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ABSTRACT

We present the first estimates of investment returns and distribution rates for U.S. non-profit endowment funds, based on a comprehensive sample of 29,762 organizations drawn from Internal Revenue Service filings for 2009-2017. Non-profit endowments badly underperform market benchmarks, with median annual returns 4.46 percentage points below a 60-40 mix of U.S. equity and Treasury bond indexes, and statistically significant alphas of -1.10% per year. Smaller endowments have less negative alphas than larger endowments, but all size classes significantly underperform. Higher education endowments, the majority of the $0.7 trillion asset class, do significantly worse than funds in other sectors. Distribution ratios are conservative, well below the funds' long-run returns. Donors increase contributions when endowment returns are strong, with an elasticity of about 0.18 between net-of-market investment returns and new donations.

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I. Introduction

Endowment funds are repositories for gifts and operating surpluses generated by non-profit organizations. Often described by their parent organizations as "nest eggs" or "rainy day funds," endowments invest in stocks, bonds, and alternative asset classes such as hedge funds and private equity, and they pay income to their parents to subsidize operating costs and capital expenditures. In recent decades, many endowments have grown rapidly due to an influx of gifts as well as riskier investment policies that have increased their returns. Probably the best-known example is Yale University, which in 2018 reported having grown to $29.4 billion with an annualized return of 11.8% per year over the prior 20 years.[1] The exponential growth of Yale's and other high-profile universities' endowments has led to scrutiny of the objective functions of their parent organizations[2] and, as of 2018, a new 1.4% federal income tax on a portion of their profits.

Yet little is known about the overall size, performance, and use of endowments in the non-profit sector. The small number of papers on endowment returns have typically focused

[1] https://news.yale.edu/2018/10/01/investment-return-123-brings-yale-endowment-value-294-billion. The same source indicated that annual endowment distributions currently represent more than one-third of Yale's net revenue, indicating the vital role its endowment plays in supporting the university's operating and capital budgets.

[2] "There is an old joke that describes Harvard as a $37 billion hedge fund with a university attached." Barry Ritholtz, "The Day Harvard Stopped Being a Hedge Fund," *Bloomberg View*, January 26, 2017.

only on funds that support major universities. These studies all rely on self-reported information from voluntary samples that take no account of selection bias or survivorship bias. The best known study, Lerner, Schoar and Wang (2008), uses annual data from the National Association of College and University Business Officers (NACUBO) and studies an opt-in sample that increased from 533 schools in 1993 to 726 in 2005 (the NACUBO sample had 809 schools in 2017 and 802 in 2018). The NACUBO source is also used by Brown, Garlappi and Tiu (2007). Cejnek, Franz, Randl and Stoughton (2014) provide a literature review of the extensive academic and trade research into the university endowment sector, which seems to have crowded all other non-profit endowment research to the sidelines.

This paper presents a comprehensive survey of endowment returns and distribution policies for the period 2009-2017 in all U.S. non-profit sectors. We use data provided by non-profit organizations in annual Form 990 filings with the Internal Revenue Service (IRS), and our extraction of data from these filings yields a sample of 189,842 annual endowment observations reported by 29,762 organizations in all non-profit sectors. To our knowledge, the only other paper to use this IRS data up to now is Yermack's (2017) study of a much smaller sample of 120 major art museums. Within the universe of non-profits, colleges and universities account for 6% of the observations and 54% of the assets, and one of our conclusions is that they are not particularly representative. In our study, the subclass of higher education institutions significantly under-performs the community of other non-profit endowments that support organizations in diverse areas such as the arts, human services, health care, and religion, among others, and the disappointing returns reported by educational institutions to the IRS appear to belie those touted in commercial surveys that have made their way into the press and academic papers.

Overall the funds in our study earn negative abnormal investment returns. The median annual investment return for endowments is 4.78% between 2009-2017. Weighting our observations by the time periods in which they occur, the benchmark returns on ten-year Treasury bonds are 4.08% per year and the equity market index returns 12.68% per year over the same measurement periods. In other words, the typical endowment fund under-performs a 60-40 combination of the equity and Treasury bond market indexes by about 4.46 percentage points annually. On a risk-adjusted basis, we use the standard Fama-French-Carhart four factor model to estimate alphas of -1.10% for our entire sample, statistically significantly below the 1% level, with the lowest alpha estimates applying to the largest size cohorts.

These poor investment results largely agree with those for other investor classes, which typically exhibit zero or negative alpha estimates in standard performance attribution regression models. See, e.g., the well known research into mutual funds by Fama and French (2010), individual investors by Barber and Odean (2000), hedge funds by Brown, Goetzmann, and Ibbotson (1999), and private equity by Franzoni, Nowak, and Phalippou (2012), among many other performance measurement studies.

We study the distribution policies of non-profit endowments to their parent organizations, which resemble the shareholder dividend policies that are an important research topic in corporate finance. We find that most endowments have conservative distribution policies that imply payouts below their long-run expected returns, and well below the actual returns realized during the sample period for our study. These cautious distribution policies would tend to cause endowments to grow without limit over time. The smallest endowment funds make no payouts at all in most years, implying that organizations seek to grow them to a critical mass before tapping them as a permanent funding source. For the very largest endowments, those with asset

values above $100 million, distributions occur almost every year, with mean and median distribution rates near 4.5%, which appears to have become a heuristic that enjoys wide acceptance in the non-profit sector without much theoretical justification.

The remainder of this paper is organized as follows. Section II presents a description of the dataset. Section III analyzes endowment funds' investment returns, and Section IV analyzes their distribution policies. Section V studies whether donations to the parent organization respond positively to good investment returns in the endowment. Section VI concludes the paper.

II. Data description

Our data come from Form 990, a document filed annually with the IRS by most non-profit operating organizations in the U.S. Since 2008, Part V of Schedule D for Form 990 has required those organizations with endowment funds to provide annual data including the fund balance at the beginning of the year, contributions, distributions, administrative expenses, and net investment earnings. These data are a matter of public record, but obtaining them for a large sample of organizations has been impractical up to now, because online databases of information from Form 990 filings such as Guidestar have all omitted coverage of this schedule.

We use Form 990 data that has been posted by the IRS since 2016 on Amazon Web Services (AWS) as a result of a lawsuit filed by Carl Malamud, an advocate for transparency in the nonprofit sector.[3] The website hosts annual schema of all electronic Form 990 filings

[3] The data are downloadable by the public from https://aws.amazon.com/public-datasets/irs-990/, although we found that considerable effort is required to parse the files, extract the relevant variables, and clean the data before it is suitable for large-sample research. A description of Malamud's successful federal lawsuit to compel the IRS to disclose the data in this way can be found at https://sunlightfoundation.com/2016/06/16/irs-opens-up-form-990-data-ushering-nonprofit-sector-into-the-age-of-transparency/.

beginning in 2011. The electronic filing requirements, which have been phased in gradually since 2006, today cover all but the smallest public charities. We believe our sample, especially in the most recent years, covers substantially all of the endowment assets in the United States, since smaller organizations are far less likely than larger ones to maintain endowments. However, a major exception occurs for religious organizations, which generally do not file financial disclosure forms with government regulators due to the constitutional principle of separation of church and state.[4]

We create our sample by downloading all available data on the AWS website, which has almost 1.5 million organization-year observations. Most of these charities are too small to have permanent endowments, and almost 1.3 million of the filings have the Schedule D, Part V data for endowments left blank. Among the remaining observations, we drop all filings where the beginning balance or ending balance are blank or reported as zero or negative; most of these observations probably represent partial years in which charities either create or liquidate their endowment funds. We also drop about 28,000 observations for which the investment gains/loss data item is blank or zero and the beginning and ending endowment values are identical. These are likely cases in which an endowment holds only illiquid assets, such as real estate or non-public company stock, that are not marked-to-market each year. For purposes of reporting our results in calendar time, we assign each filing to the calendar year that includes the final month

[4] It is not clear how large religious organizations' endowment funds might be, but it is possible they are much smaller than those in sectors such as higher education. The Roman Catholic Archdiocese of New York, surely one of the wealthiest religious non-profits in the U.S., voluntarily publishes excerpts form audited financial reports each year on its website at https://archny.org/financial-reports. For the most recent period ended August 31, 2017, the Archdiocese reported unrestricted net assets (presumably subsuming its several endowment funds) of $138 million and additional restricted net assets of $124 million. These totals are orders of magnitude below the fund balances held by major research universities. The most significant wealth of religious organizations may be held in real estate and fine art rather than financial investments. Endowment assets may also be held by individual parishes and not consolidated into the balance sheets of central administrative entities.

of its chosen fiscal year, and we collect all annual data for organizations with reporting periods ending up to December 31, 2017.[5]

We cull out duplicate observations in which the same endowment fund is reported multiple times. In the most common situation, two or more legally separate entities with different employer identification numbers (EINs) may report data for the same endowment fund, which is apparent due to identical entries in all cells of the Schedule D, Part V. For a large number of such observations, the organizations have such close names or descriptions that their connection is obvious, but other cases would not be apparent without research.[6] In all these cases of seemingly duplicate endowment data, we retain only one observation, using data for the filing organization that reports the largest amount for Total Revenues for the filing year. This choice seems appropriate since it is not unusual for endowments to be held by satellite entities, such as trusts or foundations, with no revenue of their own, while providing support to operating entities, such as universities or museums, that use the endowment distributions alongside other revenue sources. Dropping these duplicates reduces the sample size by 3,686 charity-year observations. A second data problem arises when one organization makes duplicate or amended filings on the AWS database, which we can identify from the organization's EIN. In these cases, the later filings typically correct reporting errors or inconsistencies. We create an adding up identity, in which the end-of-year endowment balance should equal the starting balance, plus

[5] Unlike for-profit companies that tend to have fiscal years coinciding with the calendar and ending in December, the most common fiscal year-end for non-profits is June 30, which is used by 42% of all observations in the sample. An additional 38% have December fiscal years, and the other 20% are scattered among the remaining 10 calendar months.

[6] For example, the connection between Concordia University Wisconsin (EIN 390833608) and Concordia University Wisconsin Foundation (EIN 396077337) is immediately obvious, while the link between Indiana State University Foundation Inc. (EIN 356045550) and Sycamore Foundation Holdings Inc. (EIN 263673809) requires some research to validate. Some of the filing duplications are extensive, such as those for ServiceSource, an organization that provides employment opportunities for people with disabilities and has a single endowment fund that is reported on the IRS filings of 11 separate affiliate organizations.

additions, plus investment gains (or losses), less distributions, and less fees if reported separately. In cases of multiple filings with different values for the same entity, we retain the one with the least deviation from this identity.

Schedule D, Part V includes space for organizations to report up to four years of historical endowment data alongside the current year, and we download this historical information when available, increasing our sample size by almost one-third. In 499 cases, this retroactive data includes also includes corrections with respect to prior years, which we are able to use to fix observations that had inconsistent or incomplete data when originally filed.

We edit or exclude a small number of observations that have further data problems. In some cases, organizations report financial data with the wrong sign. For the relatively small minority (4.2%) of observations that do not exhibit an exact adding-up constraint as described above, we change data entries with a negative value to a positive one if doing so will resolve the discrepancy. We drop all remaining observations for which the discrepancy is more than *de minimus*.[7] Finally, we drop the top and bottom 0.1% of observations for annual investment return, as calculated by our method described below, reducing our sample size by a total of 380, and 75 observations that have irregular annual reporting periods that include fewer than 360 or more than 370 days. We obtain a final sample of 189,842 annual observations for 29,762 filers, with up to nine annual observations for each of them between 2009-17.

Table 1 shows that the sample sizes gradually increase up to 2013 and then level off at around 23,300 endowments per year. The growth in annual observations likely occurs due to the gradual adoption of electronic filing by organizations during the sample period. The shortfall in

[7] We calculate the difference between the end-of-year fund balance and the sum total of beginning balance, plus contributions, plus net investment gains, minus distributions, minus any reported expenses. We then divide this difference by the start-of-year balance plus 50% of contributions. If the discrepancy is below 1%, we retain the observation (4,613 cases), and if it exceeds 1%, we drop it (3,232 cases).

observations for 2017 compared to 2013-16 is due to the long filing deadlines permitted for some organizations and follow-on delays for the IRS to digitize and post individual returns. As filings are added by the IRS in the future, we expect the number of available 2017 observations to equal or exceed those for prior years, and a small number of additional observations may emerge for prior years for organizations that file their disclosures very late. In all, we have data for 29,762 unique filing organizations, and the annual sample size peaks at 23,335 in 2015.

Our analysis focuses on the rates of return earned by endowment funds. As reported to the IRS, investment returns are based on dividends, interest, and capital appreciation of the fund's assets rather than only realized gains. An organization can either include its expenses as part of a report of Net Investment Earnings on Line 1c of this schedule, or it can report Gross Investment Earnings on Line 1c while listing Administrative Expenses separately on Line 1f. For the minority of organizations that follow the latter practice, we calculate net investment earnings by subtracting any value reported on Line 1f from Line 1c. We then calculate the annual investment return by taking the ratio of net investment earnings over the sum of start-of-year assets plus one-half of contributions. Contributions generally include bequests, gifts, and other funds deposited into endowments, and our calculation implicitly assumes that the typical contribution is received halfway through the fiscal year and that any distributions from the fund do not occur until year-end. We test the importance of these timing assumptions in sensitivity analysis reported below, and we find that they have no material effect on our results.

Due to these limitations of the available data, our calculations of investment performance lack the precision of measures such as the time-weighted returns commonly used to evaluate professional asset managers. A further limitation to our analysis arises from the absence of information about asset allocation, which is not a mandatory disclosure on the IRS Form 990,

although for some organizations it can be obtained through a careful reading of certain schedules and appendices (these tend to present the data in narrative form, so that downloading a large sample is impractical). Ideally we would also like to have more data about the oversight and governance of each endowment, including whether the organization delegates authority to an outside investment manager, but Form 990 does not require this information either.

Table 1 presents further detail about the distribution of endowment assets by year and by industry sector. Aggregate U.S. endowment assets appear to have surpassed $700 billion as of 2016, and slightly more than half of this total is held by colleges and universities in the higher education sector, with the next largest holdings in the "Education (other)" sector that includes private secondary schools. Organizations with their main operations in the arts, hospitals, other healthcare sectors, social services, and other "Public and Social Benefit" areas account for most of the rest of the endowment funds. As shown in the table, several hundred religious organizations also file disclosures even though many could avail themselves of reporting exemptions.

Table 2 presents descriptive statistics for the sample. The table shows endowment data for the sample of 189,842 observations alongside basic financial data for 145,651 fiscal years of their parent organizations. We have significantly more observations for annual endowment performance due to the availability of up to four years of historical performance data for endowment funds on Schedule D, Part V, as noted above. The typical endowment size is quite small, with a mean of $27.5 million and median of $1.2 million, but the largest funds run into the tens of billions, with a maximum value of $36.4 billion (Harvard University, 2016). Outside the education sector, the largest funds are the MasterCard Foundation ($9.4 billion as of 2017) and the Shriners Hospitals for Children ($7.3 billion as of 2014). The median annual net investment

return, calculated according to our method, is 4.78%, and the median distribution ratio is lower, 2.37%.

III. Investment returns

This section presents our analysis of investment returns. Subsection III.A includes some basic overview statistics and comparisons with equity and debt market benchmarks. Subsection III.B uses the Fama-French four-factor model to estimate the risk-adjusted abnormal returns for endowment funds, and we analyze these results in size cohorts. Subsection III.C investigates the relation between endowments' abnormal returns and their geographic proximity to financial centers. In subsection III.D we analyze endowments in the healthcare industry to study whether their returns exhibit a negative association with stocks in the industry, a result that would imply a risk management strategy in endowment asset allocation. Subsection III.E investigates the returns of endowments in the higher education sector; we study these funds separately due to their prominence in prior research on the subject.

A. Overview of endowment returns

Table 3 presents summary statistics for annual endowment returns for the entire sample and four subsamples partitioned by size. We use average start-of-year assets for each fund to determine membership in the size cohorts. For comparison we show returns on the Center for Research in Securities Prices (CRSP) value-weighted equity index, the CRSP 10-Year U.S. Treasury Bond Index, and a "balanced portfolio" comprised of 60% of the equity index and 40%

of the Treasury bond index.[8] All index returns are aligned with the fiscal year reporting periods for each endowment, which accounts for slight differences in the benchmark returns for the four size cohorts. Data in the table represent medians and inter-quartile ranges for 12-month reporting periods and should not be interpreted as compound annual returns for the 2009-2016 period, because observations are not uniformly distributed through time. Many endowments' 12-month reporting periods end in June or December, and the number of observations generally rises over time to reflect increasing compliance with IRS electronic filing requirements especially by smaller organizations. We do not report mean returns because the data are heavily influenced by a small number of extreme outliers, many of which appear to be the result of erroneous reporting by a few endowments.

Data in Table 3 show a fairly dismal pattern of endowment returns. The median return for the entire sample is 4.78%, which falls not only 446 basis points below the 60-40 balanced portfolio return, but also just 70 basis points above the 10-Year Treasury bond return. In other words, the typical endowment fund would have earned almost identical returns if its trustees had followed a simplistic investment strategy of holding 100% Treasury bonds and taken no equity market risk whatsoever. Most of our sample period was characterized by a bull market in equities, as our data begins in 2009 when asset values were depressed near their minimum points following the onset of the global financial crisis. At the same time, bonds earned strong returns due to a Federal Reserve policy of driving market interest rates to sustained record low levels. Endowment funds appear to have sat on the sidelines and missed most of this run-up in both stock and bond prices, implying that many funds may have held large amounts of cash and equivalents. More than 40% of the endowments have a June fiscal year-end. These endowments

[8] The 60% - 40% combination of the equity and bond indexes is a heuristic commonly used to evaluate the performance of asset managers. For example, Barber and Wang (2013) refer to "the 60/40 stock/bond portfolio used as a performance benchmark by many endowments."

generated a mean annual return of 5.23% and median annual return of 4.03%. For comparison, the CRSP value weighted index over the same period generated a mean annual return of 11.60%, while the CRSP 10 year U.S. Treasury index returned an annual average of 4.51%, with returns weighted according to the number of observations in each year. Repeating this analysis for a sample of endowments with December fiscal year-end (38% of the sample) yields very similar estimates of underperformance relative to the equity and debt benchmarks. For the interested reader, the Appendix presents a more detailed version of Table 3, with the performance statistics reported for all observations with 12-month fiscal reporting periods ending in each of the 108 months during the 2009-2017 sample. Within the four size cohorts of Table 3, we find that the largest endowment funds, those with assets greater than $100 million, exhibit the highest median returns, an outcome that runs counter to the conclusions of our analysis of endowments' risk-adjusted abnormal returns below.

B. Risk-adjusted abnormal returns

To estimate risk-adjusted abnormal returns, we use the standard four-factor model of Fama and French (1993) and Carhart (1997):

$$ExcessReturn_{i,t} = \alpha_i + \beta_{i,RMRF} \ln(1+RMRF_t) + \beta_{i,SMB} \ln(1+SMB_t) + \beta_{i,HML} \ln(1+HML_t) + \beta_{i,UMD} \ln(1+UMD_t) + \varepsilon_{i,t} \qquad (1)$$

The Excess Return is estimated as $[\ln(1+R_{i,t}) - \ln(1+R_{f,t})]$, where $R_{i,t}$ is the annual return for endowment i for year t, defined as the 12-month fiscal reporting period for that non-profit organization. $RMRF_t$ is the excess return on a value-weighted market portfolio annualized over the same 12-months. SMB_t, HML_t, and UMD_t are the zero-investment factor returns for size,

book-to-market and one-year momentum stock return, respectively. These are also annualized over the same 12-month period as the endowment's fiscal year.

We face a challenge in implementing this model, because it requires estimating five parameters, including the alpha intercept term, separately for each endowment fund, but our 2009-2017 sample period yields at most nine annual observations of performance data per fund. Our overall sample includes 189,842 annual observations for 29,762 endowments, and we subsample the 17,028 endowment funds that have at least seven annual observations. This subsample includes 138,769 endowment-years, or about 73% of the overall sample, and it probably imparts a slight positive bias to our estimates of alpha, since those charities with uninterrupted patterns of filing annual reports are probably the most financially successful.[9]

We start by estimating the OLS model described in equation (1) using the time-series annual returns for each of the 17,028 endowments, Thus, for each non-profit organization *i* we estimate

$$ExcessReturn_{i,t} = \hat{\alpha}_i + \hat{\beta}_{i,RMRF} \ln(1+RMRF_t) + \hat{\beta}_{i,SMB} \ln(1+SMB_t) + \hat{\beta}_{i,HML} \ln(1+HML_t) + \hat{\beta}_{i,UMD} \ln(1+UMD_t) + \hat{e}_{i,t} \qquad (2)$$

For each endowment *i* , we save the coefficient estimates ($\hat{\alpha}$, $\hat{\beta}_{RMRF}$, $\hat{\beta}_{SMB}$, $\hat{\beta}_{HML}$, $\hat{\beta}_{UMD}$) as well as the time series of residuals ($\hat{e}_{i,t}$). The cross-sectional average of alpha across the 17,028 endowments fund is reported in the first row of the first column of Table 4.

To test the statistical significance of these alpha estimates, we employ the bootstrap methodology described by Kosowski *et al.* (2006), and the description in the following passages

[9] We observe that many of the endowments that have fewer than seven observations simply have not filed their Form 990 returns for the entire sample period, or the documents have not yet been uploaded by the IRS to Amazon Web Services, and we expect these observations to become available for research purposes at some point in the future.

closely adheres to that source. For each non-profit endowment *i*, we draw a sample (with replacement) of the residuals of that fund estimated from equation (2) above. This yields pseudo-time series of resampled residuals $\{e(b)_{i,t}\}$, where *b* indexes the bootstrap iteration number. Thus, we scramble the time order of residuals for each endowment.

For the next step we create a time series of pseudo endowment returns imposing the condition of zero alpha:

$$\left[ExcessReturn_{i,t} \right]^b = \hat{\beta}_{i,RMRF} \ln(1+RMRF_t) + \hat{\beta}_{i,SMB} \ln(1+SMB_t) + \hat{\beta}_{i,HML} \ln(1+HML_t) + \hat{\beta}_{i,UMD} \ln(1+UMD_t) + e(b)_{i,t} \qquad (3)$$

Note that the construction methodology for the pseudo return for endowment *i* for year *t* consists of predicted return with a zero alpha plus a randomly bootstrapped error term. Thus by construction the pseudo-time series of returns has a true alpha of zero. There is, however, the additional error term that adds randomization, since the residuals may be sampled more than once and the residuals have been scrambled across time.

Once the pseudo time series of zero alpha returns (with a randomly sampled residual added) has been constructed for every endowment-year, we re-estimate the four-factor model using these bootstrapped pseudo endowment returns similar to equation (1). Even though the true alpha is zero, the estimate for alpha from this regressions may be positive (or negative) if that bootstrap had drawn an abnormally high number of positive (or negative) residuals. Thus we are now able to generate a cross-section of bootstrapped alphas for all 17,028 funds. We save the cross-section average of the alphas. This process is repeated for 5,000 bootstrap iterations, (*b* = 1, …. , 5,000). This repetition yields a distribution of 5,000 average (cross-sectional) alphas. Comparing the observed average alpha of -0.0110 in the top left cell of Table 4 to this distribution allows us to make statistical inference. We find that the probability of average alpha

being -0.0110 is less than 1% if the true alpha was zero. In other words, in our 5,000 bootstraps we obtained an average alpha of that magnitude in less than 1% of the cases. Thus, we can reject the null hypothesis that average alpha is zero below the 1% significance level.

In addition to illustrating our main result, that endowment funds have mean risk-adjusted returns 1.10% below their benchmarks, Table 4 also shows the fraction of alpha estimates that are negative (61%) in our subsample of 17,028 endowments, and it shows the cross-sectional average estimates for the four risk factors without testing their statistical significance. The estimate of 0.5011 for the market risk factor implies that endowments invest conservatively, with about half of their endowment excess return exposed to the equity markets.

We continue the analysis by examining separately each of the four size cohorts introduced in Table 3 above. The table shows that even though all cohorts earn average alphas that are negative, performance is better for smaller endowments compared to larger ones. Second, systematic risk decreases with endowment size, as shown by the estimates for the market return factor which decline across the size cohorts. This is consistent with a wealth effect that leads to decreasing absolute risk aversion as the value of an endowment grows (Merton, 1993). Note that the larger endowments, which have the worst performance, account for a minor number of observations by number, but an overwhelming fraction of the invested capital in the non-profit sector. For instance, the "large" cohort of endowments, those worth more than $100 million, account for 4.1% of the observations and 78.2% of the assets. In contrast, the very smallest endowments, those with asset values below $1 million which we label as "tiny," comprise 39.6% of the observations in the sample but account for only 0.4% of the assets invested.

The inverse relation we find between endowment size and performance echoes the pattern found for mutual funds in several studies. This pattern is regarded as something of a puzzle, since larger funds should enjoy advantages in trading costs and access to research and other information. Chen et al (2004) proposes a range of explanations for the pattern, including the costs of investing in illiquid securities, which are more commonly held by larger funds, and the administrative costs of team management that is often used by larger funds. Pollet and Wilson (2008) discuss the costs of diversification and fund family membership as possible explanations, but neither of these issues would seem relevant for endowments, which are typically the only funds overseen by their parent organizations. The liquidity explanation is possibly the most sensible, as some non-profit endowments are known to be over-weighted in individual securities donated by university alumni or other benefactors who found their own companies and contribute a slice of the equity to their favorite charities.[10] The costs of hedging and eventually unwinding these block ownership positions may create a drag on the overall returns for the fund.

As noted in Section II above, our calculation of annual percentage investment returns for each fund is based on an assumption that inflows of gifts and bequests occur halfway through the fiscal year, while distributions occur at the end of the year, so we calculate the return by dividing net investment gains by the sum of beginning-of-year assets plus half of new contributions. A more aggressive estimate would assume that all distributions occur at the beginning of the year while gifts are received at year-end, in which case the denominator would equal start-of-year assets minus distributions. The most conservative estimate would make the opposite assumptions, that gifts occur at the beginning of the year and that distributions are made at year-

[10] There are numerous examples, but perhaps the best known is the connection between Emory University and the founders of The Coca Cola Co.

end, which would change the denominator to start-of-year assets plus 100% of contributions. We test whether our results change materially under either of these extreme assumptions. In the first case, the median portfolio return of 4.78% in the bottom row of Table 3 would increase to 5.11%, while in the second case it would drop to 4.52%, implying a range of about +/- 30 basis points depending upon the assumption chosen, a magnitude far below the levels of underperformance documented in the right column of Table 3. The impact on the alpha estimates in Table 4 is only minor. The alpha of -110 basis points shown in the first column of Table 4 changes to -106 basis points under the former, aggressive measure and -117 basis points under the latter, conservative measure. Other results shown in Tables 3 and 4 exhibit only similarly tiny differences under either alternative assumption.

C. Returns and proximity to financial centers

We study the access to investment advice in analysis presented in Table 5. Based on a hypothesis that firms obtain better investment advice if they are located geographically close to financial experts, we use STATA's *geodist* function to calculate the distance between the office address of each non-profit organization and Wall Street, for which we use the address of Goldman Sachs headquarters in New York. We save the alphas estimated for each endowment fund in Table 4 above, and we regress these alphas against an intercept and a variable measuring this mileage. Results of these estimations, which are partitioned according to the same size cohorts used above, appear in Panel A of Table 5. In Panel B, a more refined analysis replaces the distance from Wall Street variable with the minimum distance of each organization from one of four financial centers where many asset management firms are located: New York, Boston,

Chicago, or San Francisco. For the latter three, we use the headquarters addresses of Fidelity Investments, Northern Trust, and Charles Schwab, respectively.

For the largest funds in our sample, comprising the vast majority of investment assets, we find that investment performance deteriorates if the fund is located closer to Wall Street. We find a similar estimate, but no longer statistically significant, for the variable measuring the distance to closest of the four major financial centers. The pattern is somewhat reversed for smaller endowments, which tend to perform better when they are located closer to expert financial advice, as shown by the estimate for small endowment funds in the second part of Table 5.

We are not aware of any result in the investments literature consistent with the idea that access to professional investment advice leads to superior performance; indeed, much of the research on the underperformance of professional managers and the virtues of passive indexed investing suggests quite the opposite, which is our finding for larger endowment funds.[11] Our weakly positive results for smaller endowments may be consistent with a number of potential explanations other than access to professional investment advice. For instance, smaller non-profits near financial centers are probably much more likely to have better-informed board members, and they may establish superior investment policies for these organizations' endowments. Larger funds may already have qualified board members but may be susceptible to professional money managers' sales pitches that lead to over-investment in exotic products with high fee structures.

[11] Many papers have been published in recent years on loosely related topics such as the importance of geography in investment research (Coval and Moskowitz, 2001) and the tendency of individuals to invest in local stocks Seasholes and Zhu, 2010).

D. Hedging of parent organizations' asset values

In his discussion of the optimal investment policy for a non-profit endowment, Merton (1993) leans heavily on portfolio theory. He argues that endowments should be invested in assets whose value will have inverse relations with the other assets of the organization. In a university, these assets might include local real estate and intellectual property; in a symphony orchestra, they would include the instruments, fixtures, and access to the subscriber list. By their very nature, many of these assets can be difficult to value and hedge, so Merton's advice may seem mostly theoretical for most organizations. Yermack (2017) tests this hypothesis for his sample of 120 prominent art museums, using the Mei-Moses fine art index as the industry benchmark. That study finds no significant relation.

The healthcare industry offers an opportunity to test this hypothesis closely, however, since the U.S. economy includes numerous for-profit and non-profit companies in this sector. A non-profit hospital or medical clinic should avoid investing in shares of stock issued by pharmaceutical companies or for-profit hospital chains, for instance. We analyze the returns of 626 hospital sector endowments in regression models to test this hypothesis. We regress the hospital endowment returns against the standard four risk factors plus an additional factor, the return on the healthcare industry portfolio as calculated and made available for download on the website of Prof. French. Alternatively, we use the index of returns on pharmaceutical stocks and also for medical equipment stocks as additional risk factors.

In all three cases, including the health industry risk factors leads to little or no change in the size and significance of the alpha estimates. Moreover, the healthcare, pharmaceutical, and medical equipment risk factors have beta estimates quite close to zero. We conclude that little

evidence supports the proposition that endowment managers hedge their investment strategies by over- or under-weighting healthcare stocks in their portfolios.

E. College and university endowments

Because colleges and universities represent such an important subgroup of the universe of non-profit endowments, we analyze their returns separately and display the results in Table 6. The estimates are striking: higher education institutions, whose endowments account for more than half of all assets in the sample despite representing just 6% of the observations, significantly underperform market benchmarks, with abnormal investment returns of minus 148 basis points per year. All other (non-higher education) endowment funds also earn negative alphas, with a statistically significant estimate of minus 107 basis points per year. The difference in these two estimates is itself significant below the 1% level. We confirm that this result is not size-driven by looking separately at the four size-based subsamples from above; we find that colleges and universities underperform other sectors in two out of four size cohorts, with the greatest difference occurring within the "tiny" group of endowments with assets below $1 million.

Prior research such as Lerner, Schoar and Wang (2008) has found that the self-reported returns for universities in the NACUBO sample tend to track the academic quality of the institutions, with more selective schools earning higher investment income. We find some evidence consistent with this in the right column of Table 6, which looks at the abnormal returns earned by endowments of the top 20 national universities (the Ivy League schools and others such as MIT, Stanford, and Georgetown) as ranked in 2017 by *U.S. News and World Report*. Due to inconsistent data in the filings of Cornell University, we drop it from the analysis and instead use Emory University in its place. These highly ranked schools earn almost close to

zero abnormal return (minus 19 basis points per year), a result that gives no indication of superior performance but is nevertheless much better than other colleges and universities as a whole. While these results are not in line with earlier studies and copious media coverage about the out-performance of elite schools, they suggest that the most selective schools do better than others within their sector and basically earn returns that are no worse than average. However, they also support the conclusion that the investment wisdom of top universities is largely a myth, as one could expect to earn these types of returns simply by chance. Frequent mentions in the media of the out-performance of top schools seems likely due to the outsized success of just one university, Yale.

IV. Distribution policy

Endowments exist to distribute funds to their parent organizations. In principle, these distributions could fund part of an organization's operating budget, or be used for non-recurring capital expenditures, or could occur as needed to close deficits when an organization cannot otherwise balance its budget. Little is known about the distribution policies for non-profit endowments other than two recent small-sample studies by Brown *et. al* (2014) and Yermack (2017) which appear to reach opposite conclusions. Brown *et. al* study approximately 200 large research universities and find a surprisingly pro-cyclical distribution pattern, in which universities experiencing negative financial shocks reduce their endowment payouts. Yermack (2017) studies 120 large art museums and finds that endowment withdrawals increase when the museums' operating surpluses decline.

Numerous papers beginning with Tobin (1974) have proposed spending rules for endowments, and Brown *et. al* (2014) provide an excellent review of this literature. Many of

these rules resemble the consumption-smoothing prediction of Tobin's permanent income hypothesis or the dividend-smoothing payout rules followed by corporations as first documented by Lintner (1956). The tenor of these policies implies that non-profits aim for a stable distribution rate from their endowments, with the rate equal to the long-run expected return of the fund. However, other papers have taken issue with this type of distribution policy, such as Hansmann (1990) and Merton (1993). Hansmann focuses on issues of intergenerational equity and concludes that an overly conservative distribution policy may give undue benefit to more affluent future generations. Merton notes that an endowment fund can be invested, and can follow distribution policies, that hedge an organization's cash flows from other assets, such as a university's streams of tuition revenue and donations.

Table 7 shows descriptive statistics about the distribution policies for the endowment funds in our sample. We calculate the distribution rate based on information in Part V, Schedule D of Form 990. The distribution rate equals the ratio of distributions for grants and scholarships (Line 1d) plus distributions for facilities and programs (Line 1e) over the sum of beginning-of-year assets (Line 1a) plus 50% of new contributions and transfers during the year (Line 1b). It should be thought of as similar to the dividend policy for a company deciding what fraction of its equity to pay out to shareholders each year. We present data for the sample overall in the left column of Table 7 and for each of the four size cohorts in the next four columns. The data indicate that endowments have a mean distribution rate of 4.89% and a median rate of 2.45%, with more than one-third of funds not making any distribution at all. However, these statistics obscure a clear connection between endowment size and payout policies. In the second column of Table 7, data indicate that most large endowment funds have very stable distribution policies, with mean and median distribution ratios of 4.91% and 4.39%, respectively, and more than 95%

of all funds making a distribution in a given year.[12] In the right column of Table 7, the data indicate that the majority of tiny endowment funds make no distribution at all. The other two size cohorts see the data trend monotonically between these two extremes.

The data suggest that smaller endowments follow an accumulation strategy, with a predisposition to make no distributions at all to their parent organizations, and they instead attempt to grow to a critical mass. Once endowments have grown large, they follow very different distribution strategies. The mean and median distribution rates for large endowments are very close, in the neighborhood of 4.5%. Extraordinary distributions from larger endowments seem to be rare, since the mean and median withdrawal rates are almost equal, and virtually all large funds make at least some distribution. In contrast, the mean distribution for tiny endowments is 4.47%, even though more than half make no distribution at all. This implies that smaller funds are accessed from time to time for large extraordinary distributions.

The 4.5% distribution rate appears to be a focal point that is commonly used by many large, established funds. This figure may approximate the real return that one might expect from a fund invested 60% in equities and 40% in risk-free debt, but if inflation is greater than zero, the 4.5% nominal distribution rate is likely to be less than the return of a typical fund, meaning that endowments will tend to grow over time.[13] This conservative distribution policy has been the focus of much of the external criticism that has focused especially on the growth of elite universities' endowments and contributed to Congress's decision to enact a 1.4% tax on large university endowment profits beginning in 2018. By comparison, private foundations are generally required to distribute at least 5.0% of their assets in order to maintain their non-profit

[12] For comparison, Brown *et. al*'s (2014) survey of about 200 large universities drawn from the NACUBO sample between 1986-2009 shows mean and median payout rates of 5.2%, calculated with slightly different methodology than ours. Yermack's (2017) study of 120 art museums between 2008-2013 shows mean and median spending rates of 5.8% and 4.7%, respectively.

status, and that number also has drawn criticism for being below the likely investment returns for funds held in these entities.

Table 8 presents a regression analysis of annual endowment distributions as a function of six potential sources of cash for the organization: operating income, cash on the balance sheet at the start of the year, new donations, new government grants, an increase in debt, and investment earnings on the endowment itself. Standard errors are clustered at the organization level, and we show estimates for the overall sample and for each of the four size cohorts. We exclude from this analysis observations for lagged investment performance that are reported on Schedule D, Part V of Form 990, since we lack annual operating data for these observations. We also exclude organizations that identify themselves as "Supporting Public Charities" (coded as S for the NTEE classification variable "Level 2"). These are typically organizations affiliated with other non-profits, and they typically hold or manage the other organization's endowment funds but have few if any operating expenses of their own.

In the left column of Table 8, estimates indicate that the dollar value of endowment distributions exhibits positive associations with three variables: cash available at the start of the year, operating deficits, and endowment earnings. Results for the four size-based subsamples shows that the operating surplus and cash effects can be attributed to the payout behavior of very large endowments. However, a positive association exists in all four subsamples between endowment earnings and distributions to the parent organizations.

The point estimates in the second column of Table 8 show that when large endowments run operating deficits, about 22 percent of the deficit is covered by increased distributions from the endowment, a result similar to Yermack's (2017) estimate of 13 percent for a much smaller

[13] Hansmann (1990, pp 9-10) writes, "nearly all discussions of spending rules simply take it for granted that the rate of spending out of endowment should not, over time, exceed the real rate of return on the investments constituting the endowment."

sample of prominent art museums. This result seems to contradict Brown et. al's finding that endowment payouts are reduced when an organization experiences negative financial shocks. However, that paper takes a different empirical approach, defining a "shock" not in terms of operating losses, but instead as a deterioration in the ratio of endowment assets over total expenses.

The other strong result in the first column of Table 8 shows that when an endowment's earnings rise or fall, the annual payout from the endowment to its parent can be expected to rise or fall by about 25% of the change in endowment earnings. This surprisingly high partial correlation may be an artifact of some institutions following a primitive distribution policy of simply paying out most or all of the annual realized income of the fund to the parent (Hansmann, 1990); this conjecture is strongly supported by the very large estimate of 0.65 for the tiny endowment funds in the right column of the table.

V. Endowment performance and its impact on fundraising

Given the high public interest in the investment performance of endowment funds, a natural hypothesis to examine is whether donors respond to successful years in which funds earn strong investment returns. We test this hypothesis in regressions analysis shown in Table 9. The dependent variable in this table is based on total donations during the fiscal year. We calculate this from Part VIII of Form 990 as the sum of federated campaigns (Line 1a) plus fundraising events (Line 1c) plus all other contributions, gifts, and grants (Line 1f). We do not include membership dues (Line 1b), income from related organizations (Line 1d) or government grants (Line 1e). Our dependent variable in Table 9 is then $\ln(\text{donations}_t / \text{donations}_{t-1})$, and we regress this against the endowment investment return for the prior year with results shown in the left

column. In the center column, we repeat this regression after subtracting the equity market index from the endowment return, so that the explanatory variable becomes the net-of-market return. In the right column, we subtract the 60% - 40% mix of the equity and Treasury bond indexes introduced as a benchmark in Table 3 above. We lack a sufficient number of annual observations for each fund to fit a more elaborate model of expected returns.

Results in Table 9 indicate a positive and significant intercept around 0.02, implying a secular growth rate in donations of close to 2% per year, and estimates of 0.2152, 0.1792, and 0.1270 for the lagged raw returns, net-of-market returns, and net of 60-40 benchmark returns respectively, all significant at the 1% level based on standard errors clustered by endowment. These coefficient estimates indicate a modest but significant elasticity between investment performance and the willingness of donors to contribute in future periods. If a fund out-performs the equity market benchmark by 10%, for instance, donations would grow by about 1.8% in the following year, all else equal. These results parallel those found in other "flow-to-performance" studies in the asset management industry that document increased inflows of management fee income after years in which a money manager outperforms market benchmarks. Lewellen and Lewellen (2018) provide a recent contribution in this area and a review of the lengthy literature.

VI. Discussion and conclusions

We study the investment returns and distribution policies of non-profit endowment funds, which have grown into a $0.7 trillion institutional investor class in the U.S. economy. Up to now, nearly all research on endowments has focused on a small, self-selected sample of major research universities, using self-reported survey data from these organizations. Although higher education endowments represent somewhat more than half of the total asset class, our results

suggest that the research focus on them may be somewhat misleading, as they have inferior investment performance on an absolute basis and also when compared to endowments with parent organizations in other sectors.

In a sample of more than 29,000 endowment funds drawn from U.S. Internal Revenue Service filings, our regression analysis indicates that on average, endowment funds underperform their market benchmarks significantly. This pattern is influenced by an endowment's size, as larger endowments tend to underperform the most. Endowments' returns also appear to be connected to the quality of investment advice they receive, since smaller organizations close to cities that are major financial centers earn significantly higher investment returns, while the opposite is true for the larger endowments.

Most endowments appear to follow distribution policies that are quite conservative, with a median payout ratio below 2.5% of their assets. Again, size plays a big role, as most tiny endowments make no distributions at all, and larger endowments tend to cluster around a distribution rate of about 4.5% of fair market value. This number would appear to resemble the expected long-run real return on a fund that is invested 60% in equities and 40% in debt.

Finally, we find an interesting connection between the endowment's investment performance and the willingness of donors to change their contributions in future years. We estimate an elasticity between investment returns and the growth of donations of approximately 0.21. This implies that the constituent donors of a non-profit, such as the alumni of a university, are aware of how well the organization performs as an investor and adjust their donations in a pattern that rewards stock market profits with the supply of new capital, much as one sees the inflows to a mutual fund increase when the fund outperforms the market.

Appendix

Table A1 provides month-by-month performance data for the endowment funds in our sample alongside the relevant equity and debt market benchmarks, in a format identical to Table 3. Each row of the table shows the sample size and summary statistics for endowment returns for those funds whose 12-month fiscal year reporting periods end in that month. Specifically, for each calendar month we identify all endowments with their fiscal years ending in that month. We calculate the median and inter-quartile returns for these subsets of endowments and report these statistics in columns two through four. We next calculate the returns for the CRSP value weighted index and the CRSP 10-Year U.S. Treasury Bond index over the same 12-month periods that match the fiscal years of the endowments. As shown in the table, a significant number of endowments have fiscal years ending in either June or December, with a smaller number ending in September and the rest scattered among the remaining nine months of each year. In addition, our sample size gradually increases over time, as more non-profit firms comply with electronic filing requirements phased in during our sample period by the IRS. We find that in 98 out of the 108 monthly subsamples, the median annual return for the set of endowments is below the return generated by a simple 60-40 mix of the stock index and U.S. government long bond index, as shown in the last column. In 50 of those 108 months, the median return falls below the 10-year Treasury benchmark.

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Table 1
Sample of Form 990 filings

The table shows the sample of Internal Revenue Service Form 990 filings that we retrieve from Amazon Web Services. We retain all observations that have non-missing, positive values for endowment assets at the start and end of the year as well non-missing values for investment income and exhibit no contradictions or inconsistencies in Table V, Schedule D, where the endowment data is reported. Observations are classified according to each organization's National Taxonomy of Exempt Entities (NTEE) code.

Panel A: Number of unique Form 990 filers by year and NTEE code

Year	Arts, culture, and humanities	Higher education	Education (other)	Hospitals	Environment	Health (other)	Human services	International	Mutual benefit	Public and societal benefit	Religion	Unknown or missing	Total
2009	1,594	1,067	2,342	715	633	1,746	3,467	179	215	1,566	292	304	14,120
2010	2,350	1,150	3,306	842	888	2,363	4,734	243	303	2,152	425	376	19,132
2011	2,658	1,152	3,867	851	981	2,542	5,123	275	334	2,436	464	312	20,995
2012	2,878	1,169	4,195	852	1,079	2,667	5,549	300	363	2,648	508	224	22,432
2013	3,003	1,182	4,354	864	1,137	2,733	5,802	315	375	2,712	529	137	23,143
2014	3,064	1,178	4,405	848	1,157	2,719	5,872	316	368	2,753	536	95	23,311
2015	3,052	1,178	4,401	833	1,192	2,726	5,896	320	397	2,753	537	50	23,335
2016	3,052	1,161	4,378	798	1,206	2,675	5,938	319	423	2,784	537	44	23,315
2017	2,706	1,128	4,089	545	1,025	2,154	5,079	267	307	2,288	424	47	20,059
Total	24,357	10,365	35,337	7,148	9,298	22,325	47,460	2,534	3,085	22,092	4,252	1,589	189,842

Panel B: Beginning-of-year endowment assets ($millions) by year and NTEE code

Year	Arts, culture, and humanities	Higher education	Education (other)	Hospitals	Environment	Health (other)	Human services	International	Mutual benefit	Public and societal benefit	Religion	Unknown or missing	Total
2009	28,316	297,444	64,483	28,132	5,637	15,896	15,321	2,825	2,073	22,613	1,245	1,987	485,972
2010	26,860	230,607	67,449	30,324	6,097	16,798	17,309	4,022	2,334	27,664	1,934	1,937	433,336
2011	32,229	248,994	74,938	34,302	6,599	19,773	18,877	4,633	2,518	30,322	2,304	1,907	477,397
2012	36,049	292,610	89,826	36,051	7,444	22,112	21,233	5,164	2,720	39,619	2,642	1,547	557,015
2013	37,093	294,443	93,151	38,842	7,776	23,003	22,559	5,681	2,794	43,574	3,137	945	572,998
2014	42,272	322,536	104,395	42,370	8,759	25,656	25,018	7,357	2,496	51,692	3,540	804	636,896
2015	44,864	367,012	107,596	45,167	9,245	27,670	26,679	8,281	3,041	56,019	3,866	535	699,976
2016	41,816	379,705	109,245	43,550	8,891	27,272	26,134	5,238	2,835	59,462	2,397	595	707,141
2017	36,125	365,251	109,401	33,292	7,479	21,397	21,713	4,354	2,422	45,460	2,013	679	649,586
Total	325,624	2,798,601	820,483	332,031	67,928	199,578	194,845	47,556	23,233	376,425	23,076	10,937	5,220,316

Table 2
Descriptive statistics
The table shows descriptive statistics for a sample of 29,762 U.S. non-profit organizations between 2009-17. Data are obtained from Internal Revenue Service Form 990 filings. Total revenue is reported in Part I of Form 990 (Line 12). Total assets and liabilities are reported as of the start of the fiscal year in Part X of Form 990 (Lines 16 and 26). Endowment assets at the start of year are reported in Part V of Schedule D of Form 990 (Line 1a). Contributions to endowments are reported on the same schedule (Line 1b), and the endowment distribution rate is calculated as the sum of grants and scholarships (Line 1d) and other expenditures for facilities and programs (Line 1e) divided by start-of-year endowment assets plus 0.5 times endowment contributions. Net investment return equals net endowment investment gains/losses (Line 1c) net of any administrative expenses (Line 1f), divided by start of year endowment assets plus 0.5 times endowment contributions. Fundraising is sum of federated campaigns (Part VIII, Line 1a), fundraising events (Part VIII, Line 1c) and other gifts (Part VIII, Line 1f). All dollar values are in $ millions. The number of observations for endowment data exceeds the observations for revenue, assets, and liabilities due to the availability of up to four years of historical endowment data on Schedule D of Form 990.

	count	mean	p50	sd	min	max
Total revenue	145,651	41.58	2.79	261.85	-32.96	12,712.23
Total assets BoY	145,651	90.40	7.39	761.64	-11.75	75,287.52
Total liabilities BoY	145,651	30.09	0.53	280.88	-31.06	35,024.44
Endowment assets BoY	189,842	27.50	1.21	381.37	0.00	36,428.53
Endowment additions	189,842	1.07	0.00	12.94	-25.83	1,415.68
Endowment distribution rate	189,842	0.0489	0.0245	0.1096	-3.1359	1.9992
Net investment return	189,842	0.0562	0.0478	0.0889	-0.4801	0.9153
Donations	189,842	3.93	0.28	30.79	-1.18	2,654.35

Table 3
Endowment returns

The table shows summary statistics of net investment returns on endowment funds for a sample of 29,762 U.S. non-profit organizations between 2009-2017. Endowment data are obtained from Part V of Schedule D of Internal Revenue Service (IRS) Form 990 filings. The annual net investment return for each endowment fund is estimated as endowment investment gains/losses (Line 1c) net of any administrative expenses (Line 1f), divided by start-of-year endowment assets (Line 1a) plus 0.5 times endowment contributions (Line 1b). For comparison purposes, the table also shows mean benchmark returns based on the trailing 12-month returns on the Center for Research in Securities Prices (CRSP) value-weighted index, the CRSP 10-Year U.S. Treasury Bond Index, and a "balanced portfolio" comprised of 60% of the CRSP equity index and 40% of the Treasury bond index. Data in the table represent means and medians for 12-month reporting periods and should not be interpreted as compound annual returns for the 2009-2017 period. Observations are not uniformly distributed through time. Many endowments' 12-month reporting periods end in June or December, and the number of observations generally increases over time to reflect increasing compliance with IRS electronic filing requirements especially by smaller organizations. Each endowment is assigned to one of four size cohorts based on its average start-of-year assets across all observations.

		Distribution of endowment returns			Trailing 12-month benchmark returns			
	Observations	25th %ile	Median	75th %ile	Equity	10-year Treasuries	Balanced portfolio	Endowment median minus Balanced
Large: *assets* > $100 mm	6,467	-0.0038	0.0813	0.1322	0.1100	0.0450	0.0840	-0.0026
Medium: $100 mm > *assets* > $10 mm	28,862	0.0005	0.0657	0.1229	0.1183	0.0429	0.0882	-0.0224
Small: $10 mm > *assets* > $1 mm	68,182	0.0044	0.0545	0.1129	0.1270	0.0410	0.0926	-0.0381
Tiny: $1 mm > *assets*	86,331	0.0014	0.0367	0.1028	0.1307	0.0397	0.0943	-0.0576
Full Sample	189,842	0.0019	0.0478	0.1116	0.1268	0.0408	0.0924	-0.0446

Table 4

Abnormal net investment returns (four-factor model)
The table shows regression estimates of investment alphas for a sample of 29,762 U.S. non-profit organizations between 2009-2017 using the standard four-factor model:

$$\ln(1+R_{i,t}) - \ln(1+R_{f,t}) = \alpha_i + \beta_{i,RMRF} \ln(1+RMRF_t) + \beta_{i,SMB} \ln(1+SMB_t) + \beta_{i,HML} + \ln(1+HML_t) + \beta_{i,UMD} \ln(1+UMD_t) + \varepsilon_{i,t}$$

The analysis is limited to 17,028 endowment funds that report at least seven years of performance data in U.S. Internal Revenue Service Form 990 filings. We fit a separate time series regression for each endowment fund, and the first row of the table reports the cross-sectional average of these alpha estimates. The second row reports the bootstrapped *p*-values of the four-factor alphas, calculated according to a method described more fully in the text. For the last four columns each endowment is assigned to one of the four size cohorts based on its average start-of-year assets.

	Entire Sample	Large: Assets > $100 mm	Medium: $10 mm < Assets < $100 mm	Small: $1 mm < Assets < $10 mm	Tiny: Assets < $1 mm
Four-factor alpha (cross-sectional average)	-0.0110 ***	-0.0165 ***	-0.0152 ***	-0.0111 ***	-0.0084 ***
Cross-sectionally bootstrapped *p*-value*	<0.01	<0.01	<0.01	<0.01	<0.01
Fraction of endowments with estimated alpha < 0	0.61	0.73	0.68	0.61	0.56
Observations	17,028	700	3,048	6,529	6,751
Fraction of observations	1.000	0.041	0.179	0.383	0.396
Fraction of endowment assets	1.000	0.782	0.171	0.043	0.004
β_{RMRF} (cross-sectional average)	0.5011	0.6323	0.5832	0.5158	0.4363
β_{SMB} (cross-sectional average)	0.0179	0.1586	0.0756	-0.0033	-0.0022
β_{HML} (cross-sectional average)	-0.0468	-0.0121	-0.0252	-0.0556	-0.0517
β_{UMD} (cross-sectional average)	-0.0614	-0.0093	-0.0413	-0.0649	-0.0724
R^2 (cross-sectional average)	0.8507	0.9412	0.9088	0.8583	0.8078

Significant at 1% (***), 5% (**) and 10% (*) levels.

Table 5
Endowment alphas and proximity to financial centers
The table shows regression estimates of investment alphas as a function of the locations of endowment funds, for a sample of 29,762 U.S. non-profit organizations between 2009-2017. We save the alphas estimated for each endowment fund from the regressions in Table 4. We then regress these alphas against an intercept and location variables, based on the headquarters address of each endowment's parent organization, using standard ordinary least squares estimation. The analysis is limited to 16,844 endowment funds with complete headquarters addresses that report at least seven years of performance data in U.S. Internal Revenue Service Form 990 filings. For the regressions tabulated in Panel A, the location variable equals the distance in miles from Wall Street, based on STATA's ZIP code calculator and using the New York headquarters ZIP code of Goldman Sachs as the origin. Panel B changes the location variable to equal the distance from each endowment to the nearest of four financial centers: New York, Boston, Chicago, or San Francisco, measured in a similar way. Standard errors appear in parentheses. For the last four columns each endowment is assigned to one of the four size cohorts based on its average start-of-year assets.

Panel A: Distance from Wall Street

	Entire sample	Large: assets > $100 mm	Medium: $100 mm > assets > $10 mm	Small: $10 mm > assets > $1 mm	Tiny: $1 mm > assets
Intercept	-0.0107***	-0.0144***	-0.0137***	-0.0109***	-0.0083***
	(0.0006)	(0.0017)	(0.0011)	(0.0009)	(0.0010)
Mileage from Wall Street x 10^{-3}	-0.0003	-0.0030*	-0.0019**	-0.0003	0.0000
	(0.0005)	(0.0016)	(0.0009)	(0.0008)	(0.0008)
Observations	16,844	688	3,025	6,469	6,662
R^2	0.0000	0.0051	0.0013	0.0000	0.0000

Panel B: Distance from nearest financial center

	Entire sample	Large: assets > $100 mm	Medium: $100 mm > assets > $10 mm	Small: $10 mm > assets > $1 mm	Tiny: $1 mm > assets
Intercept	-0.0114***	-0.0156***	-0.0137***	-0.0123***	-0.0088***
	(0.0006)	(0.0019)	(0.0011)	(0.0009)	(0.0010)
Mileage from nearest financial center x 10^{-3}	0.0013	-0.0038	-0.0044	0.0033*	0.0012
	(0.0012)	(0.0044)	(0.0024)	(0.0019)	(0.0020)
Observations	16,884	688	3,025	6,469	6,662
R^2	0.0001	0.0012	0.0011	0.0004	0.0001

Significant at 1% (***), 5% (**) and 10% (*) levels.

Table 6
Abnormal net investment returns for higher education endowments
The table shows alpha estimates for annual net investment returns for a sample of 29,762 U.S. non-profit endowment funds between 2009-2017 using the standard four-factor model:

$$\ln(1+R_{i,t}) - \ln(1+R_{f,t}) = \alpha_i + \beta_{i,RMRF} \ln(1+RMRF_t) + \beta_{i,SMB} \ln(1+SMB_t) + \beta_{i,HML} + \ln(1+HML_t) + \beta_{i,UMD} \ln(1+UMD_t) + \varepsilon_{i,t}$$

The analysis is limited to 17,028 endowment funds that report at least seven years of performance data in U.S. Internal Revenue Service Form 990 filings. We fit a separate time series regression for each endowment fund, and the first row of the table reports the cross-sectional average of these alpha estimates. The second row reports the bootstrapped *p*-values of the four-factor alphas, calculated according to a method described more fully in the text. The subsample of the Top 20 Universities is based on 2017 rankings from *U.S. News and World Report*, except that Cornell University, which has data inconsistencies in its endowment performance data, was replaced in the sample by Emory University.

	Entire sample	Colleges and universities	All other organizations	Top 20 universities
Four-factor alpha (cross-sectional average)	-0.0110	-0.0148	-0.0107	-0.0019
Cross-sectionally bootstrapped *p*-value*	<0.01	<0.01	<0.01	<0.50
Fraction of endowments with estimated alpha < 0	0.61	0.69	0.60	0.50
Observations	17,028	1,111	15,917	20
R^2 (cross-sectional average)	0.8507	0.9221	0.8458	0.9725

Significant at 1% (***), 5% (**) and 10% (*) levels.

Table 7
Distribution rates for endowments of different sizes
The table shows descriptive statistics about the annual distribution rates for endowment funds, for a sample of 29,762 U.S. non-profit organizations between 2009-2017. Data are obtained from Internal Revenue Service Form 990 filings on Schedule D, Part V. The distribution rate is calculated as the ratio of distributions for grants and scholarships (Line 1d) plus distributions for facilities and programs (Line 1e) over the sum of beginning-of-year assets (Line 1a) plus 50% of new contributions and transfers during the year (Line 1b).

	Entire Sample	Large: Assets > $100 mm	Medium: $10 mm < Assets < $100 mm	Small: $1 mm < Assets < $10 mm	Tiny: Assets < $1 mm
Observations	189,842	6,467	28,862	68,182	86,331
Fraction of with zero distribution	0.3411	0.0424	0.1040	0.2480	0.5162
Median distribution rate	2.45%	4.39%	3.98%	3.21%	0.00%
Mean distribution rate	4.89%	4.91%	5.16%	5.32%	4.47%

Table 8
Distributions by endowments as a function of other sources of cash
The table shows least square regression estimates of the amounts of cash distributed from non-profit endowment funds, as a function of six potential sources of cash for the parent organization. The cash distributed is estimated as the sum of grants or scholarships (Line 1d) and other expenditures for facilities and programs (Line 1e) as reported in part V of Schedule D of Internal Revenue Service Form 990. Cash donations equal the sum of federated campaigns (Part VIII, Line 1a), fund raising events (Part VIII, Line 1c), and all other contributions, gifts, and grants (Part VIII, Line 1f). The operating surplus equals program service revenue (Part VII, Line 2g) minus program service expenses (Part IX, Line 25). Endowment earnings is from part V of Schedule D (Line 1b). New debt issued equals the difference in bonds, loans, and notes outstanding at the end of year from the beginning of the year (the sum of Lines 20, 23, and 24 in Part X). Government grants received equal cash from newly awarded grants (Part VIII, Line 1e) minus changes in grants and pledges receivable (Part X, Line 3). Cash on the balance sheet is the sum of reported cash (Part X, Line 1) and savings (Part X, Line2). All filings by Supporting Public Charities are excluded. Standard errors clustered at the organization level appear in parentheses.

	Entire Sample	Large: Assets > $100 mm	Medium: $10 mm < Assets < $100 mm	Small: $1 mm < Assets < $10 mm	Tiny: Assets < $1 mm
Cash donations	-0.0107	0.0272	0.0006	0.0015***	-0.0000
	(0.0347)	(0.0805)	(0.0018)	(0.0006)	(0.0001)
Operating surplus	-0.1095**	-0.2245***	0.0005	0.0012**	0.0000
	(0.0482)	(0.0851)	(0.0014)	(0.0006)	(0.0001)
Endowment earnings	0.2527***	0.1942***	0.1349***	0.1913***	0.6528*
	(0.0224)	(0.0369)	(0.0221)	(0.0139)	(0.3738)
Net change in long term debt	0.0348	0.0580*	0.0019	-0.0004	-0.0000
	(0.0220)	(0.0326)	(0.0027)	(0.0004)	(0.0001)
Government grants received	0.0011	-0.1598*	0.0041	0.0010	0.0001
	(0.0412)	(0.0849)	(0.0025)	(0.0008)	(0.0001)
Cash on balance sheet	0.0799***	0.1074***	0.0032	0.0002	-0.0000
	(0.0173)	(0.0263)	(0.0022)	(0.0005)	(0.0000)
Intercept	2.8253**	90.6808***	14.2417***	1.7136***	0.0865
	(1.2824)	(29.4955)	(1.6030)	(0.0554)	(0.0690)
Observations	113,452	4,147	16,562	38,692	54,051
R^2	0.6069	0.6374	0.0075	0.0149	0.0272

Significant at 1% (***), 5% (**) and 10% (*) levels.

Table 9

Investment returns and subsequent donations to parent organization

The table shows regression estimates for a model of the growth in donations to the parent organizations of endowment funds, for a sample of 29,762 U.S. non-profit organizations between 2009-2017. The dependent variable is the log of the ratio of current year donations over prior year donations. Donations are estimated based on data reported in Part VIII of the Form 990 filing. Total donations are defined as sum of Line 1a (federated campaigns), Line 1c (fund raising events), and Line 1f (all other contributions) of Part VIII of the Form 990 filing. The main explanatory variables are the lagged endowment return, defined as ln(1+Annual Endowment Return), the net endowment return adjusted for return on the Center for Research in Securities Prices (CRSP) value weighted index, defined as [ln(1+Annual Endowment Return) –ln(1+Annual VWRETD)], and the net endowment return adjusted for a 60% - 40% combination of the CRSP value weighted index and the CRSP 10-Year U.S. Treasury Bond Index. Data are obtained from Internal Revenue Service Form 990 filings for the period 2009-2017. Standard errors, clustered for each endowment, appear in parentheses.

	Estimate	Estimate	Estimate
Intercept	0.0175***	0.0199***	0.0332***
	(0.0025)	(0.0023)	(0.0025)
Lagged endowment return, unadjusted	0.2152***		
	(0.0347)		
Lagged endowment return, net of equity market index		0.1792***	
		(0.0337)	
Lagged endowment return, net of 60%-40% equity-debt balanced portfolio			0.1270***
			(0.0473)
Observations	103,426	103,426	103,426
R^2	0.0003	0.0003	0.0001

Significant at 1% (***), 5% (**) and 10% (*) levels.

Table A1
Endowment returns
The table shows summary statistics of net investment returns on endowment funds for a sample of 29,762 U.S. non-profit organizations between 2009-2017. Each line of the table shows the distribution of annual endowment returns and the comparable trailing 12-month benchmark returns for observations whose 12-month fiscal year reporting periods end in that month. Endowment data are obtained from Part V of Schedule D of Internal Revenue Service Form 990 filings. The annual net investment return for each endowment fund is estimated as endowment investment gains/losses (Line 1c) net of any administrative expenses (Line 1f), divided by start-of-year endowment assets (Line 1a) plus 0.5 times endowment contributions (Line 1b). Benchmark returns are based on the Center for Research in Securities Prices (CRSP) value-weighted index, the CRSP 10-Year U.S. Treasury Bond Index, and a "balanced portfolio" comprised of 60% of the CRSP equity index and 40% of the Treasury bond index.

	Observations	Distribution of Endowment returns			Trailing 12-month benchmark returns			
Tax Year Ending Month		25th%tile	Median	75th %ile	Equity	10-Year Treasuries	Balanced portfolio	Endowment Median minus Balanced
2009m1	19	-0.2214	-0.1743	0.0195	-0.3922	0.0828	-0.2022	0.0279
2009m2	30	-0.3004	-0.1981	0.0183	-0.4410	0.0708	-0.2363	0.0381
2009m3	220	-0.2719	-0.2185	-0.0825	-0.3861	0.0938	-0.1942	-0.0243
2009m4	102	-0.2578	-0.2100	-0.1016	-0.3521	0.0722	-0.1823	-0.0276
2009m5	404	-0.2342	-0.1888	-0.0992	-0.3242	0.0748	-0.1646	-0.0242
2009m6	5,462	-0.1925	-0.1473	-0.0584	-0.2690	0.0664	-0.1349	-0.0124
2009m7	172	-0.1446	-0.0857	0.0075	-0.1986	0.0697	-0.0913	0.0055
2009m8	509	-0.1211	-0.0754	-0.0078	-0.1820	0.0642	-0.0835	0.0081
2009m9	1,068	-0.0160	0.0080	0.0317	-0.0521	0.0743	-0.0016	0.0096
2009m10	92	0.0238	0.0887	0.1345	0.1300	0.1019	0.1188	-0.0300
2009m11	14	-0.0068	0.0378	0.1525	0.3050	0.0345	0.1968	-0.1590
2009m12	6,028	0.0420	0.1494	0.2117	0.3130	-0.0583	0.1645	-0.0151
2010m1	29	0.0110	0.1640	0.2083	0.3702	0.0060	0.2245	-0.0605
2010m2	45	0.0472	0.2056	0.3237	0.5759	0.0100	0.3495	-0.1439
2010m3	354	0.0767	0.2406	0.3330	0.5424	-0.0359	0.3111	-0.0705
2010m4	158	0.0636	0.1824	0.2671	0.4182	0.0164	0.2575	-0.0751
2010m5	533	0.0602	0.1173	0.1474	0.2231	0.0595	0.1576	-0.0403

2010m6	7,590	0.0417	0.0925	0.1228	0.1646	0.0923	0.1357	-0.0432
2010m7	254	0.0341	0.0846	0.1133	0.1523	0.0919	0.1281	-0.0435
2010m8	703	0.0187	0.0482	0.0723	0.0693	0.1194	0.0893	-0.0411
2010m9	1,436	0.0287	0.0702	0.0951	0.1167	0.1057	0.1123	-0.0421
2010m10	127	0.0412	0.0903	0.1259	0.1930	0.1039	0.1574	-0.0671
2010m11	30	0.0298	0.0645	0.0970	0.1344	0.0755	0.1108	-0.0464
2010m12	7,873	0.0346	0.0873	0.1163	0.1771	0.0745	0.1361	-0.0488
2011m1	34	0.0272	0.0963	0.1216	0.2459	0.0523	0.1685	-0.0722
2011m2	58	0.0316	0.1277	0.1590	0.2500	0.0500	0.1700	-0.0423
2011m3	417	0.0512	0.0920	0.1189	0.1791	0.0644	0.1332	-0.0412
2011m4	200	0.0385	0.1036	0.1388	0.1891	0.0624	0.1384	-0.0347
2011m5	622	0.0748	0.1530	0.1891	0.2721	0.0620	0.1880	-0.0350
2011m6	8,672	0.0731	0.1595	0.1999	0.3154	0.0211	0.1977	-0.0382
2011m7	291	0.0330	0.1017	0.1363	0.2013	0.0446	0.1386	-0.0369
2011m8	780	0.0382	0.0877	0.1176	0.1829	0.0567	0.1324	-0.0447
2011m9	1,566	-0.0206	-0.0015	0.0132	-0.0082	0.0899	0.0310	-0.0325
2011m10	138	0.0032	0.0203	0.0379	0.0639	0.0824	0.0713	-0.0510
2011m11	35	0.0005	0.0253	0.0392	0.0519	0.0997	0.0710	-0.0457
2011m12	8,182	-0.0259	-0.0023	0.0142	-0.0107	0.1660	0.0600	-0.0622
2012m1	36	-0.0017	0.0072	0.0352	0.0232	0.1766	0.0846	-0.0773
2012m2	62	0.0034	0.0160	0.0406	0.0262	0.1643	0.0815	-0.0655
2012m3	456	0.0031	0.0208	0.0401	0.0474	0.1422	0.0853	-0.0645
2012m4	216	-0.0082	0.0038	0.0273	0.0112	0.1578	0.0699	-0.0661
2012m5	658	-0.0485	-0.0253	0.0039	-0.0408	0.1652	0.0416	-0.0669
2012m6	9,320	-0.0180	0.0003	0.0170	0.0145	0.1644	0.0745	-0.0741
2012m7	337	-0.0028	0.0144	0.0353	0.0486	0.1471	0.0880	-0.0736
2012m8	840	0.0185	0.0539	0.0804	0.1418	0.0924	0.1220	-0.0681
2012m9	1,679	0.0512	0.1272	0.1648	0.2808	0.0544	0.1902	-0.0630
2012m10	154	0.0330	0.0687	0.0944	0.1335	0.0642	0.1058	-0.0370
2012m11	42	0.0410	0.0667	0.1051	0.1476	0.0649	0.1145	-0.0478
2012m12	8,632	0.0397	0.0878	0.1149	0.1577	0.0359	0.1090	-0.0211
2013m1	40	0.0182	0.0687	0.0949	0.1578	0.0115	0.0992	-0.0305
2013m2	56	0.0160	0.0542	0.0728	0.1212	0.0342	0.0864	-0.0322

2013m3	469	0.0371	0.0719	0.0922	0.1335	0.0587	0.1036	-0.0317
2013m4	233	0.0281	0.0858	0.1124	0.1584	0.0475	0.1140	-0.0282
2013m5	649	0.0818	0.1379	0.1636	0.2633	-0.0161	0.1515	-0.0136
2013m6	9,666	0.0497	0.0917	0.1176	0.1985	-0.0392	0.1035	-0.0118
2013m7	350	0.0377	0.0993	0.1414	0.2489	-0.0584	0.1260	-0.0267
2013m8	856	0.0315	0.0722	0.1011	0.1856	-0.0682	0.0841	-0.0118
2013m9	1,714	0.0384	0.0813	0.1171	0.1982	-0.0455	0.1007	-0.0194
2013m10	168	0.0450	0.1011	0.1431	0.2638	-0.0360	0.1439	-0.0428
2013m11	42	0.0519	0.0910	0.1543	0.2874	-0.0567	0.1498	-0.0588
2013m12	8,900	0.0497	0.1166	0.1571	0.3047	-0.0690	0.1552	-0.0386
2014m1	36	0.0020	0.0501	0.0916	0.2006	-0.0212	0.1119	-0.0617
2014m2	56	0.0129	0.1045	0.1385	0.2456	-0.0282	0.1361	-0.0316
2014m3	465	0.0457	0.0931	0.1196	0.2086	-0.0357	0.1109	-0.0177
2014m4	224	0.0397	0.0796	0.1087	0.1928	-0.0443	0.0979	-0.0184
2014m5	638	0.0695	0.1015	0.1225	0.1941	0.0053	0.1186	-0.0171
2014m6	9,828	0.0848	0.1330	0.1579	0.2463	0.0338	0.1613	-0.0282
2014m7	353	0.0416	0.0846	0.1080	0.1595	0.0383	0.1110	-0.0264
2014m8	841	0.0678	0.1270	0.1532	0.2380	0.0716	0.1714	-0.0444
2014m9	1,699	0.0361	0.0691	0.0933	0.1633	0.0416	0.1146	-0.0455
2014m10	173	0.0395	0.0630	0.0828	0.1424	0.0480	0.1046	-0.0417
2014m11	45	0.0440	0.0653	0.0828	0.1381	0.0760	0.1133	-0.0480
2014m12	8,953	0.0163	0.0375	0.0571	0.1051	0.1015	0.1037	-0.0661
2015m1	36	0.0115	0.0266	0.0488	0.1083	0.1087	0.1085	-0.0819
2015m2	55	0.0337	0.0560	0.0743	0.1187	0.0762	0.1017	-0.0457
2015m3	482	0.0224	0.0442	0.0645	0.1021	0.0892	0.0969	-0.0527
2015m4	227	0.0206	0.0470	0.0677	0.1098	0.0716	0.0945	-0.0475
2015m5	641	0.0215	0.0381	0.0572	0.0991	0.0475	0.0784	-0.0403
2015m6	9,854	-0.0004	0.0118	0.0284	0.0486	0.0307	0.0414	-0.0296
2015m7	354	0.0042	0.0242	0.0471	0.0835	0.0465	0.0687	-0.0445
2015m8	825	-0.0419	-0.0189	0.0011	-0.0209	0.0260	-0.0021	-0.0167
2015m9	1,686	-0.0444	-0.0213	0.0000	-0.0296	0.0555	0.0044	-0.0257
2015m10	165	-0.0108	0.0044	0.0194	0.0206	0.0340	0.0260	-0.0216
2015m11	40	-0.0083	0.0023	0.0150	0.0019	0.0159	0.0075	-0.0052

2015m12	8,970	-0.0299	-0.0126	0.0013	-0.0168	0.0107	-0.0058	-0.0067
2016m1	37	-0.0513	-0.0305	0.0003	-0.0471	-0.0016	-0.0289	-0.0016
2016m2	56	-0.0869	-0.0402	0.0005	-0.0970	0.0412	-0.0417	0.0016
2016m3	460	-0.0394	-0.0222	0.0007	-0.0231	0.0312	-0.0014	-0.0208
2016m4	215	-0.0401	-0.0180	0.0047	-0.0201	0.0349	0.0019	-0.0199
2016m5	650	-0.0378	-0.0212	0.0009	-0.0162	0.0401	0.0063	-0.0275
2016m6	9,839	-0.0274	-0.0073	0.0084	0.0062	0.0949	0.0417	-0.0490
2016m7	358	-0.0024	0.0113	0.0286	0.0327	0.0821	0.0525	-0.0412
2016m8	826	0.0193	0.0474	0.0671	0.1017	0.0748	0.0910	-0.0435
2016m9	1,677	0.0399	0.0710	0.0917	0.1437	0.0546	0.1080	-0.0370
2016m10	162	0.0090	0.0294	0.0401	0.0419	0.0460	0.0435	-0.0141
2016m11	37	0.0252	0.0445	0.0596	0.0814	0.0068	0.0516	-0.0071
2016m12	8,998	0.0291	0.0548	0.0739	0.1268	0.0070	0.0789	-0.0241
2017m1	37	0.0251	0.0736	0.1136	0.2216	-0.0199	0.1250	-0.0514
2017m2	56	0.0480	0.0975	0.1376	0.2606	-0.0289	0.1448	-0.0473
2017m3	436	0.0475	0.0906	0.1127	0.1801	-0.0251	0.0980	-0.0074
2017m4	214	0.0419	0.0822	0.1074	0.1775	-0.0099	0.1025	-0.0203
2017m5	615	0.0742	0.1034	0.1187	0.1717	-0.0034	0.1017	0.0017
2017m6	9,783	0.0668	0.1014	0.1233	0.1791	-0.0368	0.0928	0.0086
2017m7	335	0.0420	0.0852	0.1084	0.1582	-0.0399	0.0789	0.0062
2017m8	809	0.0513	0.0862	0.1093	0.1568	-0.0157	0.0878	-0.0016
2017m9	1,652	0.0594	0.0969	0.1201	0.1807	-0.0313	0.0959	0.0010
2017m10	163	0.0608	0.1217	0.1493	0.2300	-0.0171	0.1312	-0.0095
2017m11	36	0.0774	0.1322	0.1550	0.2145	0.0221	0.1375	-0.0053
2017m12	5,923	0.0829	0.1266	0.1500	0.2066	0.0280	0.1352	-0.0086
Full Sample	**189,842**	**0.0019**	**0.0478**	**0.1116**	**0.1268**	**0.0408**	**0.0924**	**-0.0446**