



JOSH LERNER

Yale University Investments Office: February 2015

Anointing winners and losers on the basis of 12 months' worth of performance is silly in the context of portfolios that are being managed with incredibly long time horizons.

— David F. Swensen, Chief Investment Officer, Yale University¹

On a late January afternoon in 2015, David Swensen, chief investment officer of Yale University, stared out his window at the newly fallen snow blanketing the city of New Haven. He was considering the roster for the Investments Office's 2015 softball team, which would be aiming for its third Yale University championship after victories in 2010 and 2013. It was nice to imagine the warmth of summer.

Since his arrival in 1985, Swensen had steered Yale's endowment - the second-largest university endowment in the world - from \$1 billion to an all-time high of \$23.9 billion at the end of the 2014 fiscal year. Yale's student body had grown modestly during this period, its faculty more significantly, and the building space most of all: most dramatically, with the inception of construction of two new residential colleges - its first new colleges in more than half-a-century - in 2014.

Yale had pioneered an unconventional approach to managing its endowment. Rather than keeping a substantial share of its assets in domestic equities and bonds, as was the norm in the mid-1980s, Yale made significant investments in less efficient markets such as private equity (venture capital and buyouts), real estate, natural resources (metals and mining, timber, oil, and gas), and absolute-return investments (hedge funds). Until the financial crisis, Yale's approach had generated a string of nearly uninterrupted enviable returns and led a number of other organizations to attempt to emulate the model. Swensen and his staff, while proud of their record, had long cautioned that it should not be blindly adopted.

While the financial crisis of 2008-09 led to a nearly 25% loss in endowment value, Swensen himself was philosophical about such fluctuations. "I'd rather have the best 10-year record," he observed, "than the best one-year record. This is a long-term game." And indeed, Yale's long-term record was second to none: over the two decades ending June 30, 2014, had it had the same returns as the typical endowment (9.2% per year), for instance, rather than the 13.9% it actually achieved, Yale's endowment would have been over \$20 billion smaller. But at the same time, Yale's recent history did pose some questions. Did the recent events suggest that Yale should reduce its exposure to illiquid assets, even at the cost of lower returns and growth? Could the same approaches that have been so successful in private equity and real estate work in new asset classes like natural resources? Finally, how should Yale respond to the changes facing the private equity industry, which had historically played an integral role in its portfolio?

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Background²

Ten Connecticut clergymen established Yale in 1701. Over its first century, the college relied on the generosity of the Connecticut General Assembly, which provided more than half of its funding. The 1818 disestablishment of Congregationalism as Connecticut's state religion triggered the creation of a formal endowment for Yale. Students and alumni alike demanded that the school respond by establishing a divinity school to offer theological instruction. To fund this effort, numerous alumni made large gifts, the first in a series of successful fund drives. While Yale used many of these donations to buy land and construct buildings, it invested other funds in corporate and railroad bonds as well as equities. By the century's end, the endowment had reached \$5 million.

The growth of the endowment accelerated during the first three decades of the twentieth century, due both to several enormous bequests and to aggressive investments in equities, which represented well over half the endowment's portfolio during the Roaring Twenties. In 1930, equities were 42% of the Yale endowment; the average university had only 11.5%.³ Yale avoided severe erosion of its endowment during the Great Depression in the 1930s, however, because many recent bequests were kept in cash or Treasuries rather than being invested in equities.

In the late 1930s, Treasurer Laurence Tighe decided that the share of equities in Yale's portfolio should be dramatically reduced. Tighe argued that higher taxes were likely to expropriate any corporate profits that equity holders would otherwise receive even if a recovery did occur. He concluded that bonds would consequently perform better than stocks. His decision, which stipulated that at least \$2 would be held in fixed-income instruments for every \$1 of equity, set the template for Yale's asset allocation over the next three decades. The treasurer and trustees continued to manage the endowment themselves during this period, selecting individual bonds and high-yield or income-oriented stocks for the portfolio. These policies seemed very prudent in the late 1930s and 1940s. But, unfortunately, they were less well suited for the bull market of the 1950s and 1960s. In the mid and late 1960s, in response, the endowment's trustees decided on two substantial policy shifts.

First, the trustees decided to increase substantially the university's exposure to equity investments. In this decision, they were influenced by the findings of a blue ribbon task force that argued most university endowments had taken too conservative an approach: "It is our conclusion that past thinking by many endowment managers has been overly influenced by fear of another major crash. Although nobody can ever be certain what the future may bring, we do not think that a long-term policy founded on such fear can survive dispassionate analysis."⁴

Second, Yale decided to contract out much of the portfolio management function to an external adviser, which it helped to found. Boston-based Endowment Management and Research Corporation (EM&R) boasted principals who were successful growth-stock investors recruited from other Boston money management firms. EM&R would function as a quasi-independent external firm, free to recruit additional clients. Yale would be its largest client, with priority over other clients.

EM&R never fulfilled its high expectations. Like other universities, Yale saw its endowment's value plummet in the ensuing years due to a bear market, accelerating inflation, and operating deficits. Between June 30, 1969, and June 30, 1979, the inflation-adjusted value of Yale's endowment declined by 41%. Although this performance was not unusual relative to other endowments, it severely strained the university's financial fabric. Yale terminated its relationship with EM&R in 1979 and began using a variety of external advisers in its evolving asset management framework.

David Swensen and the Investments Office in 2015

In 1985, David Swensen was hired to head the Investments Office. William Brainard, Yale's provost at the time, and James Tobin persuaded their former student—Swensen had earned his PhD in economics at Yale in 1980—to leave his post at Lehman Brothers. The position offered not only the opportunity to help Yale but the possibility of some teaching at Yale College as well.

Since then, Swensen had built the capabilities of the Yale Investments Office. Most important, he recruited and developed a high-quality internal staff. Dean Takahashi, whom Swensen had known as a Yale student, was recruited into the Investments Office and became Swensen's primary lieutenant. The two worked extremely closely together. In fact, in the preface to his book *Pioneering Portfolio Management*, Swensen described the contents as his and his colleague's "joint intellectual property." The Investments Office had supplied a number of leaders for other endowments, such as the University of Pennsylvania, MIT, Princeton, Bowdoin, Wesleyan, the Rockefeller and Hilton Foundations and the Metropolitan Museum of Art. Many of the staff were hired directly out of Yale College or one of its graduate schools, and some had unusual backgrounds, such as the pre-med student who became a financial analyst. The office liked to hire junior staff members who could work their way up.⁵ As of the 2015 fiscal year, 18 of the office's 24 investment professionals had come from Yale. "To be interested in this job, it helps a lot if you feel a real connection to Yale and want to do something good for the University," said R. Alexander Hetherington, a director and a 2006 Yale graduate.⁶ Added Swensen, "It doesn't hurt if you can play softball." Swensen encouraged his staff to be active members of the larger Yale community, and he had chosen his office's near-campus location to signal that the Investments Office was an integral part of the university and its financial management function.

Swensen defined the role of the Investments Office broadly. Reporting to the president and to an Investment Committee (described below), the Investments Office had overall responsibility for endowment matters. While most of its day-to-day activities involved evaluating, selecting, monitoring, and overseeing external investment advisers, it also played a critical role in the entire policymaking process. For example, it was responsible for recommendations on both the investment policy and the spending policy for the endowment—that is, in broad terms, how the money should be invested and how much of it could be spent in any given year.

The Investment Committee was composed of influential and knowledgeable Yale alumni, a number of whom were active in asset management. The committee as a whole functioned as an active, involved board, meeting quarterly and providing advice and counsel to the investment staff, and ultimately approving the various investment strategies. In addition, Swensen often consulted with individual members of the Investment Committee on issues within their areas of expertise. This helped guide the thinking and recommendations of the Investments Office on various important issues, and fostered an atmosphere of advice and support within which the Investments Office could take quite different and sometimes unconventional stances if it could convince the Investment Committee of their merit. This support was critical during the crisis of 2008, when rather than panicking and selling illiquid partnership interests at steep discounts, as some of its peers did, Yale actually bought some on the secondary market. "In hindsight," commented Swensen, "we should have bought more. The groups we work with—the administration and the Investment Committee—are very supportive. We do our homework and can answer their questions. It's a very productive relationship."

Investment Philosophy

Yale's investment philosophy was perhaps the most important factor that drove the university to reject a conventional approach to portfolio construction. Swensen was fond of quoting John Maynard

Keynes's maxim "Worldly wisdom teaches us that it is better for reputation to fail conventionally than to succeed unconventionally."⁷ Nonetheless, Swensen was willing to take "the risk of being different" when it seemed appropriate and potentially rewarding. By not following the crowd, Yale could develop its investment philosophy from first principles, which are summarized below.

First, Swensen strongly believed in **equities**, whether publicly traded or private. He pointed out that equities are a claim on a real stream of income, as opposed to a contractual sequence of nominal cash flows (such as bonds). Since the bulk of a university's outlays were devoted to salaries, inflation could place tremendous pressure on its finances. Not only did bonds have low expected returns relative to more equity-like assets, but they often performed poorly during periods of rising or highly uncertain inflation. To demonstrate convincingly why he believed in the long-run advantages of equity investing, Swensen referred to the actual cumulative long-run returns over past decades. An original \$1 investment in December 1925 in large-company U.S. stocks would be worth \$5,317 by the end of 2014, and one in small-company stocks \$27,419; a comparable investment in U.S. Treasury bonds would be worth \$135, and one in Treasury bills \$21.⁸ With Yale's current target asset allocations, 95% of the endowment's assets were expected to produce equity-like returns.

A second principle was **diversification**. In general, Yale believed that risk could be more effectively reduced by limiting aggregate exposure to any single asset class, rather than by attempting to time markets. While Swensen and his staff usually had their own informed views of the economy and markets, they believed that those views were usually reflected in market prices. They thus tended to avoid trying to time short-run market fluctuations and would overweight or underweight an asset class only if a persuasive case could be made that market prices were measurably misvalued for understandable reasons.⁹

A third principle was to seek opportunities in **less efficient markets**. Swensen noted that over the past decade, the difference in performance between U.S. fixed-income managers in the 25th and 75th percentiles (of their performance universe) was only 0.7% per year, and the comparable difference in performance for U.S. large-capitalization stock portfolio managers in the 25th and 75th percentiles was 1.6% per annum. This gap widened in less liquid assets: 5.8% for hedge funds, 14.4% for U.S. buyout funds, 16.4% for natural resources, 16.6% for real estate, and 19.8% for U.S. venture capital.¹⁰ This suggested that incremental returns could increase by selecting superior managers in nonpublic markets characterized by incomplete information and illiquidity, and that is exactly what Yale endeavored to do. As a result, only 24% of Yale's endowment was in public stocks and bonds and cash.

Fourth, Swensen believed strongly in using **outside managers** for all but the most routine or indexed investments. These external investment advisers were given considerable autonomy to implement their strategies as they saw fit, with relatively little interference from Yale. The managers were chosen carefully after a lengthy and probing analysis of their abilities, comparative advantages, performance records, and reputations. The Investments Office staff was responsible for developing close and mutually beneficial relationships with each of these external managers. The staff prided themselves on knowing their managers well, listening carefully to their ongoing advice, and helping to guide them, if and when appropriate, on policy matters. Occasionally, the Investments Office effectively "put a team in business" by becoming a new manager's first client. Managers often considered Yale one of their most important clients.

Finally, the Yale philosophy focused critically on the explicit and implicit **incentives** facing outside managers. In Swensen's view, most of the asset management business had poorly aligned incentives built into typical client-manager relationships. For instance, managers typically prospered if their assets under management grew large, not necessarily if they performed well for their clients. The

Investments Office tried to structure innovative relationships and fee structures with their external managers to align the managers' interests as closely as possible with those of Yale.

Recent Asset Allocation and Performance Results

Yale's Investment Committee reviewed its endowment portfolio annually to decide on target allocations to the various asset classes. The actual allocations in recent years are shown in **Exhibit 1**, as well as the current (2015) target allocations. The comparable asset allocations for several groups of university endowments are shown in **Exhibits 2** and **3**. Private equity allocations for large institutions (including both pension funds and endowments) are shown in **Exhibit 4**.

As a part of the planning process, the Investments Office performed a mean-variance analysis of the expected returns and risks from its current allocation and compared them with those of past Yale allocations and the current mean allocation of other universities. These computations, which relied on specific assumptions about the expected returns, volatilities, and correlations among asset classes, posed several issues. First, because the relationships could change dramatically over time, the Investments Office did not just rely mechanically on historical data but instead modified the historical numbers based on its own experience. Second, the Investments Office imposed limits on the amount that could be invested in each asset class. If it did not, the optimization program would instruct Yale to hold no domestic equities (or even to short-sell this asset class) and instead invest in the more illiquid alternatives. This result followed naturally from the assumptions of the model: for instance, private equity was projected to have nearly twice the real return of U.S. equities (10.5% vs. 6.0%), albeit with a higher standard deviation (26.8% vs. 20.0%). The imposition of these constraints reflected the need of the university to diversify its holdings, as well as the substantial imprecision accompanying Yale's assessment of the risk and return of its alternative assets. **Exhibit 5** shows the comparative mean-variance analysis results.

In addition, the Investments Office examined the long-run implications of its allocation for the downside risk to the endowment. Employing Monte Carlo simulations, the office estimated the probability that the available endowment spending would fall by more than 10% (adjusted for inflation) over a 2-year period and the probability that the inflation-adjusted value of the endowment would fall by more than 50% over the next 50 years. To reach these conclusions, the Investments Office simulated and compiled thousands of possible random outcomes drawn from the assumed distribution of returns produced by the mean-variance analysis. This downside-risk analysis suggested that, based on Yale's current actual asset allocation, the probability of a 10% spending drop within any 2-year period was 16% and that of a 50% purchasing power decrease over a 50-year horizon was 18%.

Since 2009, Yale had extended a model, initially developed by Dean Takahashi and Seth Alexander,¹¹ to forecast the cash flow patterns of every private equity, real estate, and natural resources fund in its portfolio. This helped the Investments Office anticipate the impact of its illiquid commitments on cash flow requirements over the coming years. As with the overall endowment model, a series of simulations tested the results under different assumptions of capital calls and returns. Lisa Howie, a director in the Investments Office, said, "This helps us think through where we should be today so that we'll achieve our desired allocation over the medium and long term." Until 2008, the model had been run annually with periodic updates; since then, it had been run at least quarterly.

Over the past 10 years, Yale had performed extraordinarily well. Some of this could be ascribed to diversification, with each asset class making positive contributions even while occasionally experiencing "bouts of short-term underperformance."¹² Over the prior decade (to June 30, 2014), Yale's annualized returns of 11.0% exceeded the returns of domestic stocks (8.4%) and bonds (4.9%)

and placed it atop the ranks of colleges and universities.¹³ These results bested the performance of similar sized endowments (more than \$1 billion) by 2.6% per year.¹⁴ This performance was above the average of Yale's large peers at 8.4%, as well as all universities (a mean of 7.8%).

Even more impressive had been the fund's long-run performance under Swensen and Takahashi. Despite the travails of the financial crisis, the 20 years ending in June 2014 had produced an annualized return of 13.9%, exceeding the return of all colleges and universities. This result was more than 3.7% per annum better than other nontaxable endowments with over \$1 billion in assets and 4.4% per annum better than the average of all endowments.¹⁵ This performance had added \$20.6 billion of incremental value to the endowment.¹⁶ **Exhibit 6** shows the endowment's recent performance compared with that of other universities; **Exhibit 7** includes a more detailed breakdown of Yale's returns by asset class. Not only had the average return been high, but the endowment produced consistent results: Yale had experienced only two years with negative returns: 1988 and 2009.

The primary reason for Yale's superior long-term performance record had been the excess returns generated by the portfolio's active managers. These excess returns had been greatest in the least efficient markets. Over the 20 years ending in June 2014, through shrewd stock picking, Yale's domestic equities outperformed the Wilshire 5000 by 4.5% and foreign equities outperformed the composite benchmark by 7.1%. Absolute return produced 10.6% annual returns, exceeding marketable equity indices with materially lower volatility. In the least efficiently priced illiquid assets, real estate produced an annual rate of return of 13.5%, natural resources earned an annualized 18.1% return, and private equity led all asset classes with a return of 36.1% per annum.

Over time, the Investments Office and the Investment Committee had adjusted the spending policy that determined the amount of endowment funds contributed to the university's budget. In 1992 the Investments Office recommended that the Yale Corporation increase the long-term target spending rate from 4.5% to 4.75% of endowment assets. In 1995, it had done so again, to 5.0%, and in 2004 to 5.25%.¹⁷ The university thus benefited from the strength of its investment program in two ways, both from a larger endowment and from the justified increase in the target spending rate. The substantial endowment also played a role in Yale receiving the highest rating to finance capital projects (AAA/Aaa) from the two leading bond-rating agencies and in the university's ability to borrow money at extremely favorable interest rates. In 2007, two further changes occurred in response to the endowment's exceptional performance. One change modified the base calculation; the other established a cap of 6.0% and a floor of 4.5% of endowment value within which spending should lie. Both modifications were applied retroactively to 2002 and led to special dividends in 2008 and 2009. In fiscal 2009, the endowment supplied an all-time high of \$1.175 billion to Yale's operating budget, or 46% of the University's net revenues. The unfortunate coincidence of the declaration of special dividends with the 2008 financial crisis forced Yale to cut distributions from the endowment to return to sustainable spending levels. Nonetheless, spending from the Endowment grew during the last decade from \$502 million to \$1.042 billion, an annual growth rate of approximately 8%. Projected spending for fiscal 2015 stood at \$1.082 billion, or 34% of Yale's budgeted net revenues.

The Management of Marketable Securities

This investment philosophy—a focus on equity, diversification, inefficient markets, and outside managers with strongly aligned incentives—guided Yale's decisions in all of its asset classes. Swensen and Takahashi viewed the endowment's current target allocation of 5% in bonds primarily as a liquidity reserve. In situations of severe liquidity shortages, bonds could be used as collateral for loans that would provide “nondisruptive liquidity” to cover obligations without forcing the sale of illiquid assets that would have occurred at steep discounts if at all. Yale held U.S. government issues almost

exclusively: Swensen doubted whether returns from U.S. corporate bonds adequately compensated investors for the added default risk and the callability of corporate issues. He was quite skeptical of foreign fixed-income securities as well.

Unlike most of the rest of its portfolio, the Investments Office managed its bond portfolio internally. Swensen believed that the government bond market was so efficient, and the spread between the performance of government bond fund managers so small, that it did not make sense to hire an outside manager. (In many cases, managers sought to boost returns by buying riskier bonds, defeating the purpose of holding bonds in the first place.) No attempt was made to add value through trading on interest rate movements. The endowment staff attempted to generate incremental returns only through modest selection bets on securities that were backed by the full faith and credit of the United States.

Yale also owned U.S. common stocks, though the current target allocation, 6% of assets, was small relative to almost all other large institutional investors. Although Yale had been an early adopter of indexing in the late 1970s, as the Investments Office staff became increasingly confident in its ability to find superior managers it eliminated the passive portfolio in favor of a small number of active equity managers. These managers shared several characteristics. First, most of Yale's active equity managers emphasized disciplined approaches to investing that could be clearly articulated and differentiated from others. Swensen and Takahashi were convinced that disciplined fundamental-based approaches, when intelligently applied, could generate reliable and superior long-run performance. Not surprisingly, none of Yale's managers tended to emphasize market timing, nor did they use fuzzy or abstrusely intuitive investment approaches. The university's managers tended to be smaller independent organizations that were owned by their investment professionals. Other things being equal, Yale preferred managers willing to co-invest and to be compensated commensurate with their investment performance. Swensen and Takahashi worried that money managers at many organizations tended to emphasize asset growth at the expense of performance and that ownership by a large institution reduced organizational stability and dampened incentives to perform.

A more diffuse category of publicly traded investments was called absolute-return strategies, to which Yale had allocated 20% of its assets. These holdings included a variety of funds that specialized in eclectic mixtures of strategies designed to exploit market inefficiencies. Swensen maintained the importance of "understanding the strategy of the hedge funds and investing in groups where there is a clear return generation strategy and LPs are treated fairly." Yale divided the funds into two broad categories: event-driven and value-driven. Event-driven strategies generally involved creating hedged positions in mispriced securities and depended on a specific corporate event, such as a merger or bankruptcy settlement, to achieve targeted returns. Value-driven strategies also entailed hedged investments in mispriced securities but relied on changing company fundamentals or increasing market awareness to drive prices toward fair value. Both strategies were expected to produce equity-like returns that were not highly correlated with any particular financial market. Their performance benchmark was a blended composite of the Credit Suisse Hedge Fund indexes.

Yale's commitment to this asset class was tested in fiscal 2009, when the absolute return portfolio posted a negative 9.3% return. During this treacherous period, separate accounts helped Yale to protect and create value. In the wake of the liquidity crisis in 2008, many investors redeemed their holdings in absolute return funds, forcing the managers to liquidate positions at unfavorable prices. The 2008 experience reminded the Yale staff of events in 1998, when many hedge funds suffered in the "flight to liquidity" that followed Russia's August 1998 default on its debt obligations (and the ensuing collapse of Long-Term Capital Management). In that situation, Yale had learned the value of separate accounts, in which its holdings were insulated from ill-timed selling decisions of other investors. Not only could Yale remain invested even if managers faced redemptions from other clients, but separate accounts

also provided the flexibility to play offense in a targeted manner. By the end of fiscal 2014, the absolute return portfolio had rallied to post a 9.1% annualized gain over the preceding five fiscal years and gained \$377 million in cumulative outperformance over the blended Credit Suisse composite.

Importantly, the absolute return portfolio's strong long-term performance exhibited low beta to broad market indices. Despite its decline in value in fiscal 2009, the absolute return portfolio served its purpose as a diversifying asset class. The portfolio's relative outperformance during the crisis meant that it served as a valuable source of liquidity to fund spending and to satisfy illiquid partnership commitments. More than \$3 billion of redemptions from the asset class between June 2008 and June 2012 led absolute return's allocation to decline from 25% of the endowment to 15% over that period. After four years of reallocating capital away from the absolute return portfolio, Yale began growing the asset class in fiscal 2013 toward its long-term target of 25% of endowment assets.

Foreign equities, both developed and emerging, had a target allocation of 13% of endowment assets and offered a valuable source of diversification, since their returns tended to be only partially correlated with those of the U.S. equity market. But Yale had encountered some real frustrations in transferring its model for successful domestic equity investing to foreign markets. First, the selection of appropriate active money managers had proved particularly challenging. The relatively slower development of institutional investing in many foreign countries meant that there were fewer sophisticated U.S.-style money managers abroad, managers with credible audited investment performance records and specialized, disciplined investment processes. Perhaps more critically, many leading foreign fund managers appeared to work for larger organizations owned by large financial institutions, which raised concerns about misaligned incentives. Unlike in the United States, independent investment advisers owned solely by their professionals were rarer. In spite of these problems, Yale had succeeded in identifying and hiring a number of overseas investment managers and saw this as one of the near-term bright spots in its portfolio.

Yale's foreign equity managers had historically focused on small-cap stocks, believing them to be less efficiently priced and hence capable of adding greater value through active management. As a result of occasional market dislocations, however, they had found stocks across the capitalization spectrum that were well priced in terms of fundamentals. Many of Yale's managers were regional specialists, although a few had global mandates. Said Howie, "We really look for places that have knowledgeable managers on the ground. We believe that focused, local investors can conduct deeper research, build stronger networks, and develop keener insights than those who cover multiple markets and spend limited time in the geographies where they invest."

Emerging markets had become an increasingly important part of Yale's foreign equity portfolio. The team believed that emerging markets presented tremendous opportunities due to both their greater inefficiencies and their dynamic, growing economies.

Yale had difficulty in finding talented, research-driven emerging market managers with the proper incentives. Howie said, "Only in recent years have we seen independent boutique firms in emerging markets, although even so, many are plagued by inadequate research, trading orientations, and macro timing. In China and India, large, multiproduct financial institutions dominate the investment industry, creating concerns about incentives." As a result, Yale often followed managers it liked who worked at large asset management firms in the hopes that they would eventually depart to found independent operations that Yale could help put in business.

In China, Yale had a long-standing network. It was also the first endowment to receive a Qualified Foreign Institutional Investor license, which allowed it to hold domestic stocks. Its most prominent public fund manager was a graduate of Yale's School of Management whom Yale had helped put in

business. After working in the Investments Office, translating Swensen's book into Chinese, and later working at a fund in which Yale was an investor, the young manager planned to return to China to work at an affiliate of a U.S.-based hedge fund. Instead, Yale became a cornerstone investor in his own fund. By 2014, the firm had expanded its mandate to include private equity and had demonstrated success in both public and private investing.

In India, though, Yale's investment program was less developed. Said Takahashi, "We've made some good investments in India, but in general, India has been difficult largely due to the challenges presented to companies and investors due to its poor infrastructure, weak corporate governance, and need for regulatory and tax reform." Yale was cautious about other emerging markets as well. "We had some initial successes [in regions like Russia and Africa]," said Takahashi, "but that was when valuations were dirt cheap. Now valuations are more in line with developed markets and it's tough to find opportunities given our manager selection criteria."

By June 2014, Yale had seven active foreign equity markets managers in its portfolio. Six were regionally focused managers located overseas—one investing in Europe, one in China, two in India, one in Brazil, and one in Japan—concentrating on intensively researched security selection. A small U.S.-based manager used bottom-up fundamental research to invest in a concentrated global portfolio.

Yale's foreign equities portfolio had generated an annualized 18.0% return over the previous decade, 8.4% annually in excess of its composite benchmark. The emerging market subclass of the foreign equities portfolio had outperformed impressively, producing 10-year annualized gains of 20.8%, 9.1% above its benchmark. Takahashi believed that such performance was not sustainable in the long run but that emerging markets would continue to be less efficient and provide more opportunities for excess returns relative to developed markets. The Investment Committee targeted emerging markets equity holdings at 8% of the total endowment and set its benchmark as a blend of the MSCI Emerging Markets Investable Market Index and the MSCI China A-Share Index.

The Management of Private Equity

Domestic and International Venture Capital and Buyout Funds

While Yale had been among the first universities to invest in private equity, entering into its first buyout partnership in 1973 and its first venture capital partnership in 1976, the pace of investing had steadily grown over time. **Exhibit 8** shows the size of and returns from Yale's private equity portfolio. The portfolio generated a one-year return of 26.2%; 15.4% annually over 10 years; and 36.1% annually over 20 years. The current allocation target was 31%.

Yale's private equity investment strategy was consistent with its overall investment philosophy. First, the Investments Office placed a premium on building long-term relationships with a limited number of premier organizations. Yale's prestige, name, and long experience in private equity investing made it a very desirable client and allowed it to invest in some well-regarded funds that might otherwise have been closed.

Second, Yale emphasized private equity organizations that took a value-added approach to investing. Yale shied away from funds that sought to generate the bulk of their returns from simply buying assets at attractive prices, refinancing them, and flipping them. The philosophy was explicated in a discussion of buyout organizations: "While financial skill is a vital component of LBO investing, we seek firms that build fundamentally better businesses. Financial engineering skill is a commodity, readily available and cheaply priced. Value-added operational experience, however, is rare."¹⁸ Yale

sought “strong, cohesive, and hungry teams with proven ability to create value independent of the public market.”¹⁹ As a general rule, Yale gave considerable latitude to its firms to define the types of private equity deals that they wanted to do.

Another key principle was to select organizations in which the incentives were properly aligned. For instance, Yale refused to invest in private equity organizations affiliated with larger financial institutions. Such situations, the Investments Office believed, were fertile breeding grounds for conflicts of interest or insufficient incentives for the people actually doing the deals or both. In addition, Yale preferred an overall structure for each of its funds such that the private equity firm could just cover its ongoing costs from the annual fee, earning essentially all of its economic returns from the “carry” tied directly to investment performance. This policy could at times be problematic: for instance, several of the most successful venture funds had dramatically increased their annual management fee income during the 1990s. While Yale would have liked to insist that the bulk of the compensation be linked to investment performance, in many cases it had been unable to persuade the partners to change. Some of these venture organizations were sufficiently attractive that the Investments Office participated in their funds anyway. In other cases, due to fundamental changes in the private equity firm’s investment strategy or organizational structure, Yale declined.²⁰

When Yale’s private equity portfolio was compared with those of other universities, three patterns stood out. First, Yale had traditionally had considerably greater exposure to this area: in the late 1990s, Yale had a target allocation to private equity in excess of 20%, considerably more than other schools (see again **Exhibits 2 and 3**). Second, Yale had a larger fraction of its holdings concentrated in top-flight firms. A third difference related to the composition of the private equity investments. The mixture of most major universities’ endowments was heavily weighted toward leveraged buyout funds. In 2014, the average large endowment had 2.4 times the exposure to leveraged buyout funds as it did to venture capital, up from less than 0.4 times in 1990.²¹ Yale too had shifted its exposure over time: the endowment’s exposure to leveraged buyout funds had increased to 1.8 times its exposure to venture capital in June 2014, up from 0.8 times in June 1990. These shifts reflected not a changing policy objective but factors both within Yale’s control—for example, bottom-up assessments of which individual funds offered the highest prospective returns—and outside it, such as drawdown schedules of private equity managers and constraints on allocations to high-quality venture capital funds.

Private equity had been subject to a boom-and-bust cycle since at least the 1960s, with high returns attracting new investors who flooded money into the sector until returns deteriorated, whereupon they withdrew. But the unprecedented growth of the private equity industry appeared to have changed it in some permanent ways.

First was the scale on which private equity groups operated. These concerns were particularly acute on the buyout side, where multibillion-dollar funds had become the norm. **Exhibit 9** shows inflows into private equity over the past 25 years. The Investments Office was concerned that these groups would pursue low-risk, low-return transactions in order to ensure their ability to raise a follow-on fund (with the substantial associated fees), rather than following innovative strategies that had the potential of generating higher returns. As Tim Sullivan, director of private equity, noted, “Many LBO firms appear to have explicitly lowered their return hurdles in order to compete for transactions, particularly at the larger end of the market, pricing deals to yield returns in the mid-teens.”²² Even when investing in middle-market buyout groups, Yale often found itself progressively uncomfortable with the size of the funds being raised. More generally, Yale noted with dismay that a number of private equity groups were positioning themselves as “asset managers”—for instance, raising absolute-return, venture capital, mezzanine, energy and real estate funds in addition to their core buyout funds. Related to this was concern about the substantial amount of undeployed capital in buyout funds. Not only might this

inflate deal valuations and reduce returns, but it might also allow underperforming firms to eke out an existence, further congesting the market. Meanwhile, venture groups had added overseas affiliates, which also raised incentive worries, and were raising larger funds to invest in later stage deals.

The second major change involved the new classes of investors active in the industry. While overall fund-raising steeply declined during the financial crisis, investor appetite for private equity had steadily increased since then, accompanied by growing demand amongst institutional investors for co-investment opportunities. Yale particularly disliked the tiering of the buyout industry, with large players demanding fee breaks and special deals. As a result, deploying capital could be challenging. Among the quality venture capital and midmarket buyout funds that Yale favored, getting substantial allocations was difficult due to competition from other limited partners. Even accessing firms raising institutional capital for the first time could be challenging. New groups possessing strong track records and impressive partner backgrounds were often able to build substantial momentum in the market, compressing fundraising timelines and cutting back limited partner allocations.

Yale was concerned about the expansion of many of its long-standing venture capital firms into later stage investments. “Groups argue that they want to have the ability to pursue later-stage deals,” said Sullivan, “but if time is the venture capitalists’ most precious resource, shouldn’t they look at these companies when they’re young and can create 300x returns, rather than when they have multibillion-dollar valuations and may get to 3x?”

Swensen mused that if he were starting an investment program today, he might avoid venture capital entirely. He reasoned that, for a newcomer, obtaining access to the best firms was nearly impossible and that, even if successful, the endowment was unlikely to receive an allocation that would be meaningful to a \$23.9 billion portfolio. Of course, Yale’s long-standing relationships in the venture world put the university in a position different from that of a newcomer.

In sum, Swensen, Takahashi, and Sullivan believed that Yale should stay committed to private equity for four reasons:

- The first was the historical success Yale had enjoyed from these investments. Since inception, Yale’s private equity portfolio had delivered an annual rate of return of 29.9%.
- Second, over its more than 40 years of investing, Yale had developed strong relationships with key managers. An important driver of this advantage was the continuity of the team managing the private equity program. Swensen, Takahashi, and Sullivan had worked together on the portfolio for more than two decades. The Investments Office noted that many of the funds managed by top-tier private equity organizations had continued to generate superior returns. Because Yale had exposure in its portfolio to a number of these funds—Berkshire Partners, GTCR, Roark, Flexpoint, Insight, Greylock, and Benchmark—the university believed its private equity managers would produce superior performance even in a difficult environment. This belief was borne out by an analysis of Yale’s venture capital returns. The Investments Office found that its highest returns came from the groups in which the amount it could invest was severely constrained; put another way, the most exclusive clubs truly were the best! This pattern held across large and small funds. While Yale had made numerous investments into less well-known funds in hopes of backing the leaders of tomorrow, these had generated more mixed results. A few funds had generated superior returns, but the overall performance trailed the established funds in Yale’s portfolio, and “few of these firms have become consistent members of Yale’s roster of active managers.”²³

- Yale's deep understanding of the private equity process allowed it to manage investments in sophisticated ways. One example was Yale's ability to hedge its positions. Yale carefully tracked the holdings of the private equity firms in which it invested.²⁴ When it believed that it was excessively exposed to any particular publicly traded firm, it sought to hedge that exposure through short sales and derivatives. Short sales and put options would generate offsetting profits if the share price declined. This helped reduce the danger that a severe drop in the public markets might wipe out the gains of a private equity investment. This hedging strategy had protected Yale's returns from its early 1990s investment in Snapple, which declined substantially between its peak 14 months after it was taken public and the liquidation of Thomas H. Lee Equity Partners' position. Moreover, this hedging allowed Yale to continue to invest in promising private equity funds during the boom period of the late 1990s: had the university not reduced its overall exposure through hedging, the exposure would have been so far above the target that the Investments Office could not have reasonably continued to make new commitments. In another example, the use of the illiquid assets model had allowed Yale to forecast its future exposure to private equity, which in turn provided a more nuanced understanding of the long-term impact of current commitments.
- Finally, there were important benefits to being in the private equity market at all times. If Yale were to decide not to invest with a top-tier firm merely because the market was overheated, it might not be able to persuade the organization to include it when later market conditions were more favorable. As Sullivan concluded, if Yale were to alter its steady commitment to private equity and seek to time the market, top-tier firms "would not want Yale's unreliable money."²⁵

Reflecting Yale's deep commitment to and understanding of private equity, while many investors had sought to sell their holdings at substantial losses during the time of the financial crisis, Yale had actually bought interests in the secondary market.

International Private Equity Funds

An area of continuing interest was international private equity. While Yale's initial strategy had been concentrated in the United Kingdom and France (at the end of 1995 more than half its foreign investments had been based there), it had moved into developing markets in recent years.

The move into international private equity resulted from a careful planning process. While many other institutional investors saw international buyouts as particularly promising, Yale eschewed the typical strategy of investing in large funds devoted to buyouts in Europe and Asia. This reflected several considerations. First, many of the leading foreign private equity investors were subsidiaries or affiliates of large financial institutions. As discussed above, the Investments Office was concerned about potential compensation and conflict-of-interest problems in such situations. Second, the team often found it difficult to evaluate foreign private equity organizations. It was challenging to assess manager track records in relatively nascent private equity markets with few fully exited deals. In some countries, Yale lacked a strong network of reliable relationships to assess the quality of potential new partners. In many cases, the office was unsure of the weight to put on the positive and negative feedback it gathered in its due-diligence process.

These challenges were even greater in emerging markets. The emerging *public* equity markets provided attractive opportunities along with a reasonable degree of liquidity, creating a high bar for emerging markets private equity investments. Howie said, "We find ourselves asking whether emerging market private equity funds are worth the fees, lack of transparency, and illiquidity when the public markets can be so compelling." In addition, the value-added private equity approach that Yale sought in its domestic private equity portfolio was more difficult to execute in emerging markets

where foreign ownership constraints often precluded control investing and it could be difficult to replace management or take other necessary action to improve troubled companies.

Furthermore, property rights, contract enforcement, corporate governance, disclosures, and minority shareholder rights—requisites for private deals—were still developing in many emerging markets. Frauds were not uncommon and could be difficult to detect, particularly for foreign investors. China presented additional obstacles in the form of capital controls, uncertain tax policies, fragmented private equity regulations across national and municipal authorities, and a lengthy list of industries in which foreign investment is prohibited or restricted. At the same time, however, private equity capital had flooded into emerging markets in recent years, driving valuations up. Could emerging market private equity funds provide attractive risk-adjusted returns?

Yale was deeply cautious about its private equity exposure to emerging markets. In the early 1990s, Yale had made an investment in a Russian quasi-private equity fund that took stakes in both thinly traded public corporations and private companies. As the fund family enjoyed spectacular successes in the mid-1990s, Yale took a significant amount of money off the table. This fund family experienced sharply negative returns after the Russian debt crisis of 1998. Overall, the eastern bloc investment yielded Yale an annualized return in the mid-20% range—but in a breathtakingly uneven manner!

Not only was emerging markets performance volatile, but ethical standards posed an issue. For instance, a Brazilian firm had tried to take 30% of a deal as its “fee.” After Yale protested, the firm revised its stance, but Yale decided not to renew its commitment to the organization.

In its emerging market private equity funds, Yale sought the same qualities as it did in firms in developed countries: small entrepreneurial teams with operational experience on the ground, some co-investment, appropriate management and incentive fees, and a keen sense of where upside opportunities might lie. The problems of evaluating and selecting managers were extremely challenging, perhaps more severe than in almost any other asset class. Most desirable were groups that had strong U.S. ties and, ideally, ties to Yale—and these were not easy to find even in China, the emerging market Yale knew best. “Finding good people running well-structured private equity funds is the biggest challenge in China,” noted Swensen.

The team agreed that foreign exposure was important for Yale’s future—but should it be through private equity? “It took us a long time to become comfortable with Chinese public equity,” said Takahashi. “But the time and effort were well spent. Can we achieve a similar return on time devoted to private markets throughout the emerging world? We recognize that the payoff may be years away. Can we create adequate investment returns and get a large enough position in some of the smaller markets to make a difference to the endowment?”

The Management of Real Estate

Another important asset class was real estate, which had a current target allocation of 17%. The Investments Office believed that properly managed real estate provided an interesting set of investment opportunities. The returns from real estate tended to be uncorrelated with those from marketable common stock and, in the long run, should produce returns protected from inflation. Most important, though, real estate was an inefficient, cyclical market where Yale could generate very attractive returns if it found the right managers with the right strategies and the right incentive structures. As in other asset classes, Yale concentrated on pure equity investments, avoiding mortgages and other debt. The Investments Office shunned managers who were financial advisers who bought existing buildings with stable rent rolls and applied financial engineering. Instead, the office sought to

establish relationships with real estate operators who had a competitive advantage, either by property type or market, and preferably a focus on an out-of-favor sector.

Historically, Yale's real estate portfolio had consisted primarily of a single Manhattan office building at 717 Fifth Avenue, a direct investment that had been singled out and recommended by a group of alumni in the 1970s. The property, which was located at the corner of 56th Street and had housed the Steuben Glass showroom for many years, performed very well. Yale paid \$14 million for a 50% interest in 1978 and \$47 million for the remaining 50% in 1994. Yale's October 2002 sale of 717 Fifth Avenue at \$611 per square foot represented one of the highest prices ever paid for an arm's-length sale of a Manhattan office property. Over the 24-year holding period, Yale realized a 19.5% per annum return on its investment. In spite of the strong results, the challenges in actually managing 717 Fifth Avenue reinforced Yale's strong preference for external management of endowment assets.

Beginning around 1990, Yale came to believe that real estate presented a compelling opportunity and accordingly began increasing its real estate investments. Many institutional investors, having been burned in the mid-1980s, were still wary of this asset class. Yale chose to focus on deliberately contrarian segments of the real estate market that most other investors avoided. Yale sought out partners who targeted distressed sellers and possessed the operating expertise to implement value-added strategies that realized substantial returns over the medium term, such as reconfiguring strip shopping centers.

Yale encountered some challenges in implementing its real estate strategy. First, Yale believed that the institutional real estate industry had significant misalignment or conflicts of interest and that most firms were compensated through transaction fees or fees based on assets under management, rather than by shared profits. These firms thus had every incentive to lock up their investors' capital for long periods and focus on asset accumulation and retention rather than generation of superior returns. Yale therefore chose not to deal with the established group of institutional real estate advisers. Luckily, the collapse of the real estate market in the late 1980s meant that some new firms were hungry for funds and willing to accept new incentive structures. The Investments Office wanted to borrow ideas from, and improve on, the incentive structures typical in private equity funds. In particular, they wanted all the real estate principals' activities to be focused on one pool (fund) at a time; they wanted the principals to make a significant cash co-investment in the pool; they wanted an appropriately sized pool; and they wanted most of the principals' compensation to come at the end of the fund and to be linked to investors' returns.

Over time, working their networks, the Investments Office staff managed to find a number of independent firms with excellent real estate operating skills that were eager to forge such a relationship. However, most of these firms were not well known, even by knowledgeable real estate investors. Unlike in private equity, where Yale invested in the premier institutional funds, few people even recognized the names of most of its real estate funds. Yale was often the lead investor in these funds, with a sizable percentage of the limited partnership interest. Yale's few foreign real estate holdings were in Europe.

The 2008 real estate financing crisis took a toll on Yale. Real estate director Alan Forman observed:

Even conservative groups got hurt if they were midstream through repositioning a property or had significant vacancy when the capital markets melted down. We knew property, like most other asset classes, was trading at high prices but did not anticipate the extent or speed of the drop in values. In an odd dynamic, the least responsible investors that used high leverage and paid high prices often would be granted forbearance because the banks were unable to take the

hit to the balance sheet. More conservatively financed investors had less negotiating leverage as the bank's exposure was not as great.

It became readily apparent after the fact that Yale's managers had exercised a wide range of discipline heading into the downturn. The core managers survived intact, while managers engaged in development and highly leveraged strategies suffered. As a consequence, Yale reviewed its real estate managers and pared its portfolio to focus on its highest conviction relationships.

The Management of Natural Resources

Yale's natural resources portfolio contained the University's oil-and-gas, minerals and mining, and timberland partnerships. The sensitivity of natural resources to commodity price inflation provided an important hedge against inflation and enhanced the Investments Office's ability to cushion the impact of rising prices on the university. To date, Yale had focused most of its efforts on disciplined purchases of cash-generative investments, such as energy reserve acquisition programs and managed timberland. Recently, Yale had started to build exposure to mining assets.

It was difficult to find well-designed oil-and-gas partnerships led by attractive managers. Many of the partnerships appeared to be in the hands of agents, who were compensated primarily on the basis of arranging deals. A number of operators seemed to get rich even if their clients did not. Furthermore, assessing the skills of the general partners in these funds was often difficult. In many cases, individuals raised funds on the basis of their participation in earlier successful partnerships, but determining which partner had been responsible for a key discovery or production success was challenging.²⁶ Yale's general impression was that investment opportunities and partnerships with sterling track records, unblemished reputations, and proper deal structures were quite uncommon in the oil-and-gas industry.

As a result, Yale's investments in oil and gas tended to emphasize two different models. The first focused on partnerships in the business of acquiring existing oil fields and enhancing their operations (known as reserve acquisitions). In contrast to the high-risk world of exploration, assessing performance and responsibility in the reserve acquisitions arena was somewhat easier. Furthermore, the long-term assets provided relatively predictable income and protection from energy-related inflation. The other approach applied a private equity investment model whereby Yale invested in partnerships pursuing equity investments in oil-and-gas and energy service companies.

Forestland was another area of interest. Yale had invested in a number of partnerships focused on sustainable harvesting of softwood and hardwood forestland in the United States. Although the initial investments had been made at very attractive valuations, new investors had flooded the market, resulting in very few opportunities to invest in timberland at compelling valuations. By 2014, Yale's allocation to timberland was lower than at any time since 1999, as the University's managers were more inclined to be sellers than buyers.

The endowment had a current target allocation of 8% for natural resources. Longer term performance was remarkable. Over the past twenty years, Yale's oil and gas, timber, and metals and mining portfolio had generated an 18.1% return per annum.

While Yale actively looked to increase its long-term exposure to natural resources, Takahashi commented, "Many natural resources are closely linked to sensitive issues, including food, water, the environment, and safe working conditions. If we increase our exposure to these assets, we will have to proceed with our usual care to ensure that we back the right managers."

Liquidity

“The crisis underscored how important it is to be prepared,” said Swensen. Several strategies put in place more than a decade earlier had helped.

Responding to the need to generate liquidity to support hedging activities, the endowment developed a number of nondisruptive sources of liquidity (that is, sources of liquidity that did not require sales of investment positions). Examples included the use of bonds as collateral for short-term loans, known as reverse repurchase agreements, and the use of equities as collateral for short-term loans, known as security lending agreements. Swensen commented, “Having the agreements in place and having used them in the past was a huge advantage in dealing with crisis-imposed liquidity constraints.”

Similarly, Yale had access to commercial paper facilities that had been established in the early 1990s. Set up to facilitate operating transactions, capital projects, and endowment liquidity, the commercial paper facility, which was backed by fully committed bank lines of credit, provided Yale with access to \$2 billion of funds during the crisis. In addition, the university retained the ability to tap long-term financing markets for funds. After the markets stabilized, Yale borrowed \$1 billion in November 2009 and \$450 million in February 2010 to redeem previously issued commercial paper and for general university purposes.

The forecasting model helped the university avoid panic. “Certainly, we would have been in trouble if all our commitments had been called at once,” said Howie. “We knew that was not going to happen, but wanted to understand our liquidity profile under a range of scenarios. We modeled many different world states in order to truly stress and understand our liquidity.”

After the downturn, the Investments Office had adopted a number of new strategies. Perhaps the greatest impact came from the decision to target the share of illiquid assets – private equity, real estate and natural resources – to 50% of the portfolio. Swensen said, “This might seem high, but at our size we have more options for liquidity than do smaller funds.”

At the 50% illiquid assets goal, the Investments Office estimated that the portfolio would produce slightly lower rates of return, but also lower volatility than would otherwise be the case. There would be little change to the portfolio’s ability to withstand catastrophic events. Within the portfolio, however, the Investments Office planned substantial increases in allocations to absolute return, natural resources and foreign equity with reductions to private equity and real estate.

Swensen commented, “Liquidity doesn’t show up in a mean-variance model. You have to think about it very carefully.” He still believed in illiquidity as the inevitable cousin of diversification and high-return investment opportunities. “If you sell all your risky stuff just because it’s risky, you’ll end up holding lots of Treasuries yielding next to nothing,” he said.

Future Challenges

The market still posed fundamental challenges. Buyout funds, with their massive capital overhangs, were bidding up valuations; venture funds were pursuing companies with multibillion-dollar valuations instead of innovative tech start-ups. Emerging markets could not be ignored but required time-intensive, careful evaluation. Where were the exciting opportunities, either in assets or in teams targeting new approaches?

Looking beyond the short run, Swensen and Takahashi wondered about the coming challenges that the Yale endowment would face. While much of the criticism of the Yale model in the aftermath of the financial crisis had been uninformed, there were real questions. Yale's continuing expansion had increased the demands placed on the endowment—and the new illiquid asset allocation target reduced some of the endowment's most potent tools for creating returns. Were they at the right balance? Did the projected approach to the new target make sense? How should they think about the difficulty in determining precise valuations for the endowment?²⁷ In the long run, how should they think about the issues of risk and illiquidity? And could a strategy that worked so well for Yale when it was a billion-dollar fund continue to succeed as the pool of assets grew?

Exhibit 1 Asset Allocations of Yale Endowment, 1985–2014*1985–2000*

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Domestic equity	61.6%	63.5%	61.7%	56.8%	53.2%	48.0%	30.7%	27.5%	23.9%	21.2%	21.8%	22.8%	21.5%	19.2%	15.1%	14.2%
Foreign equity	6.3	8.6	10.8	14.0	15.4	15.2	14.8	15.3	16.5	14.6	12.5	12.5	12.8	12.1	11.1	9.0
Bonds	10.3	12.7	14.6	15.0	16.3	21.2	21.2	22.7	22.5	16.5	12.2	12.5	12.5	10.1	9.6	9.4
Cash	10.1	5.0	2.1	2.1	0.3	0.9	0.9	0.5	0.1	0.6	1.8	1.4	-0.2	-2.5	1.5	8.1
Real assets	8.5	7.5	7.2	7.7	8.7	8.0	7.9	7.1	6.0	8.9	13.5	11.5	11.5	13.0	17.9	14.9
Private equity	3.2	2.7	3.6	4.4	6.1	6.7	8.3	10.4	14.4	18.1	17.2	18.5	18.6	21.0	23.0	25.0
Absolute return	0.0	0.0	0.0	0.0	0.0	0.0	15.9	16.5	16.6	20.0	21.0	20.7	23.3	27.1	21.8	19.5

2001–2014

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Current (2015) Target Allocation
Domestic equity	15.5%	15.4%	14.9%	14.8%	14.1%	11.6%	11.0%	10.1%	7.5%	7.0%	6.7%	5.8%	5.9%	3.9%	6.0%
Foreign equity	10.6%	12.8%	14.6%	14.8%	13.7%	14.6%	14.1%	15.2%	9.8%	9.9%	9.0%	7.8%	9.8%	11.5%	13.0%
Bonds	9.8%	10.0%	7.4%	7.4%	4.9%	3.8%	4.0%	4.0%	4.0%	4.0%	3.9%	3.9%	4.9%	4.9%	5.0%
Cash	6.2%	0.3%	2.1%	3.5%	1.9%	2.5%	1.9%	-3.9%	-1.9%	0.4%	-1.1%	2.7%	1.6%	3.5%	0.0%
Real Assets	16.8%	20.5%	20.9%	18.8%	25.0%										
Real Estate						16.8%	18.1%	18.9%	20.6%	18.7%	20.2%	21.7%	20.2%	17.6%	17.0%
Natural Resources						11.0%	9.0%	10.4%	11.5%	8.8%	8.7%	8.3%	7.9%	8.2%	8.0%
Private equity	18.2%	14.4%	14.9%	14.5%	14.8%	16.4%	18.7%	20.2%	24.3%	30.3%	35.1%	35.3%	32.0%	33.0%	31.0%
Absolute return	22.9%	26.5%	25.1%	26.1%	25.7%	23.3%	23.3%	25.1%	24.3%	21.0%	17.5%	14.5%	17.8%	17.4%	20.0%

Source: Yale University documents.

Notes: Asset allocations are on June 30 of each year.

Private equity includes venture capital and buyouts (and oil and gas and forestland through 1998).

Absolute return includes hedge funds, high-yield bonds, distressed securities, and event arbitrage.

Real assets include real estate (through 2005) and (since 1999) oil and gas and forestland.

Cash is the endowment's cash holdings less any borrowing by the endowment either externally or internally (from the university's operating funds).

Exhibit 2 Asset Allocations of Large University Endowments, 1985–2014*1985–2000*

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Domestic equity	51.5%	52.1%	53.8%	50.2%	46.1%	45.3%	43.5%	44.4%	43.0%	41.6%	42.8%	41.1%	42.3%	39.9%	36.3%	36.5%
Foreign equity	2.0%	2.6%	3.0%	5.2%	6.6%	6.6%	7.8%	8.1%	10.2%	14.3%	15.2%	14.0%	15.9%	14.7%	14.5%	15.0%
Bonds	26.4%	28.3%	26.0%	26.2%	27.5%	29.2%	30.2%	30.7%	26.9%	22.4%	17.5%	20.1%	18.0%	15.9%	15.0%	17.4%
Cash	10.8%	8.8%	8.9%	7.7%	6.9%	6.9%	6.1%	5.2%	4.6%	3.2%	4.1%	3.2%	3.1%	2.5%	3.0%	2.8%
Real Assets	4.8%	4.9%	5.2%	4.3%	5.1%	4.4%	4.2%	3.7%	3.7%	4.2%	5.1%	5.2%	5.2%	6.9%	6.6%	4.7%
Private equity	2.7%	1.9%	2.0%	5.8%	6.6%	6.2%	6.2%	5.9%	6.6%	7.7%	8.0%	8.1%	7.2%	8.2%	11.1%	13.9%
Absolute return	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.6%	0.8%	3.3%	5.2%	6.2%	6.7%	6.9%	10.1%	11.3%	8.3%
Other	1.8%	0.0%	1.1%	0.6%	1.2%	1.3%	1.4%	1.2%	1.7%	1.5%	1.1%	1.6%	1.5%	2.0%	2.1%	1.2%

2001–2014

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Domestic equity	30.1%	29.3%	28.6%	28.3%	24.5%	20.7%	20.6%	15.1%	14.0%	11.0%	12.0%	12.0%	13.0%	13.0%
Foreign equity	13.9%	14.3%	14.2%	16.1%	17.4%	21.4%	22.9%	20.8%	12.0%	15.0%	16.0%	15.0%	17.0%	18.0%
Bonds	17.8%	23.1%	19.4%	16.0%	16.2%	14.2%	11.9%	11.3%	10.0%	10.0%	9.0%	9.0%	8.0%	8.0%
Cash	2.5%	-0.2%	0.4%	2.6%	1.1%	0.4%	0.3%	-0.6%	3.0%	4.0%	3.0%	3.0%	3.0%	4.0%
Real Assets	6.3%	5.9%	11.0%	9.7%	10.7%									
Real Estate						6.0%	6.2%	7.5%	7.9%	6.6%	7.8%	9.0%	8.0%	7.0%
Natural Resources						5.5%	6.3%	8.3%	7.3%	8.4%	9.0%	9.0%	8.0%	8.0%
Private equity	12.1%	9.9%	8.7%	8.6%	9.3%	9.9%	11.3%	14.1%	18.3%	19.2%	20.4%	21.0%	20.0%	17.0%
Absolute return	13.2%	14.7%	17.3%	17.9%	19.9%	21.1%	20.2%	23.1%	24.4%	22.8%	20.4%	22.0%	22.0%	20.0%
Other	4.1%	3.1%	0.4%	1.0%	0.8%	0.8%	0.6%	0.5%	3.1%	3.0%	2.4%	0.0%	1.0%	5.0%

Source: Compiled from National Association of College and University Business Officers, *NACUBO-Commonfund Study of Endowments* (Washington, National Association of College and University Business Officers, 2014) (and earlier years).

Notes: Asset allocations are on June 30 of each year.

Large funds are defined as those with more than \$1 billion in assets after 1998, as those with more than \$400 million in assets in 1988 through 1997, and as those with more than \$200 million in assets in 1985 through 1987.

Private equity includes venture capital, buyouts, and (through 2005) oil and gas.

Absolute return includes hedge funds, high-yield bonds, distressed securities, and event arbitrage.

Funds are weighted equally in calculating average allocations through 1988; funds are weighted by size in calculating average allocations in later years.

1985–1987 classifications may not be completely analogous to those in other years.

Exhibit 3 Asset Allocations of All University Endowments, 1985–2014*1985–2000*

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Domestic equity	46.1%	48.7%	51.4%	46.4%	48.5%	48.1%	47.1%	47.1%	48.5%	47.2%	49.2%	51.6%	52.6%	52.4%	53.7%	41.4%
Foreign equity	0.8%	1.1%	1.6%	1.5%	1.8%	2.4%	2.4%	3.2%	4.2%	7.5%	9.5%	9.5%	11.2%	11.0%	10.6%	14.1%
Bonds	30.6%	30.6%	30.8%	33.8%	32.2%	33.9%	35.3%	35.3%	34.4%	32.2%	28.3%	27.3%	25.2%	24.9%	23.1%	21.1%
Cash	14.5%	13.1%	12.6%	14.2%	13.0%	10.9%	10.1%	9.9%	7.6%	7.1%	6.5%	5.4%	4.8%	4.1%	4.0%	3.5%
Real Assets	4.2%	3.9%	2.2%	2.5%	2.7%	2.9%	2.9%	2.3%	2.1%	2.1%	2.3%	2.0%	2.0%	2.2%	2.1%	3.0%
Private equity	0.7%	0.6%	0.7%	0.9%	1.1%	1.0%	1.1%	0.9%	1.1%	1.2%	1.3%	1.4%	1.4%	1.4%	2.2%	8.7%
Absolute return	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%	1.1%	1.8%	2.0%	2.2%	2.4%	3.6%	3.8%	7.0%
Other	3.1%	2.0%	0.7%	0.6%	0.7%	0.7%	0.9%	1.0%	0.9%	0.9%	0.9%	0.5%	0.4%	0.4%	0.5%	1.1%

2001–2014

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Domestic equity	49.5%	47.3%	47.7%	48.9%	45.8%	42.4%	40.5%	34.9%	18.0%	15.0%	16.0%	15.0%	16.0%	17.0%
Foreign equity	9.9%	10.1%	9.5%	11.0%	12.7%	15.3%	17.0%	17.0%	14.0%	16.0%	17.0%	16.0%	18.0%	19.0%
Bonds	24.9%	26.9%	25.9%	22.1%	21.5%	20.3%	18.6%	19.2%	13.0%	12.0%	10.0%	11.0%	10.0%	9.0%
Cash	4.1%	3.9%	4.0%	3.7%	3.5%	3.4%	3.5%	3.9%	4.0%	5.0%	4.0%	4.0%	3.0%	4.0%
Real Assets	2.8%	3.1%	3.2%	3.4%	4.0%									
Real Estate						3.5%	3.5%	4.1%	6.1%	5.2%	6.4%	7.0%	7.0%	6.0%
Natural Resources						1.5%	1.6%	2.2%	6.1%	7.3%	8.0%	8.0%	7.0%	7.0%
Private equity	2.4%	2.0%	2.1%	2.1%	2.4%	2.8%	3.2%	4.4%	14.3%	15.6%	16.4%	17.0%	16.0%	15.0%
Absolute return	4.2%	5.1%	6.1%	7.3%	8.7%	9.6%	10.6%	12.9%	21.9%	21.3%	20.1%	21.0%	22.0%	20.0%
Other	2.1%	1.6%	1.6%	1.6%	1.4%	1.4%	1.4%	1.5%	2.6%	2.6%	2.1%	1.0%	1.0%	3.0%

Source: Compiled from National Association of College and University Business Officers, *NACUBO-Commonfund Study of Endowments* (Washington, National Association of College and University Business Officers, 2014) (and earlier years).

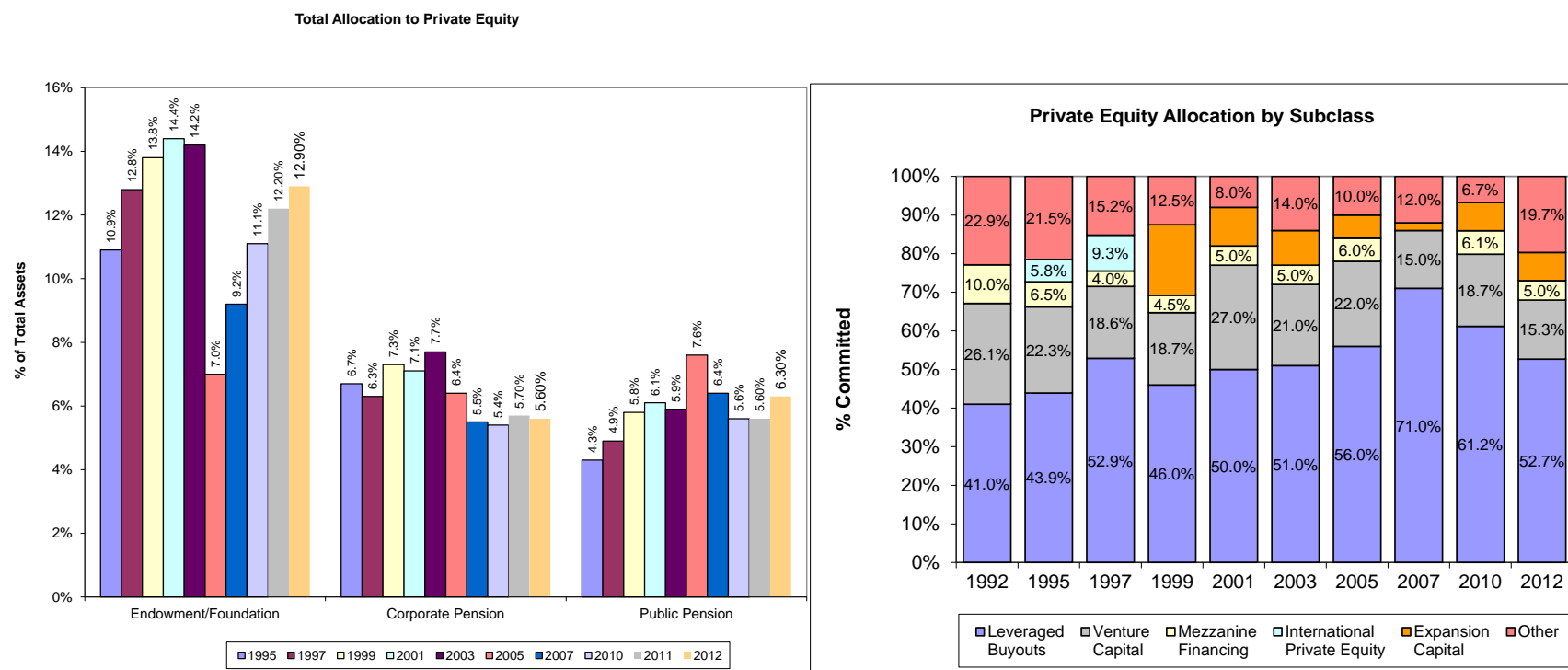
Notes: Asset allocations are on June 30 of each year.

Private equity includes venture capital, buyouts, and (through 2005) oil and gas.

Absolute return includes hedge funds, high-yield bonds, distressed securities, and event arbitrage.

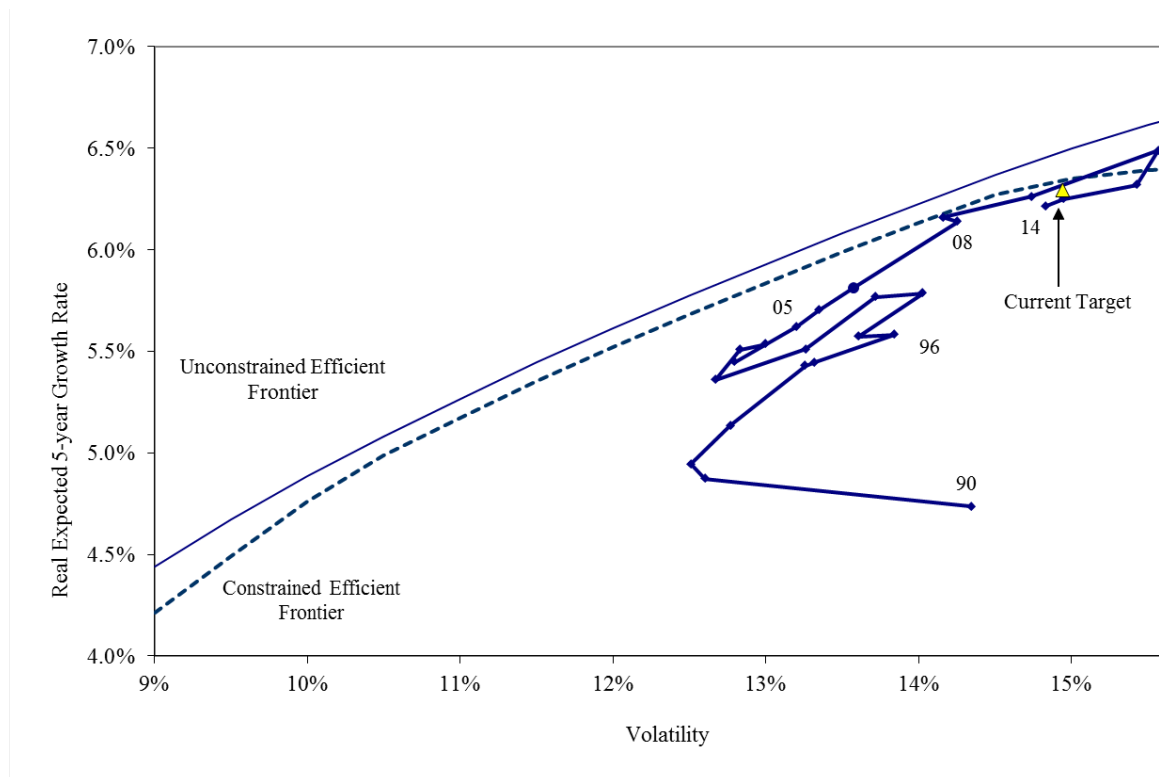
Funds are weighted equally in calculating average allocations through 2008; funds are weighted by size in calculating average allocations in later years.

1985 and 1986 classifications may not be completely analogous to those in other years.

Exhibit 4 Asset Allocations of Major Pension Funds and Endowments, 1992–2009


Source: Data for 2010 and come from Preqin, *2014 Preqin Global Private Equity Review*, (London; Private Equity Intelligence Ltd. 2014). The balance was compiled from Russell Investment Group, *2007–2008 Russell Investments' Survey on Alternative Investing*, 2007; Russell Investment Group, *2005–2006 Russell Survey on Alternative Investing*, 2005; and Goldman, Sachs & Co. and Frank Russell Capital Inc., *2003 Report on Alternative Investments by Tax-Exempt Organizations*, 2003 (and earlier years).

Note: The data for 2001 through 2007 are for North American institutions only; other years are for global institutions. In the allocation by subclass, international private equity is reported as a distinct class only between 1995 and 1997. In 2007, the 1% allocation to Mezzanine is included in Other.

Exhibit 5 Yale's Historical Risk-and-Return Profile: Yale Moves toward Risk-Return Efficiency

Source: University documents.

Exhibit 6 Returns of All University Endowments, Yale Endowment, and Benchmark Indexes, Fiscal Years 1980–2014 (%)*1980–1992*

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Equal-weighted mean	12.9%	14.9%	-0.4%	40.5%	-2.4%	25.4%	26.6%	13.7%	1.3%	14.1%	9.6%	7.2%	13.1%
Cambridge Mean	13.6%	16.0%	-1.8%	43.6%	-2.9%	27.2%	29.2%	15.5%	1.3%	14.3%	10.1%	6.9%	14.0%
Yale	18.7%	22.7%	-4.5%	50.1%	-0.2%	25.8%	36.0%	22.8%	-0.2%	17.3%	13.1%	2.0%	13.4%
S&P 500	17.0%	20.4%	-11.5%	60.9%	-4.8%	30.7%	35.6%	25.1%	-7.0%	20.5%	16.5%	7.4%	13.4%
Wilshire 5000	19.2%	25.2%	-15.0%	66.5%	-8.7%	31.2%	35.2%	20.1%	-5.9%	19.5%	12.8%	7.0%	13.9%
Government bond index	3.8%	-4.1%	13.4%	29.1%	1.8%	28.7%	20.7%	4.7%	7.5%	12.3%	7.1%	10.2%	14.2%
Consumer price index	14.3%	9.7%	7.2%	2.5%	4.3%	3.7%	1.8%	3.7%	4.0%	5.2%	4.7%	4.7%	3.0%

1993–2005

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Equal-weighted mean	13.3%	2.9%	15.5%	17.2%	20.4%	18.0%	10.8%	12.1%	-3.5%	-6.2%	3.2%	15.3%	9.3%
Cambridge Mean	14.3%	3.5%	15.8%	17.7%	20.4%	17.7%	11.9%	18.8%	-3.5%	-5.5%	3.5%	16.8%	12.2%
Yale	17.2%	11.9%	15.7%	25.6%	21.8%	18.1%	12.2%	41.0%	9.2%	0.7%	8.8%	19.4%	22.3%
S&P 500	13.6%	1.4%	26.1%	26.0%	34.7%	30.2%	22.8%	7.2%	-14.8%	-18.0%	0.3%	19.1%	6.3%
Wilshire 5000	16.1%	1.2%	24.7%	26.2%	29.3%	28.9%	19.6%	9.5%	-15.3%	-16.6%	1.3%	21.3%	8.2%
Government bond index	13.1%	-1.5%	12.8%	4.7%	7.8%	11.3%	2.7%	4.3%	11.1%	8.2%	13.1%	-0.7%	7.3%
Consumer price index	3.0%	2.5%	3.0%	2.8%	2.2%	1.6%	2.0%	3.7%	3.2%	1.1%	1.9%	3.2%	2.5%

2005–2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014	Annualized Return
Equal-weighted mean	10.8%	17.2%	-3.0%	-18.7%	11.9%	19.2%	-0.3%	11.7%	15.8%	10.0%
Cambridge Mean	13.6%	19.9%	-1.0%	-20.2%	12.3%	20.2%	-0.5%	11.9%	16.7%	10.9%
Yale	22.9%	28.0%	4.5%	-24.6%	8.9%	21.9%	4.7%	12.5%	20.2%	14.6%
S&P 500	8.6%	20.6%	-13.1%	-26.2%	14.4%	30.7%	5.4%	20.6%	24.6%	11.8%
Wilshire 5000	9.9%	20.5%	-12.5%	-26.4%	16.2%	32.4%	4.0%	21.5%	25.0%	11.8%
Government bond index	-1.5%	6.0%	7.2%	5.3%	9.7%	3.7%	8.8%	-0.6%	4.3%	7.9%
Consumer price index	4.2%	2.7%	4.9%	-1.2%	1.2%	3.5%	1.7%	1.8%	2.1%	3.5%

Source: Compiled from National Association of College and University Business Officers, *NACUBO-Commonfund Study of Endowments* (Washington, National Association of College and University Business Officers, 2014) (and earlier years), an unpublished NACUBO tabulation, and various financial databases.

Notes: Fiscal years end on June 30 of each year.
The first average includes endowments that report returns net and gross of fees.
Yale's returns are reported net of fees.
Government bond index is the Barclays U.S. Government/Credit Bond Index.

Exhibit 7 Returns of Yale Endowment, by Asset Class (%)

Asset Class	Target Benchmark (Passive above, Active below)	Yale 2014 (One-Year) Return	Yale One-Year Return vs. Passive Benchmark	Yale 10-Year Annualized Return	Yale 10-Year vs. Active Benchmark
Domestic Equity	Wilshire 5000 Russell Median Manager	32.8%	7.8%	12.0%	4.0%
Foreign Developed	MSCI EAFE IMI Russell Median Manager	13.7%	-10.5%	15.6%	8.3%
Foreign Emerging	Foreign Composite Russell Median Manager	34.6%	21.3%	20.9%	8.3%
Fixed Income	Barclays 1-3 Year Treasury Russell Median Manager	0.9%	0.0%	3.6%	0.2%
Real Estate	MSCI US REIT Index Cambridge Real Estate	12.5%	0.5%	6.6%	1.2%
Natural Resources	Natural Resources Composite Cambridge Natural Resources	56.0%	21.0%	16.5%	1.9%
Private Equity	Private Equity Composite Cambridge Private Equity Composite	26.5%	2.0%	15.4%	1.7%
Absolute Return	Barclays 9-12 Month Treasury Credit Suisse Composite	5.6%	5.3%	9.0%	3.8%
Total Endowment	Composite Benchmark Cambridge Median Endowment	20.2%	4.2%	11.0%	3.5%

Source: University documents.

Notes: All returns are net of management fees.

Returns are for periods ending June 30, 2014.

HEPI = Higher Education Price Index.

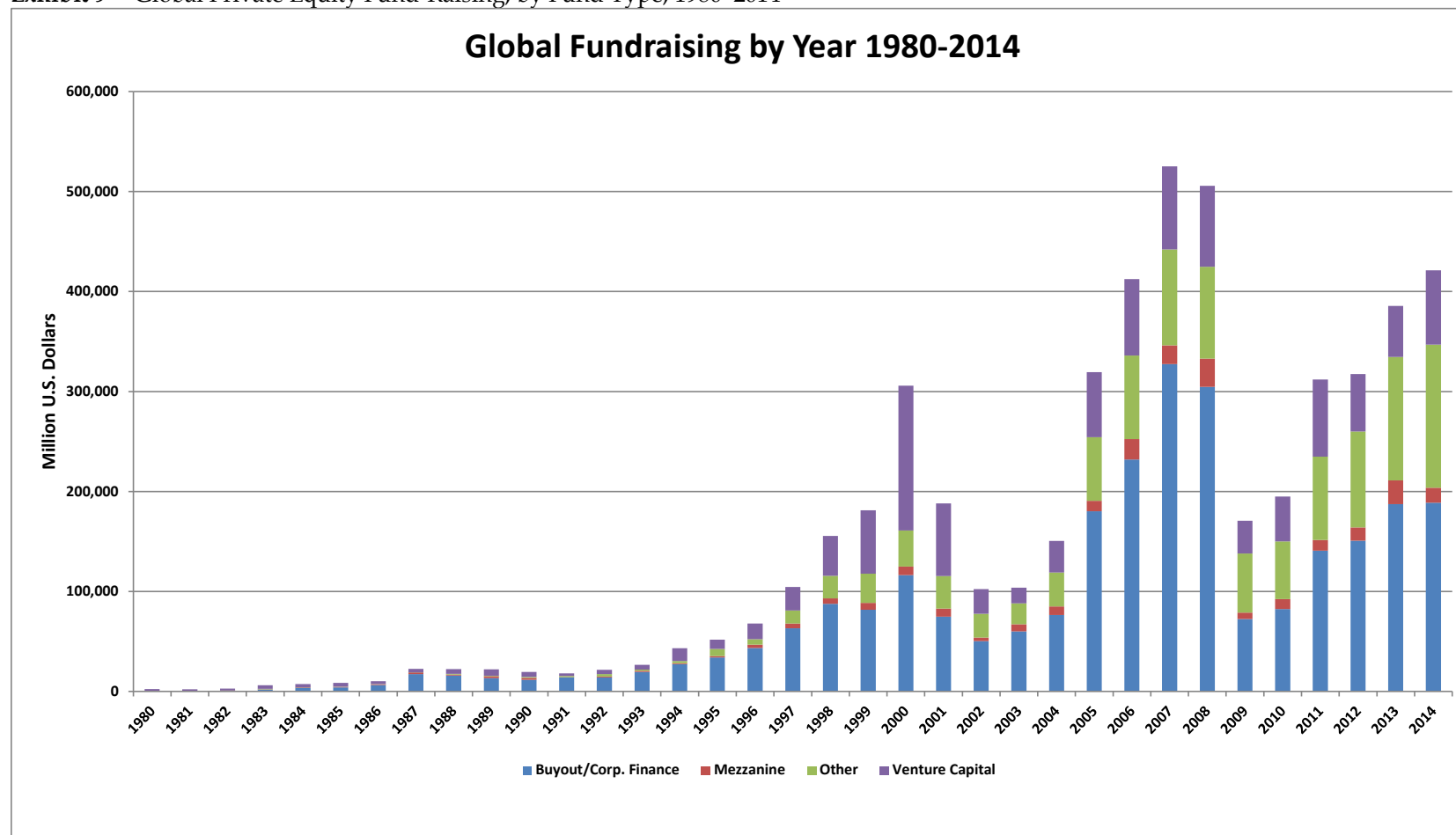
“Median Manager” and “Composite” refer to indexes of active manager performance compiled by the Russell International Group, Cambridge Associates, the National Council of Real Estate Investment Fiduciaries, and Tremont Capital Management.

Exhibit 8 Returns and Size of Private Equity Investments of the Yale Endowment, 1978–2014

Fiscal Year	Venture	LBO	Int'l	Total	Portfolio Value (\$Ms)	Endowment Value (\$Ms)
1978	27.2%	35.3%		33.9%	3.2	545
1979	-2.2%	-3.0%		-2.8%	3.4	586
1980	208.1%	231.9%		225.5%	8.4	677
1981	33.3%	-16.6%		-0.5%	15.6	800
1982	25.6%	-47.5%		-2.2%	19.3	748
1983	123.4%	-10.1%		91.4%	38.6	1,109
1984	3.7%	41.6%		9.2%	37.3	1,071
1985	-10.1%	5.6%		-5.0%	42.0	1,320
1986	2.6%	34.0%		15.8%	46.9	1,751
1987	25.4%	23.9%		24.3%	75.7	2,117
1988	-0.7%	7.8%	-1.9%	3.3%	91.0	2,056
1989	-0.3%	38.7%	13.4%	23.4%	120.7	2,333
1990	15.6%	7.3%	-4.4%	11.8%	173.7	2,590
1991	11.6%	14.7%	-10.0%	6.1%	226.8	2,590
1992	28.3%	7.2%	4.1%	14.6%	294.2	2,845
1993	13.6%	57.3%	-0.2%	32.3%	464.9	3,243
1994	20.2%	18.7%	24.0%	24.6%	640.6	3,549
1995	37.8%	26.3%	13.1%	27.0%	682.4	3,972
1996	124.8%	31.5%	33.7%	60.2%	896.6	4,860
1997	37.6%	22.1%	90.2%	36.2%	1,125.6	5,806
1998	38.0%	39.8%	1.9%	29.0%	1,382.8	6,592
1999	131.4%	8.5%	-15.4%	37.8%	1,993.6	7,205
2000	701.0%	35.1%	38.3%	168.5%	2,513.7	10,039
2001	9.0%	-14.7%	-3.9%	-5.4%	1,943.0	10,725
2002	-39.9%	-11.2%	-0.7%	-23.3%	1,492.2	10,522
2003	-13.2%	-0.3%	1.3%	-4.3%	1,612.7	11,035
2004	-0.7%	32.0%	21.8%	20.6%	1,820.6	12,747
2005	25.0%	32.4%	19.0%	28.7%	2,195.9	15,224
2006	16.7%	35.9%	46.2%	32.2%	2,963.6	18,030
2007	21.7%	45.1%	56.2%	40.7%	4,196.5	22,530
2008	10.0%	-4.6%	20.8%	1.9%	4,597.9	22,867
2009	-17.2%	-25.9%	-28.7%	-24.3%	3,920.3	16,327
2010	9.7%	22.7%	14.3%	18.1%	5,043.7	16,653
2011	39.3%	22.8%	42.7%	30.3%	6,836.6	19,374
2012	11.9%	8.8%	-3.6%	6.7%	6,980.1	19,345
2013	10.9%	16.2%	6.9%	12.7%	6,868.0	20,780
2014	44.8%	19.0%	19.4%	26.2%	8,216.7	23,895
Three-year	21.5%	13.9%	6.9%	14.3%		
Seven-year	14.3%	7.3%	9.4%	9.4%		
Ten-year	16.0%	14.9%	15.8%	15.4%		
Twenty-year	75.0%	14.8%	16.8%	36.1%		
Since Inception	34.5%	17.8%	15.6%	29.9%		
2014 Share in Yale Portfolio	35.8%	43.7%	20.5%			

Source: University documents.

Notes: Returns are for year ending June 30 of each year. Value of private equity portfolio and endowment are as of June 30 and are expressed in millions of dollars. The Yale fiscal year returns are internal rates of return calculated on a daily basis. Multiyear returns are based on internal rates of return using quarterly data. "2014 Share in Yale Portfolio" refers to the share of Yale private equity portfolio devoted to this subclass on June 30, 2014.

Exhibit 9 Global Private Equity Fund-Raising, by Fund Type, 1980-2014

Source: Thomson Reuters, accessed January 30, 2015.

Notes: Other investments include funds-of-funds, secondary-purchase funds, and venture-leasing funds.

ENDNOTES

¹ Seth Hettana, “Yale’s Financial Wizard, David Swensen, Says Most Endowments Shouldn’t Try to Be Like Yale,” *Pro Publica*, February 8, 2009, <http://www.propublica.org/article/yales-financial-wizard-david-swensen-says-most-endowments-shouldnt-try-to-b>, accessed February 11, 2015.

² This section is based on Brooks Mather Kelley, *Yale: A History* (New Haven: Yale University Press, 1974); David F. Swensen, *Pioneering Portfolio Management: An Unconventional Approach to Investment Management* (New York: Free Press, 2000); and Yale University Investments Office, *The Yale Endowment* (New Haven: Yale University, 2006).

³ General university information is from Institutional Department, Scudder, Stevens & Clark, *Survey of University and College Endowment Funds* (New York: Scudder, Stevens & Clark, 1947).

⁴ Advisory Committee on Endowment Management, *Managing Educational Endowments: Report to the Ford Foundation* (New York: Ford Foundation, 1969).

⁵ Alison Griswold, “Investments Office Hires Yalies,” *Yale Daily News*, October 2010, <http://www.yaledailynews.com/news/2010/oct/22/investments-office-hires-yalies/>, accessed February 11, 2015.

⁶ R. Alexander Hetherington, cited in Griswold, “Investments Office Hires Yalies.”

⁷ John M. Keynes, *The General Theory of Employment Interest and Money* (New York: Harcourt Brace, 1936), Chapter 12.

⁸ Data from Ibbotson “SBB1” 2015 Classic Yearbook (Chicago, Illinois: Morningstar, 2015).

⁹ Yale actively rebalanced its portfolio to maintain its target asset allocations, however, and this led to frequent short-term adjustments in its holdings. For instance, as equity values rose in the summer of 1987, Yale sold stocks in order to return to its target allocation level. After the stock market crash later that year, the endowment repurchased many of the same securities as it sought to bring its asset allocation back to the target level.

¹⁰ Fixed income and marketable equity performance based on annualized ten-year returns of BNY Mellon manager universes, adjusted for fees. Venture capital, LBO, real estate, and natural resources returns based on annualized since-inception IRRs of Cambridge Associates manager universes.

¹¹ For more on the model, see Dean Takahashi and Seth Alexander, “Illiquid Alternative Asset Fund Modeling,” *Journal of Portfolio Management* 28, no. 2 (Winter 2002).

¹² David F. Swensen, Dean J. Takahashi, and Timothy R. Sullivan, “Private Equity—Portfolio Review,” memorandum to the Investment Committee, September 20, 2010, p. 2.

¹³ Yale University Investments Office, *The Yale Endowment 2014* (New Haven, CT: Yale, 2015).

¹⁴ Cambridge Associates data for endowments with assets over \$1 billion.

¹⁵ All university benchmark data in this paragraph are from Cambridge Associates (the comparable school performance is Yale’s calculation).

¹⁶ Yale’s calculation

¹⁷ The target spending rate currently stands at 5.25%. According to the smoothing rule, the amount of the endowment spent in a given year sums to 80% of the previous year’s spending and 20% of the targeted long-term spending rate applied to the fiscal year-end market value two years prior. The spending amount determined by the formula is adjusted for inflation and constrained so that the calculated rate is at least 4.5%, and not more than 6.0%, of the endowment’s inflation-adjusted market value two years prior. The smoothing rule and the diversified nature of the Endowment are designed to mitigate the impact of short-term market volatility on the flow of funds to support Yale’s operations.

¹⁸ David F. Swensen, Dean J. Takahashi, and Timothy R. Sullivan, “Private Equity—Portfolio Review,” memorandum to the Investment Committee, September 29, 1994, p. 5.

¹⁹ David F. Swensen, Dean J. Takahashi, and Timothy R. Sullivan, “Private Equity – Portfolio Review,” memorandum to the Investment Committee, September 30, 2010, p. 2.

²⁰ When Sequoia instituted a rule that LPs could only invest in its main U.S. early stage fund if they also invested in its China, India, or growth funds, Yale decline to participate, despite a long-standing association with the firm.

²¹ Data from National Association of College and University Business Officers, *NACUBO-Commonfund Study of Endowments* (Washington, National Association of College and University Business Officers, 2013), Chapter 3, p. 17, and 1990 *NACUBO Endowment Study* (Washington, National Association of College and University Business Officers, 1990), Exhibit 26, p. 171.

²² David F. Swensen, Dean J. Takahashi, Timothy R. Sullivan, Alan S. Forman, and Seth D. Alexander, “Private Equity – Portfolio Review,” memorandum to the Investment Committee, October 7, 1999, p. 15.

²³ David F. Swensen, Dean J. Takahashi, Timothy R. Sullivan, Seth D. Alexander, and Robert F. Wallace, “Private Equity – Venture Capital Decision Making Assessment,” memorandum to the Investment Committee, May 22, 2003, p. 17.

²⁴ Private equity organizations typically do not sell the shares of firms in their portfolios at the time they go public. They generally promise the underwriter to continue to hold them for a period of months (often termed the lockup period). Many will continue to hold shares after the lockup period expires, if they believe the shares will appreciate further.

²⁵ David F. Swensen, Dean J. Takahashi, and Timothy R. Sullivan, “Private Equity – Venture Capital Strategy,” memorandum to the Investment Committee, March 4, 1992, p. 7.

²⁶ This was in contrast to venture or buyout investing, where individual partners’ successes and failures could be more or less assessed by examining who represented the partnership as a director on various firms’ boards.

²⁷ For example, valuation issues arise in terms of the estimates used in the spending rule, which originally assumed that market prices would be available to value the assets.