JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS Vol. 60, No. 3, May 2025, pp. 1111–1145

doi:10.1017/S0022109024000188

Paying Managers of Complex Portfolios: Evidence on Compensation and Performance from Endowments

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Abstract

We examine compensation for endowment Chief Investment Officers (CIOs) overseeing portfolios with significant allocations to alternatives. We find widespread use of bonuses and that large endowments with high alternative allocations hire CIOs with stronger backgrounds, pay them more, and have higher pay-for-performance sensitivity. We find weak evidence of a relationship between compensation and future performance. Our results align with contract theory predictions but differ from empirical findings on pension funds. Endowments pay CIOs more, rely more on bonuses, attract more experienced professionals, and have lower turnover than pensions. This suggests more effective talent management compared to politically influenced public pensions.

I. Introduction

We study compensation for endowment Chief Investment Officers (CIOs), who oversee substantial long-term capital with allocations to illiquid alternative assets. Previous research on asset managers' compensation and incentives has predominantly focused on mutual funds and hedge funds, which primarily invest in public securities, with a few studies of pension funds (Agarwal, Daniel, and Naik (2009), Ma, Tang, and Gómez (2019), and Lu, Mullally, and Ray (2022)). There is scant evidence, however, on how the unique circumstances of nonprofit endowments shape compensation contracts and how these contracts differ from those in other

We thank Brad Barber, Hendrik Bessembinder (the editor), Justin Birru, Greg Brown, Yong Chen, Nathan Dong, Jonathan Fluharty, Thomas Gilbert, Juan-Pedro Gómez, Amit Goyal, Jillian Grennan, Fotis Grigoris, Umit Gurun, Victoria Ivashina, Steven Kaplan, Aymen Karoui, Josh Lerner, Francis Longstaff, Stefano Pegoraro, Philipp Schnabl, Stephan Siegel, Yuehua Tang (the referee), Jay Wang, and conference participants at the 2022 Eastern Finance Association, the 33rd Australasian Finance and Banking Conference (AFBC), the 2020 Financial Management Association, the 2020 Southern Finance Association, and Korea University Business School for helpful comments and suggestions. Du Nguyen and Kyle Zimmerschied provided excellent research assistance. A previous version of the article circulated under the title "What Drives Pay for Chief Investment Officers At Endowments?" All errors are our own.

settings for delegated portfolio management. This is the first study to take advantage of data on actual dollar compensation from the Internal Revenue Service (IRS), thus overcoming a challenge facing many prior studies (Ibert, Kaniel, Van Nieuwerburgh, and Vestman (2017)).

Endowments differ markedly from other institutional investors in ways that can affect contracting; thus, they provide a rich setting to obtain new insights on compensation and performance-based incentives. First, endowment ownership and governance are quite different from those of for-profit funds. Endowments have multiple stakeholders (e.g., donors, students, alumni) and do not have shareholders. Moreover, cash flows in and out of an endowment fund lack the disciplining function affecting for-profit funds, where shareholders can withdraw (or add) funds based on performance (Berk and Green (2004)). Endowment spending is smoothed, and inflows rely on donor contributions. These characteristics may heighten the need for explicit incentive contracts, since effective substitute incentives do not exist (e.g., managerial ownership as in Khorana, Servaes, and Wedge (2007)). Second, endowments' long-term horizon and low liquidity needs allow for more risk tolerance and higher allocations to alternative assets than for other institutional investors (Begenau, Siriwardane, and Liang (2022)). The complexity and long-term nature of these alternatives may require different CIO skills and compensation contracts intended to align interests with the long-term mission of the institution. Moreover, endowment governance is less subject to political forces that have been shown to distort pay packages and performance in public pensions (Andonov, Hochberg, and Rauh (2018), Lu et al. (2022)). Third, labor market dynamics and nonpecuniary motives may play a differential role in nonprofits compared to for-profit entities (Besley and Ghatak (2005), Bénabou and Tirole (2006)). A nonprofit's CIO's reservation utility may reflect unique forces, such as an affiliation with the endowment's mission (e.g., support of education), which influence the CIO's inclination to act in the endowment's interest (Hansmann (1990), Glazer and Konrad (1996)). Moreover, the nature of labor market competition between for-profit and nonprofit entities would be expected to affect pay packages. Considering differences between endowments and other investment funds, we investigate what patterns in compensation contracts actually occur in the endowment setting.

We first examine the level and structure of CIO compensation and find that over 60% of endowment CIOs have incentive compensation plans. For those with incentive plans, about 40% of compensation is in the form of a bonus, much higher than reported in research on public pensions. Moreover, the average total compensation for endowment CIOs is 3 times larger than that documented by Lu et al. (2022) for public pension funds, and the differences in incentive pay are even more pronounced. These differences are notable given that endowments are, on average, much smaller than public pensions. Our findings on the widespread use of incentive pay are more in line with results for mutual fund studies.

To better understand the nature and effects of compensation, we next explore what leads to variations in CIO pay. We first examine the links between compensation and the characteristics of endowments, including the size, the complexity of the portfolio, governance, and potential competition in the labor market. Contract theory suggests that compensation will reflect the effort to manage larger pools of capital and likely include contracts with mechanisms to address potential agency

costs (and higher monitoring) associated with managing larger portfolios (Core and Guay (2001)). Compensation would also need to be more competitive to retain talent if larger assets under management (AUM) are associated with increased competition in the labor market for talent (Tervio (2008)). Empirically, we find that CIO compensation is significantly higher the larger the endowment. And these effects are more pronounced for bonuses than for total and base compensation. Moreover, AUM explains 15%–30% of the total variation in compensation.

Unlike mutual funds, endowments allocate substantial capital to alternative assets that are illiquid, difficult to value, and carry higher and more complex fee structures.[1] We find that the more complex the endowment portfolio (percentage allocation to alternatives), the higher the pay, especially so for incentive-based compensation. Moreover, the effects of allocations to alternatives hold even controlling for size. Our findings are consistent with contract theory, which predicts that compensation would reflect the skill and effort required to actively manage more complex assets and to retain and align the CIO's interests with endowment long-term objectives. For our sample, the average allocation to alternatives is 45% and is double that reported by pension fund research (Begenau et al. (2022), Lu et al. (2022)). These portfolios often involve dealing with increased complexity and require higher levels of expertise. Endowment CIOs actively select external investment fund managers, and the proportion of assets allocated to alternatives can reflect the extent of the CIO's discretion on manager selection and illiquidity (Agarwal et al. (2009)).[2]

We also find significant links between CIO pay and governance. Since nonprofits have multiple stakeholders (e.g., donors, students, local communities, etc.) and no residual equity claimants, boards face challenges in monitoring CIOs. We find that the percentage of an organization's governing body that is independent is negatively associated with CIO compensation, suggesting that board independence may provide a disciplining role on CIO pay. This differs markedly from findings for public pensions where a separate investment board is linked to higher CIO compensation, apparently providing some insulation from the distorting effects of politicized pension governance on contracts (Lu et al. (2022)). However, our results are consistent with theoretical predictions that argue that incentive mechanism are more likely when agency conflicts are high (Fama and Jensen (1983), Smith Jr and Watts (1992), Kang, Kumar, and Lee (2006), and Ma et al. (2019)).

Examining potential competition in labor markets, we find that CIO pay is higher when the endowment is closer to a major financial center and thus faces

[1]Moreover, the gaps in performance among alternative asset managers in which an endowment might invest (e.g., 2 venture capital funds) are much higher than for public securities (e.g., 2 equity mutual funds), and some alternative funds limit access. Consequently, the ability to select, access, and manage alternative asset managers may require specialized skills and have a large impact on performance. See Harris, Jenkinson, Kaplan, and Stucke (2018) who illustrate the dramatic effects of not being able to invest in top-performing venture capital funds. Cavagnaro, Sensoy, Wang, and Weisbach (2019) find that investor skill in private equity investing is an important driver of investment returns for institutional investors.

[2]On the other hand, public pensions typically outsource substantive responsibility externally, and the CIO's role may focus on evaluating consultants' recommendations for approval by a Board of Trustees. These differences in the CIO's responsibilities may lead to skill sets and pay packages that are substantially different for endowments than for public pension plans. This hypothesis benefitted substantially from conversations with a CIO for a multi-billion-dollar university endowment.

heightened competition for investment talent. This effect holds above and beyond cost-of-living considerations. The finding is consistent with theoretical results of Oyer (2004), which show that compensation is linked to outside opportunities and labor market conditions. The empirical results are also consistent with those for mutual funds reported by Ma et al. (2019).

We next examine whether compensation differences reflect the talent and background of the individuals in the job, above and beyond endowment characteristics. Tervio (2008) shows theoretically that when talent is scarce, even small differences in skill can explain variation in pay, beyond size effects. In the context of for-profit corporations, Gabaix and Landier (2008) argue that executive pay is determined by both the size of the firm and the executive's talent. To understand these predictions, we first compare the talent and pay of endowment CIOs to those of pension fund CIOs. In our sample, endowments hire more talented CIOs compared to pension funds, as proxied by substantially higher SAT scores and lower admission rates at the universities from which they graduate. When segmented into quartiles based on total compensation, the top quartile SAT for pension CIOs is below the average SAT for all but the bottom quartile of endowment CIOs. Endowment CIOs also stay much longer in their jobs than do public pension CIOs; the average (median) tenure is 10 (8) years, substantially larger than the comparable figures for pensions (average of 6 and median of 4). During our sample period, endowment CIOs move to other jobs at less than half the rate for public pensions, and there are no differences in compensation between those who leave and those who do not.

We then use detailed background data on endowment CIOs and find that endowment CIOs whose history indicates strong abilities in asset management (as proxied by advanced degrees, prior experience in the industry, and professional awards) are paid more, and the effect is most pronounced for bonuses. This is consistent with theories of tournament such as Heinkel and Stoughton (1994) and Chevalier and Ellison (1999b). Tenure in the job is positively linked to deferred compensation, consistent with compensation policies that reward longevity and have retirement packages. This also likely reflects a lower level of career concerns for more experienced CIOs, which translates into higher deferred incentive compensation schemes (Chevalier and Ellison (1999b)). We find no independent effect on pay of a CIO's gender or age. These findings are broadly consistent with a large set of empirical studies finding that managerial attributes and credentials are linked to executive compensation (Graham, Li, and Qiu (2012), Graham, Harvey, and Puri (2013), and Falato, Li, and Milbourn (2015)).

We next look at pay based on past performance. Better endowment performance leads to higher CIO compensation in large endowments (more than $1 billion in assets), and the effect is more pronounced for bonuses. The results are robust across a range of measures that benchmark an endowment against returns for other endowments. Our findings are consistent with theory suggesting that compensation contracts should include a fraction of pay awarded based on past performance (Ou-Yang (2003), Li and Tiwari (2009), Cuoco and Kaniel (2011), and Pegoraro (2023)). The results are also broadly consistent with results of Bai, Ma, Mullally, and Tang (2023) for U.S. mutual fund managers and Ibert et al. (2017) for mutual fund managers in Sweden. However, our estimates cannot be readily compared to those papers because of institutional differences across countries and

different compensation models between mutual funds and endowments (e.g., fee income in mutual funds based on AUM, policies for funds in the same family). Past research on pensions does not explore pay for performance. We suspect the sensitivity of pay to endowment performance is even larger than our analysis reveals, since compensation formulas can be complex and not easily captured with publicly available data.

Finally, we study whether compensation affects an endowment's future performance. We first find a significant positive correlation between CIO compensation and future performance. This is consistent with the empirical findings for public pension funds. It is also broadly consistent with results on hedge funds observed by Agarwal et al. (2009) who found that hedge fund managers with higher incentives and discretion (as proxied by managerial ownership and lockup periods) earn higher future returns. These positive links are consistent with theories of fee structure and investors' welfare (Das and Sundaram (2002)). We then examine whether this link remains once we control for variables that are priced into endowment CIO compensation as displayed in our earlier analysis, such as the size and complexity of the endowment portfolio and a CIO's experience and education. With these controls, there is no independent effect of CIO compensation on future performance. This suggests that compensation outcomes in the endowment CIO labor market are effective in attracting, motivating, and retaining the talent needed for a particular endowment. Ma et al. (2019) also argue that mutual fund compensation contracts are optimally set to resolve agency conflicts and are therefore not linked to future performance.

As part of our analysis, we add another potential measure of CIO capability based on experience working at the Yale Investment Office under David Swensen's leadership. Swensen pioneered the endowment model, involving large allocations to alternatives. Such experience might provide skills and networks over and above those captured by our other measures and not readily duplicated. We find that this experience is not linked to compensation but is associated with significantly higher future endowment returns of over 100 basis points annually even controlling for all other factors. Since there is a small sample of CIOs who previously worked for Swensen, the results are only suggestive, but do point to the importance of specialized networks and skills when investing in alternative assets.

Related Literature and Contributions

This article fills a void since it is the first comprehensive academic research on the compensation of endowment CIOs and its links to performance. Endowments provide a rich laboratory to study compensation because, as noted earlier, they differ in important respects from other institutional investors in ways that can shape contracting. Our study is the first to harness IRS data on endowment CIO compensation.

Our work contributes to research in 3 areas: compensation in delegated asset management, human capital's impact on pay and performance outcomes, and endowment investing. Most research on compensation in delegated asset management draws on contract theory (Li and Tiwari (2009), Cuoco and Kaniel (2011),

Di Tella and Sannikov (2021), and Pegoraro (2023)) and has focused empirically on mutual funds and hedge funds that invest in publicly traded securities. Agarwal et al. (2009) study the role of managerial incentives and discretion in hedge fund performance and find that these contract features are associated with higher performance. In the context of mutual funds, Ibert et al. (2017) use unique data on Swedish managers' compensation and find weak pay-for-performance sensitivity but a strong relationship between pay and revenues, while Bai et al. (2023) find large pay-for-performance sensitivity for U.S. mutual fund managers, which depends on expected fees from advisory. Ma et al. (2019) are the first to study compensation contracts for U.S. mutual fund managers and test theories of optimal contracting. More recently, Dyck, Manoel, and Morse (2022) and Lu et al. (2022) provide empirical insights into results for public pension funds. Our results are broadly consistent with many empirical findings using data on mutual and hedge funds but differ in important respects from those on pension funds.

Our results reinforce a large body of research highlighting the importance of human capital in understanding compensation contracts and investment performance. Consistent with findings for executives in the for-profit corporate sector, we document that pay for endowment CIOs is significantly linked to managerial ability and credentials rather than solely to size or other endowment characteristics (e.g., Gabaix and Landier (2008), Frydman and Saks (2010), Custódio, Ferreira, and Matos ((2013), (2019)), Falato et al. (2015), and Frydman (2019)). We also add to prior research that documents the importance of executive and manager characteristics for firm outcomes and investment performance (Chevalier and Ellison (1999a), Bertrand and Schoar (2003), Li, Zhang, and Zhao (2011), Graham et al. (2012), Kaplan, Klebanov, and Sorensen (2012), Chaudhuri, Ivković Pollet, and Trzcinka (2020), and Lu and Teo (2021)). Theoretically, Gabaix and Landier (2008) and Tervio (2008) show that CEO pay levels are determined in equilibrium in a matching market between heterogeneous firms competing for talent.

Prominent in endowment investing is the shift toward alternative investments such as hedge funds and private equity (e.g., Lerner, Schoar, and Wang (2008), Sensoy, Wang, and Weisbach (2014), and Gilbert and Hrdlicka (2015)) by large funds. Yet, to date, there is no comprehensive research on how compensation is structured in this setting.[3] Past research has often focused on endowments in higher education (e.g., Brown, Garlappi, and Tiu (2010), Brown and Tiu (2010), Barber and Wang (2013), Brown, Dimmock, Kang, and Weisbenner (2014), Cejnek, Franz, Randl, and Stoughton (2014), and Binfarè, Brown, Harris, and Lundblad (2022)), while recent papers study all nonprofit endowments and private foundations (Dahiya and Yermack (2021), Lo, Matveyev, and Zeume (2021), and Binfarè and Zimmerschied (2023)). Our findings on compensation suggest more effective talent attraction, motivation, and retention of CIOs in endowments than in politically influenced public pensions.

[3]Research on executive compensation in nonprofits has generally focused on top executive officers, either the president of a university or CEO of a hospital (Dong (2016)), and no studies look at CIOs. Galle and Walker (2014) summarize theories of managerial power in the context of nonprofits. For recent studies on nonprofits, see Frumkin and Keating (2010), Hartzell, Parsons, and Yermack (2010), Adelino, Lewellen, and Sundaram (2015), Finley, Hall, and Marino (2019), and Babenko, Bennett, and Sen (2021).

https://doi.org/10.1017/S0022109024000188

II. Data and Summary Statistics

While the lack of readily available data has hindered research on the compensation of for-profit investment managers, the IRS makes compensation figures for nonprofit executives publicly available. As defined by the IRS, an endowment is "An established fund of cash, securities, or other assets to provide income for the maintenance of a not-for-profit entity." Typically, the endowment is governed by a board of trustees that adopts an investment policy statement establishing guidelines for investment objectives, strategic asset allocations, and policies on review, rebalancing, spending and performance evaluation.[4] The board also typically lays out objectives for and delegates responsibilities to an investment committee and staff. Larger endowments often create an in-house professional staff headed by a CIO. That individual typically has responsibility for general management of the fund, detailed asset allocation, manager selection, risk management, performance monitoring, managing the staff, and working with/reporting to the investment committee and board. The details of job responsibilities can differ across endowments. For convenience, we use the term CIO even though formal titles vary.

A. Data and Sample

Data on nonprofit organizations, their endowments, and CIO compensation are from 990 forms filed with the Department of the Treasury (IRS) for the fiscal years 2009–2018.[5] Organizations exempt from income tax (e.g., most charitable nonprofits) file under Section 501(c), or 4947(a)(1) of the Internal Revenue Code.

We identify CIOs using several strategies. We first search the title reported to the IRS for "Chief Investment Officer," or any slight variation of it. We also collect names for all CIOs at university endowments, foundations, and hospitals from publicly available sources (Bloomberg, Skorina, AI-CIO, Trusted Insight, Relationship Science, etc.) and then match these to IRS data. This process captures CIOs whose formal title descriptions range from "senior vice president for investments" to "managing director of investments."

IRS Form 990 (Schedule J, Part II) provides 5 categories of annual compensation. The first 3 are "base," "bonus & incentive," and "other reportable" compensation, as found on W-2 and/or 1099-MISC forms. The fourth category is "retirement and other deferred compensation" and the fifth is "nontaxable benefits." The Appendix provides detailed definitions. The Supplementary Material shows an example filing (see Figure IA.2 in the Supplementary Material). Whenever total compensation is 0 or missing, we look for compensation packages in a related organization in IRS data (e.g., if a nonprofit has multiple reporting organizations). Data on endowment fund characteristics come from Form 990, Schedule D, Part V,

[4]For a more complete discussion of endowment governance see Brown, Dimmock, Kang, Richardson, and Weisbenner (2011) and Binfarè et al. (2022).

[5]Most nonprofits are required to file these 990s, which can be accessed via the IRS website, or the Registry of Open Data hosted by Amazon Web Services in their original XML format. We do not include private foundations, typically funded by a single source versus a number of sources (e.g., the Gates Foundation). These have different reporting requirements (form 990PF) and limited coverage over time. Figure IA.1 in the Supplementary Material shows the number of filings by form type. In our sample of nonprofits with CIOs, 75% of nonprofits file in June, while 25% file in December.

and include the market value of the endowment, contributions, net investment gains or losses, and distributions. We gather balance sheet and income statement data on the organization (e.g., revenues, expenses, assets) and its governance (e.g., voting members of the board, compensation policies) from Form 990, Parts I-XII. We calculate the share of assets allocated to alternative investments using Form 990, Schedule D, Part VII. Our Supplementary Material provides additional details. In our analysis, we also include controls for different sectors since endowments have different missions; the Supplementary Material breaks the sample out by nonprofit sector. We also include a measure of proximity to a financial center which is estimated as the natural logarithm of the minimum distance to Boston, Chicago, New York, or San Francisco (see Dahiya and Yermack (2021)). This allows us to capture potential effects of localized job market conditions.

For each CIO we gather detailed biographical information using public sources (e.g., Bloomberg, LinkedIn, BoardEx, Relationship Science). These include the tenure with the fund, the manager's age, gender, undergraduate and graduate education, past nonprofit experience, and whether the manager previously held a CIO role at another organization. We also gather detailed information on CIO turnover and classified each instance as being a retirement or a move to another organization (for-profit or nonprofit).

The result is a panel of more than 1400 CIO-year observations across 191 unique endowments and 246 unique CIOs. The number of CIOs has increased over time, consistent with the view that trends in endowment and foundation investing require more in-house expertise (see Figure IA.3 in the Supplementary Material).

A CIO's suitability for and performance in the job is based on a complex array of factors, only some of which are readily measured. We summarize aspects of a CIO's knowledge, skill and ability based on measures of education and experience. For convenience, we refer to this as an ability index and, following Custódio et al. (2013), develop the index based on a principal component analysis of 5 characteristics: having an MBA, holding the CFA designation, having a previous CIO position at another fund, previous work experience in the nonprofit sector, and the number of investment industry awards received in the past.[6] CIOs with an MBA or a CFA designation have been exposed to a broad understanding of business and investments. A CIO who previously held a similar position at another fund is likely to have a set of transferable skills and the ability to quickly adapt to a new environment. Given the differences between the corporate and nonprofit sectors (e.g., governance, leadership, regulation), prior nonprofit experience may also be beneficial.

We also look at whether the CIO has educational credentials from a "select" school, which may signal CIO ability and network connections over and above the nature of the degree held (see for instance Frydman and Saks (2010), Butler and Gurun (2012), and Falato et al. (2015)). Using data from The Integrated Postsecondary Education Data System (IPEDS), we define the CIO's undergraduate institution as selective if it has an average composite ACT score greater than 30.[7]

[6]The index is then standardized to have 0 mean and standard deviation of 1. The 5 variables have a positive loading, and we compute the ability index as $AI_{it} = 0.40 \times MBA + 0.41 \times CFA + 0.58 \times CIOPrior + 0.54 \times NonprofitExp. + 0.22 \times Awards$.

[7]Results are unchanged if we use the SAT scores of the undergraduate institution, or the higher of the average undergraduate school and graduate school scores if the CIO attended both.

Annual net return at the endowment fund level is defined as in Dahiya and Yermack (2021):

$$R_{ft} = \frac{E_{ft}}{M_{ft-1} + 0.5 \times C_{ft} - 0.5 \times D_{ft}}, \quad (1)$$

where E_{ft} are investment earnings (gain or loss) net of fund expenses for the management of the endowment, M_{ft-1} is the market value of the endowment at the beginning of year t, C_{ft} are gifts and contributions to the endowment and D_{ft} are distributions from the endowment (grants and other expenses).[8]

As context, we note that only a small fraction of all endowments have CIOs. Many of the over 300,000 nonprofits that file form 990 are quite small and only about 12% (37,085) have separate endowments. Moreover, many of these endowments are much too small to justify hiring a CIO. That said, CIOs manage a large fraction of all nonprofit endowment assets, even though relatively few nonprofits have CIOs. Table IA.1 in the Supplementary Material provides summary statistics for all nonprofit endowments that file Form 990.

The data in our sample imply that CIO-managed endowments account for 44% of all nonprofit endowment assets. In higher education, which represents over half of our sample institutions (119 out of 191), the average endowment managed by a CIO is $2.3 billion and over 20 times the average for all higher education endowments. Overall, CIOs manage 67% of AUM in higher education. Using 2021 rankings by U.S. News and World Report, our sample includes 18 of the national universities listed as top 20 and 13 of 16 national liberal arts colleges listed as top 15 (the 16 reflects ties and excludes 2 military academies also in that list). Our sample includes all 8 Ivy League schools. Not surprisingly, CIO-managed endowments have higher allocations to alternative assets than endowments without a CIO. After all, one of the key reasons to have a CIO is to manage such complex assets. Binfarè et al. (2022) document a significant positive link between the presence of a CIO and allocations to alternatives, even controlling for size.

We note that the figures from the IRS almost certainly understate the importance of endowments and CIOs because several foundations do not have to file Form 990. These include exceptionally large private foundations that are funded by a single source or a very limited number of sources, rather than a broad array of donors.

B. Financial and Governance Characteristics of Nonprofits

Table 1 summarizes data on endowments that hire CIOs. Panel A shows considerable dispersion in size and allocations to alternative assets. The average market value is $2.31 billion, well above the median of $0.90 billion, reflecting the presence of the extremely large endowments of some nonprofits, such as Ivy League schools. Allocations to alternatives average 45.39% but exceed 62% for the top quartile. The average annual return over our sample period is 7.50%. Contributions (e.g., gifts) to the endowment average 4.66% of total endowment assets, slightly less

[8]Some nonprofits report net investment gain (or losses), while other organizations report gross investment gains and fund expenses (e.g., fees) separately. Other expenses at the fund management level are modest, 57 basis points on average for those endowments reporting gross investment earnings.

https://doi.org/10.1017/S0022109024000188

TABLE 1

Characteristics of Nonprofits, Endowments, and Compensation Policies

Table 1 reports summary statistics for nonprofit tax-exempt organizations and their endowment funds. Entries summarize data points across all nonprofits and years, and report the number (*N*) of data points, mean value, standard deviation, and percentile values (25, 50, and 75). Panel A summarizes figures for endowment funds from IRS form 990, Schedule D, Part V and VII. Panel B summarizes characteristics of nonprofits with endowments from IRS Form 990, Part VIII-X. Panel C summarizes the methods the organization uses to establish the compensation of the organization's top management officials from IRS Form 990, Schedule J, Part I. The Appendix provides detailed variable descriptions.

	N	Mean	Std. Dev.	p25	Median	p75
Panel A. Endowment Fund Returns and Distributions						
Market value ($ millions)	1415	2312.45	4746.87	491.58	904.22	1863.63
Return	1415	7.50	6.68	2.27	7.80	12.32
Distributions (% value)	1415	4.80	2.97	3.72	4.56	5.40
Contributions (% value)	1415	4.66	10.42	1.28	2.47	4.20
Alternatives (%)	1171	45.39	24.75	27.89	46.42	62.89
Panel B. Characteristics of Nonprofits with Endowments						
Total assets ($ millions)	1415	4229.75	7473.03	1009.06	1862.94	4019.31
Distributions (% expenses)	1415	17.23	16.96	4.47	12.67	23.86
Voting members	1415	36.28	20.30	24.00	34.00	44.00
Independent (% voting)	1415	91.03	11.34	88.64	94.44	97.44
Panel C. Compensation Setting Policies (0/1 Dummies)						
Board Approval	1415	0.94	0.23	1.00	1.00	1.00
Compensation survey	1415	0.91	0.28	1.00	1.00	1.00
Compensation committee	1415	0.91	0.29	1.00	1.00	1.00
Written policy	1415	0.76	0.43	1.00	1.00	1.00
Independent consultant	1415	0.65	0.48	0.00	1.00	1.00
Form 990 of other Org	1415	0.47	0.50	0.00	0.00	1.00

than the average of 4.80% for distributions (e.g., spending on grants, scholarships, programs). Panel A also shows considerable dispersion of characteristics across endowment funds.

Panel B of Table 1 displays financial statement and governance information for nonprofit organizations that endowments support. Nonprofits vary in terms of endowment distributions as a percent of the nonprofit's annual expenses, consistent with different financial models that may place different demands on endowment returns and affect compensation policies. The average (median) is 17.23% (12.67%), while the bottom quartile figure is less than 5% and the top quartile is almost 24%. Independent board members are the vast majority of voting members in endowments (median of 94.44%).

Panel C of Table 1 summarizes practices used by the institution to establish compensation of top officers and directors. Most organizations require board approval of compensation policy (94%), use compensation surveys (91%), and have a compensation committee (91%). A written policy is in place for 76% of nonprofits, and a majority use an outside consultant (65%) in setting compensation. About half rely on IRS data (Form 990) on competitors. Overall, the data depict reasonably consistent practices across the sector.

C. Compensation of CIOs

Figure 1 illustrates the growth of CIO compensation over time and the substantial role of bonus compensation. Table 2 provides details. The average total

https://doi.org/10.1017/S0022109024000188

FIGURE 1

Chief Investment Officers Average Compensation by Year

Figure 1 shows the average total compensation and its breakdown into base compensation, bonus and incentive compensation, and other compensation for Chief Investment Officers of nonprofit tax-exempt organizations with endowment funds from 2009 to 2018 as reported to the IRS, Form 990, Schedule J, Part II. Compensation figures are in thousands of dollars for a fiscal year. Total compensation is the sum of base compensation, bonus and incentive compensation, and other compensation. Other compensation is the sum of other taxable compensation, retirement and deferred compensation, and nontaxable compensation.

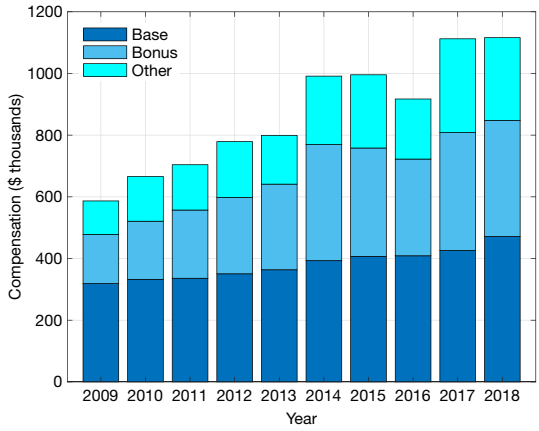

TABLE 2

Compensation and Characteristics of Chief Investment Officers

Table 2 reports summary statistics for Chief Investment Officers (CIOs) at nonprofit tax-exempt organizations with endowment funds. Panel A summarizes CIO compensation figures. Panel B shows CIO biographical characteristics. Age and tenure are in years. Awards is the number of investment awards received by the CIO. Other variables are 0/1 dummy variables if the CIO has that trait (e.g., MBA = 1 if the CIO has an MBA). Entries summarize data points across all nonprofits and years, and report the number (*N*) of data points, mean value, standard deviation, and percentile values (25, 50, and 75). All compensation figures are in thousands of dollars. Total is total compensation package (both W-2/1099 MISC and non W-2 amounts), base is base compensation, bonus is bonus incentive compensation, other is the sum of other taxable compensation, retirement and deferred compensation, and other nontaxable compensation. All figures in Panel A are reported to the IRS, Form 990, Schedule J, Part II, while figures in Panel B are collected from various public sources. The Appendix provides detailed variable descriptions.

	N	Mean	Std. Dev.	p25	Median	p75
Panel A. Compensation of Chief Investment Officers						
Total	1415	893.6	1209.1	298.3	531.8	912.7
Base	1415	387.1	214.8	228.1	342.1	500.5
Bonus	1415	301.7	722.9	0.0	75.0	302.3
Other	1415	204.8	536.1	36.5	59.3	131.5
Other taxable	1415	54.5	292.8	0.3	3.1	26.2
Nontaxable	1415	22.0	74.7	9.5	17.7	25.7
Deferred	1415	128.2	353.6	17.9	26.4	51.2
Panel B. Manager Characteristics						
Age (years)	1351	50.89	8.35	44.00	52.00	57.00
Tenure in position (years)	1351	10.27	7.90	5.00	8.00	13.00
Female	1351	0.26	0.44	0.00	0.00	1.00
Selective school	1351	0.47	0.50	0.00	0.00	1.00
Prior CIO experience	1351	0.20	0.41	0.00	0.00	0.00
MBA	1351	0.57	0.50	0.00	1.00	1.00
CFA	1351	0.29	0.45	0.00	0.00	1.00
Nonprofit experience	1351	0.45	0.50	0.00	0.00	1.00
Awards (number)	1351	0.20	0.82	0.00	0.00	0.00

compensation for CIOs is $894,000; more than 40% comes from base compensation, and about 35% is bonus which averages $302,000.[9] The average total compensation for endowment CIOs is more than 3 times larger than that documented by Lu et al. (2022) for public pension funds.[10] And the difference in incentive pay is even more dramatic. In pension funds, Lu et al. (2022) report bonuses in 15.8% of plan-years and that bonuses represent about 10% of total compensation. These differences are especially notable given that endowments are, on average, much smaller than public pension funds. The differences are consistent with fundamental differences between endowments and pension funds reflected in asset allocations and compensation policies.

There are striking differences in compensation across CIOs. The median bonus is $75,000; however, the top quartile figure of over $300,000 is 4 times as large. Deferred compensation packages can also be substantial, especially so for the top quartile. This may reflect retirement packages or bonuses deferred to a future date. Nontaxable compensation, which includes benefits specifically excluded from taxation under the IRS code, averages only $22,000. Other taxable compensation amounts, which might include a severance plan and other deferred amounts, are generally small (median value of $3,000).

The role of bonuses for endowment CIOs is also much larger than for other top nonprofit executives. As shown in Table IA.2 in the Supplementary Material, nonprofit CEOs are, on average, paid slightly more than CIOs but rely much less on bonuses. CFOs earn base compensations comparable to those of CIOs but rely even less than CEOs on bonuses: the average CFO bonus is less than 30% of the average CIO bonus even though they earn comparable base salaries.

D. Characteristics and the Labor Market of CIOs

Panel B of Table 2 summarizes biographical information for CIOs. The average (median) age is 50.9 (52) years, and the average (median) CIO tenure of 10.3 (8) years, much longer than that for mutual fund or hedge fund managers (Li et al. (2011), Ibert et al. (2017)), perhaps reflecting the longer-term horizons of endowment investing. For instance, studies of mutual fund managers find average tenures of around 3.5 to 4 years (Chevalier and Ellison (1999b), Kostovetsky and Warner (2015)). Endowment CIO tenures are also substantially longer than for those in public pensions. Lu et al. (2022) report a mean (median) tenure for pension CIOs of 6 (4) years. The endowment CIO figures are, however, similar to those in prior

[9] As a comparison, a survey of family offices found that average CIO compensation was $810,000 of which base salary was $402,000 (https://www.famcap.com/2018/01/2018-1-31-family-offices-this-is-how-much-their-top-staff-get-paid/). These figures are quite comparable to those shown in Table 2. The same survey found that compensation increased with assets under management. For $1 billion plus family offices, the average total compensation was $1,500,000 with base salary of $606,000.

[10] This large difference in total compensation holds even if we account for slightly different sample periods. For instance, the pension CIO average total compensation figure would grow to $276,900 if adjusted for 3 years of inflation between 2011 and 2014, the average dates of the Lu et al. (2022) sample and ours. This is still less than a third of the figure for endowment CIOs. The contrast in incentive compensation is much more dramatic.

studies of corporate CEOs (e.g., Fernandes, Ferreira, Matos, and Murphy (2012), Graham et al. (2012), and Custódio et al. (2013)).

Lu et al. (2022) argue that fund performance may be eroded by turnover in management and that higher compensation makes it less likely that a CIO will be hired away. In their sample, there are around 97 instances involving a CIO being hired away from a public pension (6% of 1613 plan-years). During our sample period, untabulated results show that endowment CIOs move to other jobs in only 2.7% of plan-years (less than half the rate for public pensions). When they do move, 54% go to industry and 40% go to other endowments or private foundations. In only one instance in our sample did the CIO move to a public pension. Those who did move were on average 3 years younger than those who stayed and had slightly shorter tenures (by 2 years). There was not, however, any difference in total, base, or incentive compensation. These results suggest that compensation policies for endowments are more effective in retaining talent and avoiding turnover than is true for public pensions, where pay packages can be suppressed by politicized governance.

Approximately one out of 4 CIOs is female, compared to less than 1 out of 10 CEOs in the corporate sector.[11] About half of CIOs attended a selective undergraduate institution, as measured by an average composite ACT score greater than 30. To put this in perspective, in 2018, the average ACT score across all institutions tracked by The IPEDS was around 23, and only 83 colleges (or 6.5%) would be classified as selective.

Lu et al. (2022) conclude that CIO talent has a positive impact on investment performance and that higher compensation allows pensions to attract talented managers, as proxied by SAT scores and admissions rates of the universities they attend. Consistent with the higher compensation in endowments compared to public pensions, endowments hire even more talented CIOs. The average university SAT (Admission Rate) for endowment CIOs is 1349 (.39) significantly different from the pension fund figures of 1282 (.53). When segmented into quartiles based on total compensation, the top quartile SAT for pension CIOs is 1322. This is below the SAT average for all but the bottom quartile of endowment CIOs segmented on compensation (Table IA.3 in the Supplementary Material).

In terms of general finance and investing expertise, 1 out of 5 CIOs has worked as a CIO at another firm, and more than half have an MBA. Finally, slightly less than half of CIOs have previously worked in the nonprofit sector.

E. Empirical Methodology

To investigate determinants of compensation, we estimate the following specification:

$$C^i_{ft} = \lambda_t + \mu_j + \phi \mathbf{X}_{ft} + \gamma \overline{R}_{ft:t-\tau} + \varepsilon_{ft}, \tag{2}$$

where C^i_{ft} is a measure of compensation for manager i at time t paid by fund f, and $\overline{R}_{ft:t-\tau}$ is a measure of endowment performance of fund f over the prior $t-\tau$ fiscal years. $\mathbf{X}_{ft}$ is a vector of organizational and manager specific characteristics. We first

[11] Hwang, Shivdasani, and Simintzi (2018) estimate that women held about 5% of CEO positions at firms in the Russell 3000 Index in 2018.

report results using only organizational variables and later add manager characteristics. The Appendix provides detailed variable descriptions. λ_t represents year fixed effects which control for common shocks to nonprofits, while μ_j represent fixed effects using the 10 major codes of the National Taxonomy of Exempt Entities (NTEE) to control for time-invariant unobservable characteristics (e.g., mission, regulatory environment) specific to a type of nonprofit activity (e.g., museums, hospitals, higher education).

We initially compute performance as the annualized geometric net return over a 3-year time frame (t, $t-1$, $t-2$) since endowments and foundations often measure performance over a 3-year rolling window. Ma et al. (2019) also document that the most prevalent form of evaluation window in U.S. mutual funds is 3 years. We also report on the sensitivity of results to alternate performance measures based on comparisons to industry benchmarks or a set of peers.

III. What Drives Pay for Endowment CIOs?

A. Nonprofit Characteristics and CIO Compensation

Table 3 reports estimates from equation (2) for total compensation, base compensation, and bonus and incentive compensation. The results show CIO compensation is significantly higher the larger the endowment (AUM) and the more complex the endowment portfolio (% Alternatives). This is consistent with the increased scope and demands of managing large pools of capital and alternative assets. And these effects are more pronounced for bonuses than for total and base compensation, as can be seen by the much higher coefficients on size and alternatives in column 9 compared to the figures in columns 3 and 6. The results for alternative assets are consistent with incentive pay playing a larger role in managing these more complex assets relative to highly liquid assets such as public equity. We acknowledge that endowment final decisions ultimately reflect a simultaneous process that likely involves both asset allocations and CIO compensation. As a matter of policy, strategic asset allocations are determined by the endowment's board and its investment policy statement. That said, a CIO may have some discretion in tactical variations around strategic targets. Moreover, board decisions would reflect their assessment of the talents of the CIO they can hire and retain. What our regressions clearly establish is a strong significantly positive link between allocations to alternatives and CIO compensation.

Table 3 also reveals that the degree of monitoring (percentage of board members that are independent), and labor market conditions (distance to financial centers) affect pay, and that the impacts are larger on incentive compensation. The significant negative coefficients on the distance from a financial center display that endowments pay more when they are located in or near a financial hub. In particular, the elasticity of base (incentive) compensation with respect to proximity to a financial center is 0.05 (0.22). This could reflect job market competition in locations with large pools of investment professionals and many potential employers. It may also, to some extent, reflect the willingness of CIOs to accept jobs at lower pay when they can live in different and less urban settings outside financial centers. The negative coefficients on the percentage of board members that are independent suggests that more governance

https://doi.org/10.1017/S0022109024000188

TABLE 3

CIO Compensation and Endowment Characteristics

Table 3 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at nonprofit endowments and endowment and nonprofit characteristics. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include distributions from the endowment as a fraction of the institution's expenses, number of voting board members, the proportion of voting members that is independent, the distance to a major financial center, the market value of the endowment, and the percentage of assets allocated to alternative strategies. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total			Base			Incentive		
	1	2	3	4	5	6	7	8	9
log(voting)	0.22**	0.01	0.04	0.21***	0.10*	0.10*	0.25	0.02	0.09
	[0.11]	[0.09]	[0.09]	[0.06]	[0.05]	[0.06]	[0.17]	[0.16]	[0.17]
Independent (% voting)	−2.50***	−1.16***	−1.00**	−1.40***	−0.67***	−0.54**	−4.16***	−2.24***	−2.06***
	[0.51]	[0.37]	[0.46]	[0.27]	[0.23]	[0.27]	[0.77]	[0.79]	[0.77]
Financial Center	−0.13***	−0.10***	−0.09***	−0.07***	−0.06***	−0.05***	−0.24***	−0.20***	−0.22***
	[0.03]	[0.02]	[0.02]	[0.01]	[0.01]	[0.01]	[0.04]	[0.04]	[0.04]
Distributions (% expenses)	0.44	−0.20	−0.30	0.29*	−0.06	−0.14	1.12**	0.09	−0.02
	[0.29]	[0.24]	[0.23]	[0.16]	[0.14]	[0.13]	[0.56]	[0.45]	[0.44]
log(AUM)		0.32***	0.37***		0.17***	0.20***		0.44***	0.43***
		[0.04]	[0.06]		[0.02]	[0.03]		[0.08]	[0.12]
Alternatives (%)			0.56***			0.30***			0.94***
			[0.15]			[0.10]			[0.34]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.29	0.51	0.55	0.31	0.48	0.50	0.32	0.45	0.44
No. of obs.	1415	1415	1171	1415	1415	1171	906	906	750

scrutiny in such cases reduces compensation. The extent of an organization reliance on endowment distributions (distributions/expenses) is not significant in explaining differences in CIO pay.

Results for the effects of size on CIO compensation echo prior research findings for both company executives and asset managers in the private sector. Larger endowments pay more, and size adds substantial explanatory power in explaining differences in compensation. Moreover, the effect of size is even more pronounced for incentive pay to CIOs. Table 3 also reveals that even controlling for size, CIOs are paid more when they manage more complex portfolios with high allocations to alternative assets. The larger the allocation to alternative investments, the notably higher the incentive pay. This is consistent with compensation practices being crafted to retain and provide strong incentives to CIOs, since investing in alternative assets presents larger challenges and more opportunities for outperformance than does investing in public equities and debt.

Overall, estimates in Table 3 explain half the variation in total compensation and over 40% for bonuses.

B. Ability, Human Capital, and CIO Compensation

So far, we have focused on organizational characteristics in determining pay. Gabaix and Landier (2008) argue that executives are matched to firms in equilibrium,

and pay is determined by both firm characteristics and the executive's talent. In the private sector, Falato et al. (2015) find that higher-skilled CEOs earn up to a 5% pay premium. Given the skills required to manage large, complex portfolios, we would expect compensation to be related to a CIO's human capital (e.g., ability, credentials, networks).

Table 4 examines the effects of manager characteristics on compensation. The first column shows that if no organizational characteristics are included, manager characteristics (along with fixed effects) explain 39% of the variation in total compensation. When both organizational and manager characteristics are included, the adjusted R^2 is 64% (column 2). Comparing Tables 3 and 4 shows that both organizational and manager characteristics provide insights into compensation. Given the importance of both sets of variables, we focus our discussion on the even-numbered columns in Table 4, which include both sets. We have also added an analysis of deferred compensation (column 8) since that is likely tied to a person's stage of career and to features of the incentive award plan in place. Table IA.4 in the Supplementary

TABLE 4

CIO Compensation and Manager Characteristics

Table 4 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at nonprofit endowments and CIO characteristics. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include an index of ability using the first factor of the principal components analysis of some of the variables in Panel B of Table 2 (prior CIO, CFA, MBA, nonprofit experience, number of investment awards), whether the CIO attended a selective undergraduate institutions, gender, tenure at the institution (in years), age (in years), and all control variables used in Table 3. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total		Base		Bonus		Deferred	
	1	2	3	4	5	6	7	8
Ability index	0.38***	0.22***	0.20***	0.11***	0.63***	0.45***	0.33***	0.15*
	[0.05]	[0.04]	[0.03]	[0.02]	[0.09]	[0.08]	[0.09]	[0.09]
Selective school	0.53***	0.27***	0.32***	0.16***	0.81***	0.43**	0.68***	0.50***
	[0.10]	[0.08]	[0.05]	[0.05]	[0.20]	[0.18]	[0.16]	[0.17]
Female	0.09	0.00	0.08	0.05	0.08	0.03	0.08	−0.07
	[0.09]	[0.08]	[0.06]	[0.05]	[0.19]	[0.17]	[0.15]	[0.17]
Age	−0.00	0.00	0.00	0.00	−0.01	−0.01	−0.00	0.00
	[0.01]	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]	[0.01]
Tenure	0.02**	0.01	0.01*	0.00	0.03	0.01	0.04***	0.02*
	[0.01]	[0.01]	[0.00]	[0.00]	[0.02]	[0.01]	[0.01]	[0.01]
log(voting)		0.00		0.09**		−0.03		0.00
		[0.08]		[0.04]		[0.14]		[0.19]
Independent (% voting)		−0.96**		−0.51**		−2.13***		−0.82
		[0.44]		[0.23]		[0.62]		[0.85]
Financial center		−0.09***		−0.05***		−0.22***		−0.03
		[0.02]		[0.01]		[0.04]		[0.05]
Distributions (% expenses)		−0.32		−0.13		0.01		−0.49
		[0.22]		[0.12]		[0.43]		[0.42]
log(AUM)		0.29***		0.15***		0.30***		0.38***
		[0.05]		[0.03]		[0.09]		[0.09]
Alternatives (%)		0.48***		0.28***		0.79**		0.32
		[0.13]		[0.08]		[0.32]		[0.23]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.39	0.64	0.38	0.58	0.36	0.55	0.20	0.32
No. of obs.	1351	1122	1351	1122	884	734	1285	1066

Material also examines effects on other forms of compensation, such as other W-2 income (e.g., longevity awards) and nontaxable benefits (e.g., health insurance).

1. Total Compensation

As shown in column 2, total compensation is significantly higher for CIOs who bring more ability to the job (as proxied by ability index) and who graduated from a selective school. The results also show that the organizational effects of size, %Alternatives, location and governance shown in Table 3 still remain significant once manager characteristics are added.

2. Form of Compensation

The positive effect of ability holds across total, base, and bonus pay, and seems especially important for bonus pay. The effect of going to a selective school is positively linked to all the forms of compensation including deferred compensation. In contrast, the effect of tenure in the job is less important, although there is weak support for a positive link between tenure and deferred compensation. The variable may reflect skill and wisdom acquired or simply the results of compensation policies that reward time in the job. These effects are consistent with compensation packages geared toward the end of career or to retain long-standing employees.

To illustrate the magnitudes of the effects, we compute the implied change in compensation for a given change in manager characteristics. A 1 standard deviation increase in a CIO's ability index is associated with an increase in total compensation (bonus) of about 22% (45%). In economic terms, this change would increase total compensation and bonus compensation by $220,000 and $172,000, respectively. The figures imply that CIOs in the top quartile of the ability index make more than twice as much as CIOs in the bottom quartile. All other things equal, CIOs who attended a selective undergraduate institution earn 31% higher total compensation than CIOs who did not attend a selective college.

Looking at other CIO characteristics, Table 4 shows essentially no effect of age or gender independent of other variables. In our sample, the median compensation for female CIOs is higher than that for males. This is counter to the higher pay to males Finley et al. (2019) find for nonprofit CEOs and CFOs.

Overall, the results in Table 4 suggest investment ability acquired through experience and education and academic credentials based on education are significantly linked to higher pay. Moreover, even controlling for these manager characteristics, endowment size, complexity, location, and governance affect CIO compensation.

To further explore the effects of distance from a financial center, we repeated Table 4 regressions adding a proxy for the cost of living for the endowment's location using the seasonally adjusted Zillow Home Value Index (ZHVI) in a city at the start of the fiscal year. If we do not control for distance from a financial center, cost of living is significantly linked to total, base, and incentive compensation, but not to deferred compensation. Once we include both variables, the distance from the financial center is significantly negatively linked to total, base, and bonus compensation, but the cost-of-living measure is not. As a result, the distance from the financial center appears to capture effects of competition for talent in asset management over and above cost-of-

living considerations. Results are tabulated in Table IA.5 in the Supplementary Material.

To examine possible nonmonetary incentives affecting CIOs, we also created a 0–1 dummy variable coded one when an endowment's CIO was an alum of the school. Such alumni represent about a fourth of CIOs in higher education and tend, on average, to be at smaller schools that are further from financial centers. While similar in average age to all CIOs in higher education, the "alum CIOs" have less prior professional experience in nonprofits or as a CIO elsewhere. As the regressions in Table 4 show, these differences between alum and nonalum CIOs would lead to lower compensation. To control for these effects, we repeated the regressions in Table 4 (for the higher education subsample) adding the "alum CIO" variable. For regressions with both manager and endowment characteristics, being an alum was significantly negatively linked to base and deferred compensation, but not to bonus pay. The coefficients imply that "alum CIOs" earn base compensation that is 10% to 16% lower than that of other CIOs. The effect on total compensation was negative, though not significant at the 10% level. The results are consistent with nonmonetary incentives that might make a CIO work for lower dollar compensation. Results are tabulated in Table IA.6 in the Supplementary Material.

C. Paying for Endowment Performance

In this section, we explore whether CIO compensation depends on past performance.[12] Unlike the cases of mutual and hedge funds, endowment portfolio returns are only available on an annual basis for research. Moreover, endowments' investments in illiquid assets make it more difficult to measure performance (Binfarè et al. (2022)). In practice, compensation contracts can be complicated and be linked to multiyear results relative to a benchmark (or set of benchmarks) based on specific sets of endowments (peer groups) or passive strategies.[13] These contracts are typically not publicly available.[14]

Table 5 reports estimates measuring performance as the "raw" average annual net return (geometric) for the 3-year period ending at time t. For regressions without control variables, the coefficients on performance are significant for total, base, and

[12]We also explore whether nonprofit CEO and CFO compensation depends on past endowment performance in Table IA.7 in Supplementary Material and find that it does not.

[13]Evans, Gomez, Ma, and Tang (2022) study peer versus pure benchmarking in the compensation of mutual fund managers. Tiu (2017) provides an extensive description of benchmarking practices at university endowments.

[14]The Supplementary Material has a summary of an arrangement for a major university endowment that was made public due to a court order after a Freedom of Information Act lawsuit. Another example comes from the investment office at Duke (2019) that "Duke's primary peer benchmark (Peer Group Median) is the Cambridge Associates Universe. This group of peer colleges and universities have endowment pools that are similar to Duke's, often managed by professional internal staff … Another long-term benchmark is the composite of 70% MSCI All Country World Index and 30% Bloomberg Barclays Aggregate Index (70/30)." Similarly, we learn from the investment office at Northwestern (2019) that performance goals are measured on three levels: i) realizing a total return exceeding the endowment payout and inflation over a long-term horizon, ii) endowment returns to exceed the target composite benchmark based on target asset allocation weights and index returns, and iii) realizing investment returns competitive with those of peer institutions.

TABLE 5

CIO Compensation and Pay-for-Performance

Table 5 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at nonprofit endowments, and CIO and endowment characteristics and past returns. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include the endowment annualized (geometric) net return over a 3-year time frame (t, $t-1$, $t-2$) and all control variables used in Table 4. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total		Base		Bonus		Deferred	
	1	2	3	4	5	6	7	8
$\overline{R}_{t:t-2}$	0.06***	0.01	0.03***	0.00	0.11***	0.02	0.05	−0.00
	[0.02]	[0.01]	[0.01]	[0.01]	[0.03]	[0.02]	[0.03]	[0.02]
Ability index		0.22***		0.11***		0.45***		0.14
		[0.04]		[0.02]		[0.08]		[0.09]
Selective school		0.27***		0.16***		0.43**		0.52***
		[0.08]		[0.05]		[0.17]		[0.18]
Female		0.01		0.06		0.04		−0.07
		[0.08]		[0.05]		[0.17]		[0.17]
Tenure		0.01		0.00		0.02		0.02*
		[0.01]		[0.00]		[0.01]		[0.01]
Age		0.00		0.00		−0.01		0.00
		[0.00]		[0.00]		[0.01]		[0.01]
log(voting)		−0.00		0.09**		−0.04		−0.01
		[0.08]		[0.05]		[0.14]		[0.20]
Independent (% voting)		−0.98**		−0.52**		−2.09***		−0.88
		[0.44]		[0.23]		[0.61]		[0.85]
Financial center		−0.09***		−0.05***		−0.21***		−0.02
		[0.02]		[0.01]		[0.04]		[0.05]
Distributions (% expenses)		−0.36		−0.14		−0.04		−0.52
		[0.22]		[0.13]		[0.44]		[0.42]
log(AUM)		0.29***		0.15***		0.30***		0.38***
		[0.06]		[0.03]		[0.10]		[0.09]
Alternatives (%)		0.48***		0.27***		0.80**		0.30
		[0.12]		[0.09]		[0.32]		[0.24]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.13	0.63	0.14	0.57	0.16	0.55	0.06	0.31
No. of obs.	1354	1077	1354	1077	872	708	1286	1023

bonus compensation. However, once controls are added, the coefficients on performance are essentially 0 in all regressions. The effects of other variables are virtually unchanged from Table 4. Though not reported, we estimated additional regressions to explore the sensitivity of coefficient estimates on performance. When we include endowment performance and all other controls except size and %Alternatives, the coefficients on performance are significant. In the next section, we explore the link between size and pay for performance in more detail.

To supplement the regressions in Table 5, we performed a variance decomposition that separates the explained variation in CIO compensation into proportions contributed by each variable: fixed effects (time and NTEE code), organizational characteristics (e.g., size, governance, location), CIO characteristics (e.g., ability, selective school, age), and past performance. As shown in Table IA.8 in the Supplementary Material, the results of that analysis confirm the patterns revealed in the regression results. Most of the variations in our data are cross-sectional, and they are

https://doi.org/10.1017/S0022109024000188

primarily explained by organizational and manager attributes. When all variables are entered, fixed effects account for about a quarter of the explained variation. For base pay, organization variables collectively account for about 50% of the explained variation with size contributing the lion's share of that; manager characteristics account for about 24% with the ability index contributing about half of that. For bonus compensation, organizational variables account for about 47%, with size and location contributing about 80% of that; manager characteristics contribute 35%, with the ability index providing the vast majority of that.

IV. The Endowment Model and CIO Compensation

Large endowments play a dominant role in terms of investments supporting nonprofits and their scale allows them to adopt higher allocations to alternative assets, the hallmark of the "endowment model" pioneered at Yale. As discussed earlier, these assets (such as private equity, hedge funds, and venture capital) undoubtedly take more investment expertise to access and manage than investing in public stocks and bonds.

To take a closer look, we segment our sample into large and small endowments. Within the large category, we also show results for higher education, which comprises the vast majority of that grouping. It also allows us, later in the article, to use a range of performance benchmarks reported in higher education. This partitioning enables us to see if different profiles of talent are employed by these larger endowments and what seems to drive pay for these CIOs. We use a $1 billion AUM threshold, which is the standard categorization used by NACUBO in designating large (vs. medium or small) endowments in higher education. The 2020 NACUBO-TIAA Study of Endowments reports that in higher education 80% of AUM are managed by endowments with over $1 billion in AUM and that these large endowments allocate on average about 60% of assets to alternatives. We note that many of these large endowments are still smaller than many public pension funds but have much higher allocations to alternatives. For instance, Lu et al. (2022) report that the bottom decile (mean) of pension plan AUM is $1.85 billion ($21.3 billion) while the bottom decile (mean) allocation to alternatives is essentially 0 (around 18.6%).

Table 6 shows that over 85% of large endowments are from higher education. Moreover, CIOs in large endowments differ in some respects from those at smaller funds. CIOs employed by larger endowments are slightly older, more likely to be female, and show signs of more ability and credentials (as measured by the selectivity of the school from which they graduate, advanced degrees and certifications, awards, and prior experience in nonprofits and as a CIO). Tenure in the job is, however, a bit shorter for CIOs at larger endowments. Overall, these patterns are consistent with larger funds employing individuals equipped to manage more complex investment portfolios and suggest that there may be some career progression in individuals moving to large funds.

Panels B and C of Table 6 demonstrate the substantial differences between the large and small endowments. The large endowments, on average, are 8 times as large as the small ones, have higher allocations to alternatives, and reap much higher returns. Moreover, large endowments pay their CIOs more and rely much more on

TABLE 6

CIO Characteristics in Large Versus Small Endowments

Table 6 reports summary statistics for Chief Investment Officers (CIOs) in large versus small endowments. Panel A shows CIO biographical characteristics. Panel B summarizes figures for endowment market values, fund returns, and distance to a financial center. Panel C summarizes compensation figures for CIOs. The table also reports *p*-values calculated to test the difference between each variable in large versus small endowments. The table also reports summary statistics for large endowments in higher education. Large endowments have more than $1 billion in AUM. The Appendix provides detailed variable descriptions. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

		Market Value		Difference	Education
	Total	Small	Large	*p*-Value	Large
Panel A. CIO Characteristics					
Age (years)	51.14	50.66	51.60	0.00***	51.76
Tenure (years)	10.05	10.38	9.73	0.04**	9.52
Female	0.27	0.15	0.39	0.00***	0.38
Selective school	0.48	0.39	0.57	0.00***	0.56
Prior CIO experience	0.20	0.13	0.28	0.00***	0.31
MBA	0.58	0.55	0.61	0.00***	0.61
CFA	0.29	0.27	0.31	0.04**	0.34
Nonprofit experience	0.46	0.34	0.57	0.00***	0.55
Awards (number)	0.19	0.05	0.33	0.00***	0.37
Panel B. Endowment Characteristics					
Market value ($ millions)	2471.23	555.20	4320.15	0.00***	4657.67
Annual net return (%)	7.58	7.00	8.15	0.00***	8.21
Financial center (miles)	443	510	370	0.00***	401
Alternatives (%)	46.20	42.86	49.41	0.00***	51.41
Panel C. CIO Compensation ($ thousands)					
Total	942.04	492.22	1376.10	0.00***	1435.24
Base	398.54	301.64	492.04	0.00***	497.97
Bonus	324.36	101.55	539.36	0.00***	573.88
Other	219.15	89.03	344.70	0.00***	363.39
No. of obs.	1351	711	640	–	550

bonuses and other forms of compensation.[15] The average annual CIO compensation in the large sample is $1.4 million, and well less than half of this is base salary. In contrast, for the small endowments, the average annual compensation is $490,000, with over 60% of that coming in base salary. Overall, the results in Table 6 indicate quite different pictures of CIO characteristics and profiles between large and small endowments. The large endowments also have much higher CIO compensation and use of bonuses than reported for public pension funds (Lu et al. (2022)).

A. Do Large Endowments Pay for Performance?

Table 7 looks further at the determinants of this pay and how this differs in large endowments. For small endowments, the coefficients in Table 7 show the ability index and attending a selective school both have significant positive effects on total compensation and bonuses. The coefficients on past performance, AUM, and % Alternatives are not significant. Overall, the R^2 for small endowments shows lower explanatory power than found in the full sample regressions shown in Table 5.

In contrast, for large endowments, CIO bonuses are significantly linked to past performance, as is total compensation, though to a lesser degree. Size and % Alternatives are also significantly positively linked to both total compensation

[15]Figure IA.4 in the Supplementary Material shows the fraction of CIOs with positive bonuses for large versus small endowments over time.

TABLE 7

CIO Compensation and PPS in Large Versus Small Endowments

Table 7 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at nonprofit endowments, and CIO and endowment characteristics and past returns for large versus small endowments. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include all controls from Table 5. Large endowments have AUM greater than $1 billion. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total Compensation			Bonus Compensation		
		Large			Large	
	Small	All	Education	Small	All	Education
$\overline{R}_{t:t-2}$	−0.01	0.03*	0.04**	−0.04	0.06**	0.07**
	[0.01]	[0.02]	[0.02]	[0.03]	[0.03]	[0.03]
Ability index	0.13***	0.21***	0.22***	0.55***	0.26***	0.26***
	[0.05]	[0.04]	[0.04]	[0.14]	[0.07]	[0.07]
Selective school	0.30***	0.12	0.12	0.51**	0.29**	0.37**
	[0.10]	[0.09]	[0.10]	[0.24]	[0.13]	[0.15]
Female	0.20	−0.21**	−0.21*	0.39	−0.30**	−0.27*
	[0.12]	[0.10]	[0.11]	[0.41]	[0.15]	[0.15]
Tenure	0.00	0.02**	0.02**	−0.00	0.03***	0.04***
	[0.01]	[0.01]	[0.01]	[0.02]	[0.01]	[0.01]
Age	0.00	0.00	0.00	−0.02*	0.01	0.01
	[0.00]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
log(voting)	0.15*	0.02	−0.02	−0.34	0.13	0.16
	[0.09]	[0.08]	[0.09]	[0.31]	[0.09]	[0.11]
Independent (% voting)	−0.45	0.10	0.04	−0.65	−0.48	−1.21**
	[0.49]	[0.38]	[0.38]	[0.86]	[0.60]	[0.60]
Financial center	−0.08***	−0.09***	−0.07**	−0.32***	−0.15***	−0.15***
	[0.03]	[0.02]	[0.03]	[0.05]	[0.03]	[0.03]
Distributions (% expenses)	0.05	−0.47	−0.64**	0.62	−0.50	−0.56
	[0.28]	[0.28]	[0.30]	[0.54]	[0.39]	[0.45]
log(AUM)	0.05	0.48***	0.48***	−0.08	0.48***	0.44***
	[0.06]	[0.06]	[0.06]	[0.13]	[0.09]	[0.09]
Alternatives (%)	0.31	0.57***	0.57***	0.63	0.84***	0.74**
	[0.19]	[0.16]	[0.17]	[0.56]	[0.31]	[0.31]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	No	Yes	Yes	No
Adj. R^2	0.53	0.65	0.66	0.50	0.61	0.60
No. of obs.	524	553	487	275	433	378

and bonus, as is the ability index. Attending a selective school is positively linked to bonuses, but is not significant in the total compensation regressions. Unlike small endowments, longer tenure in the job is positively linked to compensation and bonuses. This difference may reflect patterns in career progression if some talented professionals move to larger endowments after earlier experience. Being closer to a financial center also increases compensation and bonuses, and this is also true for small endowments. Overall, the R^2 for large endowments shows higher explanatory power than found in small endowments or the full sample regressions.

We also report on a series of robustness tests. First, instead of using the 3-year average return, we enter each of 3 annual returns in regressions. As shown in Table IA.9 in the Supplementary Material, we find significant coefficients on performance for large endowments but not for small ones. The effect appears spread over the 3 years, consistent with using a longer horizon performance measure.

https://doi.org/10.1017/S0022109024000188

Second, rather than splitting the sample into large and small endowments, we interact the coefficient on past performance (over 3 years) with a dummy that takes a value of 1 if the endowment is large, and 0 otherwise. Results in Table IA.10 in the Supplementary Material confirm that pay is more sensitive to performance for large endowments. We also analyze an alternative definition of bonus to that reported on Form 990. Specifically, we adjust the reported bonus downward for any current payments based on previously deferred compensation and upward for any compensation that is "earned" this year but whose payment is deferred. The results again show that bonus pay is significantly linked to past performance for large endowments, but not for small ones. Table IA.11 in the Supplementary Material provides detail.

The patterns in Tables 6 and 7 suggest material differences in CIO characteristics and pay between large and small endowments. Large endowments hire CIOs with more ability, experience and credentials, and pay for CIOs in these larger endowments is more sensitive to past performance and to the size and complexity of funds managed. Taken together, these patterns are consistent with more sophisticated skills to manage large endowments with alternative assets. They also are consistent with greater job requirements and responsibilities facing CIOs in large endowments. For instance, NACUBO data for the 2015 fiscal year show that only about 30% of large endowments with a CIO use external consultants in key areas such as asset allocation, rebalancing, manager selection and evaluation, operational due diligence, and risk management. In contrast, the figure is much higher (65%) for smaller endowments with a CIO. Our results are also consistent with a heightened role of incentive contracts linked to endowment performance in these larger institutions.

B. Benchmarks and Pay for Performance

To investigate links between endowment returns and pay further, we construct 3 additional performance measures, which compare the endowment return to a benchmark. Since the benchmarks are published for higher education endowments, we use that set of endowments for the analysis. The first benchmark (RANK) assigns each endowment a value based on quartile cutoffs (4 being the highest returns) from annual NACUBO data on endowments in higher education. As a second benchmark (SIZE), we use the average return for endowments in the same size bucket in NACUBO data. As a third benchmark (ALLOCATION) we calculate the return from using benchmark indices for various asset classes and average asset allocations by endowment size from NACUBO. The Appendix provides additional details on these indices (e.g., equity, bonds, and various alternative assets).

Panel A of Table 8 shows that compensation for CIOs in large endowments depends on past performance, and the coefficient on each benchmark measure is positive and significant for both total compensation and bonuses. The coefficients on the size and allocation benchmarks are essentially the same as the coefficients on raw returns from Table 7. This is because all the large endowments in our sample fall in NACUBO's largest size bucket. The coefficients on performance based on RANK suggest even higher performance sensitivity, with higher compensation and bonuses in the top quartiles of performance. For NACUBO data over our sample period, the average gap between quartile cutoffs is 1.04% in moving from the top of the bottom

TABLE 8

Benchmark-Adjusted Performance and CIO Compensation in Higher Education

Table 8 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at nonprofit endowments in higher education, and alternate measures of performance and CIO and nonprofit characteristics. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include a measure of performance based on comparison to benchmarks using NACUBO data and all control variables used in Table 4. Large endowments have AUM greater than $1 billion. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total Compensation			Bonus Compensation		
	Rank	Size	Allocation	Rank	Size	Allocation
Panel A. Large Endowments in Higher Education						
$\overline{R}_{t:t-2}$	0.07**	0.04**	0.04**	0.11**	0.07**	0.06*
	[0.03]	[0.02]	[0.02]	[0.05]	[0.03]	[0.03]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.65	0.66	0.66	0.60	0.60	0.60
No. of obs.	487	487	487	378	378	378
Panel B. Small Endowments in Higher Education						
$\overline{R}_{t:t-2}$	−0.02	−0.02	−0.02**	−0.09	−0.05	−0.06
	[0.02]	[0.01]	[0.01]	[0.09]	[0.05]	[0.04]
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.37	0.38	0.38	0.42	0.42	0.42
No. of obs.	358	358	358	166	166	166

quartile to the median and 1.06% in moving from the median to the bottom of the top quartile. Thus, if an approximately 1.0% increase in return boosted an endowment's ranking by a quartile, that would translate into a total compensation (bonus) increase of 7% (11%), more than the effect implied by the return coefficients. This calculation is illustrative only, but is consistent with high-quartile performers getting higher bonuses and some performance rewards being based on exceeding thresholds (e.g., being top quartile). In sharp contrast, for smaller endowments (Panel B of Table 8) we find no significant evidence of compensation being positively linked to past portfolio performance.

In addition to the results in Table 8 we estimated regressions using threshold benchmarks (1 if the endowment beat the benchmark, and 0 otherwise). In all instances, the results are similar and echo those of Table 8. For large endowments, CIO compensation is significantly linked to past performance, but not so for smaller ones.

C. Compensation and Specialization in the Endowment Model

In this section, we examine an additional measure of a CIO's capabilities based on experience working with David F. Swensen, the pioneer of the endowment model, sometimes referred to as the "Swensen Approach." Tapped as Yale's CIO in 1985 at the age of 31, he served for over 3 decades prior to his death in 2021. In addition to his individual legacy of success in investing, Swensen hired and worked with many professionals who subsequently have gone to serve as CIOs at other endowments. This "apprentice" experience with Swensen at the Yale Investment Office might signal skills and networks (e.g., links to private equity or venture

https://doi.org/10.1017/S0022109024000188

capital funds) over and above those captured by our other measures. We identified 7 CIOs in our sample with this experience at the Yale Investment Office (excluding David Swensen himself) and examine their compensation relative to other CIOs at large endowments, controlling for organizational and other CIO characteristics.[16] These CIOs manage about 30% of the aggregate market value of endowments in our sample.

The first regression in Table 9 parallels analysis from Table 7 adding a dummy variable coded 1 if the CIO previously worked at Yale with Swensen (0 otherwise). This provides a test of whether the "Swensen experience" is independently linked to compensation once we control for the other CIO and endowment attributes. The first 2 regressions show no effect of the Swensen experience on total compensation. Regressions 3 and 4 again find no effect when we use bonus as the dependent variable.

As an additional analysis, we create a control group that matches observations with "Swensen experience" based on the ability index, tenure in the job, size of the endowment, NTEE code, and fiscal year. We use propensity score matching (see Rosenbaum and Rubin (1983), Abadie and Imbens (2016)). We then compare the compensation of the 2 groups. The results of that analysis (as shown in the Supplementary Material) confirm the conclusions from our regressions; compensation is not higher based on an independent effect of this Yale experience. If anything, the propensity matching analysis suggests lower pay but not significantly so using log compensation.

Overall, the data do not provide evidence of an independent effect of a "Swensen experience" on CIO compensation at large institutions, once we control for our other measure of ability, background, and endowment characteristics. That said, we note that sample size is small, which prevents strong conclusions.

V. Does Compensation Affect Future Performance?

We have shown that CIO compensation is strongly linked to measures of CIO ability and endowment circumstances. For large endowments, compensation is sensitive to past performance, especially so for bonus income. In this section, we turn to the issue of the link between future performance and compensation. Data availability limits the opportunity to explore this issue over long time periods. The return data on endowments from the IRS are only reported annually and do not start until 2009.

For public pensions, Lu et al. (2022) report a positive link between future performance and compensation. For mutual funds, the evidence is mixed. Berk and van Binsbergen (2015) argue that compensation will predict future mutual fund

[16]These are Seth Alexander at Massachusetts Institute of Technology, Peter Ammon at the University of Pennsylvania, Andrew Golden at Princeton University, Anne Martin at Wesleyan University, Lauren Meserve at the Metropolitan Museum of Art, Paula Volent at Bowdoin College (currently CIO of The Rockefeller University), and Robert Wallace at Stanford University. Donna Dean (Rockefeller Foundation), Lisa Howie (Smith College), Ellen Shuman (Edgehill Endowment Partners), Randy Kim (Rainwater Charitable Foundation), Kimberly Sargent (The David and Lucile Packard Foundation), Ana Yankova (Mount Holyoke College), Mary McLean (Former Ewing Marion Kauffman Foundation), and Casey Whalen (Truvvo Partners) are not part of our sample.

TABLE 9

CIO Compensation and Experience Working with David Swensen

Table 9 shows OLS regression coefficients and standard errors for the relationship between measures of compensation for Chief Investment Officers (CIOs) at large nonprofit endowments, and CIO and endowment characteristics and past returns. The dependent variable is the natural logarithm of a measure of compensation in a given fiscal year as reported to the IRS, Form 990, Schedule J, Part II. Independent variables include a 0/1 dummy that equals 1 if the CIO has worked for the Yale Investment Office under the tutelage of David Swensen, and all control variables used in Table 5. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	Total Compensation		Bonus Compensation	
	1	2	3	4
Swensen experience	0.07	−0.03	0.13	0.01
	[0.22]	[0.22]	[0.27]	[0.24]
Ability index	0.22***	0.21***	0.26***	0.26***
	[0.04]	[0.04]	[0.07]	[0.07]
Selective school	0.10	0.12	0.31**	0.29**
	[0.08]	[0.09]	[0.13]	[0.13]
Female	−0.16*	−0.21**	−0.19	−0.30**
	[0.09]	[0.10]	[0.14]	[0.15]
Tenure	0.02**	0.02**	0.03***	0.03***
	[0.01]	[0.01]	[0.01]	[0.01]
Age	0.00	0.00	0.01	0.01
	[0.01]	[0.01]	[0.01]	[0.01]
log(voting)	0.03	0.02	0.10	0.13
	[0.07]	[0.08]	[0.11]	[0.10]
Independent (% voting)	0.29	0.11	−0.26	−0.48
	[0.38]	[0.40]	[0.62]	[0.62]
Financial center	−0.07***	−0.09***	−0.12***	−0.15***
	[0.02]	[0.02]	[0.03]	[0.03]
Distributions (% expenses)	−0.22	−0.47	−0.10	−0.50
	[0.28]	[0.28]	[0.39]	[0.38]
log(AUM)	0.53***	0.48***	0.57***	0.48***
	[0.06]	[0.07]	[0.09]	[0.10]
$\overline{R}_{t:t-2}$		0.03*		0.06**
		[0.02]		[0.03]
Alternatives (%)		0.57***		0.84***
		[0.16]		[0.30]
Year fixed effects	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes
Adj. R^2	0.65	0.65	0.58	0.61
No. of obs.	640	553	499	433

performance due to forces driving fund flows in that industry. They find supporting evidence measuring performance as the gross value added by a manager, taking into account fund size. In contrast, Ma et al. (2019) report no evidence of compensation features predicting future performance for their mutual fund sample. They interpret this as being consistent with an optimal contracting equilibrium, as advisors choose compensation contracts that best resolve agency conflicts.

We use the 3-year window after compensation is paid to measure future performance, consistent with our measurement of past performance used earlier. We also examined results using a one-year window, and they are qualitatively similar. Parallel to findings for public pensions, our data show that higher compensation is statistically associated with higher future returns for endowments. Endowments that pay their CIOs top quartile compensation significantly outperform endowments with bottom quartile compensation by almost 100 basis points

https://doi.org/10.1017/S0022109024000188

TABLE 10

Future Performance, CIO Compensation, and Past Returns

Table 10 shows OLS regression coefficients and standard errors for the relationship between future performance of nonprofit endowments, and CIO characteristics and compensation and nonprofit characteristics. The dependent variable is the annual (geometric) net return over the next 3 years ($t+1$, $t+2$, $t+3$). Independent variables include the natural logarithm of total compensation, and all control variables used in Table 5. Large endowments have AUM greater than $1 billion. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	1	2	3	4
Panel A. Full Sample				
log(total comp.)	0.62***	0.11	0.10	0.32**
	[0.19]	[0.26]	[0.21]	[0.14]
$\overline{R}_{t:t-2}$			0.43***	0.46***
			[0.06]	[0.05]
Adj. R^2	0.46	0.55	0.66	0.61
No. of obs.	922	732	688	865
Panel B. Large Endowments				
log(total comp.)	0.67**	0.35	0.05	0.10
	[0.29]	[0.37]	[0.20]	[0.18]
$\overline{R}_{t:t-2}$			0.52***	0.57***
			[0.06]	[0.06]
Adj. R^2	0.48	0.57	0.72	0.68
No. of obs.	400	352	334	381
Panel C. Small Endowments				
log(total comp.)	−0.02	−0.28	−0.08	0.02
	[0.40]	[0.43]	[0.37]	[0.31]
$\overline{R}_{t:t-2}$			0.30***	0.36***
			[0.07]	[0.07]
Controls	No	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes
Adj. R^2	0.45	0.58	0.63	0.56
No. of obs.	522	380	354	484

annually. This is larger than the range of 47–60 basis points reported by Lu et al. (2022) for the same contrast in public pension plans.

To examine this issue more thoroughly, Table 10 shows results of regressing future performance on compensation and control variables, where the control variables are the CIO and endowment characteristics used in earlier tables to explain variations in pay. If we do not include control variables, the significant positive coefficient on compensation in column 1 shows a positive statistical link between future performance and pay for both the entire sample (Panel A) and large endowments (Panel B). However, when controls are added, the link between compensation and future performance disappears. Regression 2 adds all control variables except past returns, and the coefficient on compensation is not significantly different from 0 for the entire sample as well as the subsamples based on size. When we add past returns to the set of explanatory variables, regression 3 again shows no link between compensation and future performance. There is, however, strong persistence in an endowment's ability to earn higher returns over time, as shown by the highly significant positive coefficients on past returns. The magnitude of persistence for small endowments is appreciably lower than for large funds, as shown by the smaller coefficients on past returns. Even without other controls, including past returns in regression 4 results in insignificant coefficients on compensation.

https://doi.org/10.1017/S0022109024000188

In Table 10, the coefficients on control variables are not shown in the interest of brevity but can be found in Tables IA.12–IA.14 in the Supplementary Material. We also estimated regressions using base salary or bonus compensation rather than total compensation, and the results are consistent with conclusions from Table 10.

The Swensen Premium

Table 11 examines a potential effect on performance of working with David Swensen. The results indicate a positive and substantive effect. Without controlling for past returns, the first 3 regressions show an effect of over 200 basis points per year. Once we enter past returns, the effect is still well over 100 basis points. For instance, with all controls, regression 5 indicates a "Swensen effect" of 130 basis points a year. We note that these controls include the endowment's allocation to alternative assets so that the effect is not purely a result of high exposures to alternatives. Not surprisingly, the effect would be even more if we added Swensen himself to the Swensen experience sample. The positive coefficients on past returns echo the findings from Table 10 on return persistence, but are slightly smaller. Consistent with a positive effect of "Swensen experience" on future performance, we also find that endowments managed by CIOs with such experience have significantly higher returns than those of a matched sample based on propensity scores, as shown in Table IA.15 in the Supplementary Material.

The correlation between Swensen's experience and future performance likely stems from a combination of factors related to Swensen's approach. These factors include connections to top-performing venture capital managers, intellectual curiosity, and engagement with investment committees and boards. For instance, one possibility is that endowments, which can bear higher allocations to illiquid assets, choose to hire investment managers with a special set of skills to manage diversified alternative portfolios. This endogenous hiring choice and asset allocation decision

TABLE 11

Future Performance and CIOs Who Worked with David Swensen

Table 11 shows OLS regression coefficients and standard errors for the relationship between future performance of large nonprofit endowments, and CIO characteristics and compensation and nonprofit characteristics. The dependent variable is the annual (geometric) net return over the next 3 years ($t+1$, $t+2$, $t+3$). Independent variables include a 0/1 dummy that equals 1 if the CIO has worked for the Yale Investment Office under the tutelage of David Swensen, the natural logarithm of total compensation, and all control variables used in Table 5. Large endowments have AUM greater than $1 billion. The Appendix provides detailed variable descriptions. Each continuous variable is winsorized at the 1% level in both tails. All specifications include year and NTEE code fixed effects. Standard errors are adjusted for clustering at the nonprofit organization level. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

	1	2	3	4	5
Swensen Experience	2.77***	2.47***	2.15***	1.42***	1.30***
	[0.49]	[0.48]	[0.63]	[0.37]	[0.46]
log(total comp.)		0.51*	0.47	0.05	0.14
		[0.27]	[0.34]	[0.18]	[0.17]
$\overline{R}_{t:t-2}$				0.53***	0.49***
				[0.07]	[0.07]
Controls	No	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
NTEE fixed effects	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.51	0.52	0.61	0.69	0.73
No. of obs.	400	400	352	381	334

would drive higher future returns. Alternatively, Swensen's apprentices may invest in different strategies with a higher beta (e.g., mega-buyout funds vs. growth equity funds vs. early-stage venture capital), leading to higher expected returns (e.g., an omitted variable). Finally, the correlation might result from superior fund selection or access within the same strategy, representing an excess return. Unfortunately, due to data limitations, we do not have access to the specific funds each nonprofit endowment invests in, nor do we possess information on the performance achieved with these funds. This constraint limits our ability to delve into the nuances of fund selection and its effect on the observed correlation.

Overall, our findings suggest that higher compensation is used to attract, retain and incentivize talented managers that fit the circumstances of the endowment, but beyond that is not itself linked to future performance. This is consistent with results by Ma et al. (2019) for mutual funds. The persistence in endowment returns is strong across time and is an interesting subject for future research. It suggests that high-performing endowments continue to outperform, even controlling for allocations to alternative assets. This may reflect the ability to select and get access to high-performing funds (Binfarè et al. (2022)). It may also be, in part, linked to well-known return smoothing issues for alternative assets which are not traded and make up significant portions of large endowment portfolios. Finally, while only suggestive given the small sample of CIOs who previously worked for Swensen, this experience is correlated with higher future returns, likely linked to features of the endowment model. Fuller examinations of these patterns over time await longer periods of data for research.[17]

VI. Conclusions

Endowments often allocate substantial resources to illiquid alternative assets, which creates the need to hire CIOs. This article presents the first comprehensive research of compensation for CIOs in endowment management, using previously unexplored IRS data. The study explores the factors and economic frictions impacting CIO incentives, which may lead to different compensation contracts than mutual funds, hedge funds, and pensions.

We find that over 60% of endowment CIOs have incentive-based compensation plans, with about 40% of their compensation coming from bonuses. The extensive use of bonus plans is consistent with findings for mutual funds, but differs from that for public pensions. The average total endowment CIO compensation is 3 times higher than public pension CIOs, with more pronounced incentive pay

[17]To learn more about allocations by Swensen CIOs, we gathered data from 2018 audited financial statements for each large endowment in our sample. While the statements do not provide a full breakout of alternative assets, we were able to group them into 3 categories: private equity (inclusive of venture capital), hedge funds, and real assets (e.g., real estate or natural resources). In that year, Swensen CIOs had about the same average allocation to hedge funds (21% to 22%) as other larger endowments but higher allocations to private equity (23% vs. 17%) and real assets (15% vs. 10%). We repeated Table 11 regressions using these granular allocations (vs. the alternative category from the IRS) and assuming they were constant over our sample period. The estimated coefficient on Swensen Experience was significantly positive in all regressions and about 100 basis points, even controlling for past returns.

variations. Larger endowments attract CIOs with stronger backgrounds, pay them more, and structure pay significantly linked to past investment performance. Overall, our findings suggest that endowment compensation outcomes are more effective in attracting, motivating, and retaining talent compared to those for public pensions, which are subject to more politicized governance and regulation.

We also examine whether larger compensation packages result in enhanced future performance. While there is a significant positive correlation between compensation and future performance, this effect disappears when accounting for underlying pay determinants. We introduce a novel measure of CIO capability based on experience under David Swensen's leadership at the Yale Investment Office, revealing that "Swensen experience" CIOs outperform peers at large endowments by over 100 basis points annually.

Appendix. Variable Definitions

Variable	Definition	Data Source
Panel A. Compensation of Highest Paid Employees – Schedule J		
Base compensation	Base W-2 compensation for the fiscal year. Base compensation means nondiscretionary payments to a person agreed upon in advance, contingent only on the payee's performance of agreed-upon services (such as salary or fees)	IRS Form 990, Schedule J, Part II, Column (B)(i)
Bonus compensation	Bonus and Incentive W-2 compensation for the fiscal year. Examples include payments based on satisfaction of a performance target (other than mere longevity of service), and payments at the beginning of a contract before services are rendered (e.g., signing bonus)	IRS Form 990, Schedule J, Part II, Column (B)(ii)
Other reportable compensation	Other reportable W-2 compensation for the fiscal year. Examples include, but are not limited to, current-year payments of amounts earned in a prior year, payments under a severance plan, payments under an arrangement providing for payments upon the change in ownership or control of the organization or similar transaction, deferred amounts and earnings or losses in a nonqualified defined contribution plan subject to section 457(f) when they become substantially vested, and awards based on longevity of service	IRS Form 990, Schedule J, Part II, Column (B)(iii)
Retirement/deferred compensation	Retirement and deferred W-2 compensation for the fiscal year. It includes compensation that is earned or accrued in, or is attributable to, 1 year and deferred for any reason to a future year, whether funded, vested, or subject to a substantial risk of forfeiture	IRS Form 990, Schedule J, Part II, Column (C)
Nontax benefits	Nontax benefits for the fiscal year. Nontaxable benefits are benefits specifically excluded from taxation under the Internal Revenue Code	IRS Form 990, Schedule J, Part II, Column (D)
Prior 990 compensation	Any payment reported in this year's column (B) to the extent such	IRS Form 990, Schedule J, Part II, Column (F)

(continued on next page)

Variable	Definition	Data Source
Panel A. Compensation of Highest Paid Employees – Schedule J (continued)		
	payment was already reported as deferred compensation to the listed person in a prior Form 990, 990-EZ, or 990-PF. For this purpose, the amount must have been reported as compensation specifically for the listed person on the prior form	
Panel B. Endowment Funds – Schedule D, Part V and Part VII		
Net investment return	Return includes investment earnings, gains, and losses, including both realized and unrealized amounts for the fiscal year. We compute returns following Dahiya and Yermack (2021) and subtracting fund expenses whenever gross returns are reported	IRS Form 990, Schedule D, Part V, Line 1c minus 1f
Contributions	Contributions and transfers to the endowments for the fiscal year. These amounts include all donor gifts, grants, and contributions received, as well as additional funds established by the organization's governing board to function like an endowment, but that can be expended at any time at the discretion of the board	IRS Form 990, Schedule D, Part V, Line 1b
Distributions	Amounts distributed for grants or scholarships, and expenses for programs and facilities in the fiscal year	IRS Form 990, Schedule D, Part V, Line 1d-1e
Market value	Beginning-of-year and year-end balances of the organization's endowment funds for the current fiscal year	IRS Form 990, Schedule D, Part V, Line 1a and 1g
Alternatives (%)	The share of endowment assets allocated to alternative investments at the end of the fiscal year. For "alternative asset" figures that exceed the value of the endowment, we divide the value of alternative investments by total assets	IRS Form 990, Schedule D, Part VII
Panel C. Filing Organization – Form 990		
Voting members	Number of voting members of the governing body of the organization with power to vote on all matters that come before the governing body as of the end of the organization's tax year	IRS Form 990, Section A, Line 1a
Independent voting members	Number of independent voting members of the governing body as of the end of the organization's tax year. Independent means not compensated as an officer, with total compensation less than $10,000, not a family member involved in transactions	IRS Form 990, Section A, Line 1b
Total assets	Total assets for the organization, including endowment assets	IRS Form 990, Part X, Line 12
Distributions/expenses	Amounts distributed for grants or scholarships, and expenses for programs and facilities in the fiscal year divided by total expenses	IRS Form 990, Schedule D, Part V, Line 1d-1e and Part I, Line 18
Financial center	Minimum distance from a financial center (Boston, Chicago, NYC, San Francisco) in miles. The data come from the IRS Form 990 and authors' calculations following Dahiya and Yermack (2021). We use the natural logarithm of the minimum distance to a financial center in the analysis	

(continued on next page)

Variable	Definition	Data Source
Panel D. Endowment Investment Performance Metrics		
$\overline{R}_{t:t-2}$	Average (geometric) annual net return over the 3 prior fiscal years.	IRS Form 990, Schedule D, Part V.
Rank	Value between 1 (lowest) and 4 (highest) based on each nonprofit return ranking versus NACUBO's quartile returns each fiscal year.	IRS Form 990, and NACUBO.
Allocation	Difference between the average 3-year return and a strategy using benchmark indices and average asset allocations by size from NACUBO. We use the S&P 500 for domestic equity, the BB US Aggregate Index for fixed income, the MSCI ACWI ex US for international equity, Cambridge Private Equity Buyout Index for private equity, Cambridge Venture Capital Index for venture capital, NCREIF for private real estate, HFRWI for marketable strategies (hedge funds), HFRI Distress/ Restructuring for distress situations, and the GSCI for energy and commodities.	NACUBO, and Bloomberg.
Size	Difference between the average 3-year return and the average 3-year return of endowments and foundations in the same size bucket as surveyed by NACUBO each year.	IRS Form 990, and NACUBO.
Panel E. Manager Characteristics		
Ability index	First factor from principal component analysis of 5 proxies of ability: i) whether the CIO has earned an MBA, ii) whether the CIO holds the CFA designation, iii) whether the CIO held a previous CIO position at another firm, iv) whether the CIO previously worked in the nonprofit sector, v) whether the CIO has received investment industry awards in the past	LinkedIn, Relationship Science, BoardEx, and Skorina
Selective school	Dummy variable that takes a value of 1 if the CIO attended an undergraduate institution with an average ACT score of 30 or above as of 2018, 0 otherwise	IPEDS
Swensen experience	Dummy variable that takes a value of 1 if the CIO has previously worked at the Yale Investment Office under the tutelage of David Swensen, 0 otherwise	LinkedIn, Relationship Science, BoardEx, and Skorina
Female	Dummy variable that takes a value of 1 if the CIO is female, 0 otherwise	LinkedIn, Relationship Science, BoardEx, and Skorina
CIO tenure	Number of years in office at the current endowment	LinkedIn, Relationship Science, BoardEx, and Skorina
CIO age	Current age of the CIO. Computed as years since birth when available, or as years since undergraduate graduation plus 22 if date of birth is unavailable	LinkedIn, Relationship Science, BoardEx, and Skorina

Supplementary Material

To view supplementary material for this article, please visit http://doi.org/10.1017/S0022109024000188.

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