean Dep	84.00	22.85	22.18	79.11	54.02
Observations	2,274	2,274	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	0.808	0.554	-2.374	-2.477	-1.657
	(1.592)	(1.588)	(2.704)	(2.189)	(2.063)
Mean Dep	84.00	22.85	22.18	79.11	54.02
Observations	2,274	2,274	2,274	2,274	2,274

Note: This table presents estimates of the effect of cumulative endowment returns on the rate of receipt of financial aid in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A8
Post-Recession: Average Aid and Net Price

	Federal Grants	State Grants	Institutional Grants	Loans	Net Price
College Type Groups					
Cumulative Returns	-756.685*	91.078	674.968	821.074**	152.214
	(363.934)	(416.887)	(995.398)	(283.920)	(874.118)
Mean Dep	5,868.34	4,086.18	25,857.50	7,637.03	33,733.15
Observations	2,274	2,274	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	-287.402	134.460	800.174	715.978*	92.731
	(233.520)	(382.336)	(1,024.086)	(371.385)	(883.853)
Mean Dep	5,868.34	4,086.18	25,857.50	7,637.03	33,733.15
Observations	2,274	2,274	2,274	2,274	2,274

Note: This table presents estimates of the effect of cumulative endowment returns on average amounts of financial aid received by incoming freshmen (conditional on receipt) in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A9
Post-Recession: Admissions Selectivity

	Natural Log			Median Score	
	Admits	Enroll	Yield	SAT	ACT
	(2)	(3)	(5)	(6)	(7)
College Type Groups					
Cumulative Returns	-0.032	-0.048	0.876	-11.781	-0.225
	(0.069)	(0.032)	(1.993)	(12.471)	(0.399)
Mean Dep	7.74	6.37	28.17	1,247.93	27.66
Observations	2,265	2,274	2,265	1,861	1,832
College Type Groups with Endowment and Outcome Baselines and Pretrends					
Cumulative Returns	-0.029	-0.047	1.164	-4.760	0.026
	(0.076)	(0.029)	(2.107)	(11.470)	(0.348)
Mean Dep	7.74	6.37	28.17	1,247.93	27.66
Observations	2,265	2,274	2,265	1,861	1,832

Note: This table presents estimates of the effect of cumulative endowment returns on admissions, enrollments, yield rates, and admissions exam scores (when reported by institutions) in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student, pre-trend in investment returns, baseline level of the outcome of interest, and the pre-trend in the outcome of interest. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A10
Post-Recession: Race of Incoming Freshman: Percent of Cohort

	Asian (1)	White (2)	Hispanic (3)	Black (4)	Other (5)	White, Asian (6)	Black, Am Ind, Hispanic (7)
College Type Groups							
Cumulative Returns	1.620*	2.635	-2.958**	-0.868	-0.429	4.255**	-4.038**
	(0.731)	(1.759)	(0.971)	(0.932)	(1.010)	(1.570)	(1.357)
Mean Dep	8.03	67.28	9.12	8.01	7.56	75.31	17.55
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274
College Type Groups with Endowment and Outcome Baselines and Pretrends							
Cumulative Returns	1.381	2.860	-2.459**	-0.884	-0.195	4.594**	-3.821**
	(0.765)	(2.093)	(0.989)	(0.979)	(1.488)	(2.016)	(1.338)
Mean Dep	7.37	62.01	8.49	7.44	14.69	69.38	16.30
Observations	2,268	2,268	2,268	2,268	2,268	2,268	2,268

Note: This table presents estimates of the effect of cumulative endowment returns on the racial composition of incoming freshmen in the years following the Great Recession. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. The comparison group are institutions of the same Carnegie classification (research university, liberal arts colleges, master's colleges and universities, general bachelor's colleges) and the same quintile of endowment wealth per full-time students in the baseline period. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.

TABLE A11
Post-Recession: US News and World Report Ranking

		Colleges (by 2008 rank)				Universities (by 2008 rank)		
	Overall	All	#1-25	#26-50	#51-110	All	#1-25	#26-60
College Type Groups								
Cumulative Returns	-7.499**	-12.100**	-8.343***	-9.834***	-15.664	1.229	0.367	4.496
	(3.079)	(4.238)	(1.705)	(2.381)	(8.653)	(2.130)	(1.734)	(8.231)
Mean Dep	46.63	52.61	11.50	38.45	80.67	34.41	11.71	39.91
Observations	1,492	998	242	263	493	494	219	176
College Type Groups with Endowment and Outcome Baselines and Pretrends								
Cumulative Returns	-6.448*	-11.122**	-9.493***	-7.021**	-16.561*	2.817	1.509	-0.654
	(3.313)	(4.244)	(2.189)	(3.042)	(8.407)	(2.723)	(1.703)	(8.007)
Mean Dep	46.63	52.61	11.50	38.45	80.67	34.41	11.71	39.91
Observations	1,492	998	242	263	493	494	219	176

Note: This table presents estimates of the effect of cumulative endowment returns on U.S. News and World Reports rankings in the years following the Great Recession. Attention is restricted to institutions that are ranked in the baseline year. Each specification includes institution fixed effects as well as year-by-comparison group fixed effects. Institutions are grouped according to their classifications (college or university) and their baseline U.S. News and World Reports rankings. The second panel controls for the interaction of year with each institution's baseline endowment per student and pre-trend in investment returns. Standard errors are clustered at the institution and year levels. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent, respectively.