

# 2018

The Yale Endowment



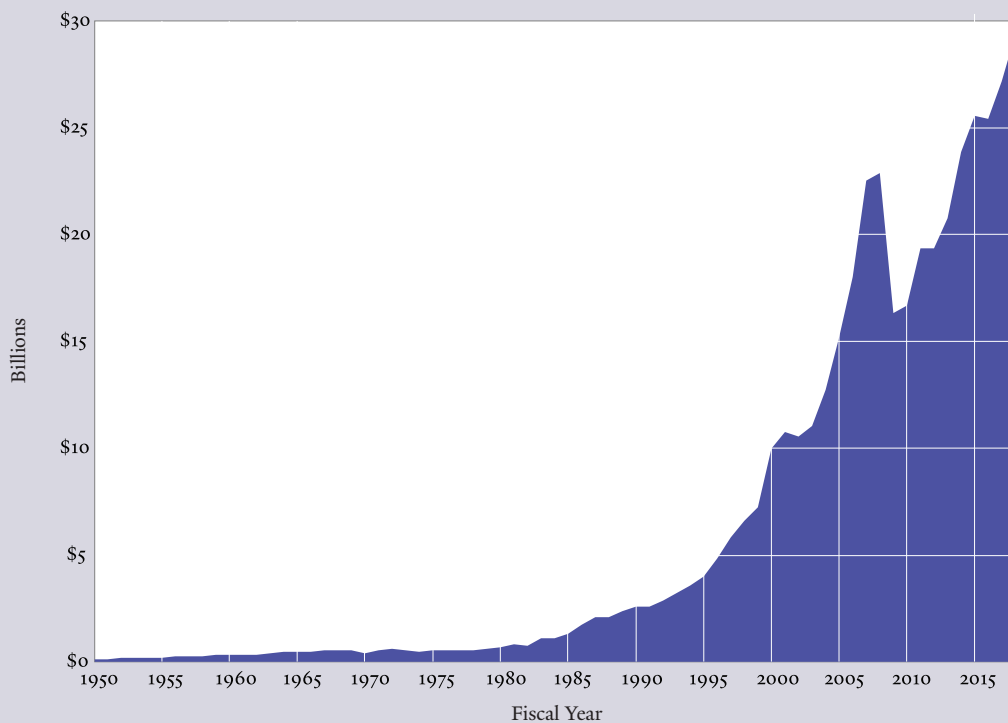
# Endowment Highlights

	Fiscal Year				
	2018	2017	2016	2015	2014
Market Value (in millions)	\$29,351.1	\$27,176.1	\$25,408.6	\$25,572.1	\$23,894.8
Return	12.3%	11.3%	3.4%	11.5%	20.2%
Spending (in millions)	\$ 1,281.0	\$ 1,225.8	\$ 1,152.8	\$ 1,082.5	\$ 1,041.5
Operating Budget Revenues (in millions)	\$ 3,874.9	\$ 3,692.2	\$ 3,472.4	\$ 3,297.7	\$ 3,116.1
Endowment Percentage	33.1%	33.2%	33.2%	32.8%	33.4%

## Asset Allocation (as of June 30)

Absolute Return	26.1%	25.1%	22.1%	20.5%	17.4%
Domestic Equity	3.5	3.9	4.0	3.9	3.9
Fixed Income	4.2	4.6	4.9	4.9	4.9
Foreign Equity	15.3	15.2	14.9	14.7	11.5
Leveraged Buyouts	14.1	14.2	14.7	16.2	19.3
Natural Resources	7.0	7.8	7.9	6.7	8.2
Real Estate	10.3	10.9	13.0	14.0	17.6
Venture Capital	19.0	17.1	16.2	16.3	13.7
Cash	0.5	1.2	2.3	2.8	3.5

Endowment Market Value 1950–2018



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*Front cover:*

Stairway in the Yale University Art Gallery's older wing, designed by Egerton Swartwout, B.A. 1891, and dating to 1926.

*Right:*

Passageway between Ezra Stiles College (at left) and Morse College, with Payne Whitney Gymnasium in the background.



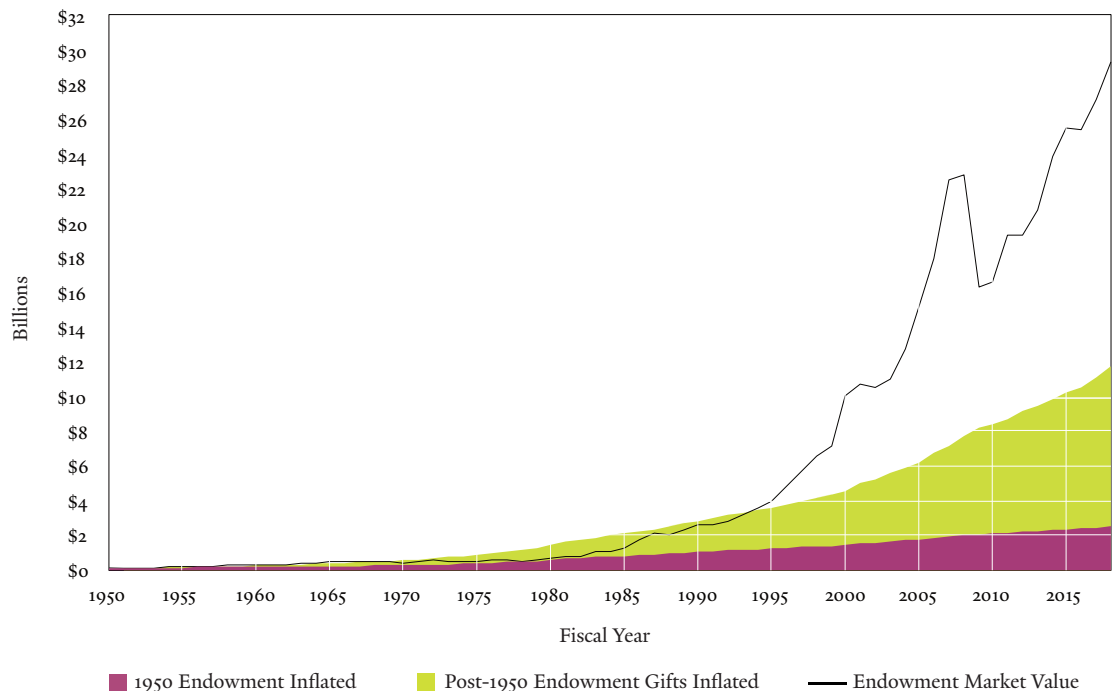
# Introduction

# 1

Yale's Endowment generated a 12.3% return, net of fees, in fiscal 2018. Over the past ten years, the Endowment grew from \$22.9 billion to \$29.4 billion. With annual returns of 7.4% during the ten-year period, the Endowment's performance exceeded its benchmark and outpaced institutional fund indices. For six of the past ten years, Yale's ten-year record ranked first in the Cambridge Associates universe.

Spending from the Endowment grew during the last decade from \$850 million to \$1.3 billion, an annual growth rate of 4.2%. Next year, spending will amount to \$1.4 billion, or 34% of projected revenues. Yale's spending and investment policies provide substantial levels of cash flow to the operating budget for current scholars, while preserving Endowment purchasing power for future generations.

### Endowment Growth Outpaces Inflation 1950–2018



# Nobel Prize Winners at Yale

Yale University professor William D. Nordhaus was recognized with a Nobel Prize in 2018, joining eight other distinguished members of the Yale community who received the prestigious award in prior years.



## William D. Nordhaus

Nobel Prize in Economic Sciences, 2018

William D. Nordhaus, B.A. 1963, M.A. 1972, Sterling Professor of Economics, and the world's leading economist on climate change, was awarded the 2018 Sveriges Riksbank Prize in Economic Sciences for "integrating climate change into long-run macro-economic analysis."

"I am honored to be awarded the Nobel Prize in Economics for work on environmental economics," Nordhaus said. "But even more, I am grateful for the intellectual environment at Yale that taught me as a student, nurtured me as a teacher and scholar, and allowed the freedom to devote my life to one of the critical emerging issues of humanity."

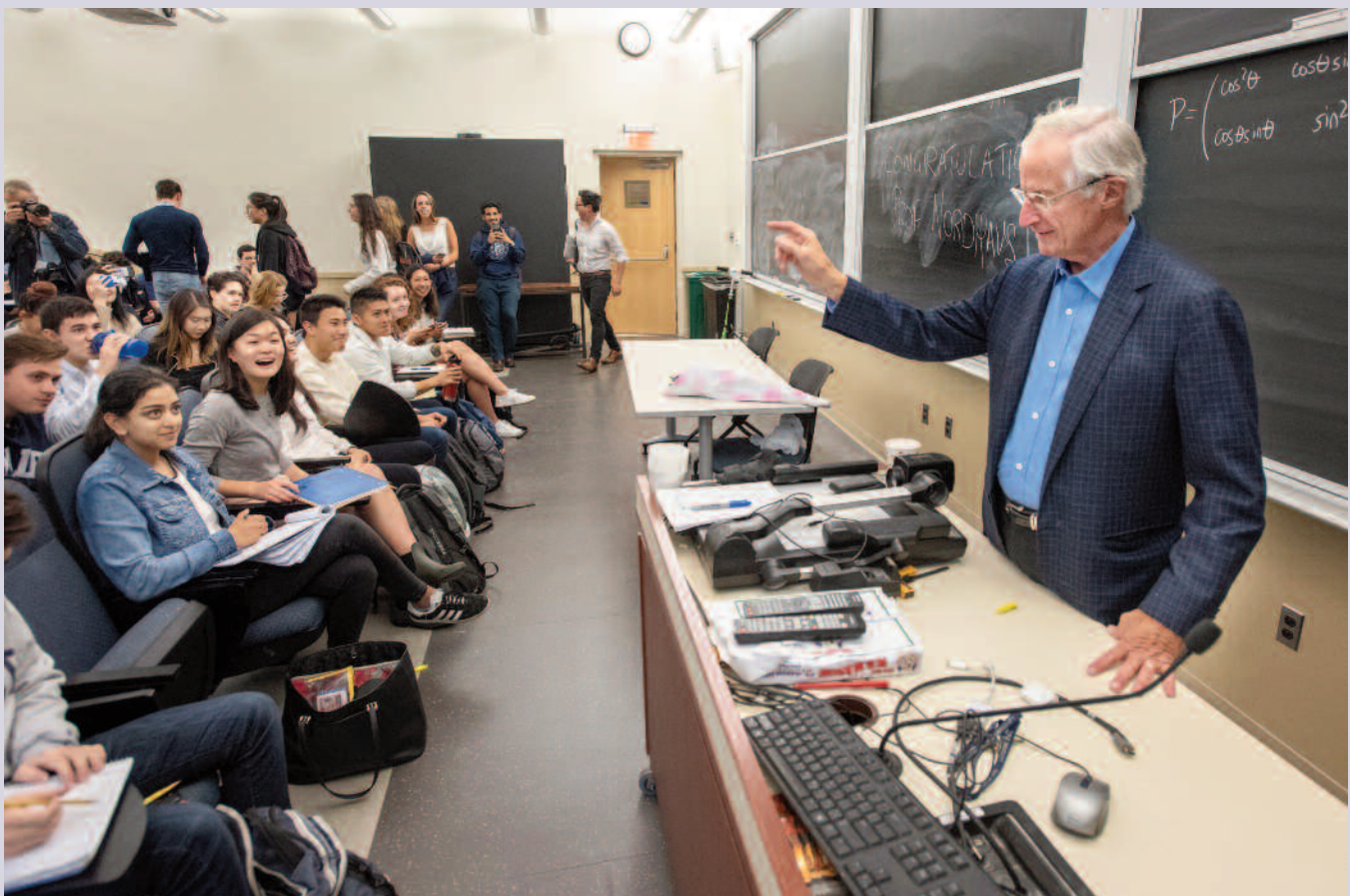
Nordhaus shared the prize with Paul Romer, professor of economics at New York University's Leonard N. Stern School of Business.

Nordhaus's research has focused on economic growth and natural resources, the economics of climate change, and resource constraints on economic growth. Since the 1970s, he has developed economic approaches to global warming, including the construction of integrated economic and scientific models to determine the efficient path for coping with climate change. These models are widely used today in research on studies of climate change economics and policies. He has studied wage and price

behavior, health economics, augmented national accounting, the political business cycle, productivity, and the "new economy."

"This is fitting recognition of William Nordhaus's work on the economics of climate change," said Yale University President Peter Salovey. "Yale is absolutely thrilled to have one of our most distinguished faculty – who is also one of our most distinguished alumni – receive this great honor."

Born in Albuquerque, New Mexico, Nordhaus completed his undergraduate work at Yale in 1963 and received his Ph.D. in economics in 1967 from the Massachusetts Institute of



Professor William D. Nordhaus lecturing in Yale College. Even Nobel laureates on the faculty regularly teach.

*Nordhaus cont'd.*

Technology. He joined the Yale faculty in 1967 and in 2001 became a Sterling Professor of Economics. He is also a professor in Yale's School of Forestry & Environmental Studies.

From 1977 to 1979, Nordhaus was a member of President Carter's Council of Economic Advisers; from 1986 to 1988, he was provost of Yale University. He has served on several committees of the National Academy of Sciences on topics including climate change, environmental accounting, risk and the role of the tax system in climate change.

His 1996 study of the economic history of lighting back to Babylonian times found that the measurement of long-term economic growth has been significantly underestimated. He returned to Mesopotamian economics with a study of the costs of the U.S. war in Iraq, published in 2002, before the war began, projecting a total cost as high as \$2 trillion. He directs the

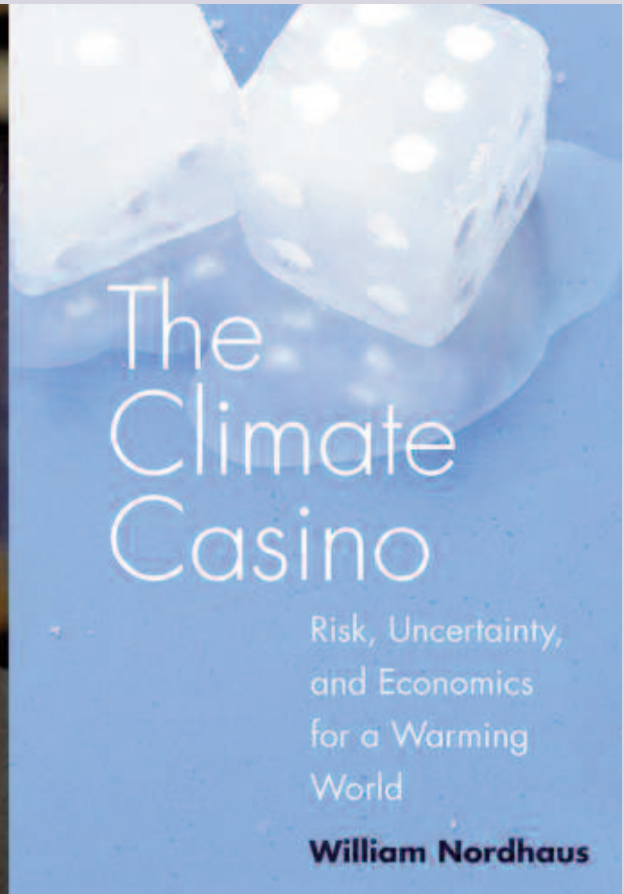
"G-Econ project," which provides the first comprehensive measures of economic activity at a geophysical scale. Nordhaus is current or past editor of several scientific journals and has authored many books, among them *Invention, Growth and Welfare; Is Growth Obsolete?; The Efficient Use of Energy Resources; Reforming Federal Regulation; Managing the Global Commons; Warming the World*; and (jointly with Paul Samuelson) the classic textbook *Economics*, whose 19th edition was published in 2009. He is the author of two books published by Yale University Press: *A Question of Balance: Weighing the Options on Global Warming Policies*, which was selected by *Choice* magazine as an Outstanding Academic Title of 2008, and *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World*, which was published in 2013.

Nordhaus was the first chair of the Advisory Committee for the Bureau of Economic Analysis and of the American Economic Association

Committee on Federal Statistics. In 2004 he was awarded the prize of "Distinguished Fellow" by the American Economic Association (AEA). He served as president of the AEA for the 2014–2015 term.

Nordhaus is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. He is on the research staff of the National Bureau of Economic Research and the Cowles Foundation for Research at Yale and has been a member and senior adviser of the Brookings Panel on Economic Activity since 1972. He served as the chair of the Board of Directors of the Boston Federal Reserve Bank from 2014 to 2015.

In 2017 he received the BBVA Foundation's Frontiers of Knowledge Award for his work on climate change.



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## **Sterling Professorships**

*One of the University's great strengths is a world-class faculty, sustained by permanently endowed chairs or professorships. At Yale, no chairs are more respected than the Sterling Professorships. Recognized throughout academia, these endowed positions confer prestige on their holders, while providing a reliable flow of funds for their activities.*

*John W. Sterling, a New York attorney who graduated from Yale in 1864, left most of his estate to the University in 1918. At that time, the \$15 million bequest was the largest sum ever donated to an American university. The estate's trustees ultimately transmitted \$25 million to Yale. Sterling wished to have the money used to create "at least one enduring, useful and architecturally beautiful building" as well as "scholarships, fellowships, or lectureships; the endowment of new professorships and the establishment of special funds for prizes."*

*Today, a Sterling Professorship is the highest honor at Yale, bestowed upon the University's most eminent scholars. Appointment of Sterling Professors is made by the Yale president, in consultation with the provost and the deans of the University's graduate and professional schools, and confirmed by a vote of the Yale Corporation.*

*In 1920, President Arthur Twining Hadley appointed John Johnson, a chemist, as the first Sterling Professor. Since then, a notable succession of scholars have held Sterling chairs, including Supreme Court Justice William O. Douglas; art historian Vincent Scully; historian of ancient Greece Donald Kagan; art historian and former Dean Mary Miller; Chinese historian Jonathan Spence; historian of medieval culture and literature María Rosa Menocal; legal scholars Roberta Romano, Harold Hongju Koh, and Akhil Reed Amar; geneticist Carolyn Slayman; and physician Harvey Cushing.*

*In 1958 the Yale Corporation voted to limit the number of Sterling Professors to*

*a maximum of twenty-seven at any one time, roughly the number of scholars that the Sterling endowment could support.*

*With the growth of the Yale Endowment, the University expanded the number of authorized chairs to thirty-six in the 1990s and to forty in the 2000s. There are currently thirty-nine holders of the Sterling Professorship.*

*Sterling's bequest provided \$13 million for the endowment of professorships. On June 30, 2018, the funds totaled \$418 million. Over the past twenty-five years, \$259 million was distributed to support Sterling Professors.*



# The Yale Endowment

## 2

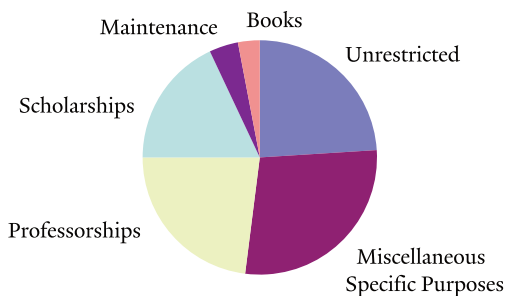
Totaling \$29.4 billion on June 30, 2018, the Yale Endowment contains thousands of funds with various purposes and restrictions. Approximately 83% of funds constitute true endowment, gifts restricted by donors to provide long-term funding for designated purposes. The remaining funds represent quasi-endowment, monies that the Yale Corporation chooses to invest and treat as Endowment.

Donors frequently specify a particular purpose for gifts, creating endowments to fund professorships, teaching, and lectureships (23%); scholarships, fellowships, and prizes (18%); maintenance (4%); books (3%); and miscellaneous specific purposes (28%). Twenty-four percent of funds are unrestricted. Nineteen percent of the Endowment benefits the overall University, with remaining funds focused on specific units, including the Faculty of Arts and Sciences (34%), the professional and arts schools (25%), the library (7%), and other entities (15%).

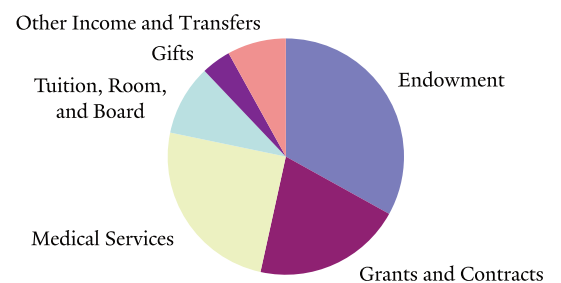
Although distinct in purpose or restriction, Endowment funds are commingled in an investment pool and tracked with unit accounting much like a large mutual fund. Endowment gifts of cash, securities, or property are valued and exchanged for units that represent a claim on a portion of the total investment portfolio.

In fiscal 2018 the Endowment provided \$1.3 billion, or 33%, of the University's \$3.9 billion operating income. Other major sources of revenues were medical services of \$962 million (25%); grants and contracts of \$790 million (20%); net tuition, room, and board of \$374 million (10%); gifts of \$156 million (4%); and other income and transfers of \$312 million (8%).

Endowment Fund Allocation  
Fiscal Year 2018



Operating Budget Revenue  
Fiscal Year 2018





# 3

Yale’s portfolio is structured using a combination of academic theory and informed market judgment. The theoretical framework relies on mean-variance analysis, an approach developed by Nobel laureates James Tobin and Harry Markowitz, both of whom conducted work on this important portfolio management tool at Yale’s Cowles Foundation. Using statistical techniques to combine expected returns, variances, and covariances of investment assets, Yale employs mean-variance analysis to estimate expected risk and return profiles of various asset allocation alternatives and to test sensitivity of results to changes in input assumptions.

Because investment management involves as much art as science, qualitative considerations play an extremely important role in portfolio decisions. The definition of an asset class is subjective, requiring precise distinctions where none exist. Returns and correlations are difficult to forecast. Historical data provide a guide, but must be modified to recognize structural changes and compensate for anomalous periods. Quantitative measures have difficulty incorporating factors such as market liquidity or the influence of significant, low-probability events. In spite of the operational challenges, the rigor required in conducting mean-variance analysis brings an important perspective to the asset allocation process.

The combination of quantitative analysis and market judgment employed by Yale produces the following portfolio:

Asset Class	June 2018 Actual	June 2018 Target
Absolute Return	26.1%	26.0%
Domestic Equity	3.5	3.0
Fixed Income	4.2	5.0
Foreign Equity	15.3	15.5
Leveraged Buyouts	14.1	15.0
Natural Resources	7.0	6.5
Real Estate	10.3	9.5
Venture Capital	19.0	18.0
Cash	0.5	1.5



Students participating in a project in the Center for Engineering Innovation & Design (CEID), in the Becton Center.

The target mix of assets produces an expected real (after inflation) long-term growth rate of 6.9% with risk (standard deviation of returns) of 13.9%. Because actual holdings differ slightly from target levels, the actual allocation produces a portfolio with slightly higher expected growth rate and risk level. The University's measure of inflation is based on a basket of goods and services specific to higher education that tends to exceed the Consumer Price Index by approximately one percentage point.

At its June 2018 meeting, Yale's Investment Committee adopted changes to the University's policy portfolio allocations. The Committee approved increases in the absolute return target from 25% to 26%, in the leveraged buyouts target from 14% to 15%, and in the venture capital target from 17% to 18%. The Committee approved decreases in the domestic equity target from 4% to 3%, in the natural resources target from 7% to 6.5%, in the real estate target from 10% to 9.5%, and in the cash target from 2.5% to 1.5%.

Over the longer term, Yale seeks to allocate approximately one-half of the portfolio to the illiquid asset classes of leveraged buyouts, venture capital, real estate, and natural resources. The Endowment has made significant progress in reducing illiquidity in the years since the financial crisis.

Providing resources for current operations and preserving purchasing power of assets dictate investing for high returns, causing the Endowment to be biased toward equity. The University's vulnerability to inflation further directs the Endowment away from fixed income and toward equity instruments. Hence, more than 90% of the Endowment is targeted for investment in assets expected to produce equity-like returns, through holdings of domestic and international equities, absolute return strategies, real estate, natural resources, leveraged buyouts, and venture capital.

Over the past three decades, Yale dramatically reduced the Endowment's dependence on domestic marketable securities by reallocating assets to nontraditional asset classes. In 1988, 65% of the Endowment was targeted to U.S. stocks and bonds. Today, target allocations call for 9.5% in domestic marketable securities and cash, while the diversifying assets of foreign equity, absolute return, real estate, natural resources, leveraged buyouts, and venture capital dominate the Endowment, representing 90.5% of the target portfolio.

The heavy allocation to nontraditional asset classes stems from their return potential and diversifying power. Today's actual and target portfolios have significantly higher expected returns than the 1988 portfolio with similar volatility. Alternative assets, by their very nature, tend to be less efficiently priced than traditional marketable securities, providing an opportunity to exploit market inefficiencies through active management. The Endowment's long time horizon is well suited to exploit illiquid, less efficient markets such as real estate, natural resources, leveraged buyouts, and venture capital.

## James E. Rothman

Nobel Prize in Physiology or Medicine, 2013

James E. Rothman, B.A. 1971, the Fergus F. Wallace Professor of Biomedical Sciences, and professor and chair of the Department of Cell Biology, was awarded the 2013 Nobel Prize in Physiology or Medicine for his work on how molecular messages are transmitted inside and outside of our cells. Rothman was appointed Sterling Professor of Cell Biology in 2017.

Rothman shared the prize with Randy Schekman of the University of California, Berkeley, and Thomas Südhof of Stanford University.

Rothman helped reveal the mechanism that allows information-containing cellular compartments, called vesicles, to transmit information both in the interior of the cell and to the surrounding environment. The fusion of vesicles and cellular membranes, a process called exocytosis, is basic to life and occurs in organisms as diverse as yeast and humans. Exocytosis underlies physiological functions ranging from the secretion of insulin to the regulation of the brain neurotransmitters responsible for movement, perception, memory, and mood.

However, this process was barely understood forty-plus years ago when George Palade, at the Rockefeller Institute for Medical Research, first showed that proteins shuttled between cellular compartments.

“My life’s work on membrane trafficking in cells was inspired by the discoveries of George Palade, who founded Yale’s cell biology department in 1973, and indeed founded the field of cell biology as we know it today,” said Rothman in 2008, when he was hired by Yale from Columbia University to head the department Palade created.

Scientists soon discovered that vesicles containing protein cargoes

bud from the membranes of compartments inside the cell and then fuse with another membrane inside the cell or with the cell’s outer membrane to release their cargo. But in the late 1970s, when Rothman started working in the field, no one understood exactly how the cell creates and maintains such an elaborate information-trafficking system. Rothman decided to try to unravel these mechanisms biochemically in a “cell-free” system, breaking down each step in the process and recreating it in the labora-

tory. Many scientists believed it would be impossible to isolate each of these mechanisms outside the cell.

Over the years, Rothman and other scientists have described in great detail the genes and enzymes responsible for the budding of vesicles and their fusion in membranes. Rothman, who serves as director of the Nanobiology Institute on Yale’s West Campus, has received numerous honors, including the King Faisal International Prize for Science, the Gairdner



*Rothman cont'd.*

Foundation International Award, the Lounsbury Award of the National Academy of Sciences, the Heineken Foundation Prize of the Netherlands Academy of Sciences, the Louisa Gross Horwitz Prize of Columbia University, the Lasker Basic Science Award, the Kavli Prize in Neuroscience, the Massry Prize, and the E.B. Wilson Medal.

Rothman graduated summa cum laude from Yale College in 1971 with a degree in physics. He earned a PH.D. in biological chemistry from Harvard Medical School. He conducted post-doctoral research at the Massachusetts Institute of Technology before moving to the Stanford School of Medicine as an assistant professor. He continued his research at Princeton University, where he became the founding chair of the Department of Cellular Biochemistry and Biophysics at Memorial Sloan-Kettering Cancer Center and vice chair of the Sloan-Kettering Institute. Prior to coming to Yale in 2008, Rothman served on the faculty of Columbia University's College of Physicians and Surgeons, where he was a professor in the Department of Physiology and Biophysics, the Clyde and Helen Wu Professor of Chemical Biology, and director of the Columbia Genome Center.

Sterling Hall of Medicine.

### **Fergus F. Wallace Chair in Biomedical Sciences**

*The professorship was established in 2006 by David W. Wallace, a former corporate attorney and philanthropist who was a longtime supporter of the School of Medicine and Yale. Wallace understood the financial challenges that research entails and the need for philanthropic support to fuel scientific discovery. Along with his wife, Jean, he established six professorships at the School of Medicine to provide faculty members with the resources and intellectual freedom to pursue innovative research.*



## Robert J. Shiller

Nobel Prize in Economic Sciences, 2013

Robert J. Shiller, Sterling Professor of Economics, was awarded the 2013 Sveriges Riksbank Prize in Economic Sciences with Eugene F. Fama and Lars Peter Hansen from the University of Chicago. According to the Nobel committee, the three were honored “for their empirical analysis of asset prices.”

Shiller, whose name became a household word with the wide use of the Case-Shiller Home Price Real Estate Index, came to national prominence with the publication in 2000 of *Irrational Exuberance*. The book, which quickly became a bestseller, described speculative bubbles fueled by mass misinformation and herd instinct, and accurately predicted the dot-com implosion. As early as 2003, Shiller warned of the housing market collapse and later wrote a precept for recovery, *Subprime Solution: How Today's Global Financial Crisis Happened, and What to Do about It*.

Shiller made his indelible mark as an economist with an article in the June 1981 edition of the *American Economic Review*, in which he questioned the “efficient markets hypothesis,” which holds that stock market prices are driven by the rational expectations of investors. The article, “Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?,” was named one of the top twenty articles in the history of the *American Economic Review*, one of the most respected journals in its field.

Born in Detroit in 1946, Shiller received his B.A. from the University of Michigan in 1967 and Ph.D. from the Massachusetts Institute of Technology in 1972. He held academic appointments at the University of Minnesota, the Massachusetts Institute of Technology, and the University of Pennsylvania before joining the Yale faculty in 1982. At Yale, Shiller is affiliated with the

Cowles Foundation for Research in Economics and is a fellow at the International Center for Finance at the Yale School of Management. He holds a joint appointment as a professor of finance at the School of Management and previously served as the Arthur M. Okun Professor of Economics.

Shiller is a major voice for behavioral economics, which brings human psychology into the study of finance. In addition to *Irrational Exuberance* and *Subprime Solution*, Shiller co-authored, with Nobel Prize winner George Akerlof, *Animal Spirits: How Human Psychology Drives the Economy and Why It Matters for Global Capitalism*, which received the getAbstract International Book Award

and the TIAA-CREF Paul A. Samuelson Award for Outstanding Scholarly Writing on Lifelong Financial Security. His latest book, *Finance and the Good Society*, published in 2012, won the Prose Award for Business, Finance and Management.

Shiller has served on a number of boards and advisory panels, including the American Real Estate and Urban Economics Association, the Brookings Panel on Economic Activity, The Economic Advisory Panel for the Federal Reserve Bank of New York, The World Economic Forum Global Agenda Council on Fiscal Crises, The Competitive Markets Advisory Council at the CME Group, and the Future of Finance Advisory



*Shiller cont'd.*

Committee for the CFA Institute. He has been president of the Eastern Economic Association and vice president of the American Economic Association.

The economist has been a research associate at the National Bureau of Economic Research since 1980 and has been co-organizer of its workshops on behavioral finance (with Richard Thaler) since 1991 and on macroeconomics and individual decision-making, behavioral macroeconomics (with George Akerlof) since 1994.

Shiller is consistently ranked among the most influential economists of our times. In a special 2011 issue of *Bloomberg Markets*, he was named one of the “50 Most Influential People with the Power in Global Finance” and in 2010 he was named by *Foreign Policy* to its list of top global thinkers. The German newspaper *Die Zeit* cited Shiller as one of twenty-one thinkers for the twenty-first century. In 2009 the economist was awarded the Deutsche Bank Prize in Financial Economics for pioneering research in the field of financial economics, relating to asset prices in markets as diverse as fixed income, equities, and real estate. Shiller received the CME Group-MSRI Prize in Innovative Quantitative Applications for 2012.

He is the author of countless articles and papers in academic journals and general interest and financial publications. He writes a regular column titled “Finance in the 21st Century” for Project Syndicate, which publishes internationally, and “Economic View” for *The New York Times*.

Cowles Foundation for Research in Economics is housed at 30 Hillhouse Avenue.

### **Arthur M. Okun Professorship**

*The professorship was created in 1991 in memory of Arthur M. Okun, a Yale professor and an American economist who served as chairman of President Johnson’s Council of Economic Advisers (CEA) from 1968 to 1969. He combined his special gifts as an analytical and theoretical economist with his great concern for the well-being of his fellow citizens into a thoughtful, pragmatic, and sustaining contribution to his nation’s public policy. Okun is known mainly for Okun’s Law, which describes a linear relation between percentage-point changes in unemployment and percentage changes in gross national product. James Tobin, Okun’s colleague at Yale, called Okun’s Law “one of the most reliable empirical regularities of macroeconomics.”*



## Asset Class Characteristics

Yale's eight asset classes are defined by differences in their expected response to economic conditions, such as economic growth, price inflation, or changes in interest rates, and are weighted in the Endowment portfolio by considering their risk-adjusted returns and correlations. The University combines the asset classes in such a way as to provide the highest expected return for a given level of risk, subject to fundamental diversification and liquidity constraints.

## *Absolute Return*

In July 1990, Yale became the first institutional investor to define absolute return strategies as a distinct asset class, beginning with a target allocation of 15.0%. Designed to provide significant diversification to the Endowment, absolute return investments are expected to generate high long-term real returns by exploiting market inefficiencies. The portfolio is invested in two broad categories: event-driven strategies and value-driven strategies. Event-driven strategies rely on a specific corporate event, such as a merger, spin-off, or bankruptcy restructuring, to achieve a target price. Value-driven strategies involve hedged positions in assets or securities with prices that diverge from their underlying economic value. Today, the absolute return portfolio is targeted to be 26.0% of the Endowment, above the average educational institution's allocation of 21.7% to such strategies. Absolute return strategies are expected to generate a real return of 4.8% with risk of 8.6%. The Barclays 9 to 12 Month Treasury Index serves as the portfolio benchmark.

Unlike traditional marketable securities, absolute return investments have historically provided returns largely independent of overall market moves. Over the past twenty years, the portfolio exceeded expectations, returning 8.3% per year with low correlation to domestic stock and bond markets.

## *Domestic Equity*

Equity owners reasonably expect to receive returns superior to those produced by less risky assets such as bonds and cash. The predominant asset class in most U.S. institutional portfolios, domestic equity represents a large, liquid, and heavily researched market. While the average educational institution invests 20.4% of assets in domestic equities, Yale's target allocation to this asset class is only 3.0%. The domestic equity portfolio has an expected real return of 6.0% with a standard deviation of 18.0%. The Wilshire 5000 Index serves as the portfolio benchmark.

Despite recognizing that the U.S. equity market is highly efficient, Yale elects to pursue active management strategies, aspiring to outperform the market index by a few percentage points, net of fees, annually. Because superior stock selection provides the most consistent and reliable opportunity for generating attractive returns, the University favors managers with exceptional bottom-up, fundamental research capabilities. Managers searching for out-of-favor securities often find stocks that are cheap in relation to fundamental measures such as asset value, future earnings, or cash flow. Yale's domestic equity portfolio has posted returns of 11.8% per year over the past twenty years.

## *Fixed Income*

Fixed income assets generate stable flows of income, providing more certain nominal cash flow than any other Endowment asset class. The bond portfolio exhibits a low covariance with other asset classes and serves as a hedge against financial accidents or periods of unanticipated deflation. While the typical educational institution's allocation to fixed income and cash instruments is 12.1%, Yale's target allocation to fixed income and cash is 6.5%. Bonds have an expected real return of 0.5% with risk of 3.0%. The Barclays Capital 1 to 3 Year Treasury Index serves as the portfolio benchmark.

Yale is not particularly attracted to fixed income assets, as they have the lowest expected returns of the eight asset classes that make up the Endowment. In addition, the government bond market is arguably the most efficiently priced asset class, offering few opportunities to add significant value through active management. Based on skepticism of active fixed income strategies and belief in the efficacy of a highly structured approach to bond portfolio management, the Investments Office chooses to manage Endowment bonds internally. Over the past twenty years, the fixed income portfolio has generated returns of 3.9% per annum.

## *Foreign Equity*

Foreign equity investments give the Endowment exposure to the global economy, providing diversification and the opportunity to earn outsized returns through active management. Yale allocates 7.0% of its portfolio to foreign developed markets and 8.5% to emerging markets. Yale's foreign equity target allocation of 15.5% stands below the average endowment's allocation of 22.8%. Expected real returns for emerging equities are 7.5% with a risk level of 23.0%, while developed equities are expected to return 6.0% with risk of 18.0%. The portfolio is benchmarked against a composite of developed markets, measured by the MSCI Europe, Australasia and Far East (EAFE) Investable Market Index, and emerging markets, measured by a blend of the MSCI Emerging Markets Investable Market Index and the MSCI China A-Share Investable Market Index.

Yale's investment approach to foreign equities emphasizes active management designed to uncover attractive opportunities and exploit



Students near Noah Porter Gate.



market inefficiencies. As in the domestic equity portfolio, Yale favors managers with strong fundamental research capabilities. Capital allocation to individual managers takes into consideration the country allocation of the foreign equity portfolio, the degree of confidence that Yale possesses in a manager, and the appropriate size for a particular strategy. In addition, Yale attempts to exploit mispricings in countries, sectors, and styles by allocating capital to the most compelling opportunities. Twenty-year returns for Yale's foreign equity portfolio stand at 15.6% per year.

### *Leveraged Buyouts*

Leveraged buyouts offer extremely attractive long-term risk-adjusted returns, stemming from the University's strong stable of managers that exploit market inefficiencies. The University's target allocation to leveraged buyouts of 15.0% far exceeds the 6.1% actual allocation of the average educational institution. The leveraged buyout portfolio is expected to generate real returns of 10.0% with risk of 23.6%.

Yale's leveraged buyout strategy emphasizes partnerships with firms that pursue a value-added approach to investing. Such firms work closely with portfolio companies to create fundamentally more valuable entities, relying only secondarily on financial engineering to generate returns. Investments are made with an eye toward long-term relationships – generally, a commitment is expected to be the first of several – and toward the close alignment of the interests of general and limited partners. Over the past twenty years, the leveraged buyout program has earned 12.1% per annum.

### *Natural Resources*

Equity investments in natural resources – oil and gas, timberland, and agriculture – share common risk and return characteristics: protection against unanticipated inflation, high and visible current cash flow, and opportunities to exploit inefficiencies. At the portfolio level, natural resource investments provide attractive return prospects and significant diversification. Yale has a 6.5% long-term policy allocation to natural resources with expected real returns of 6.4% and risk of 23.9%. Yale's policy allocation is below the 8.2% natural resources allocation of the average endowment.

Superior operators have demonstrated the ability to generate excess returns through a market cycle. Over the past twenty years, Yale's natural resources portfolio has generated an impressive 15.2% per annum.

### *Real Estate*

Investments in real estate provide material diversification to the Endowment. A steady flow of income with equity upside creates a natural hedge against unanticipated inflation without sacrificing expected return. Yale's 9.5% policy allocation significantly exceeds the average endowment's commitment of 3.2%. Expected real returns are 5.5% with risk of 15.0%.

While real estate markets sometimes produce dramatically cyclical returns, pricing inefficiencies in the asset class and opportunities to add value allow superior managers to generate excess returns over long time horizons. Twenty-year returns for the portfolio stand at 9.0% per annum.

## Venture Capital

Venture capital investments provide compelling option-like returns as the University's premier venture managers gain exposure to innovative start-up companies from an early stage. Yale's target venture capital allocation of 18.0% exceeds the 5.5% actual allocation of the average educational institution. The venture capital portfolio is expected to generate real returns of 16.0% with risk of 37.8%.

Yale's venture capital program, one of the first of its kind, is regarded as among the best in the institutional investment community; the University is frequently cited as a role model by other investors. Yale's venture capital managers field strong, cohesive, and hungry teams with proven ability to identify opportunities and support talented entrepreneurs. The University's venture capital portfolio contains an unparalleled set of manager relationships, significant market knowledge, and an extensive network. Over the past twenty years, the venture capital program has earned an outstanding 165.9% per annum.<sup>1</sup>

## Asset Allocations as of June 30, 2018

	Yale University	Educational Institution Mean
Absolute Return	26.1%	21.7%
Domestic Equity	3.5	20.4
Fixed Income	4.2	8.8
Foreign Equity	15.3	22.8
Leveraged Buyouts	14.1	6.1
Natural Resources	7.0	8.2
Real Estate	10.3	3.2
Venture Capital	19.0	5.5
Cash	0.5	3.3

<sup>1</sup> Returns reported for manager performance in marketable equities and absolute return are time-weighted returns, because the University determines cash flows to and from the asset classes. Returns reported for leveraged buyouts, venture capital, real estate, and natural resources are dollar-weighted internal rates of return, because the managers of illiquid asset classes determine when to buy and sell assets.

Yale's 165.9% venture capital return over the past twenty years is heavily influenced by large distribu-

tions during the Internet boom. Since such a calculation assumes reinvestment of proceeds from the portfolio during the period at the same rate of return for the rest of the period, it is inappropriate to compound the 165.9% return over the twenty-year time horizon. For reference, the twenty-year time-weighted return of Yale's venture capital portfolio is 24.6%. The other illiquid asset classes are not subject to similarly large distortions.



Detail from the gateway at the Class of 1954  
Chemistry Research Building.

## Thomas Steitz

1940–2018

Nobel Prize in Chemistry, 2009

Thomas A. Steitz, Sterling Professor of Molecular Biophysics & Biochemistry and professor of chemistry, was one of three winners of the 2009 Nobel Prize in Chemistry for his work describing the structure and function of the ribosome, the protein-making factory key to the function of all life.

Steitz, a former Howard Hughes Medical Institute investigator, shared the award with Venkatraman Ramakrishnan of the MRC Laboratory of Molecular Biology, Cambridge, United Kingdom, and Ada E. Yonath, Weizmann Institute of Science, Rehovot, Israel. All three used x-ray crystallography to map the position for each and every one of the hundreds of thousands of atoms that make up the ribosome. While the work began as a quest to answer basic questions about the makeup of ribosomes, knowledge of its structure has created targets for a new generation of antibiotics.

The instruction manual for the creation of proteins is DNA, but the ribosome is the machine that translates the encoded information to turn it into proteins. Steitz's work elucidated the structure and function of the ribosome, an enormously complex ensemble of numerous protein and RNA components.

Steitz and colleagues built upon research of the past half-century to describe in minute detail the architecture of the protein-making machinery. Scientific interest in the ribosome has focused on two major subunits. The smaller 30S subunit binds to messenger RNA that harbors the blueprint for protein synthesis. The second subunit 50S carries out the protein synthesis reaction by adding specific amino acid residues onto a growing protein backbone.



In x-ray crystallography, beams of x-ray pass through and bounce off atoms in protein-RNA crystals. This leaves a diffraction pattern scientists use to discern the three-dimensional atomic details of the molecules under study. Steitz used a 2.5 billion electron volt x-ray beam at the Brookhaven National Laboratory's National Synchrotron Light Source and additional data from the Advanced Photon Source at Argonne National Laboratory to study the atomic structure of the 50S subunit. By 2000, the high resolution enabled the team to resolve the atomic structure of all 100,000 atoms that are well ordered in the crystal.

Steitz's close collaboration with Peter Moore, Sterling Professor of Chemistry and professor of molecular biophysics and biochemistry, and interactions with William Jorgensen, Sterling Professor of Chemistry, led to the establishment of the company Rib-X Pharmaceutical, Inc., now known as Melinta Therapeutics,

which used knowledge of the structures of the large ribosomal subunit and its antibiotic complexes to develop new classes of antibiotics.

Steitz was born in 1940 in Milwaukee and received his bachelor's degree from Lawrence College in 1962 and a doctoral degree in molecular biology and biochemistry in 1966 from Harvard University. He was a post-doctoral fellow at Harvard from 1966 to 1967 and at the MRC Laboratory of Molecular Biology, Cambridge, United Kingdom, from 1967 to 1970. He joined the Yale faculty in 1970.

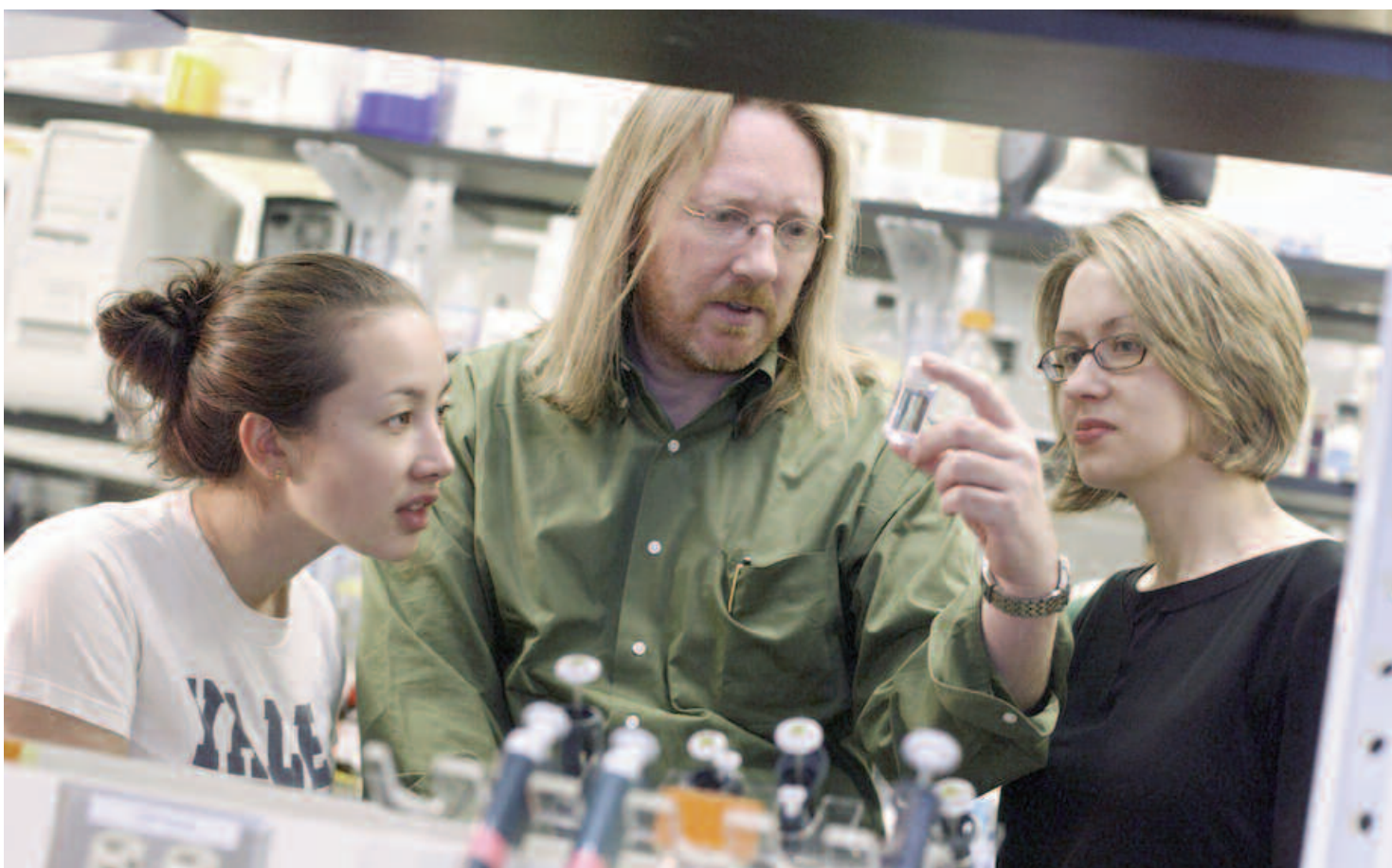
Steitz was the recipient of many awards, including the Gairdner International Award, which he received in 2007, the year after his wife, Joan A. Steitz, Sterling Professor of Molecular Biophysics, won the prestigious award.

# 4

The spending rule is at the heart of fiscal discipline for an endowed institution. Spending policies define an institution's compromise between the conflicting goals of providing support for current operations and preserving purchasing power of Endowment assets. The spending rule must be clearly defined and consistently applied for the concept of budget balance to have meaning.

The Endowment spending policy, which allocates Endowment earnings to operations, balances the competing objectives of providing a stable flow of income to the operating budget and protecting the real value of the Endowment over time. The spending policy manages the trade-off between these two objectives by combining a long-term spending rate target with a smoothing rule, which adjusts spending in any given year gradually in response to changes in Endowment market value.

The target spending rate approved by the Yale Corporation currently stands at 5.25%. According to the smoothing rule, Endowment spending 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 4.0%, and not more than 6.5%, of the Endowment's inflation-adjusted market value two years prior. The smoothing rule



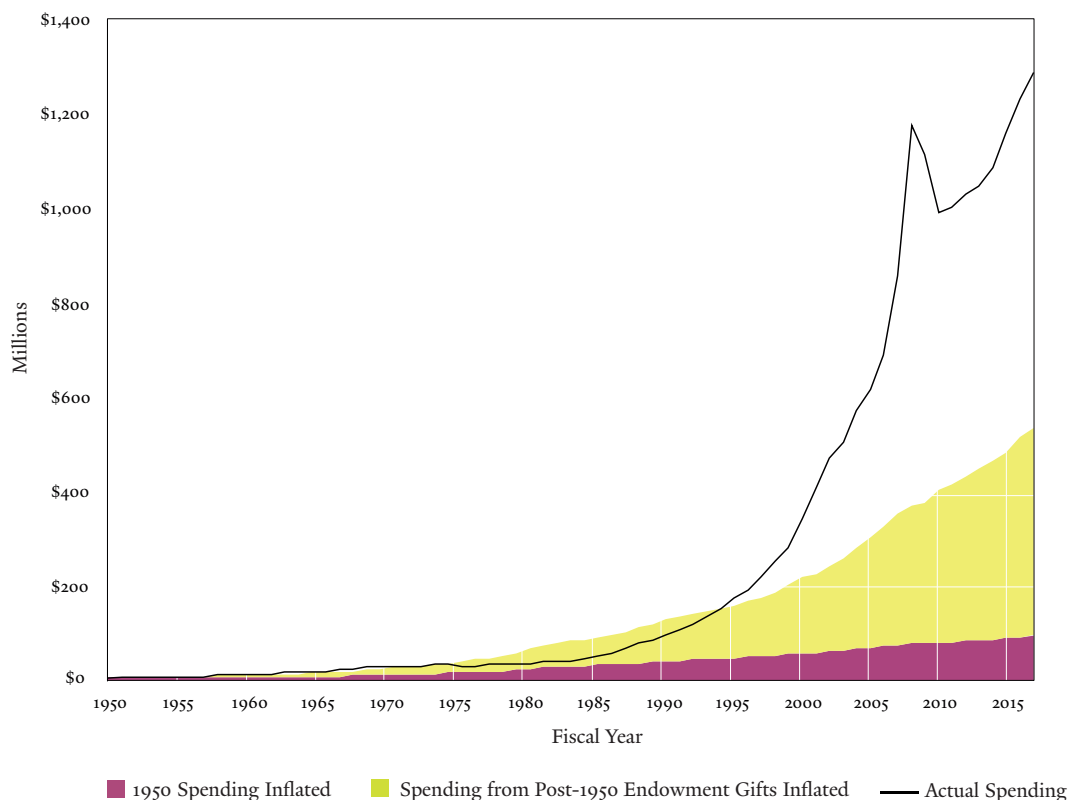
W. Mark Saltzman, Head of Jonathan Edwards College and Goizueta Foundation Professor of Chemical and Biomedical Engineering, with students.

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.

The spending rule has two implications. First, by incorporating the prior year's spending, the rule eliminates large fluctuations, enabling the University to plan for its operating budget needs. Over the last twenty years, the standard deviation of annual changes in actual spending has been approximately 70% of the standard deviation of Endowment returns. Second, by adjusting spending toward the long-term target spending level, the rule ensures that spending will be sensitive to fluctuating Endowment market values, providing stability in long-term purchasing power.

Distributions to the operating budget rose from \$850 million in fiscal 2008 to \$1.3 billion in fiscal 2018. The University projects spending of \$1.4 billion from the Endowment in fiscal 2019, representing approximately 34% of revenues.

Spending Growth Surpasses Inflation 1950–2018



## Sidney Altman

Nobel Prize in Chemistry, 1989

Sidney Altman, Sterling Professor of Molecular, Cellular & Developmental Biology, was awarded the Nobel Prize in Chemistry in 1989 for discovery of the catalytic properties of RNA. Altman, who served as dean of Yale College from 1985 to 1989, shared the award with Thomas Cech, a Howard Hughes Medical Institute investigator at the University of Colorado, Boulder.

Altman's research demonstrated that RNA, which was originally believed only to be a carrier of genetic material, can actually function as a catalyst and thereby perform some of the same functions as proteins. In 1978, Altman studied an enzyme taken from the *E. coli* bacteria that had the ability to cleave RNA. This enzyme was a combination of a protein and RNA. He discovered that the enzyme lost its ability to cleave if the RNA was removed. Later, he proved that RNA alone had the same ability to cleave as the enzyme. In 1983, one of Altman's assistants, Cecilia Guerrier-Takada, made the crucial observation that the RNA itself was capable of enzymatic activity.

Altman received a B.S. in physics from the Massachusetts Institute of Technology in 1960 and a Ph.D. from the University of Colorado in 1967. He served as a postdoctoral fellow at Harvard University from 1967 to 1969 and a visiting research fellow at MRC Laboratory, Cambridge, United Kingdom, from 1969 to 1971. Altman joined the Yale faculty in 1971.

In recent years, Altman's research has identified compounds that can neutralize or kill several varieties of drug-resistant and other dangerous bacteria and developed techniques to attack malarial parasites in blood cells.



Students at work in an organic chemistry lab in Sterling Chemistry Laboratory, where 159,000 square feet of laboratory space underwent far-reaching renovation in 2017.

## James Tobin

1918–2002

Nobel Prize in Economic Sciences, 1981

James Tobin, Sterling Professor of Economics, won the 1981 Prize in Economic Sciences for his theory of financial markets and their relation to consumption, investment, expenditures, employment, production, and prices. Tobin summarized his theory simply: “Don’t put all your eggs in one basket.”

Tobin had a distinguished career spanning fifty years, during which he made many outstanding contributions to economic theory. His fundamental concern, however, was how economic policies affected people’s lives. He believed that the federal government could use fiscal and monetary measures to benefit society.

Tobin won an academic scholarship to Harvard in 1935. There Tobin was introduced to the theories of the British economist John Maynard Keynes, whose newly published book *The General Theory of Employment, Interest and Money* advocated for governmental intervention in the economy. Keynes came to influence Tobin’s later academic research, including the work for which he received the Nobel Prize.

Tobin earned his three academic degrees from Harvard: his A.B. in 1939; his A.M. the following year; and his PH.D. in 1947, after wartime service.

In 1941 he went to work for the U.S. government, first in the Office of Price Administration and then with the Civilian Supply and War Production Board. Tobin enlisted in the Navy following the attack on Pearl Harbor. After serving four years on the U.S.S. *Kearny* in the Atlantic and Mediterranean, ending his naval duty as executive officer of the ship, Tobin returned to Harvard to earn his doctorate. He stayed at Harvard as a junior fellow until 1950. That year he received an

academic appointment at Yale as associate professor of economics. He was promoted to full professor five years later, and was named Sterling Professor of Economics in 1957.

Tobin’s early research provided theoretical underpinnings for Keynesian macroeconomic theory that led to the modern theory of portfolio choice and asset pricing.

In the early 1950s, Tobin served as an editor at two prestigious economic journals, *Econometrica* and the *Review of Economic Studies*. In 1955 he was awarded the American Economic Association’s John Bates Clark Medal as the “American economist under the age of forty... judged to have made a significant contribution to economic thought and knowledge.” The same year he became director of the Cowles Foundation for Research in Economics, an organization dedicated to connecting mathematical and statistical studies to economics, which had just moved from the University of Chicago to Yale.

In 1960, Tobin’s work came to the attention of President-elect John F. Kennedy, earning him a place on the President’s Council of Economic Advisers. Tobin, along with two other members of the Council, Kermit Gordon and Walter Heller, wrote a seminal statement of political and economic policy that dominated public discourse for many decades. In the report, Council members recommended goals of full employment, greater competition, and stiffer enforcement of anti-trust legislation. The report also advocated increased investment in science and technology, industrial and commercial infrastructure, education, and training. After a year and a half in the Kennedy administration, Tobin returned to Yale.

Tobin’s dedicated teaching of undergraduate and graduate students spanned nearly four decades. Former students recall his incisive gaze as he explored new concepts with them and the gleam in his eye when they showed their understanding. Of the classroom, Tobin once wrote, “I like teaching, and I do a lot of it. I never fail to learn, from the students themselves and from the discipline of presenting ideas clearly to them.”

Although Tobin formally retired in 1988, he continued to work at the highest level. Among the awards he received are the Eckstein Prize of the Eastern Economic Association, 1988; Grand Cordon, Order of The Sacred Treasure, Japan, 1988; Centennial Medal, Harvard University Graduate School, 1989; and Medal of the Presidency of the Italian Republic, 1993. The James Tobin Professorship of Economics was established at Yale University in 1994.

The author of dozens of books and hundreds of articles, Tobin continued writing until the end of his life. His last books include *Money, Credit, and Capital; Full Employment and Growth*; and *Essays in Economics, vol. IV, National and International*.



# 5

## Performance by Asset Class

Yale has produced excellent long-term investment returns. Over the ten-year period ending June 30, 2018, the Endowment earned an annualized 7.4% return, net of fees, placing Yale in the top decile of colleges and universities. Over the same period, domestic stocks returned 10.2% and domestic bonds returned 3.7%. Endowment outperformance stems from sound asset allocation policy and superior active management.

Yale’s long-term superior performance relative to its peers and benchmarks creates substantial wealth for the University. Over the ten years ending June 30, 2018, Yale added \$4.5 billion relative to the average return of a broad universe of college and university endowments and \$757 million relative to its passive benchmark.

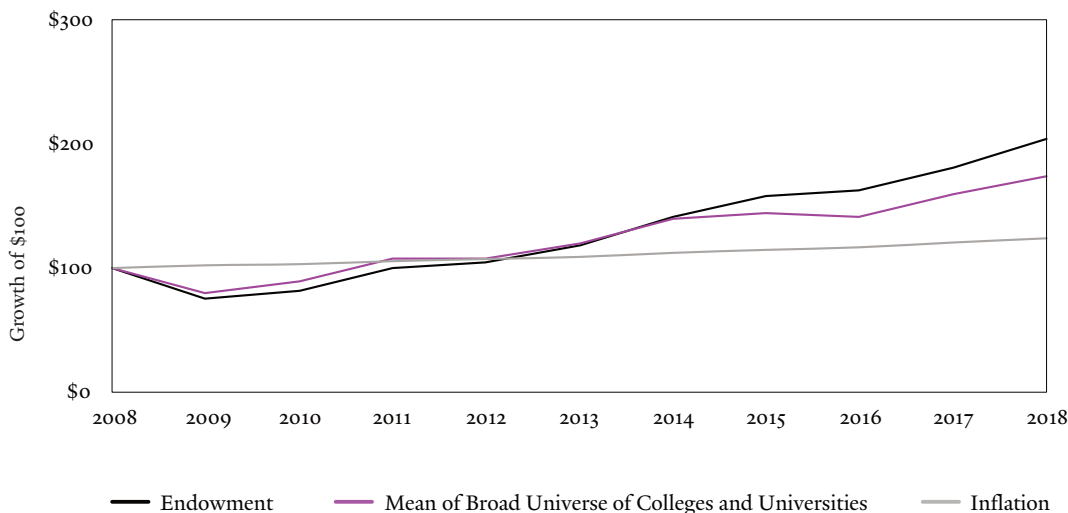
Yale’s long-term asset class performance continues to be outstanding. In the past ten years, nearly every asset class posted superior returns, outperforming benchmark levels.

Over the past decade, the absolute return portfolio produced an annualized 4.8% return, exceeding the passive Barclays 9 to 12 Month Treasury Index by 4.0% per year and besting its active benchmark by 3.5% per year. For the ten-year period, absolute return results exhibited little correlation to traditional marketable securities.

The domestic equity portfolio returned an annualized 12.4% for the ten years ending June 30, 2018, outperforming the Wilshire 5000 by 2.2% per year and the BNY Median Manager return, net of estimated fees, by 3.0% per year. Yale’s active managers have added value to benchmark returns primarily through stock selection.

Yale’s internally managed fixed income portfolio earned an annualized 1.6% over the past decade, modestly underperforming the passive index.

Yale’s Performance Exceeds Peer Results  
June 30, 2008 to June 30, 2018, 2008=\$100





The foreign equity portfolio generated an annual return of 14.0% over the ten-year period, outperforming its composite passive benchmark by 10.6% per year and the BNY Median Manager return, net of estimated fees, by 10.9% per year. The portfolio's excess return is due to effective security selection by active managers and astute country allocation.

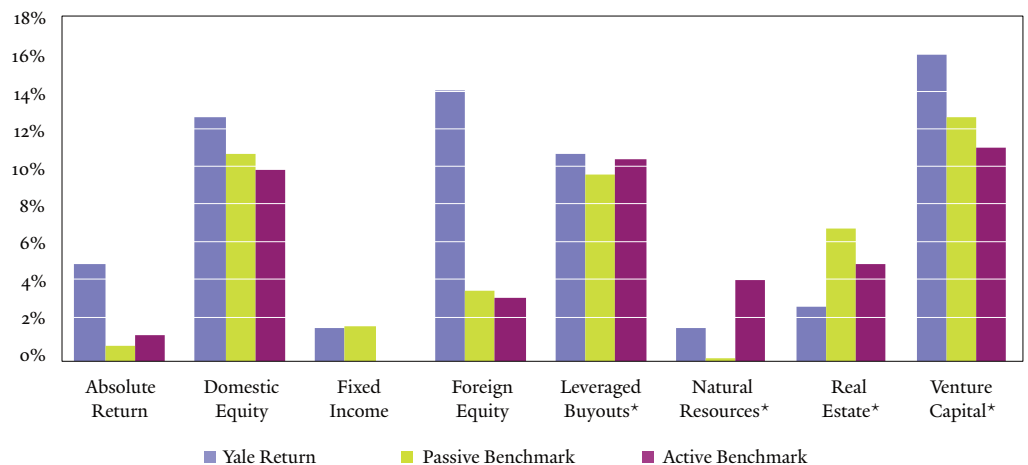
Leveraged buyouts generated an annualized 10.2% return over the decade, outperforming the composite passive benchmark by 0.7% per year and the pool of buyout managers compiled by Cambridge Associates by 0.2% per year.

Yale's natural resources portfolio produced an annualized return of 1.7% over the past decade, surpassing its composite passive benchmark by 1.5% per year, but underperforming the Cambridge Associates natural resources manager pool by 2.3% per year.

Real estate generated a 2.7% annualized return over the ten-year period, underperforming the MSCI U.S. REIT Index by 3.9% per year and the pool of Cambridge Associates real estate managers by 2.1% per year.

The venture capital portfolio earned an annualized return of 16.0% for the ten years ending June 30, 2018, exceeding its composite passive benchmark by 3.6% per year and the Cambridge Associates venture capital manager pool by 5.1% per year.

### Yale Asset Class Results Beat Most Benchmarks June 30, 2008 to June 30, 2018



\* Yale Returns and Active Benchmarks are dollar-weighted.

#### Passive Benchmarks

*Absolute Return:* Barclays 9-12 Month Treasury  
*Domestic Equity:* Wilshire 5000  
*Fixed Income:* Barclays 1-3 Year Treasury (Barclays 1-5 Year Treasury from July 2008 to September 2013)  
*Foreign Equity:* Blend of MSCI EAFE Investable Market Index, MSCI Emerging Markets Investable Market Index, MSCI China A-Share Investable Market Index  
*Leveraged Buyouts:* Blend of Russell 2000, MSCI ACWI ex-U.S. Small-Cap Index  
*Natural Resources:* Blend of Custom Timber REIT Basket, S&P O&G Exploration & Production Index, Euromoney Global Mining Index  
*Real Estate:* MSCI U.S. REIT Index  
*Venture Capital:* Blend of Russell 2000 Technology, MSCI China Small-Cap Index, MSCI India Small-Cap Index

#### Active Benchmarks

*Absolute Return:* Credit Suisse and Inverse Wilshire 5000 Composite  
*Domestic Equity:* BNY Median Manager, U.S. Equity, with fee adjustment of 78 basis points per annum  
*Foreign Equity:* BNY Median Manager Composite, Foreign Equity, with fee adjustment of 81 basis points per annum for developed equity and 97 basis points per annum for emerging equity  
*Leveraged Buyouts:* Cambridge Associates Leveraged Buyouts Composite  
*Natural Resources:* Cambridge Associates Natural Resources  
*Real Estate:* Cambridge Associates Real Estate  
*Venture Capital:* Cambridge Associates Global Venture Capital

## Tjalling C. Koopmans

1910–1985

Nobel Prize in Economic Sciences, 1975

Tjalling C. Koopmans, the Alfred Cowles Professor of Economics, and Russian economist Leonid Vitaliyevich Kantorovich shared the 1975 Sveriges Riksbank Prize in Economic Sciences for their independent analyses of the optimal allocation of scarce resources. Both developed econometric models for transportation unit scheduling.

In addition to his important role in the theory of the allocation of scarce resources, Koopmans developed statistical methods for the analysis of economic data. In both areas, Koopmans employed the methods of other quantitative disciplines for the purposes of economics; mathematical statistics became econometrics and linear programming became the activity analysis model of production. Koopmans was concerned with the study of economic growth and the economic consequences of the depletion of nonrenewable resources. Koopmans combined his mathematical aptitude with a deep concern for the ultimate practical applications of his work.

Koopmans received his master's degree from the University of Utrecht in 1933 and his PH.D. from the University of Leiden in 1936. During World War II, Koopmans worked in Washington as a statistician for the British Merchant Shipping Mission. In 1944, Koopmans joined the staff of the Cowles Commission for Research in Economics, affiliated with the University of Chicago, becoming Director of Research in 1948. He joined Yale in 1955 as a full professor and became the University's first Alfred Cowles Professor of Economics when the chair was endowed in 1970. He served as director of the Cowles Foundation for Research in Economics from 1961 to 1967.



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### *Alfred Cowles Professorship of Economics*

*The professorship was established in 1970 by the Cowles Foundation in memory of Alfred Cowles, B.A. 1913, the founder of the Cowles Commission for Research in Economics, which has resided at Yale since 1955. Cowles elevated economics into a more precise science using mathematical and statistical techniques. Since its creation, the foundation has helped foster the development and application of rigorous logical, mathematical, and statistical methods of analysis.*



## George E. Palade

1912–2008

Nobel Prize in Physiology or Medicine, 1974

George E. Palade, who founded the Section of Cell Biology at the Yale School of Medicine, redefined the field of cell physiology. He, Albert Claude, and Christian de Duve shared the 1974 Nobel Prize in Physiology or Medicine for their influential findings on structural and functional cell organization.

Beginning in the 1940s, Palade pioneered the use of electron microscopy and other techniques to discover tiny structures within cells and to discern their functions. He discovered the ribosome, the cell's protein-making factory, and helped explain the way proteins are transported out of the cell. Such discoveries later proved useful in understanding diseases and in the protein production that is the basis of the biotechnology industry.

Born in Romania, Palade received his medical degree from the School of Medicine of the University of Bucharest, Romania. He was a member of the faculty of that school until 1945, when he came to the United States for postdoctoral studies. Palade joined Claude at the Rockefeller Institute for Medical Research in 1946 and was appointed assistant professor there in 1948. He was later named a full professor and head of the Laboratory of Cell Biology.

In 1973 he moved to Yale, where he established the Section of Cell Biology. Palade held the Sterling Professorship of Cell Biology from 1975 to 1983, when the section, upon his retirement as chair, became the Department of Cell Biology.

In 1983 he was named senior research scientist, professor emeritus of cell biology, and special adviser to the dean.

In 1990, at age seventy-seven, Palade became the first dean for scientific affairs at the School of Medicine at the University of California-San Diego. He retired in 2001. The school named a building for him in 2004 and a professorship was endowed in his name in 2006.

Palade won many awards, including the Albert Lasker Basic Medical Research Award and the National Medal of Science.



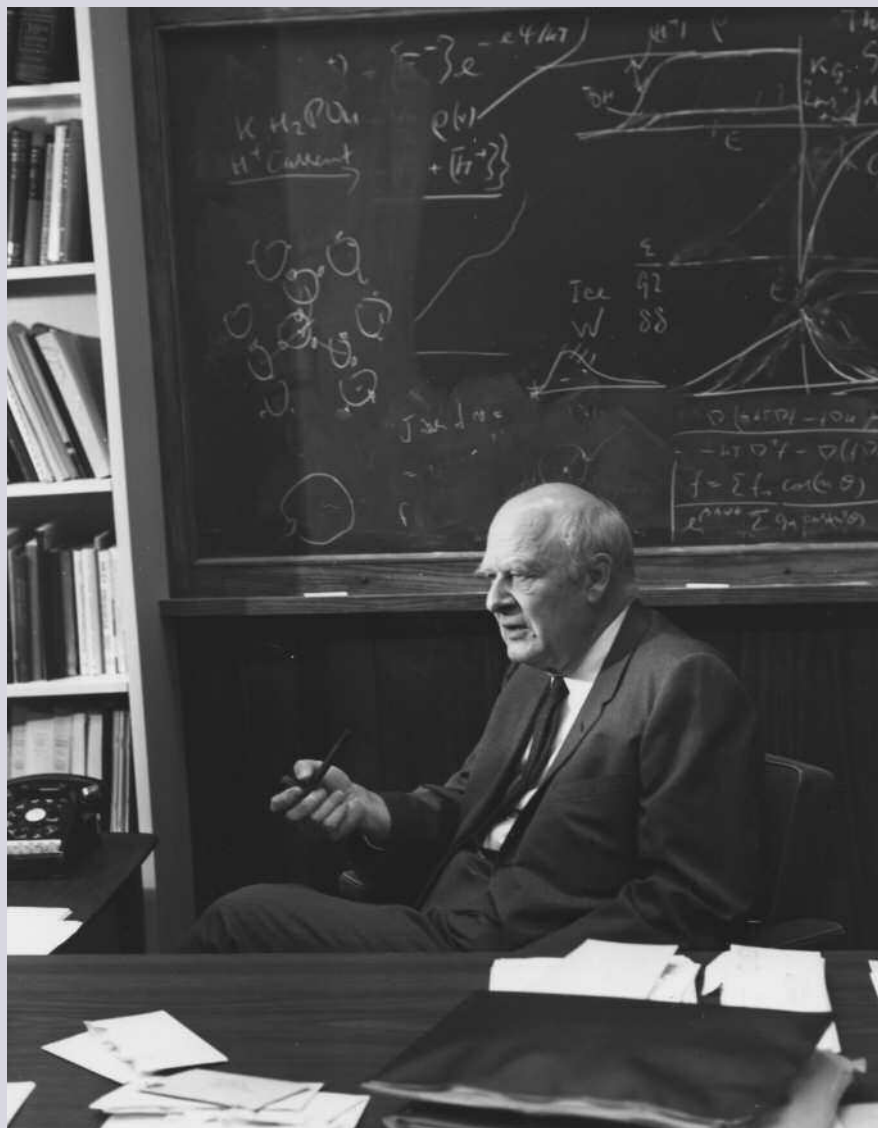
## Lars Onsager

1903–1976

Nobel Prize in Chemistry, 1968

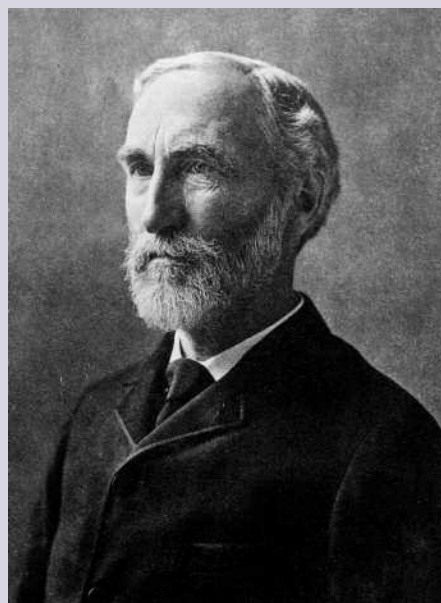
Lars Onsager was Yale University's first resident Nobel Laureate, receiving the Nobel Prize in Chemistry in 1968 for his discovery of the Onsager reciprocal relations in the thermodynamics of irreversible processes. Over the years, his subjects of interest came to include colloids, dielectrics, order-disorder transitions, metals and superfluids, hydrodynamics, and fractionation theory.

Onsager earned a CH.E. in chemical engineering from the Norwegian Institute of Technology in 1925 and a PH.D. in chemistry from Yale in 1933. He taught at Johns Hopkins University and Brown University before accepting a fellowship at Yale in 1933. Onsager went on to serve as assistant professor (1934–1940), associate professor (1940–1945), and the Josiah Willard Gibbs Professor of Theoretical Chemistry (1945–1972).



### *Josiah Willard Gibbs Professorship of Theoretical Chemistry*

*Yale professor Irving Fisher, B.A. 1888, PH.D. 1891, created the professorship in 1927 in honor of Josiah Willard Gibbs to help support a Yale faculty member in the chemistry, physics, or mathematics department. Yale conferred the first American PH.D. in engineering on Gibbs in 1863, who then joined the Yale faculty as the first professor of mathematical physics in the United States. He made fundamental contributions to the fields of statistical mechanics, vector calculus, and thermodynamics.*



## Management and Oversight

# 6

Since 1975, the Yale Corporation Investment Committee has been responsible for oversight of the Endowment, incorporating senior-level investment experience into portfolio policy formulation. The Investment Committee consists of at least three Fellows of the Corporation and other persons who have particular investment expertise. The Committee meets quarterly, at which time members review asset allocation policies, Endowment performance, and strategies proposed by Investments Office staff. The Committee approves guidelines for investment of the Endowment portfolio, specifying investment objectives, spending policy, and approaches for the investment of each asset category.

### *Investment Committee*

Douglas A. Warner, III '68  
Chairman  
*Former Chairman*  
*J.P. Morgan Chase & Co.*

Francis Biondi '87  
*Managing Member*  
*King Street Capital Management*

Michael J. Cavanagh '88  
*Senior Executive Vice President and CFO*  
*Comcast Corporation*

Charles W. Goodyear IV '80  
*President*  
*Goodyear Investment Company*

Ben Inker '92  
*Partner*  
*GMO*

Ann Miura-Ko '98  
*Co-Founder*  
*Floodgate*

John Shrewsberry '92 MPPM  
*Senior Executive Vice President and CFO*  
*Wells Fargo & Company*

Peter Salovey '86 PH.D.  
*President*  
*Yale University*

Carter Simonds '99  
*Former Managing Director*  
*Blue Ridge Capital*

Josh L. Steiner '87  
*Senior Advisor*  
*Bloomberg L.P.*



Statue of the honoree, in the courtyard of Benjamin Franklin College.

The Investments Office manages the Endowment and other University financial assets, and defines and implements the University's borrowing strategies. Headed by the Chief Investment Officer, the Office currently consists of 32 professionals.

## *Investments Office*

David F. Swensen '80 PH.D. '14 L.H.D.  
*Chief Investment Officer*

Amy M. Chivetta  
*Associate Director*

Dean J. Takahashi '80, '83 MPPM  
*Senior Director*

Michael E. Finnerty  
*Associate Director*

Carrie A. Abildgaard  
*Director*

Patrick K. Sherwood '13 M.B.A.  
*Associate Director*

Alexander C. Banker  
*Director*

Celeste P. Benson  
*Senior Portfolio Manager*

Alan S. Forman  
*Director*

Michael Knight  
*Senior Business Associate*

R. Alexander Hetherington '06  
*Director*

Bertan Akin  
*Senior Performance Associate*

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Timothy H. Hillas '13  
*Senior Associate*

Matthew S. T. Mendelsohn '07  
*Director*

Daniel J. Otto '12  
*Senior Associate*

John V. Ricotta '08  
*Director*

John T. Ryan '14  
*Senior Associate*

Timothy R. Sullivan '86  
*Director*

Laura W. Bass '15  
*Senior Investment Analyst*

Xinchen Wang '09  
*Director*

Robert J. Pecoraro '15  
*Senior Investment Analyst*

Stephanie S. Chan '97  
*Senior Associate General Counsel*

Ahmed L. Sarhan '16  
*Senior Investment Analyst*

Deborah S. Chung  
*Senior Associate General Counsel*

Michael J. Byrnes '18  
*Investment Analyst*

Lauren Caplan  
*Associate General Counsel*

Claire D. Goldsmith '18  
*Investment Analyst*

Sohail S. Ramirez '10 J.D.  
*Associate General Counsel*

Nicholas A. Gomez '18  
*Investment Analyst*

Peter N. Steinwachs  
*Associate General Counsel*

Ilana M. Kamber '18  
*Investment Analyst*

## Yale Faculty Honors

In addition to William Nordhaus's Nobel Prize, many other members of the Yale faculty received recognition for their accomplishments during 2018. The Lasker Foundation honored Joan Steitz for her groundbreaking research on RNA and enduring dedication to mentoring women scientists. Hee Oh won the 2018 Ho-Am Prize in Science for her contributions to the

field of homogeneous dynamics. Gregg Gonsalves earned a MacArthur Fellowship for his dedication to improving public health and advancing human rights. Reva Siegel was elected to the American Philosophical Society. David Hafler was elected to the National Academy of Medicine, and the National Academy of Engineering elected W. Mark Saltzman to

join its ranks. Six Yale faculty members were elected to the National Academy of Sciences: David Bercovici, Igor Frenkel, Akiko Iwasaki, Haifan Lin, David Schatz, and Günter Wagner. Three were elected to the American Academy of Arts and Sciences: John Collins, Haifan Lin, and Gerald Shulman.



David Bercovici



John Collins



Igor Frenkel



Gregg Gonsalves



David Hafler



Akiko Iwasaki



Haifan Lin



Hee Oh



W. Mark Saltzman



David Schatz



Gerald Shulman



Reva Siegel



Joan Steitz



Günter Wagner

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Educational institution asset allocations and returns from Cambridge Associates.

Much of the material in this publication is drawn from memoranda produced by the Investments Office for the Yale Corporation Investment Committee. Other material comes from Yale's financial records, Reports of the Treasurer, and Reports of the President.

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Yale University Office of Development

Yale University Office of the President

Other material on Yale-affiliated Nobel laureates from Yale Office of Public Affairs & Communications

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#### Design

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Back cover: A recent Baccalaureate ceremony in Woolsey Hall, during Commencement weekend.

