How do Financial Expertise and Networks Affect Investing? Evidence from the Governance of University Endowments *

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Abstract

This paper studies how investment expertise and networks of university board members are linked to endowment investment performance. Harnessing detailed information on 11,019 board members for 579 universities, we find that more expertise in alternative assets (hedge funds, private equity and venture capital) and larger professional networks lead to higher allocations to alternatives and better investment results, even after controlling for risk. Expertise and networks appear particularly important in private equity and venture capital which are especially difficult to analyze and manage. The improved investment performance comes through a number of channels: capturing higher returns that can accompany alternative assets in general, greater ability to select or have access to high performing managers and being able to use direct funds rather than funds of funds which impose an extra layer of fees. Our results suggest that endowments directly benefit from having experts in alternative investments serving on university boards.

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University endowments spend billions of dollars a year to support higher education in the United States. Rather than rely on investments in public securities such as stocks and bonds to fund this spending, many (and especially large) endowments have substantial allocations to "alternative" assets, such as hedge funds, private equity, or venture capital. One explanation for the shift to alternative assets is the opportunity to earn higher returns by capturing illiquidity premia that accompany private assets. Another potential opportunity in alternatives stems from active management to identify and access high performing managers, since private markets are less efficient than public markets due to frictions in trading and obtaining information. Given their mission and profile, endowments may be well positioned to bear illiquidity and to invest with top performing managers in private assets based on expertise, links to alumni, long time horizons and few constraints on investment choices. These arguments undergird the "endowment model" (often called the Yale model due to its development there by David Swensen) which has been adapted by many university endowments. Despite these possible benefits, active management and investing in alternative assets comes with frictions and costs. Investments in many alternatives are illiquid, not easily scaled, and have high search and monitoring costs. An endowment may need considerable expertise to make successful investments in these areas. In an open letter in 2016, Warren Buffett challenged the endowment model. Yale responded:

> In advocating the adoption of a passive indexing strategy, Buffett provides sound investment advice for the vast majority of individuals and institutions that are unable (or unwilling) to commit the resources (human and financial) necessary for active management success. Yet, Buffett's advice is not appropriate for the cohort of endowments that possess the capabilities to pursue successful active management programs. The fabulous returns generated by the top performers result from long-standing commitments to sound investment principles implemented by top-notch investment teams under the oversight of world-class governance bodies (Yale Endowment Annual Report, 2017).

In this paper, we provide the first study of whether the investment expertise and networks resident in university governance affect endowments' allocations to assets and resulting returns. We pay particular attention to alternative assets (hedge funds, private equity and venture capital) for which skill and contacts may be especially important.

We collect information on 11,019 unique individuals matched with 579 endowments to construct novel measures of board members' expertise in investments and networks in business. We develop granular measures related to specific investment areas (e.g., asset management of public securities, hedge funds, private equity, and venture capital). We also survey endowments asking specific questions about governance and the investment process.

Our analysis uncovers several features of university endowment investments.

First, we document the substantial shift to alternative assets which is especially pronounced for larger endowments. For endowments with assets above one billion dollars, the average allocation to alternatives is almost fifty percent.

Second, we show that university endowments, on average, have strong investment returns. They outperform simple passive strategies in public markets. This return advantage is most notable for larger endowments. Moreover, this effect is not simply due to taking on higher levels of risk; endowment portfolios have higher returns per unit risk as expressed in higher Sharpe Ratios. We also find that endowments, on average, outperform benchmarks based on their asset allocation weights, suggesting that they generate extra returns from active management. Overall, our results suggest that, on average, endowments (especially large endowments) have earned higher total returns due to investing in alternative assets. Part of the return increase is due to harvesting higher returns in an asset class (e.g., a liquidity premium in alternative assets) and part is due to active management within an asset class.

Third, we show notable differences across endowments in the expertise and networks resident in their governing bodies. We find that more expertise in alternative assets goes along with higher allocations to those assets. This effect is true even after controlling for endowment size. Moreover, the nature of expertise appears granular; expertise in hedge funds

matters for allocations to hedge funds, whereas expertise in private equity or venture capital matters most for that specific area. Consistent with this pattern, we find that having a CIO is positively linked to allocations to private equity and venture capital, both of which involve complexities such as managing capital calls and dealing with illiquidity. For hedge funds, however, the presence of a CIO is not linked to allocations. These findings across hedge funds, private equity, and venture capital are consistent with the relative difficulty of managing and accessing these alternative asset classes.

Fourth, in addition to expertise, we find that professional connections (networks) matter, especially for allocations to private equity and venture capital. This is consistent with being able to overcome restrictions or barriers to investing in funds that might otherwise be difficult or impossible to access.

Fifth, the extra returns experienced by endowments are related to investment expertise. In addition to being linked to asset allocations, expertise leads to higher "selection" returns within alternative assets, that is, extra returns having controlled for benchmarks of average performance in an asset class. The importance of expertise emerges even after controlling for endowment size and is particularly notable in venture capital. This is consistent with the importance of access to high performing venture capital partnerships.

Finally, we provide evidence on specific parts of the investment process. We find that expertise affects how endowments navigate choices between direct funds and funds of funds. Endowments with more expertise resident in their boards are more likely to use direct funds to invest in alternative assets, rather than funds of funds which have an additional layer of intermediation and fees. This is consistent with an increased ability to understand and access direct funds. Further, our survey reveals that participants in the investment process (e.g. senior staff of endowments) benefit from more knowledgeable and better-connected governance bodies, citing more frequent recommendations of and access to alternative investment funds, especially those that might be restricted or closed. This confirms a prominent role for expertise and networks.

Overall, our results indicate that endowments likely benefit from seeking out investment experts to serve on governing bodies. The potential benefits seem highest in areas such as private equity and venture capital, where investments are often harder to analyze and access.

We proceed as follows. Section 1 discusses endowments and related research. Section 2 discusses data sources and endowment characteristics, including asset allocations, returns and measures of expertise and networks. Sections 3 and 4 study how asset allocations and returns, respectively, are affected by investment expertise and networks. Section 5 examines some specific channels for effects on the investment process, including the results of our endowment survey on the topic. Finally, section 6 concludes.

1 University Endowments and Past Research

University endowments make headlines every year when they report asset allocations and returns. On behalf of their schools, these endowments in the U.S. collectively manage over half a trillion dollars (2015) and annually spend 4 to 5 percent of this aggregate wealth on, among other things, scholarships for students, support for faculty, and investments in infrastructure for teaching and research. Endowments' investment performance is thus vital for the future of what schools strive to accomplish.

These endowments provide an especially good laboratory for research on institutional investing and are often viewed as innovators in investment management. They typically have a long term (infinite) investment horizon, limited restrictions on asset choice, and favorable tax status which may reduce frictions. Moreover, endowment decisions are less likely to be influenced by external political forces or other constraints facing many large institutional investors. This is the first study to examine the links between asset allocations and returns and measures of investment expertise and networks that reside in endowment governance. This expertise and networks may be especially important for alternative assets to which endowments often make large allocations. For instance, studying the boards of

pension funds, Andonov et al. (2018) find that the lack of financial experience on the board contributes to poor investment performance. Moreover, pensions whose boards have a high fraction of government officials have lower returns within investment categories, such as real estate and venture capital, likely due to political pressures favoring certain (sub-optimal) investments. Studying private equity, Cavagnaro et al. (2017) find that more institutional investors (limited partner investors in private equity) do consistently better or worse (relative to median returns) than can be explained without the presence of differential skill among the private equity managers. Other research focusing on private equity also suggests an important role for expertise. Lerner et al. (2008) find that large endowments' shift towards alternative investments was accompanied by higher returns, and conclude that top endowments have superior ability to select and access managers. They caution, however, against a simple mimicking strategy of higher allocations to private equity since success may depend on an endowment having the ability to select and access high performing funds.

Sensoy et al. (2014) also examine private equity and find that endowments enjoyed superior returns over the 1991-1998 period. They attribute this advantage to access to high-performing venture capital funds. After 1998, however, the authors find that endowments' advantages disappear and that other institutional limited partners do just as well investing in private equity. Sensoy et al. (2014) attribute this erosion of endowments' advantages to a maturation of the private equity industry.

Academic research on endowment portfolio performance is limited (Barber and Wang (2013), Brown et al. (2010)). Studying the 1991-2011 period, Barber and Wang (2013) conclude that university endowments do not exhibit any ability to beat high level benchmarks through selection or timing skills. They conclude that "elite" institutions (e.g. Ivy League and high SAT level schools) benefit from higher returns on alternative assets (e.g. due to high allocations) but do not earn any extra returns over and above private asset benchmarks. Barber and Wang (2013) do not, however, develop specific measures of expertise and networks. Moreover, their methodology relies on ex-post estimates of portfolio weights to earn returns

over a past period, not actual investment weights put in place at the beginning of a period. While not directly addressing endowment performance, there is also limited research on the impact of financial and income shocks on endowment spending and asset allocation (see, for example, Brown et al. (2014), Dimmock (2012), Rosen and Sappington (2016)). None of this prior research, however, uses specific measures of skill or networks such as we develop.

In this paper, we focus on expertise and networks inherent in governing boards. The governance of endowments may have a number of effects including spending policy, appetite for risk, and effectiveness in executing strategy. Our focus is on how the investment expertise and networks resident in a university's governance affects allocations to various assets and the resultant returns. Schools have adopted different plans for governing endowments but most share some common features. The typical governance structure includes a Board of Trustees that specifies spending policies, broader fund objectives, and delegates responsibilities. Responsibilities are often given to an investment committee, often a subset of the larger trustee board, which sets investment policy and risk limits. In turn, the investment committee often further delegates investment and operational power to a management staff. For larger endowments, the investment committee may delegate substantial discretion to a full-time staff that includes a Chief Investment Officer (CIO) and a range of investment professionals. In small endowments, there may be few or no professional staff with investment expertise, and the investment committee itself remains closely involved with details of the investment process, often working with a consultant. Endowments typically create an Investment Policy Statement codifying key features of endowment policy.[1]

[1] A number of surveys and analysis of governance structures are available from industry sources, including NACUBO, Cambridge Associates, and the Greenwich Roundtable. Some universities set up the endowment as a separate management company with its own separate board. Some have blended models that outsource staff responsibilities to another firm which has a Chief Investment Officer and professional staff.

2 Data Sources and Endowment Characteristics

2.1 Data Sources

Data on returns and allocations come from comprehensive annual surveys of higher education endowments by the National Association of College and University Business Officers (NACUBO).[2] These provide an individual endowment's overall annual return and detail on its asset allocation. Some endowments also report annual returns by asset class (e.g. for private equity). In addition, NACUBO reports an array of data such as the endowment's size, spending rate, whether it is public or private and whether it employs a Chief Investment Officer. We have surveys for the years 2004 through 2015, thus including the 2007-2009 financial crisis (missing from some earlier studies).

Since NACUBO does not provide names for individuals associated with an endowment or a breakout of alternative asset specialties (e.g. hedge funds versus venture capital), we use two additional sources: Guidestar which provides names of individuals (including trustees) associated with nonprofit organizations, and Boardex which covers comprehensive biographical data on business leaders (from top executives to mid-level managers). We measure expertise based on employment history. For instance, if an individual had worked for a venture capital fund they would be classified as having expertise in alternatives and within that category as having venture capital expertise. Network measures are based on connections to individuals through current or past employment, educational experience or social history through organizations. For instance, if an individual had at one time worked for Fidelity, the individual would be matched with all individuals in BoardEx who had worked for Fidelity. We match NACUBO, Guidestar and BoardEx to create a panel of data covering 579 endowments, 11,019 unique individuals in governance roles at those endowments and 55,446 individual-year observations (over the years 2007-2015 for which both BoardEx and

[2]NACUBO and the Commonfund Institute joined forces in 2009 to create a single, comprehensive annual study of higher education endowments (NCSE).

Guidestar data are available). To develop measures at the endowment level we aggregate across individuals that serve in governance roles at the endowment. As a result, for each endowment in each year we capture expertise and networks available to the endowment at a granular level, including breaking out alternatives into hedge funds, private equity and venture capital. The Appendix provides detail on data construction and variable definitions.

2.2 Endowment Characteristics

NACUBO data illustrate key features of the endowment landscape: large differences among schools in assets under management, in investment patterns and in returns. A few endowments have assets above $10 billion but the simple average across the NACUBO sample is just over $500 million, and the median figure is around $100 million. Figure 1 displays asset allocations to alternative assets accompanying adoption of the endowment model by many universities. Larger endowments tilt their allocation toward alternative strategies, investing about half of their assets in alternatives, while smaller endowments allocate only about one fifth. Smaller endowments have increased allocations to alternatives steadily over time but still have much smaller allocations than larger funds.

Another feature of endowment investing is differences in return patterns across endowments, not surprising given their different allocation patterns. Figure 2 plots average returns for three size groups of endowments. As comparison, it also shows the return from avoiding alternatives altogether with a passive strategy of U.S. stocks (50% in SP500), fixed income (30% in JP Morgan Bond Index) and international equity (20% in MSCI ACWI). Figure 2 shows that all size groupings of endowments had higher returns than this passive strategy. Moreover, the difference in returns between large and small endowments is striking: large funds outperform their smaller peers by over 2 percent annually and have an even larger spread over the passive strategy.

Table 1 provides more detailed information on endowment characteristics. Panel A emphasizes the large role endowments play in university life: the average endowment spends

4.45% of assets annually and funds 9.91% of the school's budget. The figures also show the striking differences in size across endowments. While the mean endowment size is $515 million, three fourths of endowment have assets less $305 million. Panel B provides more detail behind the asset allocation trends seen in Figure 1 and the differences between large and small endowments. The "average" endowment allocation to Domestic Equity is 35.6% and about one-fourth is alternative investments (24.3%). If the figures are weighted by dollars, the last column of Panel B shows only about one-fifth of total endowment dollars (19.8%) are in Domestic Equity and almost half (47.9%) are in alternatives. This reflects the role of big endowments which have large allocations to alternatives.

Panel C provides insights on endowment returns. The first row parallels patterns shown in Figure 2. The average endowment return is 7.35% which rises to 9.66% on an asset weighted basis due to the higher returns of large endowments. Panel B also presents Sharpe ratios measuring returns per unit risk (as described in the appendix). The Sharpe ratio of 0.82 on an asset weighted basis is higher than the simple average of 0.64, suggesting that the higher returns of larger endowments are not simply the result of taking on higher portfolio risks. We caution, however, that measures of portfolio risk are notoriously difficult when private assets are involved. Quoted values for private assets are often stale, may be measured with substantial error and can present a "smoothed" version of the actual risk in the asset class. As described in the appendix, we take explicit steps to adjust risk measures for these features but acknowledge their limitations.

Finally, Panel D of Table 1 summarizes measures of expertise and networks along with other information on the size of the board and the endowment's professional staff. As expected, the data display quite different situations across endowments. Backgrounds for an "average" endowment show that about a third of the board members have finance experience which is outside of investments, six percent have worked in asset management (public securities) and 18 percent have experience in alternatives. The quartile figures portray a more complex story and stark differences across endowment size. On a dollar weighted basis boards have

nine percent of their members with asset management experience and over 30 percent with experience in alternatives. Comparison of simple and dollar-weighted averages also shows that large endowments tend to have larger networks, larger boards, bigger professional staffs and are more likely to have a full-time CIO. Strikingly, while only about one in four endowments has a CIO, dollar weighted figures show that almost three-fourths of all endowment assets are managed using a full-time CIO.

3 Asset Allocations by University Endowments

To investigate endowments' asset allocations we use a pooled regression with fixed effects for time, geography and whether the school is public or private as given below:

$$y_{it} = \beta_0 + \beta_1 Expertise_{it} + \beta_2 Network_{it} + \Lambda Controls_{it} + FEs + \epsilon_{it} \tag{1}$$

where y_{it} represents the allocation to an asset class expressed as a percentage of total assets (e.g., to domestic equity or to venture capital) by endowment i at time t. We cluster standard errors at the endowment level to allow for correlation in the error term over time for a given fund. Expertise and network are measures of the financial expertise and networks resident in the endowment's governing board.

In some specifications we include controls for the size of the endowment (the natural logarithm of total assets), whether the endowment has a full-time CIO (zero-one dummy coded 1 for a CIO), the size of the endowment's professional staff (natural logarithm of number of full time equivalents, and the size of the governing board (natural logarithm of the number of members). Endowment size captures the role of scale on the ability to invest in asset classes not easily accessible to smaller funds. Having a CIO and large professional staff adds in-house expertise and is likely related to a different division of responsibilities between the governing body and staff.

Fixed effects for each year control for market-wide macroeconomic shocks to all endow-

ments. We also include a fixed effect for an endowment's state since location may influence endowment behavior through unobserved time-invariant factors such as the regulatory environment or proximity to investment opportunities. For example, endowments in California may invest more in venture capital given the long history of angel investing and innovation in the Silicon Valley area. Finally, the fixed effects for public versus private institutions capture potentially different roles for governing bodies, different risk limits and different constraints on asset classes.

Table 2 examines allocations to domestic equity and fixed-income. The first regression for each asset class uses only measure of expertise, while the second adds all other variables. Without controlling for size, investment expertise in both asset management (public securities) and alternative assets are linked to lower allocations to domestic equity. Once size and other control variables are added, the effects of expertise are not significant, revealing the correlation between expertise and asset size. The significant negative coefficients on size shows that larger endowments allocate less to domestic equity: this is the flip side of higher allocations to alternatives seen in Figure 1. For fixed income, the patterns are similar to those of domestic equity, with one exception. The exception is that public institutions allocate more to fixed income (1.63 percent more) than do privates. This higher allocation may reflect tighter constraints on investment alternatives or on risk taking behavior.

Overall, the results in Table 2 suggest measures of investment expertise, if anything, are negatively linked to allocations to traditional asset classes such as stocks and bonds. Once one controls for the size of the endowment, expertise has no significant effect. These patterns are consistent with recent trends in investment strategies, whereby cheap and passive exposure to mutual fund managers or pooled investment vehicles can be easily obtained through ad hoc investment programs (e.g. TIAA-CREF).

Table 3 turns to alternative assets where we would expect investment expertise and networks to play a larger role than in public markets. Using only expertise measures, regression 1 reveals that both expertise in asset management (public securities) and alternatives are

significantly linked to higher allocations to alternatives. This is the mirror image of the patterns seen in Table 2 for allocations to domestic equities and fixed income. The results suggest that expertise in investment management (either public or private) is associated with higher allocations to alternatives. When we introduce all variables except for endowment size (regression 2), the expertise effects remain. In addition, having a CIO, a large investment team and a large board all are positively linked to alternative allocation. This is consistent with the skill and infrastructure necessary to deal with asset classes that may involve managing capital calls and liquidity. Once we introduce asset size in regression 3, the positive effect of expertise in alternatives remains; however, the effects of asset management expertise and board size are no longer significant. The patterns in Table 3 show the difficulty of untangling whether it is simply the size of the endowment or some of the characteristics of most large endowments that matter. What is clear is that even controlling for these size related factors, having more expertise in alternative assets is positively and significantly linked to higher allocations to alternative assets as is the presence of a CIO. A 10% increase in the proportion of alternative specialists on the board is associated with a 82 basis points increase in the allocation to alternatives. The presence of a CIO is associated with an almost 4% increase in allocation to alternatives. Taken together these effects show that expertise resident in both the governing board and in the staff (as reflected in the presence of a CIO) goes hand-in-hand with moves to alternative assets. This expertise is specific to alternative assets, not just experience in finance or asset management more generally. These links are consistent with the increased complexity of analyzing and accessing alternative assets compared to public markets.

Table 3 finds no significant role for networks. Moreover, it uses a measure of expertise across a spectrum of alternative investments that can be quite different in terms of their liquidity, investment thesis and investment horizon (e.g., hedge funds versus private equity versus venture capital). To explore effects of expertise and networks more thoroughly, we look separately at allocations to hedge funds, to private equity and to venture capital rather than

lumping them together. We also use more granular measures of expertise related specifically to a class of assets. Tables 4 through 6 present results.

Table 4 focuses on hedge funds whose assets are mostly public securities, unlike the private companies held by private equity and venture capital funds. As in Table 3, we first introduce measures of expertise and then add other variables in subsequent specifications. Looking across the regressions shows that types of expertise in alternatives are not equal in affecting hedge fund allocations. For instance, controlling for all variables in regression 4, hedge fund expertise remains significantly positively linked to hedge fund allocations, but this is not true for expertise in private equity or venture capital. We also note that the presence of a CIO is not significant nor is our measure of network. We will return to these patterns after considering allocations to private equity and venture capital.

Table 5 looks at private equity. Once we control for endowment characteristics, regressions 3 and 4 show that private equity expertise remains significant in explaining higher allocations to private equity, though expertise in hedge funds or venture capital is not. The findings also show a significant role for the board's network and the presence of a CIO. Table 6 examines venture capital. Regressions 3 and 4 show that even controlling for other endowment characteristics, venture capital expertise is still significantly positively related to allocations, but expertise in hedge funds or private equity is not. Moreover, network matters as does the presence of a CIO and a sizable investment team.

Tables 4 through 6 show that the nature of expertise related to allocations is granular and appears tailored to each of the three subsets of alternatives. For hedge fund allocations, expertise in hedge funds matters. A 10% increase in the proportion of members with hedge fund experience is associated with a 1.8% increase in the allocation to hedge funds. Similarly, experience in venture capital is linked to higher venture capital allocations, and private equity expertise matters in private equity. These patterns suggest that expertise does not readily travel across alternative asset classes; rather, investment expertise has elements unique to the particulars of the type of investment.

The results also reveal interesting patterns in the effect of networks and the presence of a CIO on allocations. While the size of the network and the presence of a CIO are significantly positively related to allocations to venture capital and private equity, this is not the case for hedge funds. The size of the investment team seems to matter most for venture capital allocations. These patterns across hedge funds, venture capital, and private equity are consistent with the relative difficulty of managing and accessing these alternative asset classes. Recent trends in hedge fund investing show that allocations to hedge funds have increased across all endowments reflecting easier (and possibly cheaper) access to hedge fund managers. In contrast, private equity investments involve managing capital calls, substantial illiquidity, and assessing management teams who invest in real assets (companies). Venture capital shares the complexity of private equity with the added challenges of the increased riskiness related to new businesses and sometimes restricted access to high performing funds. Our results suggest that having a CIO and board networks is more important in navigating and accessing the more complex arrangements with private equity and venture capital funds, as compared to hedge fund investing.

Since some endowments (often with smaller amounts of assets) have little or no exposure to private equity and venture capital, we also performed regressions using only endowments that have a positive allocation to the three relevant asset groupings. In addition, we looked at specifications controlling for the percentage of the institution's budget funded by the endowment. Results of all these estimates are qualitatively similar to those reported.

To address concerns about the endogeneity of networks, we estimate a two-stage least squares (2SLS) regression using the number of separate industries in which trustees work as an instrument for the network measure. While the number of industries is highly correlated with the number of connections (high F-statistic in the first stage), there is no ex-ante reason to believe that asset allocations across aggregate categories (such as hedge fund, private equity or venture capital) would be linked to trustee exposure across industry sectors in terms of executive or board positions held. Table 7 shows that we still find a positive and

significant relationship between networks and allocations to venture capital and private equity. If anything, networks seem negatively related to hedge fund allocations, likely reflecting the role networks play in shifts toward private equity and venture capital.[3]

Overall our results on allocation choices show important roles for the investment experience and networks of an endowment's governing body. These results are true even after controlling for the size of the endowment. Thus, it is not simply scale that seems at work as larger endowments allocate more to alternative assets. In a subsequent section, we explore possible channels for these effects including evidence from a survey.

4 Endowment Investment Performance

Table 8 shows endowment returns and Sharpe ratios. In addition, the last column reports "selection" returns; these estimate the ability to invest with high performing managers and are calculated as the endowment's return minus a benchmark obtained by multiplying its actual allocation weights times index returns for each asset class. As a comparison, Table 8 also includes a hypothetical passive strategy of avoiding alternative assets and having investment spread across domestic equity (50%), fixed income (30%) and international equity (20%).

Echoing Figure 1 shown earlier, column 1 of Table 8 displays that larger endowments have higher returns than their smaller contemporaries over our sample period. Moreover, all three size groupings of endowments have returns in excess of the simple passive strategy. The Sharpe ratios in column 2 suggest that this outperformance is also true on a risk-adjusted basis. All three size groupings of endowments have higher Sharpe ratios than the passive strategy. The large endowments' average of 0.80 is the highest and is statistically greater than the passive strategy's Sharpe Ratio of 0.54 at the 5% level of significance.

Looking at the selection component, the mean across endowments is 1.06%, and is significantly different from zero with a t-statistic of 2.08. Thus, results suggest that, on

[3]In unreported tables, we use the total number of trustees that earned an MBA as an instrument for networks. Results are qualitatively and quantitatively similar.

average, endowments have been able to earn just over 1% above benchmark returns. Moreover, selection's effect on returns is positive for all three endowment size groupings. The effect is largest for big endowments; the mean selection return for large endowments is 1.70% compared to 0.94% for small endowments. Large endowments' selection advantage of 0.76% over small endowments (0.76 = 1.70 - 0.94) does not, however, fully explain the almost 3% advantage larger endowments have in total returns (column 1).

The patterns in Table 8 are consistent with larger endowments gaining return advantages from both allocation and selection decisions. Higher allocations to alternatives may allow harvesting illiquidity premia from an asset class. In addition, endowments appear to have some ability to earn extra returns from investing with good managers within an asset class, and this is especially true for large endowments.

To study performance more carefully, we first use Sharpe ratios (which adjust for risk) using the same regression approach as applied to allocations. Table 9 shows that after controlling for endowment characteristics (including size), expertise in venture capital remains significantly linked to better investment performance as measured by Sharpe ratios. This effect holds even though portfolio performance aggregates results across a range of asset classes, thus making it harder to pick up effects related to a specific asset class.

Next we look at selection. Ideally, we would analyze selection returns granularly; for instance, looking directly at an endowment's return on an asset class compared to an index for that asset class. While endowments routinely report a full set of asset allocation weights, unfortunately, some report returns to NACUBO only at the portfolio level. And even when they break out components, they often only report a return for a broad category such as alternatives, rather than segmenting further. For instance, if we require that the endowment reported its return on alternatives, our sample size drops by over half. To navigate these issues, we first present results based on selection at the portfolio level in which we can use our entire sample. We then present results measuring selection within alternatives for those

endowments who report a selection return.[4]

Using selection at the portfolio level, the first three regressions of Table 10 show that no variables have significant coefficients except for size. A slightly different story emerges when we look at selection within alternatives in the right part of the table. Both size and venture capital expertise are significant and positively linked to selection returns within alternatives.

One reason the two measures of selection used in Table 10 might give different results is that portfolio performance aggregates results across a range of asset classes, thus making it harder to pick up effects related to a specific asset class. Another possible reason is differences in properties of the two samples. To see if the different signals in Table 10 about the role of venture capital expertise are due to sample differences, we also estimated portfolio selection regressions based only on the smaller sample that reported alternative returns. The results (unreported) were essentially the same as for the larger sample. This suggests that the differing findings are more likely due to the power of our tests than to sample differences.

Table 10 thus provides limited evidence that venture capital expertise increases selection returns. Moreover, Table 9 shows higher Sharpe ratios accompany venture capital expertise, even having controlled for size. These findings are broadly consistent with prior research finding that venture capital investing benefited endowments (Lerner et al. (2008), Sensoy et al. (2014)). It is also consistent with findings on the large importance of selection in venture capital where a few fund returns have spectacular returns; simply matching benchmark returns requires getting into some "top quartile" funds which may have limited access (Harris et al. (2016), Harris et al. (2018)). It is certainly the case that venture capital plays a special role for some endowments. Yale, whose venture capital allocation stood at 17.1% as of June 30, 2017, illustrates this.

> The university's venture capital portfolio contains an unparalleled set of manager

[4]The decrease in the number of funds that report return figures is explained by the fact that (a) many endowments have simply a zero-asset allocation to certain type of investments (private equity and venture capital for instance), and hence there is no return for these asset classes; and (b) institutions selectively do not report return figures (although less likely), or simply do not know the return breakdown. However, approximately 60 percent of endowments that have positive asset allocation to private equity or venture capital report return figures too, and three-fifths report hedge fund returns.

> relationships, significant market knowledge, and an extensive network. Over the past twenty years, the venture capital program has earned an outstanding 106.3% per annum. (Yale Endowment Annual Report, 2017)

As discussed above, Tables 9 and 10 show that expertise in venture capital is associated with better portfolio performance for endowments. However, there is substantial heterogeneity among endowments. For instance, a sophisticated and investment-savvy board might be more relevant for endowments without a CIO who might bring expertise. While Tables 9 and 10 control for a CIO and whether the school is public or private, we investigate this issue further. We partition the sample based on whether the endowment has a CIO and on whether it is public or private. We then repeat the regressions for both Sharpe ratios and for selection returns. The results (unreported) suggest that venture capital expertise is most strongly related to performance (both in Sharpe ratios and selection) for private schools who do not have a CIO. Regressions based on that set of schools show significant coefficients on venture capital expertise, while coefficients on other measures of expertise and network are not. This area seems promising for future research in understanding the various contributions of the board and staff to endowment performance.

5 Channels of Effect on the Investment Process

Endowment governance covers the larger system by which the endowment is managed, directed, controlled and monitored. We examine possible channels by which the endowment's investment process may benefit from the financial expertise and networks resident in governing bodies.

5.1 Use of Funds

One potential benefit of expertise and networks would be the avoidance of extra fees associated with additional layers of financial intermediation. For instance, investments in

direct private equity funds (which own private companies) are illiquid, relatively undiversified, not easily scaled, and have high search and monitoring costs. Given the costs and frictions in direct fund investment, funds of funds (FoFs) provide a second level of intermediation with specialized expertise and services for investing in direct funds. But these benefits come at the cost of additional fees paid to FoFs. In alternative assets such as private equity, FoF fees can be substantial, unlike the low cost alternatives for index funds in public securities (see Harris et al. (2018)).

We hypothesize that an endowment with extensive expertise and networks would be better able to navigate direct fund investing in alternative assets and hence avoid the extra fees from FoFs. To examine this possibility, we take advantage of NACUBO data which reports the number of separate direct funds and FoFs an endowment uses to invest in alternative strategies. The count is across all alternative strategies, and, unfortunately, does not distinguish between marketable alternatives (such as hedge funds) and non-marketable alternatives (such as private equity, venture capital, and real assets). We regress the number of funds (separately for direct funds and FoFs) on the natural logarithm of total assets, networks, experience, and all the controls used in sections 3 and 4. Since we have count data and the distribution is highly right-skewed, we use a negative binomial regression.[5] The first regression in Table 11 shows that the number of direct funds is positively and significantly related to an endowment's size, expertise in alternatives on its board, and the presence of a CIO. The second regression splits out expertise in the more granular fashion and suggests that the effect of expertise in VC and private equity is most pronounced on the use of direct funds. The third and fourth regressions use FoFs as the dependent variable. They show limited evidence that expertise is negatively linked to the use of FoFs. In regression 4, for instance, the coefficients on expertise in VC and PE are negatively related to the use of FoFs (significant at the 5% and 10% level). Moreover, having a large investment staff goes hand-in-hand with fewer FoFs (also significant at the 1% level). Overall, the results in Table 11 support our conjecture: more expertise

[5]Results are robust to different econometric specifications such as a Poisson and a simple OLS where we use the natural logarithm of one plus the number of funds used.

seems to give endowments an edge is accessing direct funds. This, in turn, relieves the need to invest in FoFs and pay the extra fees that FoFs charge. The finding that expertise in VC and PE matters more in the regressions is consistent with needed skills to navigate investing in these non-marketable assets compared to marketable alternatives such as hedge funds.

5.2 Survey Evidence

To shed additional light on the role for governance in the investment process, we conducted a novel survey of endowment boards and managers. The 132 responding institutions represent almost 20% of university endowments represented in the NACUBO-Commonfund data, and collectively manage more than 60% of total market value as of 2015. About three-fifths of the respondents are CIOs, CFOs, or senior investment directors. Over a third of the respondents had 15 or more years of service with the current endowment fund, and over 70 percent of respondents had five or more years of service. We asked a variety of questions (both quantitative and qualitative) related to the investment process.

Overwhelmingly, respondents felt that expertise on the investment committee was useful for the endowment. When asked about the following statement, "the fund's investment process and decisions benefit substantially from the expertise of the committee," 83 percent somewhat or strongly agreed and almost half strongly agreed. Moreover, committee members with investment management experience play a key role; over 71 percent of respondents somewhat or strongly agreed with the statement, "investment committee members with the most investment management experience have a large influence on committee decisions and interactions with investment staff." Less than 10 percent disagreed (the remainder neither agreeing nor disagreeing). Our survey also confirmed the crucial role that IC members play in an endowment's asset allocation. 90 percent of respondents said the committee was important in setting the fund's strategic asset allocation policy, with over 70 percent strongly agreeing. For two-thirds of the endowments, the committee was also important in determining tactical asset allocation (e.g., specific allocations within a policy range).

Turning to manager selection, the survey revealed a range of approaches with nuances related to individual circumstances. In terms of a formal process, 66 percent report that the IC approves managers, but in only 27 percent of cases did the IC interview them. More typically, the IC, based on recommendations made by consultants or staff, approves who conducts the interviews. In some (typically larger) endowments, staff has full discretion to hire managers, often within guidelines. Most respondents agree that the investment committee is not involved in the day-to-day investment management process. This is especially true for larger endowments with full time staff. That said, there is substantial interaction with staff. Asked the question "how often do committee members interact with senior investment staff (including CIO) outside of regularly scheduled meetings?", over 60 percent of respondents reported that it happened once or more a month; 47 percent cited one to three times monthly, 10 percent said four to nine times, and four percent said more than ten times monthly. Further, the larger the fund, the more frequent this interaction. Endowments with one to three interactions per month had median assets of $286 million, compared to only $60 million for those with less than one interaction per month. Almost all respondents (93.5%) felt that the level of interaction was appropriate and none thought it too much. 6% of respondents consider the level of interaction as too little.

In tandem with the formal committee process for manager selection, many endowments report roles for IC members in making recommendations. When asked the question, "how often do committee members provide information on potential investment recommendations to the investment staff and leave it up to staff to do due diligence and make decisions?", only 22 percent responded "never." For 43 percent the response was "rarely," 30 percent "occasionally," and 6 percent "frequently." Most of the time, IC members only suggest a recommendation and leave discretion to follow the recommendation. 74 percent responded that IC members never make recommendations that staff is mandated to accept.

Another channel through which IC members affect the investment process is via networks and connections. 56 percent of respondents reported the "committee members facilitate

access to investment opportunities that would otherwise be difficult to identify or undertake (e.g., closed or restricted funds)." This help with access is fairly infrequent, however. 34 percent said it happened rarely (less than once a year) and only four percent said it happened more than twice a year.

Overall, our survey shows that members of endowments' governing bodies affect the investment process through a number of channels. In addition to formal policies on asset allocation determined by a board, IC members (especially those with investment expertise) provide advice and contacts in many endowments. This includes roles in manager selection as well as in establishing contacts with funds that may be hard to access. Such closed or restricted funds are most prevalent in alternative assets such as venture capital or private equity. This contribution of expertise is consistent with our prior empirical findings on asset allocation and the use of funds of funds in alternative assets. We note, however, that there is considerable variation across endowments, often related to size.

To probe more deeply into our survey responses, we use a regression framework. We focus on two questions; the first on "facilitating access" to investments that are hard to access, the second on "providing information on potential investments" to staff. Each question had four possible answers which we coded one through four based on the response (4 being the most frequent occurrence of IC members providing assistance). Table 12 reports results from an order probit model on the impact of size, network and expertise on IC member assistance with fund access and recommendations. The measures of network and expertise are in alternative assets since these are the hardest to analyze and access. For both help with access (column (1)) and recommendations (column (3)), there is a strong and significantly positive relationship (5% level) between IC networks and the frequency with which the IC provides assistance. Expertise has a positive but insignificant coefficient. These results are consistent with patterns highlighted earlier and illustrate key roles IC members often play in the investment process.

6 Conclusions

University endowments provide an especially good laboratory to study how financial expertise and networks affect choices made by and returns to an institutional investor. These endowments often have the institutional flexibility to pursue fairly unrestricted investment opportunities, have a favorable tax status which may reduce frictions in investing, and have a long term (infinite) investment horizon. Moreover, endowments are more likely to be free from external political influence and other constraints facing some large institutional investors.

We find notable differences across endowments in the expertise and networks resident in their governing bodies. Moreover, these differences affect endowment choices regarding asset allocations; more expertise in alternative assets goes with higher allocations to these assets. These effects are concentrated in alternative assets (such as venture capital, private equity, and hedge funds) to which many endowments have large allocations. Since alternative assets, by their very nature, are likely harder to analyze, manage and access than traded public securities, there is an enhanced role for expertise and networks in alternative assets.

The nature of relevant expertise appears to be geared to subsets of alternative assets. Expertise in hedge funds matters for allocations to hedge funds but it is expertise in private equity that matters for private equity and expertise in venture capital that matters for venture capital. Consistent with this pattern, we find that having a CIO is positively linked to allocations in private equity and venture capital, both of which involve complexities such as managing capital calls and dealing with illiquidity. These findings suggest that some elements of expertise do not readily travel across different types of alternative assets but are unique to the type of investment. This has broad implications for forming governing bodies and creating staff capabilities for endowments.

Our findings on networks also highlight complexities of investing in some types of assets. We find that connections to investment professionals (networks) matter especially for allocations to private equity and venture capital. This is consistent with networks helping

facilitate ways to overcome restrictions or barriers to investing in funds that might otherwise be difficult or impossible to access.

Finally, beyond effects on allocation, we document that more expertise is associated with better performance for an endowment's portfolio. The improved investment performance comes through a number of channels: capturing higher returns that can accompany alternative assets in general, greater ability to select or have access to high performing managers, and being able to use direct funds rather than funds of funds which impose an extra layer of fees.

Our results suggest that endowments directly benefit from having experts in alternative investments serving on university boards. The potential benefits seem highest in areas such as private equity and venture capital.

References

Andonov, A., Hochberg, Y. V., and Rauh, J. D. (2018). Political representation and governance: Evidence from the investment decisions of public pension funds. *The Journal of Finance*, 73(5):2041–2086.

Barber, B. M. and Wang, G. (2013). Do (some) university endowments earn alpha? *Financial Analysts Journal*, 69(5):26–44.

Brown, J. R., Dimmock, S. G., Kang, J.-K., and Weisbenner, S. J. (2014). How university endowments respond to financial market shocks: Evidence and implications. *The American Economic Review*, 104(3):931–962.

Brown, K. C., Garlappi, L., and Tiu, C. (2010). Asset allocation and portfolio performance: Evidence from university endowment funds. *Journal of Financial Markets*, 13(2):268–294.

Cavagnaro, D. R., Sensoy, B. A., Wang, Y., and Weisbach, M. S. (2017). Measuring institutional investors' skill at making private equity investments. *OSU Working Paper*.

Cohen, L., Frazzini, A., and Malloy, C. (2008). The small world of investing: Board connections and mutual fund returns. *Journal of Political Economy*, 116(5):951–979.

Dimmock, S. G. (2012). Background risk and university endowment funds. *Review of Economics and Statistics*, 94(3):789–799.

Faleye, O., Kovacs, T., and Venkateswaran, A. (2014). Do better-connected ceos innovate more? *Journal of Financial and Quantitative Analysis*, 49(5-6):1201–1225.

Getmansky, M., Lo, A. W., and Makarov, I. (2004). An econometric model of serial correlation and illiquidity in hedge fund returns. *Journal of Financial Economics*, 74(3):529–609.

Harris, R. S., Jenkinson, T., and Kaplan, S. N. (2016). How do private equity investments perform compared to public equity? *Journal of Investment Management*, 14(3):14–37.

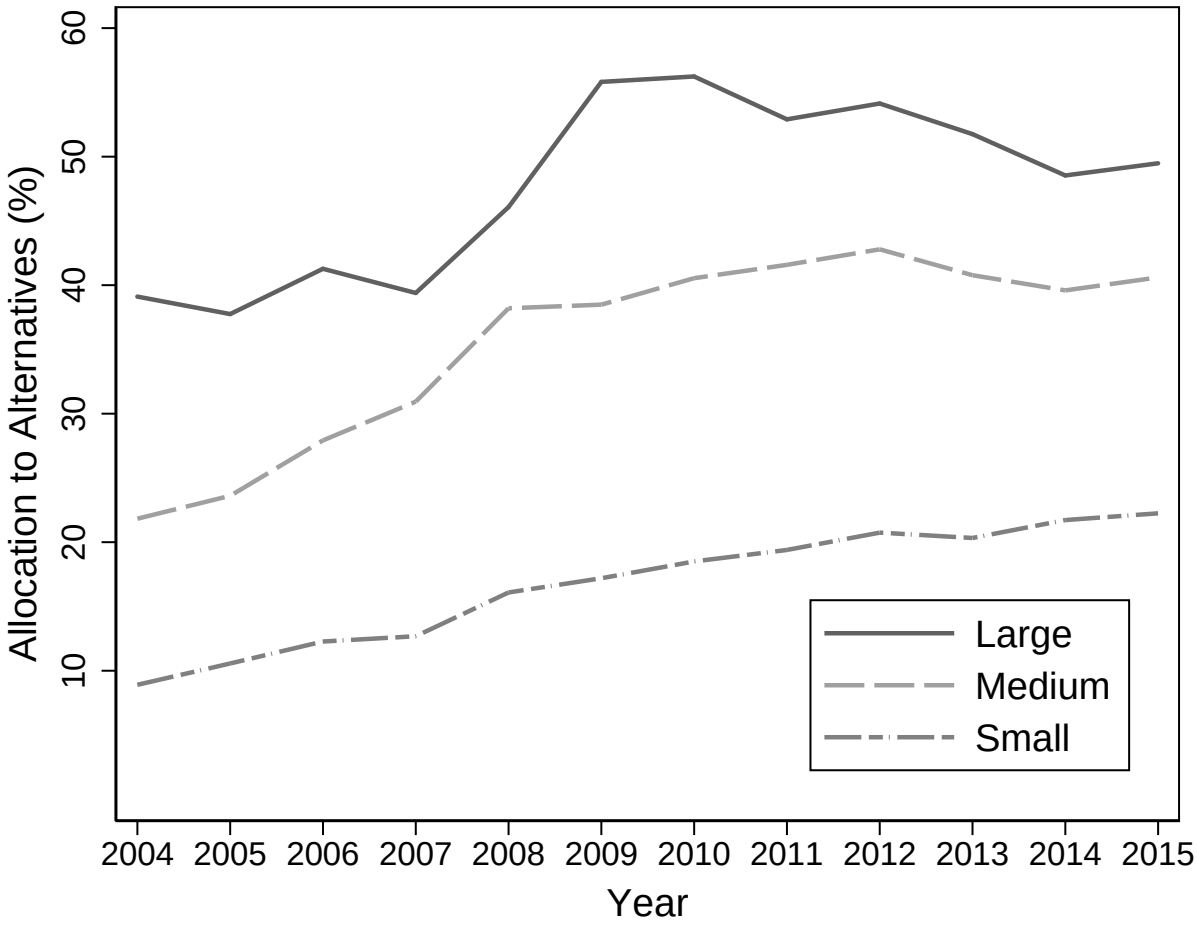
Harris, R. S., Jenkinson, T., Kaplan, S. N., and Stucke, R. (2018). Financial intermediation in private equity: How well do funds of funds perform? *Journal of Financial Economics*, 129(2):287–305.

Lerner, J., Schoar, A., and Wang, J. (2008). Secrets of the academy: The drivers of university endowment success. *The Journal of Economic Perspectives*, 22(3):207–222.

Rosen, H. S. and Sappington, A. J. (2016). What do university endowment managers worry about? an analysis of alternative asset investments and background income. *Education Finance and Policy*.

Sensoy, B. A., Wang, Y., and Weisbach, M. S. (2014). Limited partner performance and the maturing of the private equity industry. *Journal of Financial Economics*, 112(3):320–343.

Figure 1: Asset Allocations to Alternative Investments by Endowment Size
This figure shows the proportion of total assets allocated to alternative investments for U.S. university endowments from 2004 to 2015 by size. These includes real estate, private equity, venture capital funds, commodities, and hedge funds. Large endowments have more than $1 billion of total assets, medium between $250 million and $1 billion, small less than $250 million.



[1]Board of trustees variables come from BoardEx and Guidestar starting 2007. Investment office variables are from NACUBO.

Figure 2: Endowment Average Annual Return by Endowment Size

This figure shows the average annual net return (in %) for U.S. university endowments from 2004 to 2015 as reported to NACUBO. Large endowments have more than $1 billion of total assets, medium between $250 million and $1 billion, small less than $250 million. The figure also shows the average annual return from a passive strategy of investing only in public securities allocated 50/30/20 (domestic equity, fixed income, and international equity, respectively).

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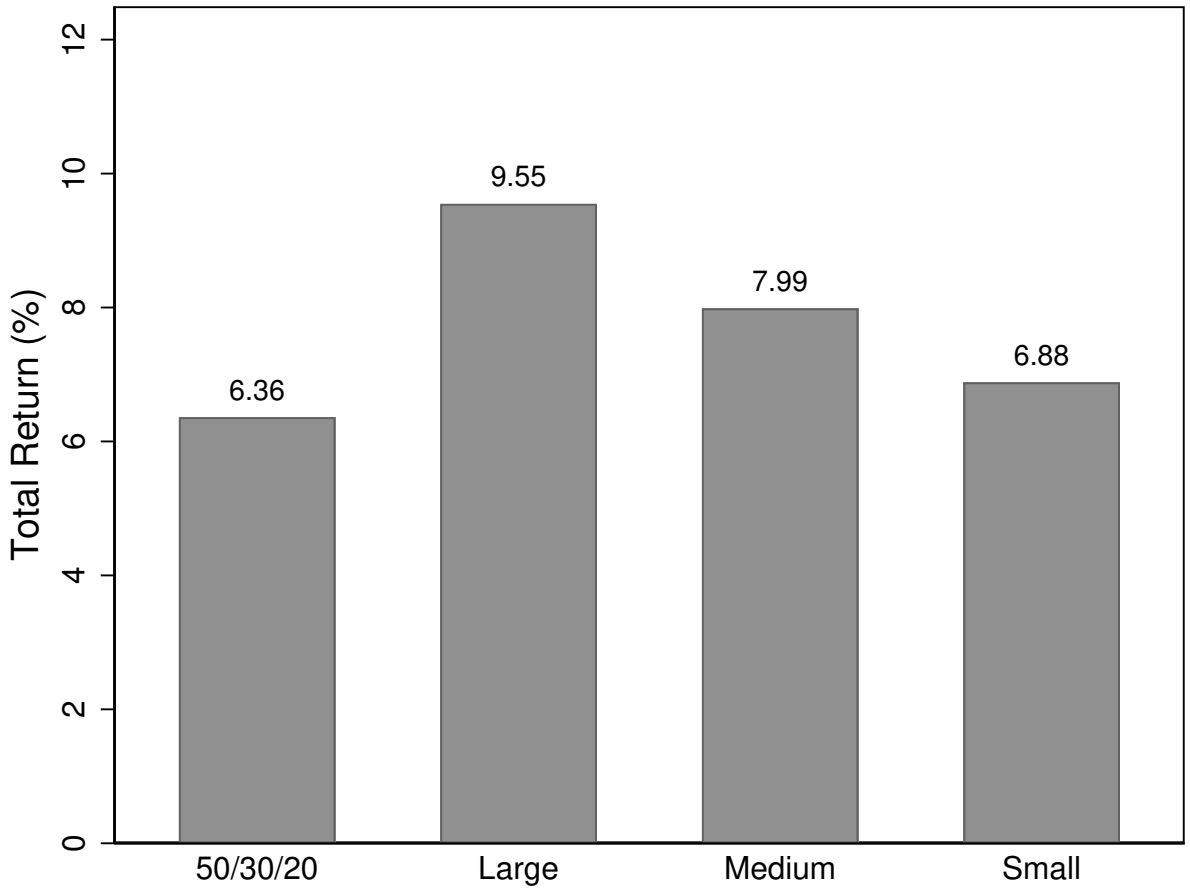

Table 1: Summary Statistics for Endowments

This table reports summary statistics for university endowments. Entries summarize data points across all endowments and years and report the number (N) of data points, mean value, standard deviation, percentile values (25^{th}, 50^{th} and 75^{th}), and the asset weighted mean (weighted by the dollar ($) value of the endowment). Size is total endowment assets (in millions of dollars, $M), Annual gifts is the sum of gifts and bequests (in $M). Spending rates are the total spending from the endowment as a percentage of the institution's annual budget (or its total assets). Total net return is an annual figure in percent. Portfolio standard deviation is estimated as the standard deviation of the endowment portfolio return using actual weights and benchmark index variances and co-variances adjusted for illiquidity as explained in the appendix. The Adjusted-Sharpe Ratio is the difference between the endowment annual net return and the annualized 30-day U.S. Treasury bill rate divided by the portfolio standard deviation. Panel D shows board of trustee size, trustee networks, and trustee expertise, i.e., the fraction of trustee-year observations with relevant experience in finance outside of investments (general banking or insurance), asset management (public securities), alternative investments, hedge funds, private equity, and venture capital. Chief Investment Officer (CIO) represents the fraction of endowment-year observations that have a CIO, while investment team is the full-time equivalent number of investment professionals.

	N	Mean	SD	P25	P50	P75	Mean ($W)
Panel A: Endowment Characteristics							
Asset Size ($M)	7960	515.32	2004.63	37.69	96.76	304.99	8130.66
Annual Gifts ($M)	7960	86.67	241.27	5.24	20.00	62.23	543.59
Spending as % of Assets	7729	4.45	2.00	3.82	4.50	5.00	4.76
Spending as % of Budget	6328	9.91	16.65	1.00	3.84	10.57	18.04
Panel B: Asset Allocation (% of Total Assets)							
Domestic Equity	7960	35.63	16.99	22.70	33.53	48.07	19.84
Fixed Income	7960	18.93	10.55	11.60	17.80	25.00	11.30
Alternative Strategies	7960	24.30	19.57	7.63	21.68	37.30	47.94
Hedge Funds	6361	15.75	12.05	6.90	15.00	23.00	21.68
Private Equity	6361	4.41	5.72	0.00	2.60	7.00	10.54
Venture Capital	6361	1.57	2.85	0.00	0.00	2.10	3.76
Panel C: Investment Returns and Risk							
Portfolio Total Return	7722	7.35	11.42	0.90	10.70	15.50	9.66
Portfolio St. Dev.	6361	11.70	1.68	10.87	11.84	12.69	11.86
Adjusted-Sharpe Ratio	6258	0.64	1.38	0.07	0.94	1.33	0.82
Panel D: Governance and Expertise[1]							
Finance (Non-Investments)	3188	0.32	0.17	0.20	0.32	0.43	0.32
Asset Management	3188	0.06	0.08	0.00	0.03	0.11	0.09
Alternatives	3188	0.18	0.15	0.06	0.17	0.29	0.31
Hedge Funds	3188	0.03	0.06	0.00	0.00	0.03	0.09
Private Equity	3188	0.08	0.10	0.00	0.04	0.13	0.15
Venture Capital	3188	0.05	0.07	0.00	0.00	0.08	0.07
Network	3178	549.69	310.83	321.50	509.27	712.50	864.46
Chief Investment Officer	3188	0.26	0.44	0.00	0.00	1.00	0.74
Investment Team	3086	1.75	4.05	0.25	0.50	1.50	12.79
Board Size	3188	13.25	9.77	7.00	11.00	17.00	22.49

Table 2: Allocation to Public Assets, Investment Expertise and Networks

This table reports OLS regression coefficients and standard errors of the relationship between the share of assets allocated to domestic equity and fixed income, and some university endowment-specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in finance (banking & insurance), asset management, alternative investments, whether the endowment uses a CIO, where the institution is public or private, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	Domestic Equity		Fixed Income	
	(1)	(2)	(3)	(4)
Finance Expertise	-0.35	2.28	-0.52	1.21
	(2.91)	(2.52)	(1.89)	(1.67)
Asset Management Expertise	-20.25***	-1.54	-7.94**	2.17
	(5.82)	(4.69)	(3.78)	(3.07)
Alternative Expertise	-23.35***	-2.36	-12.16***	-1.23
	(3.38)	(2.82)	(2.01)	(1.92)
Network		0.01		0.34
		(0.62)		(0.41)
Public = 1	1.50	1.33	1.63*	1.74**
	(1.42)	(1.12)	(0.87)	(0.77)
CIO=1		-1.36		-1.47*
		(1.12)		(0.75)
Investment Team		-0.35		0.22
		(0.89)		(0.59)
Board Size		-0.43		-0.09
		(0.80)		(0.53)
Total Assets		-5.14***		-2.99***
		(0.47)		(0.36)
Year Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.20	0.41	0.18	0.37
Observations	3184	3072	3184	3072

Table 3: Allocation to Alternative Investments, Investment Expertise and Networks
This table reports OLS regression coefficients and standard errors of the relationship between the share of assets allocated to alternative investments, and some university endowment-specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in finance (banking & insurance), alternative investments, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Finance Expertise	-1.58	-1.79	-3.08
	(3.74)	(3.33)	(3.00)
Asset Management Expertise	26.70***	12.93**	4.86
	(7.24)	(6.14)	(5.51)
Alternative Expertise	38.98***	12.82***	8.22**
	(4.68)	(4.24)	(3.82)
Network		0.24	-0.33
		(0.79)	(0.71)
CIO=1		5.54***	3.65**
		(1.59)	(1.47)
Investment Team		9.74***	2.06*
		(1.08)	(1.19)
Board Size		2.59**	-0.05
		(1.04)	(0.97)
Total Assets			6.59***
			(0.63)
Year Fixed Effects	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes
R^2	0.29	0.49	0.56
Observations	2734	2653	2653

Table 4: Allocation to Hedge Funds, Investment Expertise and Networks

This table reports OLS regression coefficients and standard errors of the relationship between the share of assets allocated to hedge funds, and some university endowment-specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Finance Expertise	-0.31	1.14	0.03	-0.85
	(2.42)	(2.46)	(2.63)	(2.42)
Asset Management Expertise	15.75***	14.50***	9.76**	5.52
	(4.75)	(4.85)	(4.91)	(4.66)
Alternative Expertise	18.58***			
	(2.84)			
Hedge Funds Expertise		33.42***	21.09***	18.21***
		(5.98)	(5.73)	(5.92)
Private Equity Expertise		5.85	-1.40	-2.41
		(4.41)	(4.33)	(4.01)
Venture Capital Expertise		17.09***	10.92*	7.61
		(6.25)	(6.43)	(6.08)
Network			-0.76	-1.06*
			(0.59)	(0.54)
CIO=1			0.87	-0.16
			(1.02)	(0.98)
Investment Team			3.57***	-0.66
			(0.69)	(0.80)
Board Size			1.77**	0.30
			(0.73)	(0.72)
Total Assets				3.61***
				(0.41)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.24	0.24	0.30	0.35
Observations	2734	2734	2653	2653

Table 5: Allocation to Private Equity, Investment Expertise and Networks

This table reports OLS regression coefficients and standard errors of the relationship between the share of assets allocated to private equity, and some university endowment-specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Finance Expertise	-1.04	-0.79	-1.35	-1.78*
	(1.34)	(1.32)	(0.99)	(0.93)
Asset Management Expertise	4.23	3.49	-0.32	-2.38
	(2.90)	(2.90)	(2.56)	(2.51)
Alternative Expertise	9.57***			
	(1.62)			
Hedge Funds Expertise		10.08**	-1.12	-2.53
		(4.20)	(3.45)	(3.54)
Private Equity Expertise		12.13***	4.70**	4.21*
		(2.78)	(2.25)	(2.20)
Venture Capital Expertise		2.83	-2.50	-4.12
		(3.38)	(2.96)	(2.96)
Network			1.17***	1.02***
			(0.27)	(0.26)
CIO=1			2.49***	1.98***
			(0.65)	(0.63)
Investment Team			2.31***	0.24
			(0.49)	(0.56)
Board Size			0.68**	-0.04
			(0.34)	(0.31)
Total Assets				1.76***
				(0.29)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.18	0.19	0.37	0.41
Observations	2734	2734	2653	2653

Table 6: Allocation to Venture Capital, Investment Expertise and Networks
This table reports OLS regression coefficients and standard errors of the relationship between the share of assets allocated to venture capital, and some university endowment specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Finance Expertise	0.27	0.55	0.39	0.33
	(0.62)	(0.63)	(0.52)	(0.53)
Asset Management Expertise	1.99	1.68	0.06	-0.20
	(1.34)	(1.36)	(1.10)	(1.13)
Alternative Expertise	4.46***			
	(0.87)			
Hedge Funds Expertise		3.66*	-1.69	-1.86
		(1.89)	(1.67)	(1.67)
Private Equity Expertise		3.44***	-0.04	-0.10
		(1.29)	(1.09)	(1.08)
Venture Capital Expertise		5.24***	2.44*	2.24*
		(1.59)	(1.26)	(1.29)
Network			0.25**	0.23*
			(0.12)	(0.12)
CIO=1			1.17***	1.11***
			(0.33)	(0.34)
Investment Team			1.08***	0.82***
			(0.25)	(0.28)
Board Size			0.41*	0.32
			(0.23)	(0.23)
Total Assets				0.22
				(0.14)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.15	0.15	0.31	0.32
Observations	2734	2734	2653	2653

Table 7: Asset Allocation, Expertise and Networks: 2SLS Tests

This table reports IV 2SLS regression coefficients and standard errors of the relationship between the share of assets allocated to hedge funds, private equity, and venture capital funds, and some university endowment-specific variables. The first stage uses the total number of separate firms a member has worked in as an instrument for his/her total network. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	First Stage	Second Stage		
	Network	Hedge Funds	Private Equity	Venture Capital
Total Industries	0.11***			
	(0.01)			
Network		-2.79**	2.32***	0.65**
		(1.27)	(0.75)	(0.30)
Finance Expertise	-0.38***	-0.46	-1.07	0.49
	(0.12)	(2.63)	(1.02)	(0.52)
Asset Management Expertise	-0.00	10.57**	-0.78	-0.10
	(0.24)	(4.89)	(2.56)	(1.12)
Hedge Funds Expertise	0.21	21.59***	-1.41	-1.79
	(0.27)	(5.92)	(3.36)	(1.68)
Private Equity Expertise	0.23	0.08	3.85*	-0.34
	(0.21)	(4.40)	(2.20)	(1.09)
Venture Capital Expertise	-0.26	11.25*	-2.70	2.38*
	(0.32)	(6.51)	(2.99)	(1.27)
CIO=1	0.05	1.00	2.41***	1.14***
	(0.04)	(1.03)	(0.65)	(0.33)
Investment Team	0.04	3.80***	2.17***	1.03***
	(0.03)	(0.69)	(0.50)	(0.25)
Board Size	0.24***	2.37***	0.34	0.29
	(0.04)	(0.77)	(0.40)	(0.24)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.42	0.29	0.36	0.31
Observations	2653	2653	2653	2653

Table 8: Investment Returns and Risk for Endowments

This table reports mean values and t-statistics for annual total net returns, the adjusted-Sharpe ratio, and the selection component of returns. The Adjusted-Sharpe Ratio is the difference between the endowment annual net return and the annualized 30-day U.S. Treasury bill rate divided by the portfolio standard deviation. Portfolio standard deviation is estimated as the standard deviation of the endowment portfolio return using actual weights and benchmark index variances and covariances adjusted for illiquidity as explained in the appendix. Data on returns and weights are from NACUBO and cover the years 2004-2015. The selection component of returns is the return above the return calculated using the actual weights multiplied by the benchmark return. Large funds have total assets greater than $1 billion, medium funds between $1 billion and $250 millions, and small funds have less than $250 millions. For asset class benchmark returns we use public equity (SP500), fixed income (JP Morgan Bond Index), International Equity (MSCI ACWI), Real Estate (NCREIF), Hedge Funds (HFRI), Private Equity (Cambridge Associates PE), Venture Capital (Cambridge Associates VC), Commodities (GSCI) and Cash (30-day treasury bill). t-statistics are calculated to test the difference between endowment groupings and the 50/30/20 portfolio. Standard errors are adjusted for clustering at the year level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	Total Return	Adjusted-Sharpe Ratio	Selection Component
	Mean (%) - (t-stat)	Mean - (t-stat)	Mean (%) - (t-stat)
50/30/20	6.36	0.54	0.00
	-	-	-
All Endowments	7.35	0.64	1.06*
	(1.53)	(1.56)	(2.08)
Large Endowments	9.55**	0.80**	1.70**
(≥$1 billion)	(2.83)	(2.61)	(2.95)
Medium Endowments	7.99*	0.66	1.12*
	(2.04)	(1.64)	(1.94)
Small Endowments	6.88	0.61	0.94*
(≤$250 million)	(1.04)	(1.24)	(1.87)

Table 9: Adjusted - Sharpe Ratio, Investment Expertise and Networks

This table reports OLS regression coefficients and standard errors of the relationship between the Adjusted-Sharpe Ratio, and some university endowment-specific variables. The Adjusted-Sharpe Ratio is the difference between the endowment annual net return and the annualized 30-day U.S. Treasury bill rate divided by the portfolio standard deviation. Portfolio standard deviation is estimated as the standard deviation of the endowment portfolio return using actual weights and benchmark index variances and covariances adjusted for illiquidity as explained in the appendix. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Finance Expertise	0.03	0.04	0.05	0.04
	(0.04)	(0.04)	(0.04)	(0.04)
Asset Management Expertise	0.17**	0.15*	0.12	0.10
	(0.08)	(0.08)	(0.08)	(0.08)
Alternative Expertise	0.06			
	(0.04)			
Hedge Funds Expertise		0.15*	0.06	0.05
		(0.08)	(0.08)	(0.08)
Private Equity Expertise		-0.03	-0.08	-0.09
		(0.06)	(0.06)	(0.06)
Venture Capital Expertise		0.22**	0.19**	0.18**
		(0.09)	(0.09)	(0.09)
Network			0.01	0.01
			(0.01)	(0.01)
CIO=1			0.00	-0.00
			(0.02)	(0.02)
Investment Team			0.03***	0.01
			(0.01)	(0.02)
Board Size			-0.01	-0.02
			(0.01)	(0.01)
Total Assets				0.02**
				(0.01)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
R^2	0.94	0.94	0.94	0.94
Observations	2704	2704	2624	2624

Table 10: Selection, Investment Expertise and Networks

This table reports OLS regression coefficients and standard errors of the relationship between investment performance, and some university endowment-specific variables. Portfolio selection is the total portfolio return above the return calculated using the actual weights multiplied by the benchmark return. Alternative selection is the total alternative return above the return calculated using the actual weights multiplied by the benchmark return. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network,the proportion of trustees with experience in hedge funds, private equity, venture capital, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	Portfolio Selection			Alternative Selection		
	(1)	(2)	(3)	(4)	(5)	(6)
Finance Expertise	0.19	0.33	0.28	0.16	-0.73	-1.09
	(0.46)	(0.48)	(0.48)	(1.64)	(1.66)	(1.66)
Asset Management Expertise	1.03	0.94	0.70	-1.64	-2.80	-4.24
	(0.92)	(0.94)	(0.93)	(3.07)	(3.14)	(2.96)
Hedge Funds Expertise	1.44	0.91	0.75	-4.36	-6.49	-5.28
	(0.99)	(0.97)	(0.98)	(9.86)	(10.06)	(10.15)
Private Equity Expertise	-0.76	-1.06	-1.12	6.02*	4.80	5.00
	(0.73)	(0.78)	(0.78)	(3.14)	(3.16)	(3.16)
Venture Capital Expertise	1.31	1.31	1.13	14.06***	13.06**	12.03**
	(0.93)	(0.97)	(0.97)	(5.09)	(5.20)	(5.17)
Network		-0.00	-0.02		-0.11	-0.22
		(0.13)	(0.13)		(0.44)	(0.44)
CIO=1		0.20	0.14		-0.01	-0.31
		(0.19)	(0.19)		(0.78)	(0.79)
Investment Team		0.11	-0.12		0.57	-0.76
		(0.13)	(0.17)		(0.61)	(0.79)
Board Size		-0.04	-0.12		0.82	0.37
		(0.12)	(0.12)		(0.55)	(0.54)
Total Assets			0.20**			1.17***
			(0.08)			(0.42)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.24	0.24	0.24	0.50	0.51	0.51
Observations	2704	2624	2624	1149	1137	1137

Table 11: Use of Funds of Funds, Investment Expertise and Networks

This table reports marginal coefficients and standard errors from negative binomial regression results of the relationship between the number of direct alternative funds and alternative funds of funds used, and some university endowment-specific variables. Independent variables are the natural logarithm of total assets, board size, the de-trended measure of network, the proportion of trustees with experience in finance (banking & insurance), hedge funds, venture capital, private equity, asset management, whether the endowment uses a CIO, and the natural logarithm of the full-time equivalent number of investment professionals at the endowment. Year, public/private, and state fixed effects are included. Standard errors are adjusted for clustering at the endowment level. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	Direct Alternatives		Funds of Funds	
	(1)	(2)	(3)	(4)
Finance Expertise	4.45	5.93	0.03	-0.05
	(5.77)	(5.33)	(0.74)	(0.74)
Asset Management Expertise	-0.27	-0.25	-1.37	-1.04
	(10.85)	(10.45)	(1.60)	(1.57)
Alternative Expertise	21.92***		-2.00**	
	(7.91)		(0.95)	
Hedge Funds Expertise		-11.80		-2.18
		(15.62)		(2.09)
Private Equity Expertise		12.14		-2.52*
		(8.35)		(1.40)
Venture Capital Expertise		36.65***		-3.81**
		(13.21)		(1.80)
Network	-1.24	-1.15	0.19	0.23
	(1.49)	(1.48)	(0.21)	(0.21)
CIO=1	5.84***	5.60***	-0.33	-0.30
	(1.91)	(1.88)	(0.39)	(0.39)
Investment Team	1.62	1.83	-1.36***	-1.33***
	(1.94)	(1.85)	(0.36)	(0.36)
Board Size	0.37	0.32	0.13	0.12
	(1.80)	(1.71)	(0.26)	(0.26)
Total Assets	18.78***	18.35***	1.39***	1.41***
	(2.58)	(2.34)	(0.20)	(0.20)
Year Fixed Effects	Yes	Yes	Yes	Yes
Public/Private Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes
Pseudo-R^2	0.14	0.14	0.04	0.04
Observations	2825	2825	2833	2833

Table 12: Survey Evidence on Impacts of Expertise and Networks

This table reports order probit regression coefficients and standard errors of the relationship between access to investment opportunities difficult to undertake or identify (never, rarely, occasionally and frequently), beneficial effect of the investment committee (strongly disagree, somewhat disagree, neither agree or disagree, somewhat agree, strongly agree), impact on investment performance (very negative, negative, no impact, positive and very positive) and some endowment-specific variables. Independent variables are the natural logarithm of total assets, fraction of trustees with alternative investment expertise, and the de-trending network measure. Standard errors are robust to heteroskedasticity. Significance levels are denoted by a ***, **, and *, which corresponds to the 1%, 5%, and 10% levels, respectively.

	Access		Recommend	
	(1)	(2)	(3)	(4)
Size	0.294**	0.358***	-0.083	0.001
	(0.126)	(0.133)	(0.102)	(0.099)
Network	0.435**		0.368**	
	(0.186)		(0.167)	
Alternatives		1.347		0.511
		(0.942)		(0.673)
Pseudo R-squared	0.13	0.11	0.02	0.00
Observations	64	64	69	69

Appendix

Data Construction and Risk Measurement

Measures of Expertise and Networks

To construct measures of expertise and networks we draw on data from NACUBO, Guidestar and BoardEx. NACUBO reports on university endowments including returns and asset allocations. GuideStar provides information on nonprofit organizations, including the individual names and titles of trustees and officers, collected from copies of Form 990 filed with the IRS. Matching Guidestar and NACUBO data (using endowment IRS Employee Identifier Numbers) crates a listing of individual names associated with each endowment for each year. We then match these individual names with BoardEx, our third primary data source. BoardEx includes comprehensive biographical data on business leaders (from top executives and board directors to mid-level managers) and supplies a wide range of variables on each person's individual profile, employment history, education, awards, and affiliations with nonprofit organizations. BoardEx variables include name, age, date of birth, gender, nationality, education (including degrees and award dates), professional certifications (such as CPA), employment history (current and past, including board positions and industry sector), recognitions (such as prizes awarded), and other activities (such as roles in nonprofits, clubs and other organizations). While BoardEx does not directly disaggregate experience into subcategories of alternative assets (e.g., venture capital, private equity, hedge funds), we are able to create these granular classifications based on specific company names recorded in BoardEx's history of an individual. BoardEx classifies the sector of a company under FTSE international classification (ICB).[6] We augment it with the more granular disaggregation of the finance sector. For instance, if BoardEx recorded that an individual worked for Sequoia Capital (a venture capital firm), we code that individual as having expertise in venture

[6]Industry Classification Benchmark (ICB) is a globally recognized standard, operated and managed by FTSE Russell for categorizing companies and securities across four levels of classification. See FTSE Russell.

capital. In addition, we investigated each instance in which BoardEx used the category of "Specialty and other finance". This category frequently includes affiliations to hedge funds, venture capital funds or private equity funds which we could then code into our more granular scheme. The result of this process is a set of codes identifying whether each individual has expertise in venture capital, in hedge funds or in private equity.

We also develop network measures. For each individual, we search BoardEx to find the number of persons with whom the individual shares a common employment, educational, or social history. Following Faleye et al. (2014), we measure four different types of connections: past employment, current employment, education and other activities. Past employment is the sum of all first order connections through past employment (as identified by the name of the company in BoardEx). For instance, if a trustee for Ohio State had at one time worked for Microsoft, the trustee would be matched with all individuals in BoardEx who had worked for Microsoft. Current employment is the sum of all first order connections through current employment. Education is the sum of all first order connections through higher education.[7] The fourth measure is the sum of all first order connections through other organizations such as social clubs, charities, or other nonprofits. Since networks are likely especially important in alternative assets, we construct measures for these areas by aggregating an individualâs connections (through education, employment or social history) to organizations and people in hedge funds, venture capital and private equity. For these measures we exclude connections to trustees of the same university or to individuals working for the same alternative asset firm. To account for time trends, we first regress the count of all connections on a time trend. We then use the residuals to create a de-trended network measure which is absolute value of the sample minimum plus the natural logarithm of one plus the residual.[8] Developing our measures requires matching across data sets on individual names. To minimize possible mismatches, we take several steps. We search for similar individual names and exact matches

[7]We follow Cohen et al. (2008) and consider individuals who graduated from the same school, within 2 years, and with a similar type of degree

[8]See Faleye et al. (2014).

of university identifiers (EINs). We use different combinations of first name, last name, forenames, prefix and suffix to avoid errors due to two or more individuals having the same name. To minimize the likelihood of including an individual other than the one reported by GuideStar, we only retain individuals with unique names in BoardEx. While BoardEx does not designate whether a person sits on the endowment's investment committee, we believe from spot checks that there is very high correlation between investment expertise and connections for the trustee group (which we do know from BoardEx) and the investment committee, especially when it comes to alternative assets. NACUBO data reveals that over two thirds of all endowment investment committees are composed entirely of trustees; and, that even large endowments (greater than $1 billion) typically have few non-trustee members (median value of 1.0 across large endowments). Data from BoardEx and Guidestar are only available from 2007. Since an endowment's governing board tends to be quite stable over time, our measures of expertise and networks are typically fairly constant over the years. As part of our analysis, we also assumed that 2007 values would also be true for earlier years. The empirical findings from this assumption are similar to those using the 2007-2015 period and change none of our conclusions. We also compare university endowments whose board members appear in BoardEx versus those that do not, and confirm that the two samples are similar along several dimensions (e.g. size, total gifts, and spending).

Risk Measures and Sharpe Ratios

A portfolio's Sharpe Ratio for time t is the portfolio's excess return (over and above a risk free rate) per unit of risk and is defined as:

$$SR_t = \frac{R_t - R_t^f}{SD_t} \tag{2}$$

where R_t is the portfolio total annual net return (from NACUBO), R^f is the risk-free rate (30-day Treasury-bill from CRSP) and SD is the portfolio return's standard deviation. While

the returns are readily observable, we must estimate the standard deviation. Since we have a limited time series of annual data for any endowment and endowment asset allocations change over time, we base our standard deviation estimates on returns to benchmark indices, weighted by actual endowment allocations, with adjustments to account for stale and asynchronous prices on illiquid assets. These adjustment effectively increase the estimated standard deviations and correlations of illiquid assets. Specifically, we compute a variance-covariance matrix based on our benchmark indices for each asset class using quarterly data for the period 1995-2015. We follow Getmansky et al. (2004) in adjusting risk estimates and generalize their approach to cover multiple categories of illiquid assets. We use lags of up to four quarters in the estimation. We have a total of eight indices: three for liquid asset classes (SP500, JP Morgan Bond Index and MSCI ACWI), and five for illiquid assets (NCREIF, HFRI, GSCI, VC Cambridge and PE Cambridge). We compute an endowment's standard deviation (at time t) by applying the endowment's asset weights to the estimated variance-covariance matrix from the benchmark indices. An important element of our adjustments is to better reflect the risk of illiquid assets. For instance, after our adjustments the implied beta of venture capital (versus the SP500 index) is 2.09 and its standard deviation is .41 (over twice that of the SP500). Without adjustments, the venture capital beta would appear well below one. When we compute variances and covariances on a rolling window basis during the two decade period, untabulated results show no substantive differences in Sharpe Ratios compared to our main specification which uses the entire period for risk estimation.

Figure A.1: Asset Allocations to Specific Alternative Investments by Endowment Size
This figure shows the proportion of total assets allocated to hedge funds, private equity, venture capital and commodities for U.S. university endowments from 2004 to 2015 by size. Large endowments have more than $1 billion of total assets, medium between $250 million and $1 billion, small less than $250 million.

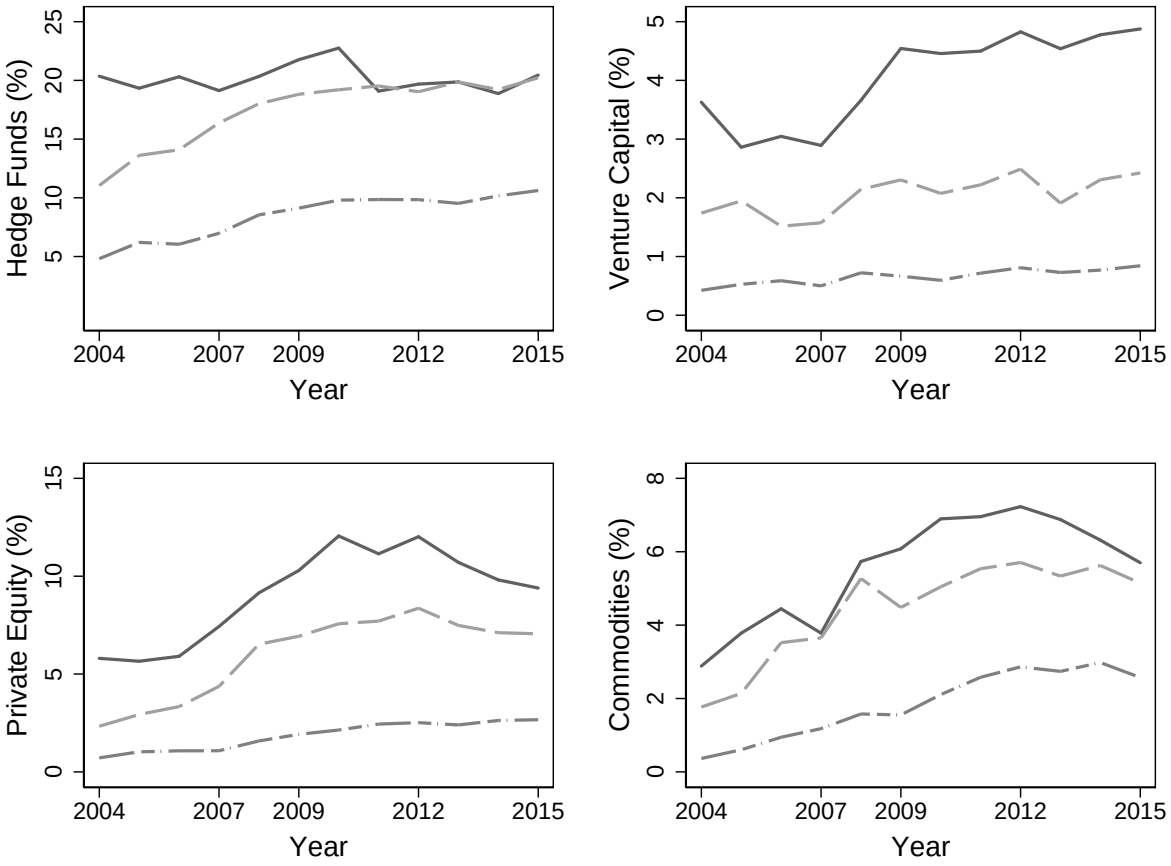

Table A.1: Variable Definitions

Variable	Definition	Data Source
	Panel A: Endowment Characteristics	
Asset Size	Total endowment assets at fiscal year end. This includes true endowment, term endoment, quasi-endowment and funds held in trust	NACUBO, NCSE
Annual Gifts	Total individual gifts and bequests, either restricted or unrestricted by donor	NACUBO, NCSE
Spending as % of Assets	Percentage of the institution's assets distributed for spending during the fiscal year	NACUBO, NCSE
Spending as % of Budget	Percentage of the institution's operating budget funded from the endowment during the fiscal year	NACUBO, NCSE
	Panel B: Asset Allocation (% of Total Assets)	
Domestic Equity	Percentage of the endowment's assets allocated to domestic equity. This includes active, index (passive /enhanced), Commonfund Multi-strategy equity fund and other equity funds	NACUBO, NCSE
Fixed Income	Percentage of the endowment's assets allocated to fixed income. This includes domestic (U.S.) active and passive, investment grade and non-investment grade bonds, international (non U.S.), emerging markets (active or passive), Commonfund Multi-strategy Bond Fund and other bond funds	NACUBO, NCSE
Alternative Strategies	Percentage of the endowment's assets allocated to alternative strategies. This includes hedge funds, private equity, venture capital, real estate and commodities	NACUBO, NCSE
Hedge Funds	Percentage of the endowment's assets allocated to hedge funds. This includes absolute return strategies, market neutral, long/short, 130/30, event driven and derivatives	NACUBO, NCSE
Private Equity	Percentage of the endowment's assets allocated to private equity. This includes LBO's, mezzanine, M&A, international private equity	NACUBO, NCSE
Venture Capital	Percentage of the endowment's assets allocated to venture capital	NACUBO, NCSE
	Panel C: Investment Returns and Risk	
Portfolio Total Return	Net annualized total return of the endowment's investable assets	NACUBO, NCSE
Portfolio Standard Deviation	Portfolio standard deviation is estimated as the standard deviation of the endowment portfolio return using actual weights and benchmark index variances and co-variances adjusted for illiquidity	NACUBO, NCSE, CRSP, Bloomberg
Adjusted-Sharpe Ratio	The Adjusted-Sharpe Ratio is the difference between the endowment annual net return and the annualized 30 day U.S. Treasury bill rate divided by the portfolio standard deviation	NACUBO, NCSE, CRSP, Bloomberg
	Panel D: Governance and Expertise	
Finance (Non-Investments)	Proportion of board of trustee members with experience in finance (non-investments)	BoardEx, GuideStar
Asset Management	Proportion of board of trustee members with experience in asset management (public securities)	BoardEx, GuideStar
Alternatives	Proportion of board of trustee members with experience in alternative investments	BoardEx, GuideStar
Hedge Funds	Proportion of board of trustee members with experience in hedge funds	BoardEx, GuideStar
Private Equity	Proportion of board of trustee members with experience in private equity	BoardEx, GuideStar
Venture Capital	Proportion of board of trustee members with experience in venture capital	BoardEx, GuideStar
Network	Total connections via past and current employment, education and other activities, of board of trustee members	BoardEx, GuideStar
Board Size	Total number of board of trustee members	BoardEx, GuideStar
Investment Team	Full-time equivalent (FTE) staff employed in the investment management area of the endowment	NACUBO, NCSE
Chief Investment Officer	A dummy that takes a value of one if the endowment hires a Chief Investment Officer (CIO), zero otherwise	NCSE

Table A.2: Benchmark Indices

This table reports summary statistics for the asset class benchmark indices. Entries summarize data points across time and report the standard deviation, covariance with the SP500, and the implied beta. For asset class benchmark returns we use public equity (SP500), fixed income (JP Morgan Bond Index), International Equity (MSCI ACWI), Real Estate (NCREIF), Hedge Funds (HFRI), Private Equity (Cambridge Associates PE), Venture Capital (Cambridge Associates VC), Commodities (GSCI). Annualized Standard deviations and covariances of illiquid asset are adjusted following Getmansky et al. (2004), using quarterly data from 1995 to 2015.

Asset Class	Index	St.Dev.	Cov. with Market	Implied Beta
Panel A: Liquid Assets				
Domestic Equity	S&P 500	0.167	0.028	1.000
Fixed Income	JP Morgan Bond Index	0.061	-0.004	-1.070
International Equity	MSCI ACWI	0.189	0.029	0.812
Panel B: Illiquid Assets				
Real Estate	NCREIF	0.082	0.013	0.455
Hedge Funds	HFRI	0.097	0.013	0.451
Commodities	GSCI	0.233	0.009	0.335
Venture Capital	VC Cambridge	0.411	0.058	2.086
Private Equity	PE Cambridge	0.151	0.029	1.047