Do (Some) University Endowments Earn Alpha?

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Abstract

We analyze the returns earned by US educational endowments using style attribution models. For the average endowment, models with only public stock and bond benchmarks explain virtually all of the time-series variation in returns, yield no alpha, and generate sensible factor loadings. Elite institutions perform well relative to public stock and bond benchmarks because of large allocations to alternative investments. We find no evidence that manager selection, market timing, and tactical asset allocation generate alpha.

Educational institutions hold billions of dollars in endowment funds. As of June 2011, the top five educational endowments (Harvard, Yale, Stanford, Princeton, and The University of Texas) collectively managed $102 billion, while all educational endowments managed in excess of $408 billion.[1] While these funds are often critical to the funding of educational institutions, we know very little about the performance of endowments. Our lack of knowledge regarding the performance of endowments, largely a result of the limited availability of data, is remarkable given the legendary performance of some institutions, most notably the Yale endowment. David Swensen, the long-time manager of the Yale endowment, has long advocated the so-called "endowment model"[2] of investing popularized in his book, "Pioneering Portfolio Management." Following the principles that he espouses, the Yale endowment earned double-digit returns for over a decade through 2008 before dropping by 24.5% for the year ending June 2009, ranking Yale in the bottom decile of endowment performance.

Yale was not the only elite institution hit hard by the market woes of 2009. Harvard and Stanford also saw the value of their endowments drop by more than 20%. Many universities, including elite institutions like Princeton and Harvard, that rely heavily on endowment funding for ongoing operational expenses were forced to slash spending in the wake of steep losses.[3]The losses incurred by endowments in 2009 caused plan sponsors to question their ability to deliver superior returns using the endowment model.

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[1] See http://www.nacubo.org/Research/NACUBO-Commonfund_Study_of_Endowments/Public_NCSE_Tables_.html ,
Table: All US and Canadian Institutions Listed by Fiscal Year Endowment Market Value and Percentage Change in Market Value from FY 2010 to FY 2011.

[2] The endowment model, sometimes referred to as the Yale model, is generally attributed to David Swensen and Dean Takahashi, who have been senior managers of Yale's endowment for many years. The model generally calls for diversifying a portfolio across broad asset classes including alternative investments like hedge funds and private equity.

[3] Philips, Michael, "The Not-So-Rich Elite," Newsweek, August 18, 2009. See also Brown, Dimmock, Kang, and Weisbenner (2010), who document that negative return shocks result in operational cuts, and Dimmock (2012), who documents that institutions with more volatile non-financial revenue streams tend to invest in less volatile endowment portfolios.

In this paper, we shed light on the strong returns (and sharp correction) experienced by many endowments. To do so, we analyze endowment returns for a large set of institutions over the 21 years ending in June 2011. We address three questions: (1) Does the average endowment earn an abnormal return (alpha) relative to standard benchmarks? (2) Do elite institutions earn alpha? (3) Is there evidence of performance persistence in endowment returns?

To answer these questions, we employ simple asset class attribution models pioneered by Sharpe (1992). The intercepts from these models can be interpreted as the additional return earned by endowment funds relative to the best-fit replicating portfolio. We begin the analysis with simple two- and three-factor attribution models. The two-factor model employs benchmarks for publicly traded US stocks (S&P 500) and US bonds (Barclays Capital Aggregate Bond Index). The three-factor model adds a benchmark for international stocks (Morgan Stanley Capital Index excluding the US). Since these benchmark assets are easily replicated using readily available index products, the intercepts from these attribution models can be readily interpreted as alphas (i.e., abnormal returns).

The simple two-factor model explains 94% of the time-series variation in the return of the average endowment and yields an estimated intercept of merely 4 bps per year. The estimated loadings on the stock and bond factors are 59% and 41%, which are remarkably close to the 60/40 stock/bond portfolio used as a performance benchmark by many endowments. The three-factor model (i.e., adding international stocks) explains 99% of the time-series variation in the return of the average endowment and yields an estimated intercept of 40 bps per year, which is also unreliably different from zero. Thus, we find no evidence that the average endowment is able to deliver alpha relative to public stock/bond benchmarks.

The performance of the average endowment masks interesting cross-sectional variation in the performance of endowments. In one analysis, we sort endowments into deciles based on performance in year t-1 and analyze

performance in year t. Using the two- or three-factor models, there is strong evidence of performance persistence. The top performance decile earns two- and three-factor alphas of 2.19% and 2.41% (*t*=1.92 and 2.89, respectively), while the bottom performance decile earns annual alphas of -1.63% and -1.48% (*t*=-1.86 and -2.06, respectively). The spread in returns between the top and bottom performance deciles of 3.82 to 3.90% is reliably positive (*t*=3.51 and 3.59, respectively).

In a second analysis, we focus on the returns earned by elite institutions. Relative to the two- and three-factor models, Ivy League schools earn alphas of 3.15% and 3.82% (*t*=2.01 and 3.69). We also analyze the returns of the 30 non-Ivy League schools with top SAT math scores for incoming freshman. Student SAT scores are an objective measure of a school's status since the SAT is widely used to screen college applications in the US. These institutions also deliver strong two- and three-factor alphas of 1.74% and 2.28% (*t*=1.34 and 2.53). The spread in returns between Ivy League (or top-SAT schools) and other institutions is reliably positive.

To dig deeper into the revealed performance spreads, we introduce benchmarks related to two alternative investments popular for many endowments: hedge funds and private equity.[4] For a hedge fund benchmark, we use the Hedge Fund Research Fund-Weighted Composite Index (HFRI). For a private equity benchmark, we use the Cambridge Associates US Private Equity Index. When alternative investments (private equity and hedge funds) are added to our three-factor attribution model (US Stocks, US Bonds, International Stocks), the top performance decile, Ivy League schools, and top-SAT schools fail to deliver reliably positive intercepts (with point estimates of -18 bps, 46 bps, and -99 bps, respectively). Thus, the intriguing evidence of superior returns among the top

[4] The Commonfund-NACUBO survey defines alternative investments as private equity, marketable alternative strategies (i.e., hedge funds), venture capital, real estate and natural resources. Of these categories, private equity and hedge funds represent almost 67% of all alternative investments (see Commonfund Benchmarks Study (2011), figure 3.6a, p.68).

performing and elite institutions is completely explained by their strategic asset allocation decisions.

The fact that the average allocations to asset classes explains the returns for top performing and elite institutions provides insights into the mechanism used to generate the strong returns earned by these endowments. Specifically, these results suggest that manager selection and dynamic (or tactical) asset allocation do not generate alpha for top performing and elite institutions. There are two ways in which an endowment can generate an alpha relative to asset class benchmarks. First, endowments might pick superior managers within an asset class, so the returns earned within an asset class will beat benchmark returns. Superior manager selection would yield positive intercepts in the estimated attribution models. Second, endowments might dynamically allocate investments across asset classes, overweighting (or underweighting) an asset class in anticipation of good (or bad) asset class returns—a form of market timing. Successful dynamic asset allocation (or market timing) would also deliver positive intercepts in the attribution models. Our results suggest that endowments fail to earn alpha from manager selection or dynamic asset allocation.[5] Rather, large strategic allocations to alternative investments explain much of the documented cross-sectional variation in performance.

These conclusions rest on two assumptions underlying our analysis. First, our benchmark model must include relevant asset classes. We believe we can make a solid case that we have done so. Endowments report the largest allocations to the five asset classes we use (US Stock, US Bond, International Stock, Private Equity, and Hedge Funds). Moreover, our empirically estimated factor loadings dovetail reasonably well with average reported allocations. In addition, to overturn our

[5] Note that this conclusion is based on the combined effects of manager selection and dynamic asset allocation. The attribution models would also deliver an intercept of zero if an endowment had good manager selection that was offset by poor dynamic asset allocation ability (or vice versa).

finding of negligible alphas relative to the benchmarks employed, the omitted asset class must deliver a low (or high) average return that is unrelated to the included factors and is weighted heavily by endowments. In robustness checks, we consider four additional asset classes that would be likely to move our alpha estimates: T-Bills, venture capital, public real estate, and private real estate. The basic results are unaffected by inclusion of these additional asset classes.

Second, we implicitly assume the benchmarks themselves do not deliver alpha.[6] Public stock and bond benchmarks do not represent alpha since it is easy to replicate the returns earned on the indexes. This is not the case for the private equity and hedge fund benchmarks. Thus, it is possible that the alternative investment benchmarks deliver alpha. At a minimum, our results indicate the strong returns earned by some endowments can be traced largely to the strong performance of alternative assets during the sample period we analyze. Thus, whether some endowments earn alpha can be boiled down to determining whether the alternative investments deliver alpha.

An extensive literature analyzes the performance of private equity and hedge funds and ongoing debate focuses on whether these asset classes deliver alpha. We briefly discuss this literature and analyze the performance of the alternative benchmarks that we employ. To summarize, little positive evidence supports the conclusion that private equity as an asset class is able to deliver alpha. In contrast, some evidence suggests that hedge funds can deliver alpha as they deliver positive risk-adjusted returns using standard risk models (e.g., the Fama-French three-factor model). Of course, standard risk models (or even more elaborate risk models such

[6] In our main analysis, we use an attribution model and use the intercept from this model to measure performance. Thus, we implicitly assume that the benchmarks used to estimate the intercept do not themselves generate alpha (i.e., a positive risk-adjusted return using identifiable risk factors). It is possible for a benchmark to deliver alpha. For example, if a hedge fund benchmark earns a positive alpha, this would indicate that either (1) hedge fund managers, on average, are able to identify mispriced assets and deliver alpha by doing so or (2) the model employed to measure alpha is misspecified (the classic joint test problem).

as those in Fung and Hsieh (2004)) may not adequately capture the risks inherent in hedge funds. As Stulz (2007) forcefully points out, many hedge funds might deploy strategies that are akin to selling earthquake insurance. Such strategies would deliver high returns in virtually all periods … until the earthquake hits. We do not resolve the question of whether private equity and hedge funds deliver alpha. However, whether the superior returns of some educational endowments can be interepreted as alpha critically rests on the answer to this question.

Our paper is not the first to study endowment returns. Lerner, Schoar, and Wang (2008) present intriguing descriptive statistics that suggest endowments earn strong returns relative to asset class benchmarks. Brown, Garlappi, and Tiu (2010) analyze the returns to endowments using a dataset similar to that employed in this study. They use reported asset allocation weights for endowments and benchmark returns to analyze the strategic asset allocation, tactical asset allocation, and security selection abilities of endowment managers. Consistent with our results, they show that the average endowment earns a negligible alpha, but they present only a limited analysis of the predictable cross-sectional variation in performance.

Lerner, Schoar, and Wongsunwai (2007) analyze the returns within one asset class – private equity – and, using a sample of 838 funds raised between 1991 and 1998, document that educational endowments enjoy the highest rates of return. At first blush, this finding might seem to contradict our finding that manager selection by endowments does not generate alpha. However, two points are worth emphasizing. First, Lerner et al. (2007) base their conclusions on internal rate of return calculations and make only rudimentary adjustments for risk. Second, the private equity benchmark we use includes investments that might be closed to new investors and *still* fails to deliver an alpha relative to standard asset pricing benchmarks. Thus, the benchmark alpha of zero might represent a best-case scenario for endowments that have recently added private equity as an asset class.

I. Data and Methods

A. Endowment Returns Data

We use data from a combination of the National Association of College and University Business Officers (NACUBO) Endowment Study and the NACUBO-Commonfund Study of Endowments (NCSE). NACUBO provides endowment returns from 1991 to 2008. In 2009, Commonfund and NACUBO began jointly publishing a study of endowment returns. The dataset contains the institution, year, and endowment return (through June of each reporting year).

The data are not backfilled and are virtually free of survivorship bias. Some survivorship bias is possible if institutions close in a particular year and closing is related to endowment performance. While this is a huge issue for the study of mutual funds, where performance and fund closure are related, we doubt that it is a big issue here as most educational institutions (and their endowments) are quite enduring.

One concern regarding these data is the voluntary nature of reporting. If institutions are reluctant to publicize poor performance, they may refrain from reporting in below-par years and the reported returns would overestimate the performance of endowments. A strategic reporting bias (if any) will cause our returns to be overstated. Ultimately, we find no evidence of superior investment returns relative to asset class benchmarks. Thus, the presence of any reporting bias that favors strong returns would only strengthen this conclusion.

To investigate whether reporting bias is material, we conduct three tests. First, we compare the returns of institutions with no reporting gaps (i.e., institutions that continuously report after their first reporting year) to those with gaps (i.e., institutions that fail to report in at least one year after their first reporting year). This analysis suggests that the reporting bias is small as the difference in returns

between diligent reporters and those with gaps is, on average, an economically small 18 basis points per year, with diligent reporters earning stronger returns.

Second, we compare the returns of first-time reporters to repeat institutions. If institutions are strategic in their reporting, we might expect first-time reporters to have systematically higher returns than continuing reporters. Though there are differences between the two groups, the first-time reporters tend to have lower rather than higher returns. This observation is not consistent with strategic reporting by first-time reporters. Moreover, auxiliary analyses indicate that about half of the difference in returns can be explained by the difference in asset allocations between first-time and continuing reporters.[7]

As a third check, we compare the returns of the 279 endowments that report in all 21 years of our sample period to the returns of others. These consistent reporters earn average annual returns that are 50 bps higher than all institutions. Auxiliary analyses indicate about 2/3rds of the 50 bps difference can be explained by the difference in asset allocations between consistent reporters and the average endowment.

Taken together, the above tests suggest the reporting biases in the data are not economically large. Furthermore, much of our analysis focuses on Ivy League schools (which report in all years) and top-SAT schools (which report in 96% of all years).

B. Elite Institutions

Much of our analysis focuses on the returns earned by elite institutions. We identify two groups of elite institutions. The first group consists of the eight Ivy

[7] First-time reporters likely are young and small endowments with low allocations to alternative investments. The low allocations to alternatives explain the somewhat lower returns of first-time reporters. The five-asset class attribution model developed later in this paper, which includes private equity and hedge fund return indexes, explains all but 62 bps of the 1.3% difference in returns between first-time and other endowments. The estimated allocation of first-time reporters to private equity is 8.4% lower (p=.06) than continuing reporters.

League schools (Brown, Columbia, Cornell, Dartmouth, Harvard, Princeton, Penn, and Yale). The second group consists of top-SAT schools outside the Ivy League. Our first ranking of schools takes place in 1991, and we update the ranking every five years (in 1996, 2001, and 2006). Rankings are based on the 75th percentile of math SAT scores for incoming freshman. A total of 46 schools make the top-30 rankings in one of the four ranking years. The rankings are generally quite stable: 16 schools make the top 30 in all four ranking periods, and an additional 9 schools make the top 30 in three of the four ranking periods (see the online appendix for details). In the end, we carve the universe of endowments into three groups: Ivy League Schools, top-SAT Schools outside the Ivy League, and the remaining institutions.

In Table 1, we present descriptive statistics on the returns earned by each of these groups, all endowments, and benchmark returns. The number of reporting institutions has generally increased over time and peaked in 2010 with 817 reporting endowments. Average endowment returns have tracked market conditions, with downturns during the bear market of 2000-2001 and the more recent downturn in 2009.

Consistent with endowment folklore, we find that elite institutions earn superior returns. Ivy League schools earn 11.9% per year. Top-SAT schools (excluding the Ivy League) earn 10.7% per year, while other institutions earn 8.7% per year. Ivy League schools enjoy a performance edge of 3.3 percentage points per year ($p<.01$), while top-SAT schools enjoy a performance edge of 2.0 percentage points ($p<.02$).

C. Performance Persistence

In addition to rankings based on the prominence of schools, we construct quintiles based on the returns earned by endowments in each year and update the quintiles annually. To analyze the extreme performers, we further split the bottom quintile into two groups corresponding to the bottom two performance deciles

(labeled 1A (Lo) and 1B). The top quintile is similarly split into two groups (labeled 5A and 5B (Hi)).

In Table 2, we present descriptive statistics on the returns earned by each of these performance groups. We lose data for 1991 as we require data in prior years to sort on performance. The results provide strong evidence of performance persistence in endowment returns. Returns are monotonically increasing from the bottom performance decile (1A) to the top performance decile (5B). The top performance decile outperforms the bottom decile by 4.08 percentage points per year, and we can comfortably reject the null hypothesis of equal returns ($p<.01$). Similarly, the penultimate extreme deciles (1B vs. 5A) have a return spread of 1.96 percentage points per year ($p<.01$).

In auxiliary analyses (see online appendix), we estimate the turnover in these performance groups from one year to the next. The prior results suggest top (bottom) performers are more likely to repeat, and this is indeed the case. We would expect 10% of endowments ranked in the top performance decile in year *y* to repeat in the same decile in year *y+1* by chance. In fact, we observe 29% repeat their top performance ranking. The results are quite similar for the bottom performance decile. We can strongly reject the null hypothesis that endowment performance is independent across years ($p<.01$).

D. Attribution Analysis

How do elite institutions and top performing endowments generate superior returns? To answer this question, we conduct a simple attribution analysis as described in Sharpe (1992). In our empirical analysis, we consider five factors: US equities, US bonds, International Equities, Private Equity, and Hedge Funds. For discussion purposes, consider a two-factor model (e.g., US stocks and US bonds). The simple two-factor model with US stocks (R_{st}) and US bonds (R_{bt}) is represented by the following annual time-series regression:

$$R_{pt} = \alpha + \beta_s R_{st} + \beta_b R_{bt} + \varepsilon_t, \quad (1)$$

subject to the constraint that the $\beta_s + \beta_b = 1$. In our main analysis, we do not constrain coefficients to be nonnegative, but empirically this constraint would not be binding. The coefficients on the factors can be interpreted as the two-factor portfolio that best approximates the portfolio return (R_{pt}). The intercept (α) of the regression provides an estimate of the abnormal return relative to the factor-mimicking portfolio. A positive alpha indicates the endowment manager has generated superior returns relative to the factor-mimicking portfolio.

Three distinct mechanisms enable a manager to deliver superior returns relative to the simple two-factor model. First, endowments may identify superior investments within a particular asset class. Consider an endowment manager who invests solely in US equities and US bonds. She might generate superior returns by identifying managers who beat their benchmarks in these two asset classes. Assuming superior manager selection, a two-factor style analysis (US stocks and US bonds) would yield reliably positive alphas.

Second, endowments may have market timing ability. For example, a manager may invest soley in US equities and bonds, but is able to time these allocations by overweighting equities prior to equity bull markets. Assuming timing ability, a two-factor style analysis (US stocks and bonds) for this manager would also yield reliably positive alphas.

Third, endowments may strategically allocate to alternative investments (e.g., private equity and hedge funds). If strategic asset allocation produces superior returns, a two-factor style analysis (US Stocks and US Bonds) would deliver positive alphas, but the performance edge would disappear when we include reasonable benchmarks for the alternative investments.

In our attribution analysis, we consider five benchmarks: US Stocks, US Bonds, International Stocks, Hedge Funds, and Private Equity. These five benchmarks correspond to the five asset classes with the largest percentage

allocations by endowments. The indexes used for each asset class are presented in the last five columns of Table 1. We calculate annual returns from July to June, beginning in June 1991 and ending in June 2011, to correspond with the June reporting cycle endowments use.

The public stock and bond indexes deliver returns ranging from 7.1% (US Bond) to 10.0% (S&P 500). The alternative investment benchmarks deliver impressive returns of 15.9% (private equity) and 12.1% (hedge funds). After presenting our main results, we consider whether the strong returns on these alternative investment benchmarks can be considered alpha.

II. Results

A. Average Endowment

In Table 3, we present the results of our attribution analysis for the average endowment. We present results of four models: (1) US Stock and US Bond, (2) US Stock, US Bond, and International Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, International Stock, Hedge Fund, and Private Equity. The dependent variable in all models is the equal-weighted average annual return on all reporting endowments. In robustness tests discussed in detail later, we consider subperiod analyses, additional asset classes, and alternative hedge fund indexes. The results are qualitatively similar to those reported in this section.

In each model, the slope coefficients are constrained to sum to one and, thus, can be interpreted as portfolio weights. The simple two-factor model explains 94% of the time-series variation in the returns to endowments and yields sensible portfolio weights of 59% equity, 41% bonds. A 60/40 stock/bond portfolio is a typical endowment benchmark, so it is reassuring that the simple two-factor model yields weights close to the typical benchmark weights.

When we add other asset classes (international stocks, hedge funds, and private equity) as independent variables in our attribution analysis (models 2 to 4), the R-squared values range from 98 to 99%. Nonetheless, in all models US stocks and US Bonds are the most important factors determining the time-series variation in the average endowment returns (note the large t-statistics for these asset classes in all models). In the full model (model 4), the alternative investments (hedge funds and private equity) are marginally significant with weights of 11% (hedge funds) and 8% (private equity).

The inclusion of these additional asset classes delivers sensible factor loadings. For example, the average endowment has estimated loadings on the public stock and bond benchmarks of 81%. These estimated allocations are in line with the average allocations reported by the Commonfund Benchmark Study (2011, Figure 3.2, p.14). Large endowments (over $1 billion, which are generally enjoyed by elite institutions) have average allocations of 40% to public stocks and bonds (including cash), while small endowments (less than $50 million) have average allocations of 82% to 90% to public stocks and bonds. We also compare the estimated loadings on public stocks and bonds to the reported allocations of educational endowments during our sample period. For the average endowment, the estimated allocation of 81% is in the same ballpark as the average reported allocation of 88%.

Regardless of the model, endowment returns are not unusual. Relative to a two-factor model with just US Stocks and US bonds, the average endowment earns a style-adjusted return that is indistinguishable from zero (4 bps per year, t=0.05). Thus, the average endowment could easily match the returns earned on its investments by indexing. When alternative investments are included, the estimated intercepts are negative (and at times reliably so). More importantly, a simple 60/40 stock/bond allocation would have delivered a return similar to that earned by the average endowment.

In summary, the average endowment earns a mean return very close to average benchmark returns, and virtually all of the time-series variation in endowment returns can be explained by these benchmark returns. On one level, this is good news as most endowments allocate assets to investment managers who charge high fees. These results suggest that, on average, endowments are able to recover these fees. We now turn to the question of whether some subgroups are able to earn superior returns.

B. Performance Persistence

We evaluate the future performance of endowments grouped by their prior-year return. We define losers as endowments in the bottom decile of prior-year return performance and winners as those in the top decile. Table 4 presents the attribution analysis of future performance for last year's losers (Panel A), last year's winners (Panel B), and the spread between the winner-loser portfolio (Panel C). Consider first the performance of losers (Panel A). In all models, these funds generate intercepts ranging from -1.48% (model 2) to -3.02% (model 3) annually.

The pattern for winners is different. Relative to a simple two-factor model, the winners earn an alpha of 2.19% (t=1.92). When international stocks are added to the attribution model, the alpha is even more impressive 2.41% (t=2.89). However, as models three and four make clear, the superior returns earned by the winners can be traced to their heavy allocation to hedge funds and private equity. For example, in model 4, the estimated weights on hedge funds and private equity are 19% and 25%, respectively, and the estimated intercept becomes -0.18% (albeit not reliably negative). Thus, the superior returns earned by the top decile of endowments can be traced entirely to their relatively large allocation to the alternative investments.

In Panel C, the dependent variable is the return on the top decile less the bottom decile, and the slope coefficients are constrained to sum to zero. The spread between the top and bottom deciles is consistently positive, but the spread

diminishes substantially and is no longer statistically significant when we introduce the alternative investments. Note also the relatively large increase in the R-squareds as alternative asset benchmarks are added to the attribution model.

In combination, these results indicate that the rather impressive spread in returns of 4.1% annually between the top and bottom deciles that we document in Table 2 is largely explained by the different asset allocation decisions of the top and bottom decile of endowments.

C. Elite Institutions

In Table 5, we present results for Ivy League schools (Panel A), top-SAT schools (Panel B), and all other schools (Panel C). Relative to our baseline models with merely public stock and bond benchmarks (models 1 and 2), the Ivy League endowments generate impressive alphas of 3.15 to 3.82% (t=2.01 and 3.69, respectively). However, these strong alphas are eroded when we include alternative investments in our attribution analysis, and they are indistinguishable from zero when both hedge funds and private equity are included as independent variables.

The top-SAT schools (excluding Ivy League schools) earn strong alphas relative to the public equity and public bond models, though not as impressive as the Ivy League schools. In this case, the alphas are completely explained by models that include both hedge fund and private equity benchmarks (models 3 and 4), and the latter models generate negative alphas.

The other schools, not surprisingly, generate alphas that are very similar to the full sample results. In Panel D, we compare the returns earned by Ivy League schools to returns earned by other schools. Models that include the alternative investments (hedge funds and private equity) explain 80% of the time-series variation in the return spread between Ivy League and other schools; the difference in the alphas of Ivy League schools and other schools, albeit positive 113 bps per

year, is no longer reliably different from zero. In Panel E, we compare top-SAT schools to other schools and find qualitatively similar results.

The estimate allocations to public stocks and bonds in our five-factor model are 44% for Ivy League schools and 46% for top-SAT schools. We compare these allocations to the average allocations to public stocks and bonds for these elite institutions during our sample period.[8] In 2011, the allocation of Ivy League schools to public stocks and bonds is 35%, while the allocation for top-SAT schools is 44%. For Ivy League schools, the average allocation during our sample period is 62%, while for the top-SAT schools the average allocation is 73%. For Ivy League schools, the estimated loading of 44% is within 1.08 standard errors of the average allocation. For the top-SAT schools, the estimated loadings are within 2.02 standard errors of the average allocation. There are several potential explanations for the relatively low loadings on the public stock/bond allocations. First, the public stock portfolios of endowments may have different risk profiles that more closely align with those of hedge funds or private equity (e.g., with tilts toward small or value stocks). Second, elite institutions may invest in alternatives with greater risk than the average alternative. For example, elite institutions might prefer hedge funds or private equity firms that make greater use of leverage. Unfortunately, we do not have detailed data on the public stock portfolios or alternative asset investments of endowments that would be necessary to test these conjectures, but it strikes us as a potentially interesting area for further research given our results.[9]

In combination, these results indicate that the strong returns earned by top-performing endowments, Ivy League schools, and top-SAT schools are explained by

[8] We thank Stephan Dimmock for providing us with the asset allocation data for these endowments.

[9] As we mention in the introduction, Lerner, Schoar, and Wongsunwai (2007) document that educational endowments enjoy the highest internal rates of return among private equity investors but only make rudimentary adjustments for risk. One possible explanation for the differing returns across private equity funds (and their investors) is cross-sectional variation in the risk of the funds, which would most likely be a result of different levels of leverage deployed by different private equity firms.

their allocation to alternative investments, notably hedge funds and private equity, which are relatively small factors in explaining the returns of the average endowment. More importantly, the attribution model intercepts for top-performing funds, Ivy League schools, and top-SAT schools are indistinguishable from other schools once we account for the differing asset allocation decisions. Thus, whether the superior returns of elite institutions can be considered superior risk-adjusted returns depends on whether the alternative investments deliver positive risk-adjusted returns. We discuss this issue in detail in Section IV.

D. Big vs. Small Endowments

In auxiliary analyses (see online appendix), we analyze the returns of big, medium, and small endowments. Big endowments are ranked in the top 50, medium endowments are outside the top 50 but with greater than $200 million of AUM, and small endowments are the remainder. The results of this analysis are very similar to our analysis of elite vs. other institutions. Big endowments, which tend to belong to elite institutions, generate intercepts from the two- and three-factor model of 1.98 and 2.52% (t=1.54 and 2.91, respectively). However, the intercept from the five-factor model is -0.48% and is unreliably different from zero. In contrast, medium and small endowments do not generate intercepts that are reliably different from zero for either the two-, three-, or five-factor models. Thus, big endowments enjoyed strong returns during our sample period, but the strong returns are explained by their allocations to alternative investments.

E. Distribution of Alphas

Our results indicate that asset allocation explains most of the observed variation in performance across endowments. If this conclusion is valid, we expect the distribution of intercepts from the five-factor attribution model to approximate what we would expect to observe by chance. To investigate this issue, we separately estimate the five-factor alpha for each of the 279 endowments that report returns in each of our 21 sample years. While the alphas for individual endowments are estimated with considerable noise, our main interest here is seeing whether the

distribution of the estimated alphas differs significantly from what we would expect to observe by chance.

In figure 1, we present the empirical and analytical distribution of the *t*-statistics associated with these alpha estimates. The distribution of estimated *t*-statistics is shifted toward negative territory as 176 of the 279 endowments (63%) generate negative intercepts. We can comfortably reject the null hypothesis that the empirical and analytical distribution of t-statistics are equal ($p<.01$). The cross-sectional distribution of the intercepts for endowments that report in all 21 years lends credibility to our conclusion that there is little evidence that endowments deliver superior returns relative to standard benchmarks.

III. Performance of Alternative investments

The public stock (S&P 500 and MSCI ACWI-exUS) and public bond (Barclays Aggregate) are widely used benchmarks that merely track passive portfolios. Thus, it is difficult to argue that these asset classes generate alpha.

Hedge funds and private equity are different. Indeed, the raison d'etre for hedge funds is arguably the identification of alpha. Private equity funds might also identify investment strategies that deliver alpha. Even if hedge fund and private equity fund managers identify investments that earn superior returns, this alone is not sufficient to generate superior returns for those who invest in them. Fund managers would be able to charge high fees for their superior skill, and investors would arguably be left with zero net-of-fee alphas, as in Berk and Green (2004). Indeed, many hedge funds and private equity funds charge high fees (often a 2% management fee and a 20% performance fee). In summary, for endowments to enjoy the alpha-generating abilities of hedge funds or private equity, two conditions must hold. First, the funds must be able to identify alpha. Second, they must charge fees that do not completely offset the alpha-generating abilities of fund managers.

Whether hedge funds generate alpha is the subject of ongoing research. Ibbotson, Chen, and Zhu (2011) analyze the returns to over 8,000 hedge funds and conclude the net-of-fee alpha of the funds is 3% per year. Kosowski, Naik, and Teo (2007) conclude the average alpha across hedge funds is 42 bps per month (albeit statistically insignificant). However, funds in the top performance bracket earn impressive monthly alphas in excess of 1% per month. Jagannathan, Malakhov, and Novikov (2010) document similar performance persistence in hedge funds. Fung, Hsieh, Naik, and Ramadorai (2008) analyze the returns on funds-of-funds and document that alphas are not reliably positive across the three subperiods they analyze. In reviewing this work, Stulz (2007, p.186) concludes "hedge funds have a nonnegative alpha net of fees on average." Put another way, hedge fund managers at least cover their fees on average. Stulz also issues an admonition that the evidence of performance persistence may be misleading as many hedge funds may employ strategies that are akin to selling earthquake insurance. He concludes (p.187): "A hedge fund that implements a strategy akin to selling earthquake insurance and whose risk is not captured well by commonly used risk factors will have a significant positive alpha – until the earthquake hits."

Several studies analyze the returns to private equity. Kaplan and Schoar (2005) analyze fund-level data and document that the net-of-fee returns of private equity funds (both venture capital and buyout) approximately equal the return on the S&P 500, while Ljungqvist and Richardson (2003) using a different sample find returns that are 5.7% higher than a simulated investment in the S&P 500 with the same time schedule. Ewens, Jones, and Rhodes-Kropf (2013) use general partner value estimates (rather than realized returns) to estimate quarterly private equity returns and document annual alphas of 4% for buyout funds. Phalippou and Gottschalg (2009) use a dataset similar to Kaplan and Schoar (2005) but argue that reasonable adjustments to the data to reflect the nature of reporting biases leads to lower estimates of returns. Franzoni, Novak, and Phalippou (2012) argue that private equity investments are exposed to illiquidity risk and, after accounting for this liquidity risk, earn an alpha close to zero. In reviewing the literature on the

performance of private equity, Metrick and Yasuda (2011) conclude: "The evidence on whether venture capital and buyout funds achieve excess performance is mixed." They attribute the mixed results to the poor estimation of the risk characteristics inherent in the funds, stale reporting, and, in the case of buyouts, the lack of an adjustment for the leverage employed.

We also evaluate whether the benchmark indexes that we employ generate alphas relative to standard asset pricing models. To do so, we estimate the alphas on the alternative investments using the Fama-French three-factor model (Fama and French (1993)). The three factors are a market risk premium ($R_{mt} - R_{ft}$), a size factor (SMB), and a book-to-market factor (HML). All factors are from Ken French's online data library. We regress the returns on the hedge fund (or private equity) index less the risk-free rate on the three factors. Hedge fund returns are monthly returns, while private equity returns are quarterly returns. Both hedge funds and private equity are arguably illiquid asset classes. To correct for this stale pricing issue in the estimation of alphas, we use lagged independent variables (Scholes and Williams, 1977).

The results for hedge funds are presented in Table 6. The baseline regression (with no lags) generates a low, but reliably positive beta (0.33) and size coefficient (0.17). More importantly, the annualized alpha is an impressive 5.36% per annum. As in Asness, Krail, and Liew (2001), we include three lags of the monthly factor returns to correct the alphas for stale pricing. Including lagged factors does increase the market and size loadings (an indication that stale pricing is an issue with the hedge fund return series), but puts only a small dent in the estimated alpha, which is now 4.93% per annum.[10] The summed loadings on the lagged market and size factors are reliably positive (p=.01 and .10, respectively), while the summed loading

[10] Including a momentum factor, UMD from Ken French's online data library, as an additional independent variable results in a positive summed coefficient estimate on UMD of 0.058 (p<.02) and reduces the estimated annualized alpha to 4.45%.

on the lagged value factor is not (p=.89). (Asness, Krail, and Liew (2001) document that index alphas are indistinguishable from zero for the period 1994 to 2000, but this result appears to be period specific.) Consistent with the research reviewed previously and summarized by Stulz (2007), these results indicate the hedge funds generate impressive returns.

The results for private equity are presented in Table 7. The baseline regression (with no lags) generates low but reliably positive market beta (0.37) and impressive alphas. However, stale pricing is a severe issue for private equity returns. The regressions with 8 quarterly lags generate much larger summed loadings on the market and size factors. The sum of the lagged coefficients on the market risk premium and size factor are reliably positive (p<.01 and .02, respectively), while the sum of the lagged coefficients on the book-to-market factor is not reliably positive (p=.86). These results indicate that private equity investments have average market betas and a strong tilt toward small stocks.[11] More importantly, after correcting for the stale pricing inherent in private equity investments, the estimated alphas are no longer reliably positive. These results jibe well with the conclusions of Metrick and Yasuda (2011) and Franzoni, Novak, and Phallippou (2012). In short, the insignificant alpha on the private equity benchmark makes it difficult to argue that the returns earned by tilting toward private equity represent alpha.

In summary, allocations to hedge funds could arguably be considered alpha generating, while we cannot reject the null hypothesis that private equity alphas are zero. The largest estimated loading on hedge funds in our five-factor attribution model is 0.22 for Ivy League schools (Table 5, Panel A). Thus, one could arguably add 1.08% (22% x 4.9%) to the five-factor attribution model intercept for Ivy League school of 0.46% (Table 5, Panel A) and call the result, 1.54%, an estimate of the alpha. However, given the standard error on the attribution model intercepts for

[11] Private equity returns do not load significantly on a momentum factor (UMD) when we include it as an additional independent variable in the regression.

the Ivy League schools is 1.3%, calling the hedge fund allocation alpha still fails to deliver positive evidence of superior risk-adjusted performance.

IV. Robustness

A. Subperiod Analysis

To test the robustness of our conclusions, we split our sample period into two subperiods, 1991 to 2000 and 2001 to 2011, and reestimate the regressions presented in tables 4 and 5 by subperiod. The results are presented in Table 8, Panel A. Of course, we lose power given we only have 10 or 11 observations of annual returns within each sample period. Nonetheless, the results are quite supportive of our main conclusions. We find no evidence that the elite institutions (Ivy League or top-SAT schools) or the top performance decile earn reliably positive returns. In fact, using the full five-factor attribution analysis, all estimated alphas but one are negative within each subperiod (albeit not reliably so) for Ivy League, top-SAT, and the top performance decile. The lone exception is the Ivy League alpha of 1.38% (*t*=.85) during the 2001-2011 period.

B. Omitted Asset Classes

One concern that readers may have is that we have omitted a relevant asset class. To understand the impact of an omitted asset class on our analysis, consider a portfolio that is a linear combination of n asset classes and earns no alpha relative to the allocation:

$$R_{pt} = \sum_{i=1}^{n} \beta_i R_{it} + \varepsilon_t, \quad (2)$$

where R_{pt} is the portfolio return in period t, R_{it} is the return on asset class i, and β_i is the allocation to asset class i (and β_is sum to one). The error term (or the portfolio's tracking error relative to the asset classes) is measured by ε.

Assume the researcher omits the n^{th} factor and estimates a constrained regression (β_is sum to one) of the portfolio return (R_{pt}) on n-1 factors (i.e., the n^{th} factor is omitted from the regression):

$$R_{pt} = \alpha + \sum_{i=1}^{n-1} \beta_i' R_{it} + \varepsilon_t. \quad (3)$$

The nature of the bias in the estimated alpha from equation (3) can be understood by considering a secondary regression of the return on the n^{th} asset class on the remaining n-1 asset class returns:

$$R_{nt} = \alpha_O + \sum_{i=1}^{n-1} \gamma_i R_{it} + \nu_t, \quad (4)$$

where the n-1 γ parameters sum to one in order to preserve the linear constraint that βs sum to one in equation (2). Substituting from the secondary regression (4) for R_{nt} on the right-hand side of the true model (2) and taking expectations allows us to derive the bias resulting from the estimated regression (3).

The bias will be a function of the return of the omitted asset class relative to the n-1 included factors (α_O) and the actual allocation to the omitted asset class (β_n):

$$E(\alpha) = \beta_n \alpha_O. \quad (5)$$

If the omitted asset class generates no alpha relative to the included asset classes, the (i.e., $\alpha_O = 0$) then the estimated alpha is unbiased. Similarly, if the omitted asset class has no allocation (i.e., $\beta_n = 0$) then the estimated alpha is unbiased.

To understand the nature of the potential bias, consider an omitted asset class with returns that are independent of the included asset classes. If the asset class generates low average returns relative to the included asset class, then $\alpha_O < 0$. If this low-return asset class is omitted from the regression in equation (3) and has a positive weight in the portfolio ($\beta_n > 0$), the estimated alpha will be negative (i.e., downwardly biased relative to the true alpha of zero). Similarly, if the omitted asset class generates high returns unrelated to the included asset classes, the alpha will be positive (i.e., upwardly biased).

International stocks are an important asset class in many endowment funds. Thus, in our two-factor attribution model with US Stocks and Bonds, we are excluding an important asset class for many endowments. In all of our estimated models (for average endowment, extreme performance deciles, Ivy League, top-SAT, and other schools), the estimated alphas increase when we add international stocks

to our attribution analysis. The change in the alpha (albeit small) can be traced to the low return on international stocks (7.8%) relative to US Stocks (10.0%) and the material allocation to international stocks by many endowments.[12]

Note that the R-Squared of the estimated model (3) will be downwardly biased if the omitted factor explains important time-series variation in the portfolio return. Thus, a symptom of an omitted variable problem would be low R-Squareds in our attribution model. Since all models that include five factors generate R-Squared values ranging from 95 to 99% and we have included the asset classes that endowments list as their most important investments, it seems unlikely that there is a severe omitted variable issue.

Nonetheless, to investigate the possibility that an omitted asset class is biasing our results, we augment our five-factor model with additional asset class returns. We estimate models that include (alternatively) T-bills, the Cambridge Associates Venture Capital Index, the National Council of Real Estate Investment Fiduciaries (NCREIF) private real estate index, and the National Association of Real Estate Investment Trusts (NAREIT) public real estate index. We present these results in Table 8, panel B. In all models, the estimated intercepts do not change materially.

C. Alternative Hedge Fund Index

In our main analysis, we use the Hedge Fund Research Fund-Weighted Composite Index (HFRI). Tables 1 and 6 reveal that this index generates an impressive mean annual return of 12.1% and an annualized three-factor alpha of 4.93%. Because of survivorship, selection, and instant history biases inherent in hedge fund reporting, Fung and Hseih (2002) argue that this index overstates the

[12] To be precise, the alpha of the international stocks relative to other factors, estimated using the constrained regression of equation 4, is the relevant variable for considering the bias. For example, the estimated international stock alpha is -2.0% (t=-0.56) using US stocks and US bonds as the independent variables and -8.7% (t=-3.25) using US stocks, US bonds, private equity, and hedge funds as factors.

returns on hedge funds and suggest an index based on fund of funds provides a more realistic benchmark for hedge fund returns available to investors.

We reestimate all of our results using two alternative hedge fund benchmarks: the Hedge Fund Research Fund of Funds index (HFRFOF) and the Hedge Fund Research Equity Hedge Index. Consistent with Fung and Hseih (2002), the HFRFOF index delivers a less impressive mean annual return of 8.0% and an annualized three-factor alpha less than half that of the HFRI index, 2.17% (p=.03). In table 8, Panel C, we summarize our main results of the five-factor attribution analysis using the fund of funds index (HFRFOF). While the endowment alphas are greater when we use the HFRFOF index, none of the endowment subsamples earn reliably positive alphas. The use of the HFR Hedge Equity Index, which consists of hedge funds that employ long/short equity strategies, also does not materially change our results.

D. Other Robustness Checks

We consider a number of additional robustness checks, which are available in the online appendix. We estimate results using AUM-weighted returns instead of equally-weighted returns, replace the US Bond benchmark with a global bond benchmark, and replace the S&P 500 index with a total stock market index. In all cases, we find results that are similar to those reported.

V. Conclusion

We analyze the returns of hundreds of US educational endowments over the 21-year period ending in 2011 using a simple attribution model that includes benchmarks related to US Stock, US Bonds, International Stock, Private Equity, and Hedge Funds. When we restrict the attribution model to public stock (US and International Stock) and bond benchmarks (US Bond), we document that the average endowment earns an alpha close to zero, that the public stock and bond benchmarks together explain 99% of the time-series variation in the return of the average endowment, and that the attribution model yields sensible estimates of the

typical stock bond allocations (roughly 60% stock and 40% bonds). These results are consistent with the view that market movements, rather than asset allocation, are the most important determinant of *time-series* variation in performance (Brinson et al. (1986); Ibbotson (2010); Xiong et al. (2010)).

There is intriguing evidence of performance persistence. Elite institutions and top-performing endowments earn reliably positive alphas relative to these simple public stock and bond benchmarks of about 1.7 to 3.8% per annum.

Allocations to alternative investments explain the majority of this superior performance. When we add indexes for hedge funds and private equity to our attribution model, the intercepts from the five-factor attribution models for elite institutions and top-performing endowments are indistinguishable from zero, ranging from -0.99 to 0.46%. These results indicate that the asset allocation of elite institutions and top-performing funds is the single most important determinant of their superior returns during the last two decades. Our results fail to provide evidence that some combination of manager selection, market timing, or tactical asset allocation generate alpha for investors, which would appear as positive intercepts in our attribution models. This conclusion rests on the assumption that the benchmarks in our factor models do not deliver alpha.

Clearly, the public stock and bond benchmarks do not represent alpha-generating asset classes. However, one might argue that the alternative investment strategies deliver alpha (i.e., positive risk-adjusted returns). Two points should be noted about this possibility. First, in theory, it is difficult to envision a market equilibrium in which alternative strategies generate a return that is not compensation for risk. If managerial talent is the scarce resource, asset managers (i.e., managers of hedge funds and private equity firms) should demand compensation equal to their ability to generate superior returns leaving investors no better (or worse) off. Second, in practice, there is mixed evidence that the high returns earned by alternative investments represent alpha.

David Swensen (2009, p.48) summarizes the challenge facing endowment management well:

> In spite of the daunting obstacles to active management success, the overwhelming majority of market participants choose to play a loser's game. Like the residents of Lake Wobegon who all believe their children to be above average, nearly all investors believe their active strategies will produce superior results. The harsh reality of the negative-sum game dictates that, in aggregate, active managers lose to the market by the amount it costs to play in the form of management fees, trading commissions, and dealer spread. Wall Street's share of the pie defines the amount of performance drag experienced by would-be market beaters.

The vast majority of endowments choose to play the loser's game, with mixed results. The average endowment allocates 73% of its domestic *public* equity portfolio and 66% of fixed income assets to active management[13] – markets in which it is notoriously difficult to beat public indexes. Hefty allocations to hedge funds and private equity also generate large fees for asset managers (with mixed evidence on their ability to generate alpha net of fees). Clearly, endowments make these allocations to expensive active strategies hoping for benchmark-beating returns.

Our analysis offers both good news and bad news. The good news is that our results indicate that the fees paid by endowments do not result in systematically low returns relative to benchmarks as we find limited evidence of negative benchmark-adjusted returns. The average endowment, elite institutions, and top-performing institutions earn benchmark-adjusted returns indistinguishable from zero in models that include alternative strategy benchmarks. The strongest evidence of subpar performance comes from the bottom-performing endowments, which earn reliably negative benchmark-adjusted returns ranging from -1.48% to -3.02%. The bad news is that the investment managers do not appear to share the fruits of

[13] The Commonfund Benchmarks Study (2011), Figures 3.3 and 3.4, p.15.

their labor with those whose money they manage. While the managers appear to earn sufficient returns to cover their fees, there is no evidence that endowments – even the endowments of elite institutions – are able to beat benchmark returns.

We have shed some light on the performance of endowments. This information should prove useful to those who manage and advise university endowments. One question that we find particularly intriguing is the extent to which investment committees, which provide advice and oversight of university endowments, affect the managerial selection (e.g., active v. passive) and asset allocation decisions of managers (e.g., stock, bond, alternatives). We conjecture that many universities staff investment committees with alumni from the financial services industry (e.g., investment banks, hedge funds, venture capital, and private equity firms). These financial professionals would have the experience necessary to qualify them for this service and are likely donors at the institutions where they serve. It is plausible that the composition of these committees has a causal and material impact on an endowment's manager and asset allocation decision. Given the large variation in these choices across institutions, we believe this is a potentially interesting area for further research.

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Figure 1: Distribution of Alphas for Endowments that Report in All Years

For 279 endowments that report returns in all sample years, we estimate the alpha and associated t-statistics from the intercept of a five-factor attribution model (US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity). The figure presents the empirical distribution of estimate t-statistics (blue line) and the analytical distribution of the t-statistic (red line).

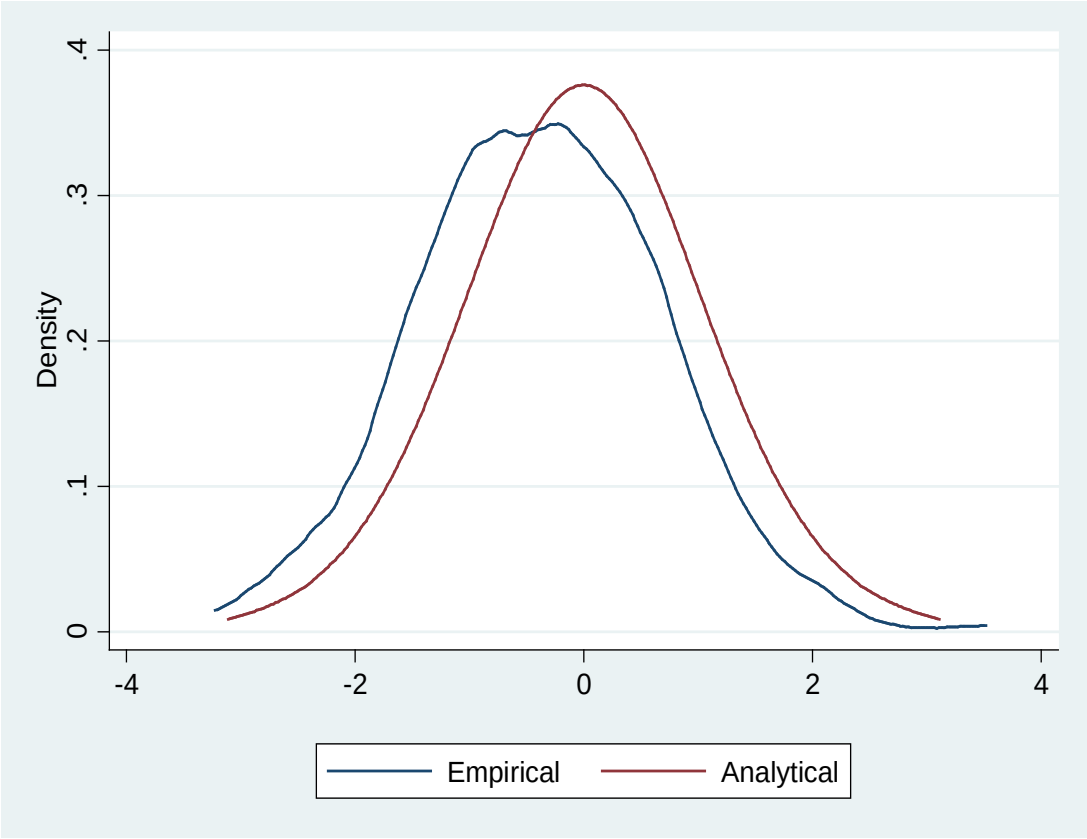

Table 1: Endowment and Benchmark Percentage Returns, 1991-2011

The left block presents returns for all endowments. The middle block presents returns for Ivy League, top-SAT schools outside of Ivy League, and others. The right block presents benchmark return data (US Stocks = S&P 500, Non-US Stocks = MSCI-exUS, Bond=Barclays Aggregate US Bond, Private Equity = Cambridge PE Index, Hedge Fund = HFR Aggregate Index).

	All Endowments						Elite v. Others			Benchmarks				
Year	N	Mean	Std. Dev.	P25	Median	P75	Ivy	Top SAT	Others	US Stocks	Non-US Stock	Bond	Private Equity	Hedge Fund
1991	346	7.4	3.5	5.6	7.5	9.2	3.6	7.7	7.4	7.4	-9.8	10.7	4.3	14.0
1992	365	13.3	3.2	11.6	13.2	15.0	14.5	14.9	13.1	13.4	0.7	14.1	9.1	23.4
1993	384	13.5	4.4	11.0	13.7	16.0	16.5	14.0	13.4	13.6	20.0	11.8	21.8	27.5
1994	397	3.0	3.0	1.0	2.9	4.6	7.2	4.3	2.8	1.4	17.5	-1.3	18.3	15.5
1995	415	15.4	4.1	13.2	15.4	17.3	15.5	16.8	15.3	26.1	2.2	12.6	17.6	13.0
1996	425	16.9	4.2	15.0	16.8	18.9	21.2	19.9	16.6	26.0	13.2	5.0	30.6	26.0
1997	435	20.4	4.7	17.9	20.3	22.7	21.0	21.0	20.3	34.7	14.1	8.2	26.1	17.2
1998	445	17.8	4.4	15.3	18.0	20.2	17.7	19.1	17.8	30.2	1.4	10.5	35.8	10.9
1999	577	10.8	4.7	8.2	10.7	13.3	12.2	12.6	10.7	22.8	9.5	3.1	15.9	11.7
2000	600	12.0	10.0	6.2	10.0	15.5	26.7	24.6	11.1	7.2	18.1	4.6	34.5	23.2
2001	564	-3.5	6.3	-7.2	-3.7	0.1	1.5	-5.8	-3.5	-14.8	-23.8	11.2	-11.4	1.5
2002	601	-6.2	4.5	-8.7	-6.3	-3.8	-1.5	-6.3	-6.3	-18.0	-8.2	8.6	-11.7	1.6
2003	643	3.2	3.1	1.6	3.0	4.6	6.2	2.8	3.1	0.3	-4.2	10.4	1.9	7.0
2004	665	15.3	4.1	13.5	15.9	17.7	17.7	17.3	15.2	19.1	32.5	0.3	23.3	13.0
2005	683	9.3	3.3	7.5	9.0	10.9	15.8	13.6	9.0	6.3	16.9	6.8	30.1	8.2
2006	707	10.8	3.5	8.5	10.9	13.0	16.9	15.1	10.5	8.6	28.4	-0.8	25.6	13.8
2007	723	17.2	3.8	15.5	17.5	19.1	23.8	21.9	17.0	20.6	30.1	6.1	34.4	14.4
2008	728	-3.0	4.0	-5.8	-3.3	-0.7	3.3	0.5	-3.2	-13.1	-6.2	7.1	4.5	0.9
2009	793	-18.7	5.3	-21.7	-19.1	-16.4	-22.0	-21.2	-18.6	-26.2	-30.5	6.0	-20.6	-10.1
2010	817	11.9	3.3	10.2	12.1	13.7	12.2	12.2	11.9	14.4	10.9	9.5	18.3	9.1
2011	792	19.2	4.3	17.8	19.8	21.8	20.5	19.9	19.2	30.7	30.3	3.9	24.7	11.5
	Mean	8.8	4.4	6.5	8.8	11.1	11.9	10.7	8.7	10.0	7.8	7.1	15.9	12.1
	Std. Dev.	9.9					10.9	11.4	9.8	17.0	17.4	4.4	16.2	9.0

Table 2: Performance Persistence of University Endowments

Educational endowments are sorted into quintiles based on performance in each year; returns are measured in the subsequent year. The bottom and top quintiles are split in half (into portfolios 1a and 1b for the bottom quintile and portfolios 5a and 5b for the top quintile). The table presents the annual percentage returns for each partition in the year following ranking.

	Endowment Returns sorted by Prior Year Performance								
Year	1a (Lo)	1b	2	3	4	5a	5b (Hi)	5a - 1b	5b - 1a
1992	12.89	13.44	13.61	12.58	13.09	12.81	15.54	-0.63	2.65
1993	10.03	11.67	12.96	14.38	14.62	14.77	15.19	3.10	5.16
1994	2.43	2.09	2.36	3.32	3.30	3.63	3.39	1.55	0.96
1995	17.64	15.51	15.79	15.46	15.22	13.60	15.46	-1.91	-2.18
1996	12.89	15.54	16.29	17.28	17.22	18.85	20.70	3.31	7.81
1997	14.77	19.57	19.96	20.36	21.17	22.25	24.50	2.68	9.73
1998	14.56	16.24	17.69	17.45	18.13	20.02	21.98	3.77	7.42
1999	8.45	10.16	10.16	11.36	11.88	12.12	12.68	1.96	4.23
2000	8.16	8.44	11.50	10.63	12.38	16.37	20.29	7.93	12.14
2001	0.80	-0.25	-1.92	-4.67	-4.41	-6.05	-6.95	-5.79	-7.75
2002	-10.79	-8.06	-7.23	-6.30	-5.54	-3.82	-1.03	4.24	9.76
2003	2.31	2.50	2.72	2.69	3.45	3.51	4.69	1.01	2.38
2004	15.59	15.42	15.76	15.44	15.19	15.26	13.88	-0.16	-1.71
2005	6.36	7.16	9.02	9.33	10.37	11.31	11.47	4.15	5.12
2006	7.12	9.00	9.65	10.45	11.89	12.93	15.69	3.93	8.57
2007	12.45	15.32	16.44	17.42	18.58	19.53	20.75	4.22	8.30
2008	-3.36	-3.98	-3.87	-3.45	-2.86	-2.61	0.68	1.37	4.04
2009	-19.58	-19.64	-19.17	-18.11	-19.63	-19.13	-18.82	0.51	0.76
2010	11.47	12.26	12.13	12.18	12.44	11.42	11.17	-0.84	-0.30
2011	15.61	16.26	19.52	19.90	20.37	21.12	20.09	4.86	4.48
Mean	6.99	7.93	8.67	8.89	9.34	9.90	11.07	1.96	4.08
Std. Dev.	9.52	9.89	10.22	10.22	10.51	10.79	11.03	2.97	4.88

Table 3: Attribution Model Results for Average Endowment Returns, 1991-2011

The table reports the intercept and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non-US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non-US Stock, Hedge Fund, and Private Equity. In all models, estimated coefficients are constrained to sum to one.

	Coefficients (Weights)					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
0.04%	0.59	0.41				0.05	13.60***	9.65***				94%
0.40%	0.41	0.38	0.21			0.99	12.46***	16.16***	7.03***			99%
-1.82%	0.36	0.28		0.17	0.19	-3.36***	7.76***	5.80***		2.37**	3.60***	98%
-0.68%	0.36	0.31	0.13	0.11	0.08	-1.25	10.01***	7.99***	3.39***	1.80*	1.63	99%

***, **, * - significant at the 1, 5, and 10% level.

Table 4: Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011

The table reports the intercept and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non-US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non-US Stock, Hedge Fund, and Private Equity. In panels A and B (panel C), estimated coefficients are constrained to sum to one (zero).

	Coefficients					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Bottom Decile												
-1.63%	0.53	0.47				-1.86*	10.83***	9.70***				92%
-1.48%	0.39	0.44	0.17			-2.06*	6.70***	10.64***	3.11***			95%
-3.02%	0.37	0.36		0.16	0.12	-3.16***	4.67***	4.38***		1.23	1.27	94%
-2.03%	0.37	0.39	0.13	0.09	0.03	-1.79*	4.88***	4.79***	1.51	0.67	0.25	95%
Panel B: Top Decile												
2.19%	0.61	0.39				1.92*	9.53***	6.18***				90%
2.41%	0.40	0.34	0.25			2.89**	5.90***	7.16***	4.09***			95%
-0.70%	0.27	0.21		0.22	0.30	-0.87	4.06***	3.00***		2.08*	3.82***	97%
-0.18%	0.27	0.23	0.07	0.19	0.25	-0.18	4.06***	3.12***	0.91	1.62	2.64**	97%
Panel C: Top - Bottom												
3.82%	0.08	-0.08				3.51***	1.31	-1.31				29%
3.90%	0.01	-0.10	0.09			3.59***	0.10	-1.54	1.09			38%
2.32%	-0.10	-0.15		0.07	0.18	1.84*	-0.94	-1.40		0.40	1.48	53%
1.86%	-0.10	-0.17	-0.06	0.10	0.22	1.17	-0.93	-1.45	-0.50	0.55	1.48	54%

***, **, * - significant at the 1, 5, and 10% level.

Table 5: Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

The table reports the intercept and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non-US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non-US Stock, Hedge Fund, and Private Equity. In panels A to C (panel D and E), estimated coefficients are constrained to sum to one (zero).

Table 5, cont'd

Alpha	Coefficients: US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	*t*-statistics: Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Ivy												
3.15%	0.57	0.43				2.01*	6.43***	4.78***				79%
3.82%	0.26	0.36	0.39			3.69***	3.01***	5.96***	5.12***			92%
-0.83%	0.08	0.17		0.30	0.45	-0.80	0.89	1.88*		2.11*	4.48***	95%
0.46%	0.08	0.21	0.15	0.22	0.33	0.36	1.01	2.33**	1.65	1.58	2.77**	96%
Panel B: Top-SAT Schools (ex. Ivy)												
1.74%	0.64	0.37				1.34	8.56***	4.91***				87%
2.28%	0.38	0.31	0.31			2.53**	5.12***	5.93***	4.73***			94%
-1.68%	0.21	0.15		0.25	0.39	-2.16**	3.15***	2.17**		2.35**	5.16***	97%
-0.99%	0.21	0.17	0.08	0.21	0.33	-1.00	3.22***	2.40**	1.14	1.89*	3.48***	97%
Panel C: Others												
-0.10%	0.58	0.42				-0.13	14.08***	10.10***				95%
0.25%	0.42	0.38	0.20			0.66	13.24***	17.21***	7.16***			99%
-1.85%	0.37	0.29		0.17	0.18	-3.40***	7.97***	5.98***		2.25**	3.36***	98%
-0.68%	0.37	0.32	0.14	0.10	0.07	-1.26	10.48***	8.40***	3.55***	1.65	1.36	99%
Panel D: Ivy – Others												
3.25%	-0.01	0.01				3.44***	-0.16	0.16				4%
3.57%	-0.16	-0.02	0.19			4.63***	-2.54**	-0.55	3.31***			62%
1.02%	-0.29	-0.12		0.13	0.27	1.40	-4.69***	-1.78*		1.33	3.88***	80%
1.13%	-0.29	-0.11	0.01	0.13	0.26	1.19	-4.54***	-1.63	0.20	1.17	2.90**	80%
Panel E: Top-SAT Schools (ex. Ivy) – Others												
1.84%	0.05	-0.05				2.56**	1.30	-1.30				29%
2.03%	-0.04	-0.07	0.11			3.11***	-0.70	-1.93*	2.33**			54%
0.17%	-0.16	-0.14		0.08	0.21	0.29	-3.32***	-2.76**		1.09	3.92***	81%
-0.31%	-0.16	-0.15	-0.06	0.11	0.26	-0.44	-3.38***	-2.96***	-1.09	1.39	3.80***	82%

***, **, * - significant at the 1, 5, and 10% level.

Table 6: Alphas on Hedge Fund Benchmark, January 1990 to September 2011

The dependent variable is the HFRI fund composite monthly return less the risk free rate. The independent variables are the Fama-French market, size, and book-to-market factors. In the regression with lags, each factor is lagged through 3 months (L to L3). Annualized Alpha is monthly alpha times 12.

	Baseline Regression (No Lags)		Regression with Lags		
VARIABLES	Coef.	t-stat	Coef.	t-stat	Summed Coef.
mktrf	0.33	22.90	0.32	23.11	0.41
L.mktrf			0.06	4.05	
L2.mktrf			0.04	2.27	
L3.mktrf			-0.01	-0.90	
smb	0.17	8.64	0.15	7.79	0.21
L.smb			0.04	2.03	
L2.smb			0.01	0.49	
L3.smb			0.01	0.42	
hml	-0.02	-0.97	-0.05	-2.33	-0.06
L.hml			0.01	0.46	
L2.hml			0.00	-0.003	
L3.hml			-0.01	-0.59	
Alpha (annualized)	5.36	7.04	4.93	6.75	
Observations	261		261		
Adjusted R-squared	0.753		0.780		

Table 7: Alphas on Private Equity Benchmark, 1986.Q2 to 2011.Q3

The dependent variable is the quarterly Cambridge Associates private equity index quarterly return less the risk-free rate. The independent variables are the Fama-French market, size, and book-to-market factors. In the regression with lags, each factor is lagged through 8 quarters (L to L8). Annualized Alpha is quarterly alpha times 4.

	Baseline Regression (No Lags)		Regression with Lags		
VARIABLES	Coef.	t-stat	Coef.	t-stat	Summed Coef.
mktrf	0.37	8.26	0.38	8.73	1.00
L.mktrf			0.10	2.26	
L2.mktrf			0.12	2.82	
L3.mktrf			0.06	1.38	
L4.mktrf			0.15	3.44	
L5.mktrf			0.03	0.69	
L6.mktrf			0.06	1.33	
L7.mktrf			0.02	0.49	
L8.mktrf			0.07	1.60	
Smb	0.02	0.22	0.11	1.46	0.64
L.smb			0.17	2.22	
L2.smb			0.10	1.36	
L3.smb			0.07	1.04	
L4.smb			-0.12	-1.48	
L5.smb			0.19	2.47	
L6.smb			-0.02	-0.28	
L7.smb			0.16	1.97	
L8.smb			-0.03	-0.36	
hml	-0.05	-0.82	-0.02	-0.23	0.01
L.hml			-0.15	-2.25	
L2.hml			0.05	0.78	
L3.hml			-0.01	-0.18	
L4.hml			-0.03	-0.41	
L5.hml			0.07	1.16	
L6.hml			0.00	0.03	
L7.hml			0.11	1.79	
L8.hml			-0.02	2.26	
Annualized Alpha	6.99	4.83	1.55	0.88	
Observations	102		102		
Adjusted R-squared	0.476		0.629		

Table 8: Robustness Test Results

The table reports attribution model intercepts (%) using alternatives to the five-factor model employed in our main results, which uses US Stock, US Bond, Non-US Stock, Hedge Fund, and Private Equity benchmarks. In Panel A, subperiod analysis uses the same model within subperiods. In Panel B, we separately consider the introduction of an additional factor (Treasury Bills, Venture Capital, Public Real Estate, Private Real Estate) to the base model. In Panel C, we consider alternative benchmarks for hedge funds (HFR Fund-of-Funds Index and HFR Equity Hedge Index).

	All Endowments	Losers	Winners	Ivy	Top-SAT	Others
Main Results	-0.68%	-2.03%	-0.18%	0.46%	-0.99%	-0.68%
	(-1.25)	(-1.79)*	(-0.18)	(0.36)	(-1.00)	(-1.26)
Panel A: Subperiod Analysis						
1991-2000	-2.27%	-0.54%	-1.53%	-3.29%	-1.02%	-2.31%
	(-3.54)**	(-0.20)	(-0.55)	(-0.74)	(-0.39)	(-4.06)***
2001-2011	-0.32%	-1.67%	-0.06%	1.38%	-0.63%	-0.33%
	(-0.57)	(-1.61)	(-0.05)	(0.85)	(-0.85)	(-0.60)
Panel B: Additional Asset Classes						
Add: T-Bills	-0.83%	-2.06%	-0.35%	0.09%	-1.18%	-0.81%
	(-1.09)	(-1.27)	(-0.24)	(0.05)	(-0.85)	(-1.08)
Add: Venture Capital	-0.74%	-2.15%	0.21%	1.11%	-0.21%	-0.79%
	(-1.23)	(-1.71)	(0.19)	(0.84)	(-0.22)	(-1.33)
Add: Public Real Estate	-1.10%	-2.54%	-0.28%	-0.10%	-1.14%	-1.11%
	(-2.18)**	(-2.16)**	(-0.25)	(-0.08)	(-1.05)	(-2.28)**
Add: Private Real Estate	-0.62%	-1.95%	-0.08%	0.64%	-0.91%	-0.62%
	(-1.24)	(-1.73)	(-0.09)	(0.60)	(-0.94)	(-1.25)
Panel C: Alternative Hedge Fund Index						
Fund-of-Funds Index	-0.04%	-1.61%	1.16%	1.64%	0.09%	-0.08%
	(-0.09)	(-1.40)	(1.32)	(1.40)	(0.10)	(-0.19)
Equity Hedge Index	-0.51%	-1.87%	0.14%	0.82%	-0.73%	-0.52%
	(-0.96)	(-1.71)	(0.15)	(0.67)	(-0.79)	(-0.99)

***, **, * - significant at the 1, 5, and 10% level, t-statistics in parenthesis

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Online Appendix

In this appendix, we present tables of auxiliary analyses that are summarized in the text of the main paper.

AUM-Weighted Results:

- Table A1: AUM-Weighted Attribution Model Results for Average Endowment Returns, 1991-2011
- Table A2: AUM-Weighted Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011
- Table A3: AUM-Weighted Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

Results using CRSP Value-Weighted Total Market Index instead of SP 500:

- Table A4: CRSP US Index: Attribution Model Results for Average Endowment Returns, 1991-2011
- Table A5: CRSP US Index: Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011
- Table A6: CRSP US Index: Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

Results using JP Morgan Global Bond Index instead of Barclays Aggregate:

- Table A7: JP Morgan Global Bond Index: Attribution Model Results for Average Endowment Returns, 1991-2011
- Table A8: JP Morgan Global Bond Index: Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011
- Table A9: JP Morgan Global Bond Index: Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

Additional Persistence Tests:

- Table A10: Transition Matrix of Performance Decile Ranks, 1991-2011

Other Tables:

- Table A11: Attribution Model Results for Big, Medium, and Small Endowments
- Table A12: Benchmark Returns
- Table A13: SAT Rankings by Year
- Table A14: Tests for Data Reporting Bias

Table A1: AUM-Weighted Attribution Model Results for Average Endowment Returns, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In all models, estimated coefficients are constrained to sum to one.

	Coefficients (Weights)					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
2.00%	0.61	0.39				1.55	8.26***	5.26***				86%
2.56%	0.35	0.33	0.32			2.99***	4.95***	6.69***	5.13***			94%
-1.33%	0.20	0.19		0.23	0.39	-1.60	2.77**	2.52**		2.06*	4.81***	97%
-0.32%	0.20	0.22	0.12	0.18	0.29	-0.32	2.97***	2.95***	1.61	1.54	3.05***	97%

***, **, * - significant at the 1, 5, and 10% level.

Table A2: AUM-Weighted Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In panels A and B (panel C), estimated coefficients are constrained to sum to one (zero).

	Coefficients					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Bottom Decile												
-0.84%	0.52	0.48				-0.84	9.46***	8.58***				91%
-0.75%	0.45	0.46	0.10			-0.77	5.60***	8.16***	1.35			92%
-1.33%	0.47	0.39		0.15	-0.01	-1.06	4.59***	3.60***		0.90	-0.09	91%
-0.34%	0.48	0.42	0.12	0.08	-0.10	-0.22	4.64***	3.79***	1.11	0.46	-0.69	92%
Panel B: Top Decile												
4.87%	0.62	0.38				2.43**	5.53***	3.45***				76%
5.17%	0.34	0.32	0.34			2.97***	2.41**	3.19***	2.64**			84%
0.19%	0.08	0.02		0.48	0.42	0.12	0.61	0.16		2.27**	2.69**	92%
-0.25%	0.08	0.01	-0.06	0.51	0.46	-0.13	0.58	0.05	-0.37	2.20**	2.38**	92%
Panel C: Top - Bottom												
5.71%	0.09	-0.09				2.92***	0.84	-0.84				20%
5.92%	-0.10	-0.14	0.24			3.20***	-0.69	-1.31	1.767*			43%
1.51%	-0.39	-0.37		0.33	0.43	0.85	-2.68**	-2.40**		1.40	2.48**	73%
0.09%	-0.40	-0.41	-0.18	0.43	0.56	0.04	-2.73**	-2.63**	-1.13	1.72	2.70**	75%

***, **, * - significant at the 1, 5, and 10% level.

Table A3: AUM-Weighted Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In panels A to C (panel D and E), estimated coefficients are constrained to sum to one (zero).

Table A3, cont'd

Alpha	Coefficients: US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	*t*-statistics: Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Ivy												
3.97%	0.60	0.41				2.23**	5.86***	4.00***				75%
4.70%	0.25	0.33	0.42			3.78***	2.43**	4.59***	4.65***			89%
-0.49%	0.04	0.14		0.31	0.52	-0.40	0.36	1.25		1.84*	4.38***	93%
0.74%	0.04	0.17	0.14	0.24	0.41	0.48	0.42	1.55	1.29	1.38	2.80**	94%
Panel B: Top-SAT Schools (ex. Ivy)												
2.41%	0.65	0.36				1.53	7.17***	3.94***				82%
3.02%	0.36	0.29	0.35			2.54**	3.67***	4.25***	4.00***			91%
-1.67%	0.13	0.12		0.26	0.49	-1.69	1.58	1.37		1.91*	5.11***	96%
-1.31%	0.13	0.13	0.04	0.24	0.46	-1.02	1.56	1.40	0.44	1.64	3.73***	96%
Panel C: Others												
0.85%	0.60	0.40				0.88	10.99***	7.25***				92%
1.28%	0.40	0.35	0.25			2.20**	8.27***	10.45***	5.88***			97%
-1.58%	0.30	0.23		0.20	0.26	-2.42**	5.45***	4.03***		2.25**	4.16***	98%
-0.50%	0.31	0.27	0.12	0.14	0.16	-0.68	6.23***	4.98***	2.35**	1.66	2.34**	98%
Panel D: Ivy – Others												
3.12%	-0.01	0.01				3.39***	-0.15	0.15				3%
3.42%	-0.15	-0.02	0.17			4.40***	-2.33**	-0.50	3.03***			58%
1.09%	-0.27	-0.10		0.11	0.26	1.40	-3.98***	-1.41		1.01	3.38***	75%
1.24%	-0.26	-0.09	0.02	0.10	0.24	1.20	-3.86***	-1.27	0.22	0.86	2.49**	75%
Panel E: Top-SAT Schools (ex. Ivy) – Others												
1.56%	0.04	-0.04				2.16**	1.03	-1.03				23%
1.73%	-0.04	-0.06	0.10			2.54**	-0.66	-1.52	1.95*			47%
-0.09%	-0.17	-0.11		0.06	0.23	-0.15	-3.47***	-2.23**		0.74	4.05***	80%
-0.81%	-0.17	-0.14	-0.08	0.10	0.29	-1.16	-3.72***	-2.69**	-1.68	1.26	4.42***	83%

***, **, * - significant at the 1, 5, and 10% level.

Table A4: CRSP US Index: Attribution Model Results for Average Endowment Returns, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In all models, estimated coefficients are constrained to sum to one.

	Coefficients (Weights)					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
-0.23%	0.61	0.39				-0.35	15.72***	10.17***				96%
0.17%	0.45	0.37	0.18			0.40	12.15***	15.34***	5.60***			98%
-1.76%	0.40	0.29		0.15	0.17	-3.26***	7.83***	6.01***		2.04*	3.13***	98%
-0.80%	0.40	0.32	0.11	0.09	0.08	-1.38	9.19***	7.51***	2.73**	1.44	1.46	99%

***, **, * - significant at the 1, 5, and 10% level.

Table A5: CRSP US Index Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In panels A and B (panel C), estimated coefficients are constrained to sum to one (zero).

	Coefficients					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Bottom Decile												
-1.90%	0.55	0.45				-2.34**	11.88***	9.80***				93%
-1.71%	0.43	0.43	0.14			-2.36**	6.76***	10.44***	2.44**			95%
-2.95%	0.41	0.37		0.13	0.09	-3.12***	4.82***	4.56***		1.02	1.00	95%
-2.13%	0.41	0.39	0.11	0.07	0.02	-1.89*	4.88***	4.82***	1.29	0.54	0.19	95%
Panel B: Top Decile												
1.88%	0.63	0.37				1.76*	10.43***	6.08***				91%
2.19%	0.44	0.34	0.23			2.58**	5.85***	6.92***	3.41***			95%
-0.70%	0.29	0.21		0.21	0.29	-0.84	3.90***	3.03***		1.87*	3.51***	97%
-0.28%	0.29	0.23	0.05	0.18	0.25	-0.28	3.82***	3.06***	0.71	1.49	2.55**	97%
Panel C: Top – Bottom												
3.77%	0.08	-0.08				3.46***	1.35	-1.35				30%
3.90%	0.01	-0.10	0.09			3.56***	0.07	-1.52	1.04			38%
2.26%	-0.12	-0.15		0.08	0.20	1.79*	-1.05	-1.43		0.46	1.56	53%
1.84%	-0.12	-0.17	-0.05	0.11	0.23	1.17	-1.01	-1.46	-0.46	0.58	1.53	54%

***, **, * - significant at the 1, 5, and 10% level.

Table A6: CRSP US Index Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, US Bond, (2) US Stock, US Bond, Non US Stock, (3) US Stock, US Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Bond, Non US Stock, Hedge Fund, and Private Equity. In panels A to C (panel D and E), estimated coefficients are constrained to sum to one (zero).

Table A6, cont'd

Alpha	Coefficients: US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	*t*-statistics: Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Ivy												
2.85%	0.61	0.40				1.94*	7.04***	4.60***				81%
3.67%	0.28	0.35	0.37			3.52***	3.04***	5.83***	4.61***			92%
-0.82%	0.09	0.18		0.29	0.45	-0.78	0.90	1.90*		2.05*	4.29***	95%
0.41%	0.09	0.21	0.15	0.22	0.34	0.33	0.94	2.33**	1.60	1.55	2.76**	95%
Panel B: Top-SAT Schools (ex. Ivy)												
1.42%	0.67	0.33				1.20	9.62***	4.81***				89%
2.04%	0.42	0.30	0.28			2.30**	5.32***	5.82***	4.12***			94%
-1.63%	0.24	0.16		0.23	0.38	-2.10*	3.26***	2.26**		2.22**	4.87***	97%
-1.04%	0.24	0.17	0.07	0.20	0.32	-1.06	3.25***	2.44**	0.99	1.81*	3.42***	97%
Panel C: Others												
-0.37%	0.60	0.40				-0.57	16.27***	10.66***				96%
0.02%	0.45	0.38	0.17			0.04	12.72***	16.13***	5.60***			99%
-1.79%	0.41	0.30		0.14	0.16	-3.29***	8.02***	6.18***		1.90*	2.88**	98%
-0.80%	0.41	0.33	0.12	0.08	0.07	-1.38	9.52***	7.81***	2.82**	1.28	1.19	99%
Panel D: Ivy – Others												
3.22%	0.00	-0.00				3.39***	0.01	-0.01				0%
3.65%	-0.17	-0.02	0.20			4.65***	-2.47**	-0.51	3.25***			61%
0.97%	-0.32	-0.12		0.15	0.29	1.33	-4.66***	-1.87*		1.51	3.97***	80%
1.21%	-0.32	-0.11	0.03	0.14	0.27	1.28	-4.55***	-1.67	0.41	1.28	2.94***	80%
Panel E: Top-SAT Schools (ex. Ivy) – Others												
1.79%	0.06	-0.06				2.51**	1.51	-1.51				33%
2.03%	-0.03	-0.07	0.11			3.06***	-0.56	-1.95*	2.14**			54%
0.16%	-0.17	-0.14		0.09	0.22	0.28	-3.19***	-2.80**		1.20	3.84***	80%
-0.24%	-0.17	-0.15	-0.05	0.12	0.26	-0.33	-3.17***	-2.92**	-0.91	1.41	3.65***	81%

***, **, * - significant at the 1, 5, and 10% level.

Table A7: JP Morgan Global Bond Index: Attribution Model Results for Average Endowment Returns, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, Global Bond, (2) US Stock, Global Bond, Non US Stock, (3) US Stock, Global Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Global, Non US Stock, Hedge Fund, and Private Equity. In all models, estimated coefficients are constrained to sum to one.

	Coefficients (Weights)					*t*-statistics						
Alpha	US Stock	Global Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	Global Bond	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
-0.21%	0.61	0.40				-0.26	13.56***	8.86***				94%
0.09%	0.47	0.36	0.18			0.15	9.49***	10.03***	3.87***			97%
-2.07%	0.36	0.25		0.20	0.19	-3.66***	7.31***	5.24***		2.65**	3.34***	98%
-1.61%	0.36	0.25	0.06	0.19	0.14	-2.35**	7.45***	5.32***	1.18	2.50**	1.91*	98%

***, **, * - significant at the 1, 5, and 10% level.

Table A8: JP Morgan Global Bond Index Attribution Model Results for Extreme Deciles of Past Performance, 1992-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, Global Bond, (2) US Stock, Global Bond, Non US Stock, (3) US Stock, Global Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Global, Non US Stock, Hedge Fund, and Private Equity. In panels A and B (panel C), estimated coefficients are constrained to sum to one (zero).

	Coefficients					*t*-statistics						
Alpha	US Stock	Global Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	Global Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Bottom Decile												
-1.97%	0.55	0.45				-2.09*	10.85***	8.83***				91%
-1.85%	0.45	0.42	0.13			-2.12**	6.51***	8.42***	2.00*			93%
-3.41%	0.37	0.32		0.19	0.12	-3.46***	4.46***	3.98***		1.45	1.23	94%
-3.16%	0.37	0.32	0.03	0.18	0.09	-2.64**	4.34***	3.89***	0.38	1.33	0.75	94%
Panel B: Top Decile												
1.92%	0.62	0.38				1.66	9.99***	6.03***				90%
2.12%	0.45	0.32	0.23			2.25**	6.01***	6.04***	3.20***			94%
-0.88%	0.27	0.20		0.22	0.31	-1.14	4.17***	3.23***		2.15**	4.01***	97%
-0.77%	0.27	0.20	0.02	0.22	0.30	-0.82	4.04***	3.14***	0.22	2.02*	3.04***	97%
Panel C: Top – Bottom												
3.88%	0.07	-0.07				3.57***	1.22	-1.22				28%
3.97%	-0.00	-0.09	0.10			3.68***	-0.02	-1.54	1.17			38%
2.53%	-0.10	-0.12		0.03	0.19	2.01*	-0.94	-1.14		0.18	1.49	50%
2.39%	-0.10	-0.12	-0.02	0.03	0.20	1.56	-0.91	-1.11	-0.17	0.20	1.27	50%

***, **, * - significant at the 1, 5, and 10% level.

Table A9: JP Morgan Global Bond Index Attribution Model Results for Ivy League, Top-SAT, and Other Endowments, 1991-2011

The table reports the intercept (alpha) and estimated loadings for four attribution models that use various combinations of benchmark returns: (1) US Stock, Global Bond, (2) US Stock, Global Bond, Non US Stock, (3) US Stock, Global Bond, Hedge Fund, and Private Equity, and (4) US Stock, US Global, Non US Stock, Hedge Fund, and Private Equity. In panels A to C (panel D and E), estimated coefficients are constrained to sum to one (zero).

Table A9, cont'd

Alpha	Coefficients: US Stock	Global Bond	Non-US Stock	Hedge Fund	Private Equity	*t*-statistics: Alpha	US Stock	Global Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Ivy												
2.90%	0.59	0.41				1.84*	6.78***	4.66***				78%
3.52%	0.31	0.33	0.36			3.01***	3.35***	4.86***	4.16***			89%
-0.95%	0.08	0.17		0.30	0.46	-0.94	0.90	1.98*		2.19**	4.55***	95%
-0.17%	0.08	0.17	0.10	0.28	0.37	-0.14	0.97	2.02*	1.11	2.05*	2.90**	95%
Panel B: Top-SAT Schools (ex. Ivy)												
1.53%	0.65	0.35				1.18	9.00***	4.87***				87%
2.02%	0.43	0.29	0.29			2.03*	5.36***	5.01***	3.88***			93%
-1.76%	0.21	0.16		0.24	0.40	-2.37**	3.25***	2.48**		2.39**	5.41***	97%
-1.44%	0.21	0.16	0.04	0.23	0.36	-1.56	3.22***	2.44**	0.61	2.25**	3.78***	97%
Panel C: Others												
-0.35%	0.60	0.40				-0.45	13.93***	9.19***				94%
-0.06%	0.47	0.36	0.17			-0.10	9.76***	10.35***	3.79***			97%
-2.11%	0.37	0.26		0.20	0.18	-3.68***	7.42***	5.32***		2.53**	3.07***	98%
-1.64%	0.37	0.26	0.06	0.18	0.12	-2.36**	7.57***	5.41***	1.19	2.38**	1.70	98%
Panel D: Ivy – Others												
3.25%	-0.01	0.01				3.46***	-0.19	0.19				4%
3.57%	-0.16	-0.03	0.19			4.69***	-2.61**	-0.76	3.37***			62%
1.16%	-0.29	-0.09		0.10	0.28	1.59	-4.58***	-1.45		1.03	3.85***	79%
1.47%	-0.29	-0.09	0.04	0.09	0.25	1.61	-4.45***	-1.41	0.58	0.93	2.59**	79%
Panel E: Top-SAT Schools (ex. Ivy) – Others												
1.88%	0.05	-0.05				2.61**	1.16	-1.16				26%
2.08%	-0.05	-0.07	0.12			3.21***	-0.87	-1.96*	2.44**			55%
0.35%	-0.16	-0.10		0.04	0.22	0.60	-3.12***	-2.06*		0.53	3.77***	78%
0.20%	-0.16	-0.10	-0.02	0.05	0.24	0.27	-3.06***	-2.01*	-0.36	0.56	3.10***	78%

***, **, * - significant at the 1, 5, and 10% level.

Table A10: Transition Matrix of Performance Groups, 1991-2011

Educational endowments are sorted into quintiles based on performance in each year; returns are measured in the subsequent year. The bottom and top quintiles are split in half (into portfolios 1a and 1b for the bottom quintile and portfolios 5a and 5b for the top quintile). The table presents the transition matrix of group assignment from year y (rows) to y+1 (columns). Panel A presents the number of endowments and Panel B presents the percentages assigned to each group in year y+1 conditional on group assignment in year y.

	Year y+1							
Year y	**1a**	**1b**	**2**	**3**	**4**	**5a**	**5b**	**Total**
Panel A: Number								
1a	308	164	163	148	130	67	99	1,079
1b	146	177	230	216	164	79	77	1,089
2	211	274	577	477	419	173	122	2,253
3	149	176	528	507	504	183	138	2,185
4	144	176	417	504	529	264	176	2,210
5a	63	71	182	191	248	156	165	1,076
5b	82	70	128	145	193	154	295	1,067
Total	1,103	1,108	2,225	2,188	2,187	1,076	1,072	10,959
Panel B: Percentage								
1a	29	15	15	14	12	6	9	100
1b	13	16	21	20	15	7	7	100
2	9	12	26	21	19	8	5	100
3	7	8	24	23	23	8	6	100
4	7	8	19	23	24	12	8	100
5a	6	7	17	18	23	14	15	100
5b	8	7	12	14	18	14	28	100
Total	10	10	20	20	20	10	10	100

Table A11: Attribution Model Results for Big, Medium, and Small Endowments

In year t, endowments are ranked based on their assets under management (AUM) at the end of year t-1. Big endowments are ranked in the top 50, medium endowments are outside the top 50 but with greater than $200 million of AUM, and small endowments are the remainder. The dependent variable for each size category is the equally weighted average return across endowments within the size category.

	Coefficients					*t*-statistics						
Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	Alpha	US Stock	US Bond	Non-US Stock	Hedge Fund	Private Equity	R2
Panel A: Big												
1.98%	0.61	0.39				1.54	8.322***	5.347***				86%
2.52%	0.35	0.34	0.31			2.907***	4.936***	6.686***	4.937***			94%
-1.35%	0.20	0.18		0.25	0.38	-1.68	2.847**	2.510**		2.280**	4.814***	97%
-0.48%	0.20	0.21	0.10	0.20	0.30	-0.48	2.986***	2.849**	1.41	1.785*	3.116***	97%
Panel B: Medium												
0.39%	0.60	0.40				0.42	11.52***	7.752***				92%
0.82%	0.39	0.36	0.25			1.71	9.873***	12.82***	7.148***			98%
-1.92%	0.31	0.25		0.18	0.26	-3.14***	5.987***	4.637***		2.158**	4.321***	98%
-0.64%	0.32	0.29	0.15	0.11	0.14	-1.04	7.735***	6.533***	3.369***	1.54	2.362**	99%
Panel C: Small												
-0.34%	0.58	0.42				-0.50	15.11***	10.93***				96%
-0.01%	0.43	0.39	0.18			-0.04	14.38***	18.46***	7.00***			99%
-1.90%	0.39	0.30		0.16	0.15	-3.51***	8.52***	6.20***		2.22**	2.84**	98%
-0.72%	0.40	0.33	0.14	0.10	0.04	-1.36	11.29***	8.75***	3.62***	1.62	0.79	99%
Panel D: Big - Small												
2.31%	0.03	-0.03				3.02***	0.66	-0.66				15%
2.53%	-0.08	-0.05	0.13			3.73***	-1.36	-1.30	2.57**			53%
0.54%	-0.20	-0.12		0.09	0.23	0.89	-3.80***	-2.18**		1.05	3.86***	79%
0.23%	-0.20	-0.13	-0.04	0.10	0.26	0.29	-3.76***	-2.24**	-0.64	1.18	3.42***	80%

***, **, * - significant at the 1, 5, and 10% level.

Table A12: Benchmark Description and Returns, 1991-2011*

Provider	Asset Class	Index Description	Mean	Std. Dev.
S&P 500 Index	US Stock	Cap-weighted return on S&P 500	10.0%	17.0%
CRSP Deciles 1-10 Index	US Stock	Cap-weighted return on all common stocks listed on the NYSE, Amex, and NASDAQ National Market	10.4%	16.5%
30-Day US T-Bill	Cash	US 30-day treasury bill	3.5%	2.0%
Barclays Capital US Aggregate Bond Index	US Bond	Cap-weighted return on treasury securities, government agency bonds, mortgage-backed bonds, corporate bonds, and international bonds traded in the US.	7.1%	4.4%
JP Morgan Global Aggregate Bond Index	Global Bond	U.S. dollar denominated, investment-grade index spanning asset classes from developed to emerging markets.	7.6%	5.6%
MSCI ACWI ex-US Index	International Stock	Cap-weighted return on publicly trade stocks in more than 20 developed and 20 emerging markets.	7.8%	17.4%
Cambridge Private Equity Index	Private Equity	Dollar-weighted return, net of fees, to 905 US private equity funds formed between 1986 and 2011.	15.9%	16.2%
Cambridge Venture Capital Index	Venture Capital	Dollar-weighted return, net of fees, to 1327 US Venture Capital Funds formed between 1981 and 2011	23.4%	52.3%
HFRI Fund Weighted Composite Index	Hedge Funds	Equally weighted return, net of all fees, across more than 2,000 hedge funds (minimum $50 million in AUM or 12-month track record).	12.1%	9.0%
HFRI Fund of Funds Composite Index	Hedge Funds	Fund of Funds invest with multiple managers through funds or managed accounts, it is not included in the HFRI Fund Weighted Composite Index.	8.0%	8.2%
HFRI Equity Hedge (Total) Index	Hedge Funds	Managers who maintain positions both long and short in primarily equity and equity derivative securities.	14.1%	12.4%
FTSE NAREIT Composite Index	Public Real Estate	Consists of all publicly traded REITs in US that meet certain minimum size and liquidity criteria. It is free float adjusted.	12.7%	19.8%
NCREIF Property Index	Private Real Estate	Composite total rate of return of 7000+ individual commercial real estate properties acquired in the private market for investment purposes only.	7.5%	9.5%

* Annual returns from July to June, beginning in June 1991 and ending in June 2011.

Table A13: Top SAT Schools (Excluding Ivy League)

Schools are ranked based on the 75th percentile of Math SAT scores in 1991, 1996, 2001, and 2006. Data for 1991 and 1996 are from College Board. Data for 2001 and 2006 are from the Integrated Postsecondary Education Data System (IPEDS, available online at http://nces.ed.gov/ipeds/). For 1991 and 1996, schools with less than 200 freshmen are not ranked. For 2001 and 2006, schools with less than 1000 total students are not ranked.

	Ranking Year			
Institution	1991	1996	2001	2006
Amherst College	--	750	750	760
Bowdoin College	--	710	--	730
Brandeis University	--	710	720	--
California Institute of Technology	780	800	800	800
Carleton College	710	720	720	740
Carnegie Mellon University	730	750	760	780
Case Western Reserve University	710	740	730	--
Claremont McKenna College	700	710	720	730
Colgate University	710	--	--	--
Cooper Union	760	--	--	--
Davidson College	730	710	--	--
Duke University	740	750	--	790
Emory University	--	720	740	740
Georgetown University	--	710	730	740
Georgia Tech	710	730	730	--
Grinnell College	--	710	--	730
Haverford College	710	720	720	740
Illinois Institute of Technology	--	720	740	--
Johns Hopkins University	730	740	760	760
Lawrence University	--	710	--	--
Massachusetts Institute of Technology	780	790	800	800
Michigan Technological University	--	--	--	770
Middlebury College	--	--	--	740
Northwestern University	710	720	750	760
Pomona College	740	740	760	760
Reed College	710	--	--	--
Rensselaer Polytechnic Institute	720	710	720	740
Rice University	750	780	770	770
Rose-Hulman Institute of Technology	730	730	720	--
Stanford University	750	760	780	780
Swarthmore College	720	730	760	760
Tufts University	--	--	--	740
University of California-Los Angeles	--	--	720	--
University of California, Berkeley	720	730	740	740
University of Chicago	720	720	740	780

Cont'd

Appendix: Top SAT Schools (Excluding Ivy League) Cont'd

	Ranking Year			
Institution	1991	1996	2001	2006
University of Iowa	--	790	--	--
University of Michigan	700	--	721	--
University of Notre Dame	720	--	730	760
University of Southern California	--	--	--	740
University of Virginia	700	--	720	--
Vanderbilt University	--	--	--	740
Wake Forest University	700	--	--	--
Washington and Lee University	710	--	--	--
Washington University in St Louis	--	--	740	780
Wesleyan University	730	--	720	740
Williams College	730	750	750	760

Table A14: Tests for Reporting Bias in Endowment Returns

The table reports the mean annual percentage returns across endowments. The left-hand side of the table splits all endowments into two groups: endowments with continuous reporting after the first year (no gaps) and those with gaps in reporting between first and last reporting year (gaps). The right-hand side of the table splits all endowments into first-time reporters (first year) and repeats reporters (other years).

	Returns for Institutions with Reporting Gaps v. Institutions with No Reporting Gaps				Returns for Institutions in First Year of Reporting v. Other Years			
Year	No Gaps	Gaps	Diff (No Gap - Gap)	% with Gaps	Other Years	First Year	Diff (Other - First)	% First Year
1991	7.31	7.68	-0.37	9.83	--	--	--	--
1992	13.27	13.23	0.04	9.86	13.31	12.41	0.90	5.21
1993	13.41	13.91	-0.50	9.87	13.53	12.12	1.41	5.19
1994	3.00	2.75	0.25	10.05	2.95	3.50	-0.55	3.27
1995	15.37	15.75	-0.38	10.12	15.54	12.28	3.26	4.10
1996	16.90	17.09	-0.19	10.09	16.95	15.74	1.21	2.58
1997	20.37	20.35	0.02	10.98	20.38	19.81	0.57	2.52
1998	17.85	17.72	0.13	11.33	17.92	14.92	3.00	2.89
1999	10.87	10.27	0.60	13.30	11.01	10.07	0.94	22.45
2000	12.18	10.71	1.47	13.06	12.20	7.76	4.44	4.46
2001	-3.64	-2.48	-1.16	13.32	-3.47	-5.01	1.54	4.05
2002	-6.27	-5.93	-0.34	13.72	-6.21	-6.71	0.50	5.42
2003	3.17	3.03	0.14	13.32	3.07	4.39	-1.32	6.14
2004	15.44	13.74	1.70	13.17	15.30	14.57	0.73	3.47
2005	9.30	9.42	-0.12	13.03	9.37	7.60	1.77	3.22
2006	10.79	10.46	0.33	13.10	10.82	8.45	2.37	2.59
2007	17.37	15.99	1.38	13.25	17.26	15.71	1.55	1.87
2008	-2.95	-3.36	0.41	13.18	-2.98	-3.80	0.82	0.80
2009	-18.77	-18.26	-0.51	11.49	-18.98	-17.87	-1.11	21.77
2010	11.90	11.83	0.07	9.55	11.96	10.76	1.20	5.51
2011	19.32	18.42	0.90	11.62	19.27	16.41	2.86	1.77
Mean	8.87	8.68	0.18	11.77	8.96	7.66	1.30	5.46
Std. Error	2.17	2.10	0.16		2.28	2.12	0.32	