

A decorative grid of 15 square images arranged in a 5x3 pattern. The images include: a green-tinted financial table with numbers, a blue-tinted abstract image, a green-tinted abstract image, a blue-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, a green-tinted abstract image, and a green-tinted abstract image.

# North Dakota Legacy Fund

## Asset Allocation Study & Spending Policy Analysis

September 28, 2012

Presented by Ron Klotter, CFA, Josh Kevan, CFA,  
and John McLaughlin, CFA

RVKuhns  
▶▶▶ & ASSOCIATES, INC.



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# Proposed Team

**A highly experienced team that strives for excellence in service quality**



## **Ronald L. Klotter, CFA – Director of Midwest Consulting, Senior Consultant**

Ron Klotter is a Senior Consultant and of Midwest Consulting operations with R.V. Kuhns & Associates, Inc. and is located in our Chicago office. Ron has 27 years of experience working in the investment consulting and investment management industries. Prior to joining RVK, Ron most recently was a Principal at Hewitt EnnisKnupp in Chicago. Ron also has held senior investment management positions with Wellington Management Company, Brinson Partners/UBS, and INVESCO. In addition to his consulting responsibilities, Ron has responsibility for coordinating and overseeing our Midwest consulting activities.

Ron has extensive experience working with a wide range of clients, including endowments and foundations, corporations, and public entities. Ron has conducted extensive research on several key topics in the investment consulting industry and is a frequent speaker at major industry conferences. Ron earned his Bachelor of Science degree in Finance with honors from Miami University in Oxford, Ohio and a Master of Business Administration degree from Northwestern University in Evanston, Illinois. Ron holds the Chartered Financial Analyst designation. He is a member of the CFA Institute and a member of the Chicago Society of Financial Analysts.



## **Joshua R. Kevan, CFA – Senior Consultant, Principal**

Josh Kevan is a Senior Consultant with R.V. Kuhns & Associates, Inc. He is based in Boise, Idaho and is supported by our Portland office. Josh joined RVK in 2000. As a Senior Consultant he advises a diverse mix of clients that include defined benefit plans, defined contribution plans, insurance companies, and other special purpose funds. In addition to his consulting relationships, he is involved in the firm's investment manager research and due diligence efforts.

Josh earned a Bachelor of Arts degree in Business from the University of Washington and holds the Chartered Financial Analyst designation. Josh is a shareholder, and also serves on the company's board of directors and its executive committee.



# Proposed Team

**A highly experienced team that strives for excellence in service quality**



## **John P. McLaughlin, CFA – Consultant**

John joined R.V. Kuhns & Associates, Inc. in 2009 and currently serves as Consultant to a number of the firm's public and private clients across a wide range of plan types. John is located in our Chicago, Illinois office. Prior to joining RVK, John worked for Russell Investments where he helped manage derivative portfolios for a number of Fortune 500 companies and state governments. Additionally, John consulted nationally to investment management and advisory firms on strategic business issues in his previous role with Moss Adams LLP. He has also worked at Mercer Consulting, where he conducted research for executive compensation projects at publically traded clients.

John graduated Magna Cum Laude from Seattle University, where he earned his Bachelor of Arts degree in Business Administration with a major in Finance and a minor in Economics. John also holds the Chartered Financial Analyst designation. He is a member of the CFA Institute and the CFA Society of Chicago.



## **William Lee – Investment Associate**

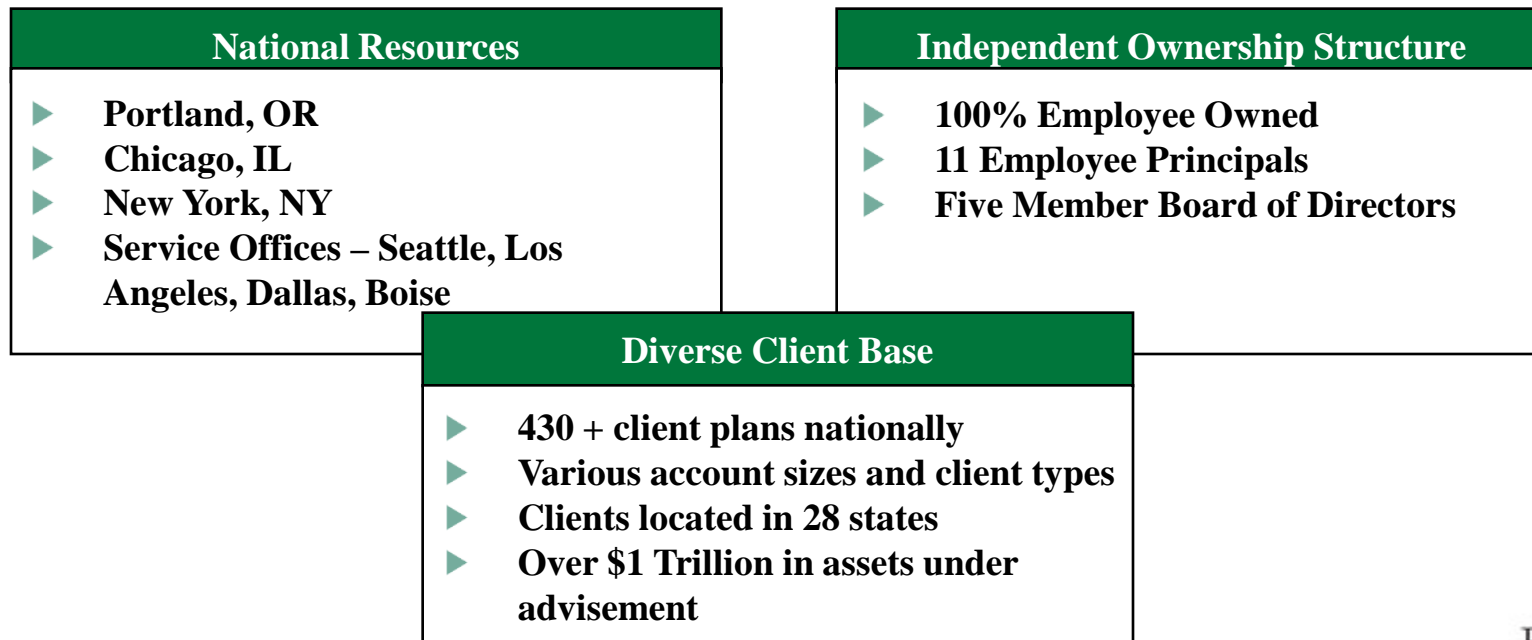
William is an Investment Associate and is located in our Chicago office. Prior to joining RVK, he worked at Cambridge Associates as an international investment performance analyst. His responsibilities within that role included leading a cross-functional team in coordination of monthly and quarterly performance reporting for endowed institutions and high-net-worth private clients. William's previous experience also includes working at The Proctor and Gamble Company as a Finance and Accounting Manager-Intern and experience with the Phi Kappa Tau Executive Offices as a senior project manager.

William earned a Bachelor of Science in Business with a major in Finance and a minor in Chinese from the Farmer School of Business at Miami University, Oxford, Ohio.



# RVK Firm Overview

- ▶ RVK has a diversified client base covering 28 states and is one of the ten largest U.S investment consultants as measured by *Pensions & Investments Age*.
- ▶ Our sole business is evaluating, implementing and monitoring successful investment programs on behalf of our institutional clientele.
- ▶ RVK has no conflicts of interests and 100% of our revenue comes from cash payments from our clients. We accept no commissions and sell no services to investment managers.
- ▶ RVK headquarters are in Portland, Oregon, with large regional offices in Chicago and New York.
- ▶ RVK has embraced a strict code of ethics since its inception in 1985.





# RVK Firm Overview

**RVK provides full-service consulting solutions to assist clients in their roles as fiduciaries for the funds that they manage.**

## General Consulting

- ▶ Trustee Education
- ▶ Investment Policy Review and Development
- ▶ Risk Budgeting
- ▶ **Spending Analysis**
- ▶ **Asset Allocation Analysis**
- ▶ Manager Search and Evaluation
- ▶ Manager Monitoring and Due Diligence
- ▶ Performance Reporting – Total Fund
- ▶ Performance Reporting – Alternative Asset Classes
- ▶ Manager Structure Studies
- ▶ Compliance Monitoring and Analysis

## Defined Contribution Plan Solutions

- ▶ Plan Structure
- ▶ Industry Trend Analysis
- ▶ Third Party Administrator Evaluation
- ▶ Investment Selection and Monitoring
- ▶ Plan Operations and Platform Analysis
- ▶ Fiduciary Policy Development and Implementation
- ▶ Participant Education

## Specialty Consulting

- ▶ Due Diligence & Pacing Studies
- ▶ Alternative Asset Due Diligence and Pacing
  - ▶ Private Equity Fund of Funds
  - ▶ Real Return Strategies
  - ▶ Hedge Fund of Funds
- ▶ **Stochastic Risk Analysis and Modeling**
- ▶ Liability Driven Investing Studies
- ▶ Asset Liability Modeling
- ▶ **Legislative Issues Support**
- ▶ Strategic Planning and Organization Analysis
- ▶ Special Projects

## Investment Operations Solutions

- ▶ Securities Lending Program Development
- ▶ Trade Execution Analysis
- ▶ Compliance Monitoring
- ▶ Organizational and Compensation Analysis
- ▶ Trust/Custody Searches and Evaluation
- ▶ Prime Brokerage Due Diligence and Selection
- ▶ Cash Management Program Development
- ▶ Transition Management



# RVK Firm Overview

## Representative Client List – Significant Public Fund Presence

### Public Fund Clients

- ▶ California Department of Human Resources - SPP
- ▶ City of Phoenix 401(a) & 457 Plans
- ▶ City of Phoenix Employees' Retirement System
- ▶ City of Phoenix MERP & LTD Trusts
- ▶ Commissioners of the Land Office, State of OK
- ▶ Commonwealth of Pennsylvania State Employees' Retirement System
- ▶ Employees Retirement System of Texas
- ▶ Kentucky Retirement System
- ▶ Memphis City Schools
- ▶ Montana State Board of Investments
- ▶ New Mexico State Investment Council
- ▶ New York State Common Retirement Fund
- ▶ Ohio Bureau of Workers' Compensation
- ▶ PERA of New Mexico
- ▶ Public Employees' Retirement Assn. of Colorado 401 (k)
- ▶ San Diego Transit Corporation Employees' Retirement Plan
- ▶ San Francisco Bay Area Rapid Transit District
- ▶ State of Michigan Retirement Systems
- ▶ State of New Jersey Department of Investment
- ▶ Teachers' Retirement System of the State of Illinois
- ▶ Texas Municipal Retirement System
- ▶ University of Oklahoma 401(a), 403(b) and 457(b) Plans
- ▶ Wyoming State Treasurer's Office



# RVK Firm Overview

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## Our Culture – How We Are Different

- ▶ **Collegial**
  - ▶ We foster a culture in which all employees respect each other and work together.
  - ▶ We want people that are excited to come to work every day.
  
- ▶ **Client Focused**
  - ▶ Everything we do is with our clients in mind.
  - ▶ Investment consulting is our only business and source of revenue, and has our complete focus.
  
- ▶ **Highest Ethical Standards**
  - ▶ We always adhere to our company Code of Ethics.
  - ▶ An ethical focus permeates our organization.
  
- ▶ **Employee Ownership and Objectivity**
  - ▶ RVK is 100% employee-owned and all owners must be active employees.
  - ▶ Ownership will continue to be shared broadly within the organization.

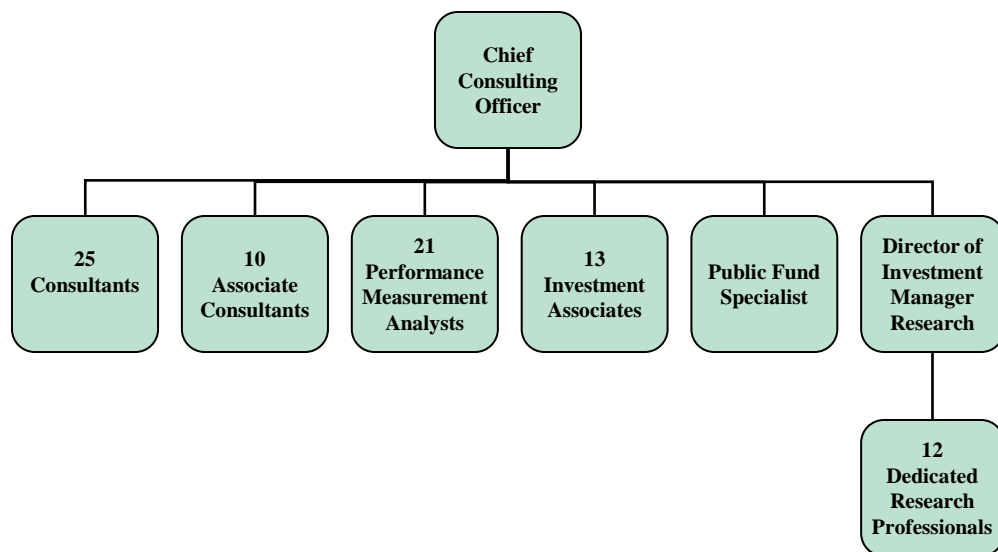




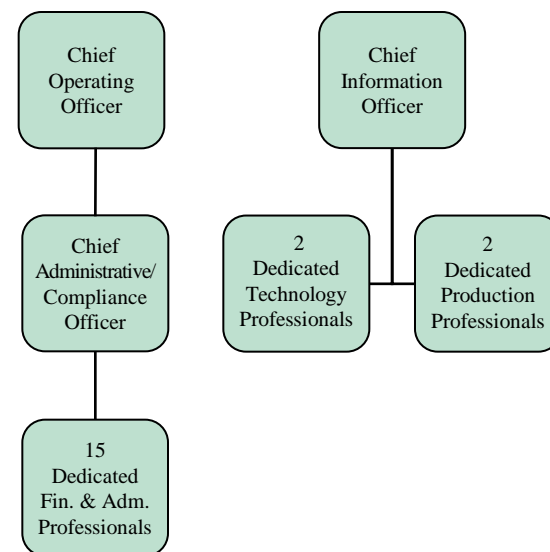
# RVK Firm Overview

RVK has significant depth of resources

## Investment Consulting



## Company Operations

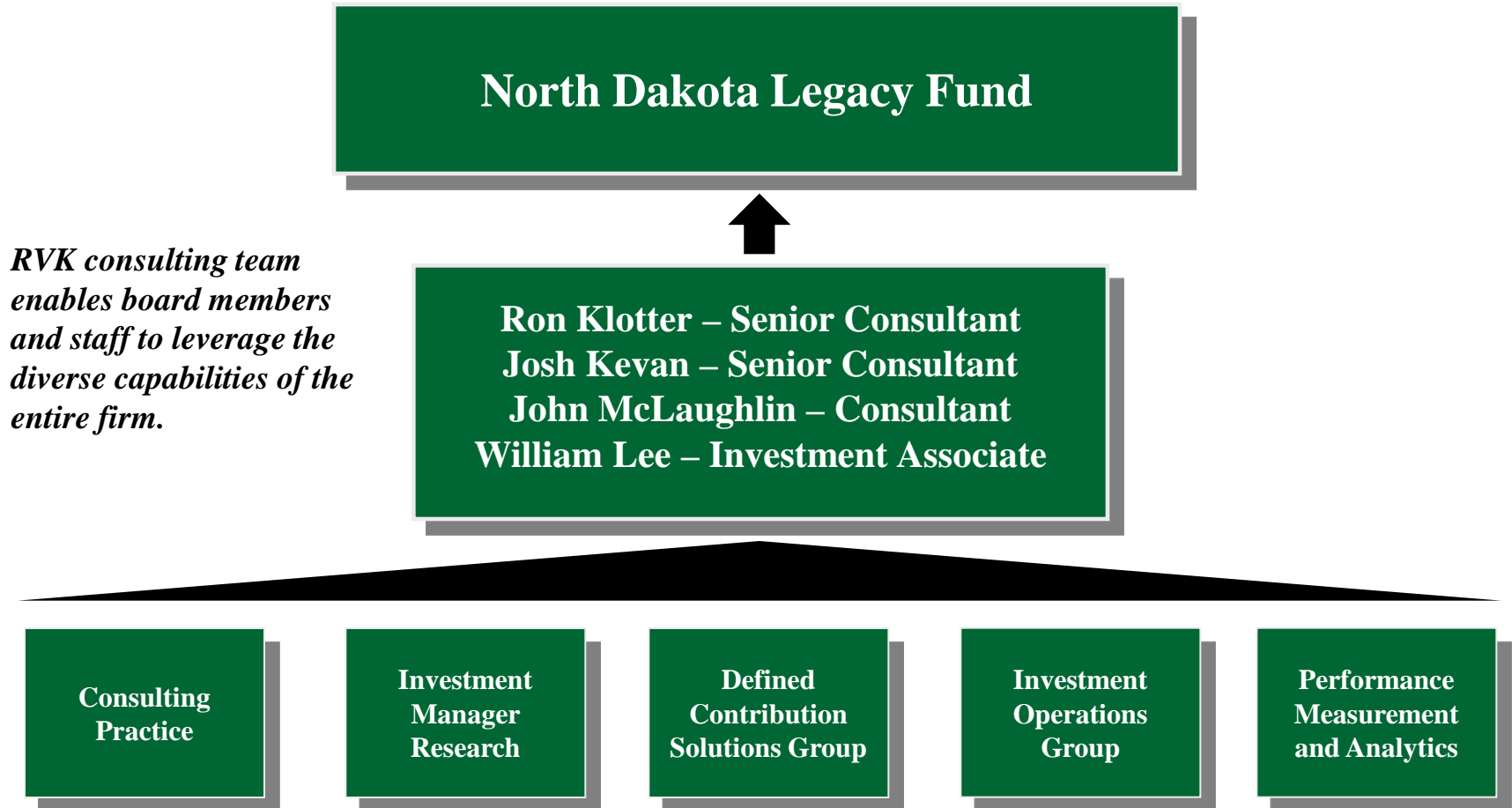


## Highlights

- ▶ RVK is well-staffed to provide both breadth and depth across key investment functions, such as investment consulting, manager research, and general investment research.
- ▶ RVK maintains expected infrastructure to ensure operational excellence in the delivery of consulting services and financial management of the firm.



# Team Consulting Model



**The RVK team approach provides North Dakota Legacy Fund with direct access to all of RVK's resources**



# RVK Capital Markets Research

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## **Jim M. Voytko – President, Chief Operating Officer, Director of Research, Senior Consultant, Principal**

Jim is President, COO, Director of Research, and a Senior Consultant with R.V. Kuhns & Associates, Inc. and is located in our Portland office. He joined the firm in 2004. Prior to joining RVK, Jim was the CEO/Executive Director of Oregon's statewide pension system for all employees of state and local governments, police and fire, teachers and higher education, statewide retiree health care insurance program, and statewide 457 deferred compensation program. Jim also served on the five member Oregon Investment Committee, which directed the investment of all statewide funds including the Oregon PERS pension fund, Oregon's 457 Plan and the state's Workers Compensation Fund, all totaling approximately \$45 billion. Jim's experience also includes serving as Director of Research for Paine Webber, CIO and Managing Director of PNC Asset Management Group/PNC Advisors, and the deputy director and Chief Operating Officer of PaineWebber's Investment Banking Division. He has served as a trustee on corporate DB and DC plans and is member of the National Association of Business Economists and the Portland City Club.

Jim earned his Bachelor of Arts degree from Carnegie Mellon University, a Master of Public Administration degree from the University of Washington, and Master of Public Policy degree from Harvard University. Jim is a shareholder of the firm.



## **Jeremy Miller – Director of Capital Markets Research, Consultant**

Jeremy is a Consultant and the Director of Capital Markets Research. He joined R.V. Kuhns & Associates, Inc. in 2006. Jeremy is based in the greater Los Angeles area and is supported by our Portland office. He is responsible for client servicing across multiple Plan types, as well as general research, modeling, and project work. His previous experience includes a variety of financial consulting projects while at KPMG Consulting.

Jeremy graduated from Yale University with a Master of Business Administration degree from the School of Management, as well as from Brigham Young University with a Bachelor of Science degree in Economics.



# Capital Markets Assumptions

- ▶ Capital Markets (CM) assumptions are almost always wrong, especially for any short or intermediate time period. What really matters is how “right” they are over the long run.
- ▶ “Relative” accuracy “well distributed” across the assumptions set is far more important than “barbell” accuracy—where some assumptions are “spot on” and others are far off.
- ▶ “Relative” accuracy “well distributed” across the assumptions set leads to well-diversified portfolios. “Barbell” accuracy produces the opposite—unbalanced, poorly diversified funds.
- ▶ Achieving “relative,” “well distributed” accuracy across a CM assumptions set, requires that every risk and return assumption needs to be “triangulated” to all other assumptions—particularly closely related ones.
- ▶ Absolute accuracy is still important –
  - ▶ Return assumptions that are “too low” may lead to excessive risk taking in order to meet pre-determined return objectives.
  - ▶ Return assumptions that are “too high” can lead to unsustainable spending policies.



# Capital Markets Assumptions

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## Long-Term Nature

- ▶ Forecast Period => 10 Years
- ▶ Trying to manage a large institutional portfolio to take advantage of one-year-ahead economic and CM forecasts—called Tactical Asset Allocation (TAA)—is a dicey and expensive proposition that very few have done well. Markets move quickly, often much faster than assets can be shifted from one asset class to another. A mistake can prove very costly.



# RVK Assumption Setting Process

- ▶ A good set of CM assumptions is so critical to our core business, that we:
  - ▶ Deploy a team of RVK professionals each year to focus on each asset class.
  - ▶ Poll our consultants annually as to where they believe CM assumptions need review.
  - ▶ Utilize historical data, current market data, financial theory, economic forecasts, product performance, and other factors to create our risk/return/correlation forecasts.
  - ▶ Ensure that all of our consultants formally review, critique, and ultimately support our CM assumptions.
  - ▶ Create a white paper and a PowerPoint presentation annually to support our CM assumptions and document their development.
  - ▶ Test every revised assumptions set on real client portfolios before we put them into use, looking for anomalies, major changes in the fund's asset allocation, or signs of reduced diversification—all potential warning signs of faulty assumptions.



# Capital Market Assumptions

## What a client should keep in mind when evaluating...

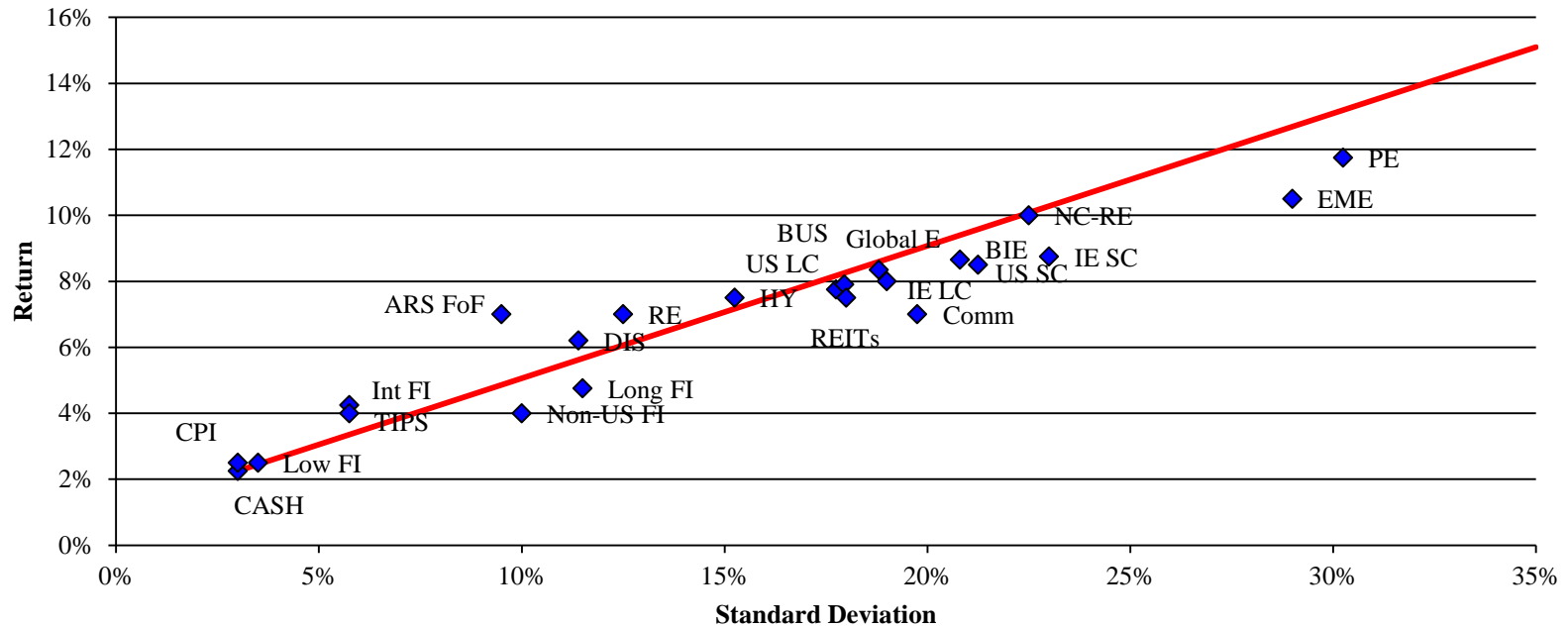
- ▶ Consultants are competitive and want to win business. Using excessively high CM assumptions across the board is one way to win business by suggesting clients *will* earn high returns.
- ▶ Remember, these are *forecasts* only, and their chief purpose is to optimally structure the portfolio. Well-structured funds are produced by “well-distributed accuracy” *not* simply “forecasting” higher returns. And well-structured funds end up with higher long-term returns and lower risk.
- ▶ A well-structured and well-executed fund will produce the highest returns the markets will allow—*regardless* of what consultants forecast for total return.
- ▶ RVK does not manage assets and does not offer investment products and our capital markets assumptions are unbiased by potentially conflicted activities.



# Capital Market Assumptions

2012

2012 Capital Market Line





# RVK's 2012 CM Assumptions

| Asset Class                                 | 2011                |                    |                   | 2012                |                    |                   | Change (2012 - 2011) |                    |                   |
|---|---------------------|--------------------|-------------------|---------------------|--------------------|-------------------|----------------------|--------------------|-------------------|
|   | Return (Arithmetic) | Standard Deviation | Return (Compound) | Return (Arithmetic) | Standard Deviation | Return (Compound) | Return (Arithmetic)  | Standard Deviation | Return (Compound) |
| Global Equity                               | 8.45%               | 18.45%             | 6.91%             | 8.35%               | 18.80%             | 6.75%             | -0.10%               | 0.35%              | -0.16%            |
| Large/Mid Cap US Equity                     | 8.00%               | 17.75%             | 6.57%             | 7.75%               | 17.75%             | 6.32%             | -0.25%               | 0.00%              | -0.25%            |
| Small Cap US Equity                         | 8.75%               | 21.75%             | 6.64%             | 8.50%               | 21.25%             | 6.48%             | -0.25%               | -0.50%             | -0.16%            |
| Broad US Equity                             | 8.15%               | 18.10%             | 6.67%             | 7.90%               | 17.95%             | 6.44%             | -0.25%               | -0.15%             | -0.23%            |
| Dev'd Large/Mid Cap Int'l Equity            | 8.00%               | 18.75%             | 6.41%             | 8.00%               | 19.00%             | 6.37%             | 0.00%                | 0.25%              | -0.04%            |
| Dev'd Small Cap Int'l Equity                | 8.75%               | 22.75%             | 6.45%             | 8.75%               | 23.00%             | 6.40%             | 0.00%                | 0.25%              | -0.05%            |
| Emerging Markets Equity                     | 10.50%              | 28.50%             | 7.00%             | 10.50%              | 29.00%             | 6.88%             | 0.00%                | 0.50%              | -0.12%            |
| Broad International Equity                  | 8.65%               | 20.10%             | 6.84%             | 8.65%               | 20.80%             | 6.71%             | 0.00%                | 0.70%              | -0.13%            |
| Intermediate Duration Fixed Income          | 4.50%               | 5.50%              | 4.36%             | 4.25%               | 5.75%              | 4.09%             | -0.25%               | 0.25%              | -0.26%            |
| Non-US Dev'd Sovereign Fixed Income UH TIPS | 4.25%               | 9.75%              | 3.80%             | 4.00%               | 10.00%             | 3.52%             | -0.25%               | 0.25%              | -0.27%            |
| Low Duration Fixed Income                   | 4.25%               | 5.75%              | 4.09%             | 4.00%               | 5.75%              | 3.84%             | -0.25%               | 0.00%              | -0.25%            |
| Long Duration Fixed Income                  | 3.00%               | 3.50%              | 2.94%             | 2.50%               | 3.50%              | 2.44%             | -0.50%               | 0.00%              | -0.50%            |
| High Yield                                  | 5.25%               | 10.50%             | 4.73%             | 4.75%               | 11.50%             | 4.12%             | -0.50%               | 1.00%              | -0.61%            |
| Diversified Inflation Strategies            | 6.75%               | 14.50%             | 5.78%             | 7.25%               | 15.00%             | 6.22%             | 0.50%                | 0.50%              | 0.44%             |
| Commodities                                 | 6.25%               | 11.25%             | 5.66%             | 6.20%               | 11.40%             | 5.59%             | -0.05%               | 0.15%              | -0.07%            |
| Core Real Estate                            | 7.25%               | 19.75%             | 5.48%             | 7.00%               | 19.75%             | 5.22%             | -0.25%               | 0.00%              | -0.25%            |
| Non-Core Real Estate                        | 7.00%               | 12.50%             | 6.28%             | 7.00%               | 12.50%             | 6.28%             | 0.00%                | 0.00%              | 0.00%             |
| Global REITs                                | 10.00%              | 21.50%             | 7.96%             | 10.00%              | 22.50%             | 7.77%             | 0.00%                | 1.00%              | -0.19%            |
| Absolute Return FoF - Multi Strategy        | 7.25%               | 18.00%             | 5.77%             | 7.50%               | 18.00%             | 6.02%             | 0.25%                | 0.00%              | 0.25%             |
| Private Equity                              | 7.50%               | 9.00%              | 7.13%             | 7.00%               | 9.50%              | 6.58%             | -0.50%               | 0.50%              | -0.54%            |
| Cash Equivalents                            | 12.25%              | 30.25%             | 8.38%             | 11.75%              | 30.25%             | 7.87%             | -0.50%               | 0.00%              | -0.52%            |
| US Inflation                                | 2.25%               | 3.00%              | 2.21%             | 2.25%               | 3.00%              | 2.21%             | 0.00%                | 0.00%              | 0.00%             |
|   | 2.50%               | 3.00%              | 2.46%             | 2.50%               | 3.00%              | 2.46%             | 0.00%                | 0.00%              | 0.00%             |

Blue highlighted cells indicate values are being calculated based on a roll up of underlying asset classes.

Global Equity is a combination of 45% Broad US Equity and 55% Broad International Equity.

Broad US Equity is a combination of 82% Large/Mid Cap US Equity and 18% Small Cap US Equity.

Broad International Equity is a combination of 67.5% Dev'd Large/Mid Cap Int'l Equity, 9.4% Dev'd Small Cap Int'l Equity, and 23.2% Emerging Markets Equity.

Diversified Inflation Strategies is a combination of 1/3 TIPS, 1/3 Global REITs, and 1/3 Commodities.

# RVK's 2012 Correlation Matrix

|                                     | Global Equity | Large/Mid Cap US Equity | Small Cap US Equity | Broad US Equity | Dev'd Large/Mid Int'l Equity | Dev'd Small Int'l Equity | Emerging Markets Equity | Broad International Equity | Int. Duration Fixed Income | Non-US Dev'd Fixed Income UH | TIPS  | Low Duration Fixed Income | Long Duration Fixed Income | High Yield Fixed Income | Diversified Inflation Strategies | Core Real Estate | Non-Core Real Estate | Global REITs | Absolute Return FoF- Multi Strategy | Commodities | Private Equity | Cash Equivalents | U.S. Inflation |
|-------------------------------------|---------------|-------------------------|---------------------|-----------------|------------------------------|--------------------------|-------------------------|----------------------------|----------------------------|------------------------------|-------|---------------------------|----------------------------|-------------------------|----------------------------------|------------------|----------------------|--------------|-------------------------------------|-------------|----------------|------------------|----------------|
| Global Equity                       | 1.00          | 0.93                    | 0.86                | 0.95            | 0.96                         | 0.91                     | 0.87                    | 0.97                       | 0.01                       | 0.23                         | 0.10  | -0.08                     | 0.01                       | 0.69                    | 0.73                             | 0.38             | 0.27                 | 0.81         | 0.69                                | 0.46        | 0.76           | -0.04            | 0.05           |
| Large/Mid Cap US Equity             | 0.93          | 1.00                    | 0.85                | 0.99            | 0.84                         | 0.75                     | 0.75                    | 0.83                       | 0.22                       | 0.06                         | 0.06  | 0.14                      | 0.23                       | 0.60                    | 0.62                             | 0.28             | 0.25                 | 0.69         | 0.49                                | 0.32        | 0.72           | 0.04             | 0.01           |
| Small Cap US Equity                 | 0.86          | 0.85                    | 1.00                | 0.89            | 0.76                         | 0.75                     | 0.74                    | 0.79                       | 0.11                       | -0.01                        | 0.02  | 0.05                      | 0.10                       | 0.62                    | 0.63                             | 0.22             | 0.17                 | 0.68         | 0.49                                | 0.33        | 0.70           | -0.01            | -0.01          |
| Broad US Equity                     | 0.95          | 0.99                    | 0.89                | 1.00            | 0.85                         | 0.77                     | 0.77                    | 0.84                       | 0.20                       | 0.05                         | 0.06  | 0.12                      | 0.19                       | 0.62                    | 0.64                             | 0.29             | 0.24                 | 0.71         | 0.51                                | 0.34        | 0.73           | 0.03             | -0.01          |
| Dev'd Large/Mid Int'l Equity        | 0.96          | 0.84                    | 0.76                | 0.85            | 1.00                         | 0.95                     | 0.82                    | 0.99                       | 0.02                       | 0.33                         | 0.12  | -0.06                     | 0.03                       | 0.65                    | 0.73                             | 0.38             | 0.26                 | 0.80         | 0.66                                | 0.47        | 0.71           | -0.05            | 0.04           |
| Dev'd Small Int'l Equity            | 0.91          | 0.75                    | 0.75                | 0.77            | 0.95                         | 1.00                     | 0.85                    | 0.93                       | 0.08                       | 0.36                         | 0.20  | -0.04                     | 0.10                       | 0.70                    | 0.79                             | 0.42             | 0.27                 | 0.81         | 0.73                                | 0.57        | 0.62           | -0.12            | 0.10           |
| Emerging Markets Equity             | 0.87          | 0.75                    | 0.74                | 0.77            | 0.82                         | 0.85                     | 1.00                    | 0.88                       | -0.02                      | 0.15                         | 0.13  | -0.10                     | -0.01                      | 0.64                    | 0.72                             | 0.28             | 0.18                 | 0.75         | 0.70                                | 0.48        | 0.64           | -0.11            | 0.05           |
| Broad International Equity          | 0.97          | 0.83                    | 0.79                | 0.84            | 0.99                         | 0.93                     | 0.88                    | 1.00                       | 0.01                       | 0.31                         | 0.14  | -0.07                     | 0.02                       | 0.68                    | 0.76                             | 0.37             | 0.24                 | 0.81         | 0.71                                | 0.51        | 0.72           | -0.08            | 0.06           |
| Int. Duration Fixed Income          | 0.01          | 0.22                    | 0.11                | 0.20            | 0.02                         | 0.08                     | -0.02                   | 0.01                       | 1.00                       | 0.43                         | 0.73  | 0.89                      | 0.94                       | 0.28                    | 0.23                             | -0.04            | -0.04                | 0.20         | 0.14                                | 0.04        | -0.21          | 0.24             | -0.15          |
| Non-US Dev'd Fixed Income UH        | 0.23          | 0.06                    | -0.01               | 0.05            | 0.33                         | 0.36                     | 0.15                    | 0.31                       | 0.43                       | 1.00                         | 0.50  | 0.44                      | 0.38                       | 0.08                    | 0.45                             | 0.02             | -0.06                | 0.35         | 0.09                                | 0.26        | -0.12          | 0.10             | -0.06          |
| TIPS                                | 0.10          | 0.06                    | 0.02                | 0.06            | 0.12                         | 0.20                     | 0.13                    | 0.14                       | 0.73                       | 0.50                         | 1.00  | 0.58                      | 0.66                       | 0.28                    | 0.48                             | 0.20             | 0.14                 | 0.25         | 0.18                                | 0.32        | -0.10          | -0.02            | 0.10           |
| Low Duration Fixed Income           | -0.08         | 0.14                    | 0.05                | 0.12            | -0.06                        | -0.04                    | -0.10                   | -0.07                      | 0.89                       | 0.44                         | 0.58  | 1.00                      | 0.73                       | 0.17                    | 0.13                             | -0.03            | -0.11                | 0.08         | 0.14                                | 0.04        | -0.26          | 0.49             | -0.04          |
| Long Duration Fixed Income          | 0.01          | 0.23                    | 0.10                | 0.19            | 0.03                         | 0.10                     | -0.01                   | 0.02                       | 0.94                       | 0.38                         | 0.66  | 0.73                      | 1.00                       | 0.26                    | 0.19                             | -0.03            | -0.01                | 0.17         | 0.12                                | 0.01        | -0.18          | 0.12             | -0.21          |
| High Yield Fixed Income             | 0.69          | 0.60                    | 0.62                | 0.62            | 0.65                         | 0.70                     | 0.64                    | 0.68                       | 0.28                       | 0.08                         | 0.28  | 0.17                      | 0.26                       | 1.00                    | 0.64                             | 0.14             | 0.09                 | 0.62         | 0.40                                | 0.33        | 0.45           | -0.06            | 0.04           |
| Diversified Inflation Strategies    | 0.73          | 0.62                    | 0.63                | 0.64            | 0.73                         | 0.79                     | 0.72                    | 0.76                       | 0.23                       | 0.45                         | 0.48  | 0.13                      | 0.19                       | 0.64                    | 1.00                             | 0.46             | 0.29                 | 0.86         | 0.63                                | 0.82        | 0.52           | -0.06            | 0.19           |
| Core Real Estate                    | 0.38          | 0.28                    | 0.22                | 0.29            | 0.38                         | 0.42                     | 0.28                    | 0.37                       | -0.04                      | 0.02                         | 0.20  | -0.03                     | -0.03                      | 0.14                    | 0.46                             | 1.00             | 0.91                 | 0.36         | 0.31                                | 0.35        | 0.50           | 0.15             | 0.07           |
| Non-Core Real Estate                | 0.27          | 0.25                    | 0.17                | 0.24            | 0.26                         | 0.27                     | 0.18                    | 0.24                       | -0.04                      | -0.06                        | 0.14  | -0.11                     | -0.01                      | 0.09                    | 0.29                             | 0.91             | 1.00                 | 0.26         | 0.28                                | 0.20        | 0.45           | 0.05             | 0.01           |
| Global REITs                        | 0.81          | 0.69                    | 0.68                | 0.71            | 0.80                         | 0.81                     | 0.75                    | 0.81                       | 0.20                       | 0.35                         | 0.25  | 0.08                      | 0.17                       | 0.62                    | 0.86                             | 0.36             | 0.26                 | 1.00         | 0.48                                | 0.42        | 0.56           | -0.08            | 0.02           |
| Absolute Return FoF- Multi Strategy | 0.69          | 0.49                    | 0.49                | 0.51            | 0.66                         | 0.73                     | 0.70                    | 0.71                       | 0.14                       | 0.09                         | 0.18  | 0.14                      | 0.12                       | 0.40                    | 0.63                             | 0.31             | 0.28                 | 0.48         | 1.00                                | 0.50        | 0.60           | 0.21             | 0.15           |
| Commodities                         | 0.46          | 0.32                    | 0.33                | 0.34            | 0.47                         | 0.57                     | 0.48                    | 0.51                       | 0.04                       | 0.26                         | 0.32  | 0.04                      | 0.01                       | 0.33                    | 0.82                             | 0.35             | 0.20                 | 0.42         | 0.50                                | 1.00        | 0.34           | 0.00             | 0.23           |
| Private Equity                      | 0.76          | 0.72                    | 0.70                | 0.73            | 0.71                         | 0.62                     | 0.64                    | 0.72                       | -0.21                      | -0.12                        | -0.10 | -0.26                     | -0.18                      | 0.45                    | 0.52                             | 0.50             | 0.45                 | 0.56         | 0.60                                | 0.34        | 1.00           | 0.08             | 0.16           |
| Cash Equivalents                    | -0.04         | 0.04                    | -0.01               | 0.03            | -0.05                        | -0.12                    | -0.11                   | -0.08                      | 0.24                       | 0.10                         | -0.02 | 0.49                      | 0.12                       | -0.06                   | -0.06                            | 0.15             | 0.05                 | -0.08        | 0.21                                | 0.00        | 0.08           | 1.00             | 0.37           |
| U.S. Inflation                      | 0.05          | 0.01                    | -0.01               | -0.01           | 0.04                         | 0.10                     | 0.05                    | 0.06                       | -0.15                      | -0.06                        | 0.10  | -0.04                     | -0.21                      | 0.04                    | 0.19                             | 0.07             | 0.01                 | 0.02         | 0.15                                | 0.23        | 0.16           | 0.37             | 1.00           |

Correlation greater than 0.50

Correlation between 0.00 and 0.50

Correlation less than 0.00

# Asset Allocation Modeling Sample

## MVO – Efficient Frontier

Asset classes used in the study. Each asset class has a unique assumption regarding return, risk and correlation.

Asset class constraints that specify the minimum/maximum amount of exposure the model can select. Constraints are based on investment policy objectives and qualitative judgment.

Efficient portfolios constructed by the optimization model based on risk, return and correlation to other assets.

Your portfolios' target allocation

Thematic investing allocations that bucket the asset classes into four distinct investment objectives.

Capital Appreciation includes US and Int'l Equities. Capital Preservation includes Fixed Income. Alpha includes Absolute Return. Inflation includes Real Return and Real Estate.

Expected Return = the long-term weighted average return of the portfolio based on the asset mix identified above.

Risk = the expected portfolio volatility based on the individual asset volatilities, correlations, and asset mixes for each portfolio.

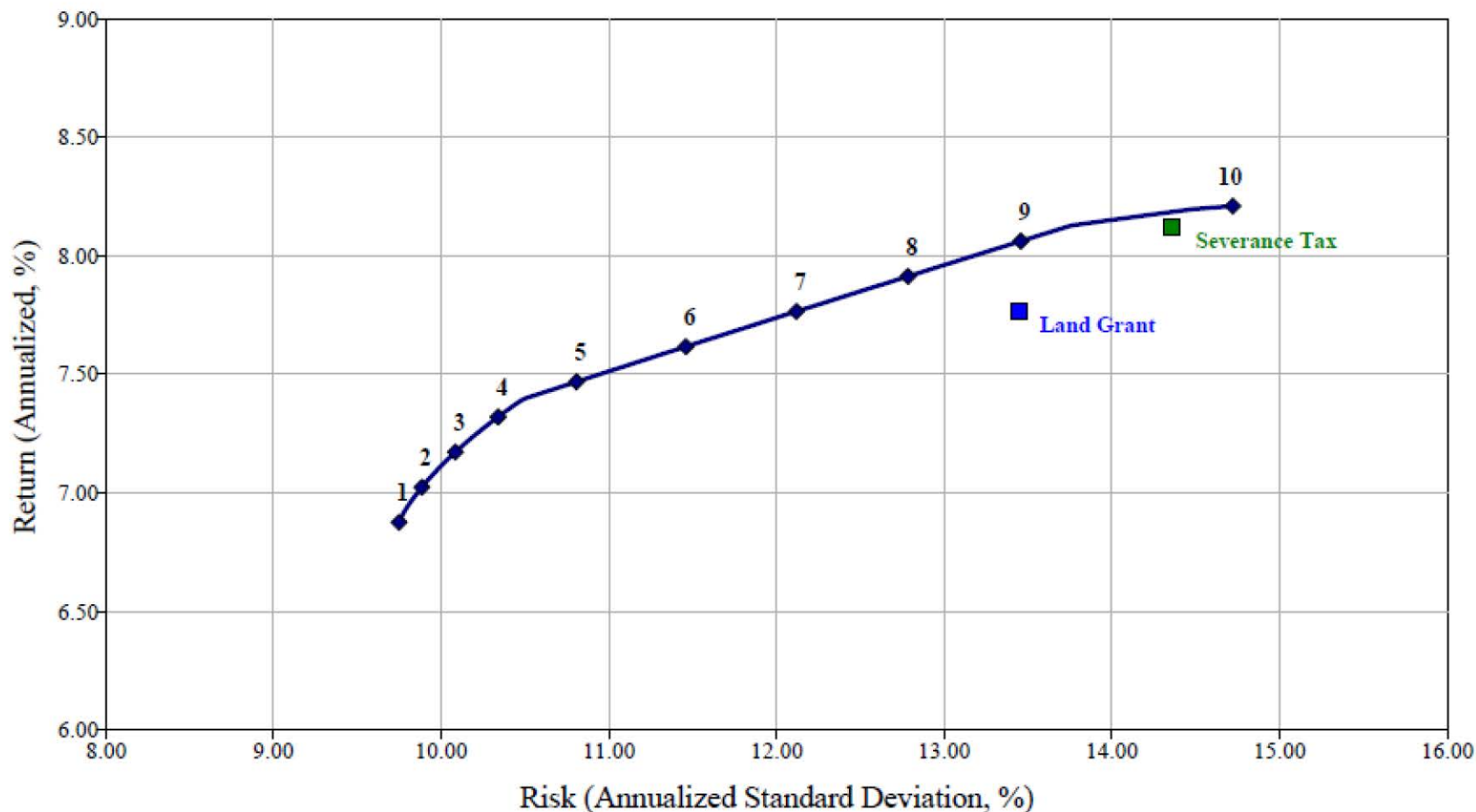
|                                      | Min | Max | 1    | 2    | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|--------------------------------------|-----|-----|------|------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| Broad US Equity                      | 0   | 60  | 40   | 34   | 30    | 27    | 24    | 28    | 32    | 36    | 40    | 50    | 51         | 48            |
| Broad International Equity           | 0   | 10  | 4    | 7    | 7     | 7     | 10    | 10    | 10    | 10    | 10    | 10    | 10         | 10            |
| Int. Duration Fixed Income           | 10  | 30  | 30   | 30   | 30    | 30    | 28    | 24    | 20    | 16    | 12    | 10    | 15         | 12            |
| Core Real Estate                     | 0   | 6   | 6    | 6    | 6     | 6     | 6     | 6     | 6     | 6     | 6     | 0     | 3          | 3             |
| Absolute Return                      | 0   | 20  | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Private Equity                       | 0   | 12  | 0    | 3    | 7     | 11    | 12    | 12    | 12    | 12    | 12    | 12    | 6          | 12            |
| Total                                |     |     | 100  | 100  | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100        | 100           |
| Capital Appreciation                 |     |     | 44   | 44   | 44    | 44    | 46    | 50    | 54    | 58    | 62    | 72    | 67         | 70            |
| Capital Preservation                 |     |     | 30   | 30   | 30    | 30    | 28    | 24    | 20    | 16    | 12    | 10    | 15         | 12            |
| Alpha                                |     |     | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Inflation                            |     |     | 6    | 6    | 6     | 6     | 6     | 6     | 6     | 6     | 6     | 0     | 3          | 3             |
| Expected Return                      |     |     | 6.88 | 7.02 | 7.17  | 7.32  | 7.47  | 7.62  | 7.77  | 7.91  | 8.06  | 8.21  | 7.77       | 8.12          |
| Risk (Standard Deviation)            |     |     | 9.75 | 9.88 | 10.08 | 10.34 | 10.81 | 11.46 | 12.12 | 12.78 | 13.46 | 14.72 | 13.45      | 14.36         |
| Return (Compound)                    |     |     | 6.44 | 6.57 | 6.70  | 6.83  | 6.93  | 7.01  | 7.09  | 7.16  | 7.23  | 7.22  | 6.94       | 7.18          |
| Return/Risk Ratio                    |     |     | 0.71 | 0.71 | 0.71  | 0.71  | 0.69  | 0.66  | 0.64  | 0.62  | 0.60  | 0.56  | 0.58       | 0.57          |
| RVK Expected Eq Beta (LC US: Eq = 1) |     |     | 0.52 | 0.52 | 0.53  | 0.54  | 0.55  | 0.59  | 0.63  | 0.67  | 0.71  | 0.79  | 0.73       | 0.77          |
| RVK Liquidity Metric (T-Bills = 100) |     |     | 76   | 73   | 69    | 66    | 65    | 65    | 66    | 66    | 66    | 72    | 77         | 71            |

Return (Compound) = the long-term compounding return that considers portfolio volatility  
 Return/Risk Ratio = A measure of the relative return per unit of risk, similar to a Sharpe Ratio  
 RVK Expected Equity Beta = A measure of the movements of the portfolio relative to LS US Equity  
 RVK Liquidity Metric = A measure of portfolio liquidity based on custom liquidity ratings for each asset



# Asset Allocation Modeling Sample

## MVO – Efficient Frontier





# Monte Carlo Simulation

## Summary

- ▶ Monte Carlo simulation overcomes the static nature of typical Mean-Variance optimization by “stress-testing” portfolios.
- ▶ Incorporates the effects of various assumed capital market factors.
- ▶ Provides insight into the performance of asset allocation by examining randomly sampled return outcomes.
- ▶ RVK uses 10,000 random samples and assumes a fat-tailed<sup>1</sup> distribution.

1. Mean-Variance optimization assumes asset class returns are normally distributed. Empirical asset class returns have been non-normal, however, exhibiting a greater probability of extreme outcomes than would be predicted by a normal distribution.

# Monte Carlo Simulation

Given a downside log-stable distribution of portfolio returns, the percentiles below correspond with the simulated returns, by percentile, for each efficient portfolio.

Example: The simulated median return, over a one year period, for the Land Grant pool is 7.61%. The simulated median three year return for the Land Grant pool is 7.20%.

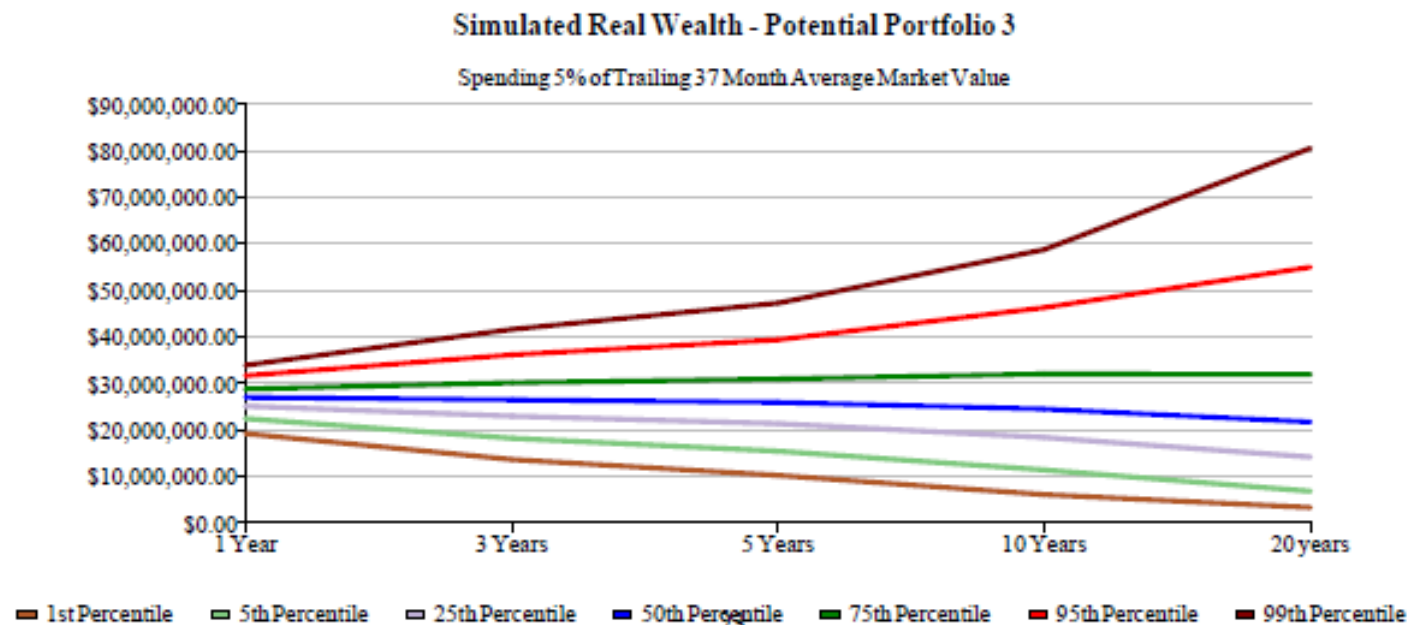
Your portfolios' target allocation.

| 1 Year          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Land Grant | Severance Tax |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|---------------|
| 1st Percentile  | -23.10 | -22.53 | -22.06 | -21.96 | -22.60 | -24.34 | -26.15 | -27.59 | -29.31 | -31.61 | -31.38     | -31.41        |
| 5th Percentile  | -10.18 | -9.81  | -9.49  | -9.30  | -9.70  | -10.58 | -11.52 | -12.33 | -13.29 | -15.15 | -14.67     | -14.70        |
| 25th Percentile | 0.36   | 0.61   | 0.86   | 1.08   | 1.01   | 0.65   | 0.35   | 0.03   | -0.30  | -1.00  | -0.96      | -0.84         |
| 50th Percentile | 6.91   | 7.04   | 7.23   | 7.39   | 7.49   | 7.59   | 7.71   | 7.87   | 8.02   | 8.08   | 7.61       | 7.98          |
| 75th Percentile | 13.41  | 13.45  | 13.52  | 13.59  | 13.90  | 14.50  | 15.10  | 15.70  | 16.32  | 17.21  | 16.45      | 16.98         |
| 95th Percentile | 23.45  | 23.30  | 23.21  | 23.17  | 23.74  | 25.09  | 26.36  | 27.74  | 29.03  | 31.44  | 30.07      | 31.01         |
| 99th Percentile | 30.64  | 30.56  | 30.28  | 30.36  | 31.27  | 33.10  | 35.01  | 36.91  | 38.75  | 42.22  | 40.00      | 41.49         |

| 3 Years         | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | -4.23 | -3.89 | -3.60 | -3.35 | -3.50 | -4.11 | -4.74 | -5.35 | -5.98 | -7.21 | -7.07      | -7.10         |
| 10th Percentile | -1.42 | -1.09 | -0.86 | -0.66 | -0.74 | -1.14 | -1.56 | -2.02 | -2.51 | -3.39 | -3.36      | -3.32         |
| 25th Percentile | 2.61  | 2.84  | 3.06  | 3.27  | 3.26  | 3.06  | 2.84  | 2.64  | 2.43  | 1.97  | 1.84       | 2.04          |
| 50th Percentile | 6.65  | 6.78  | 6.96  | 7.13  | 7.25  | 7.34  | 7.42  | 7.52  | 7.60  | 7.60  | 7.20       | 7.55          |
| 75th Percentile | 10.54 | 10.64 | 10.75 | 10.89 | 11.13 | 11.48 | 11.83 | 12.18 | 12.56 | 13.04 | 12.42      | 12.88         |
| 90th Percentile | 14.00 | 14.05 | 14.09 | 14.24 | 14.62 | 15.24 | 15.84 | 16.46 | 17.07 | 17.97 | 17.10      | 17.72         |
| 95th Percentile | 16.11 | 16.11 | 16.14 | 16.20 | 16.60 | 17.34 | 18.09 | 18.88 | 19.65 | 20.85 | 19.92      | 20.54         |

5<sup>th</sup> percentile return interpreted as 95% of the time I would expect my annualized return over a 3 year period return to be greater than -7.07% given my asset return assumptions and the distribution assumption of those returns.

# Monte Carlo Simulation

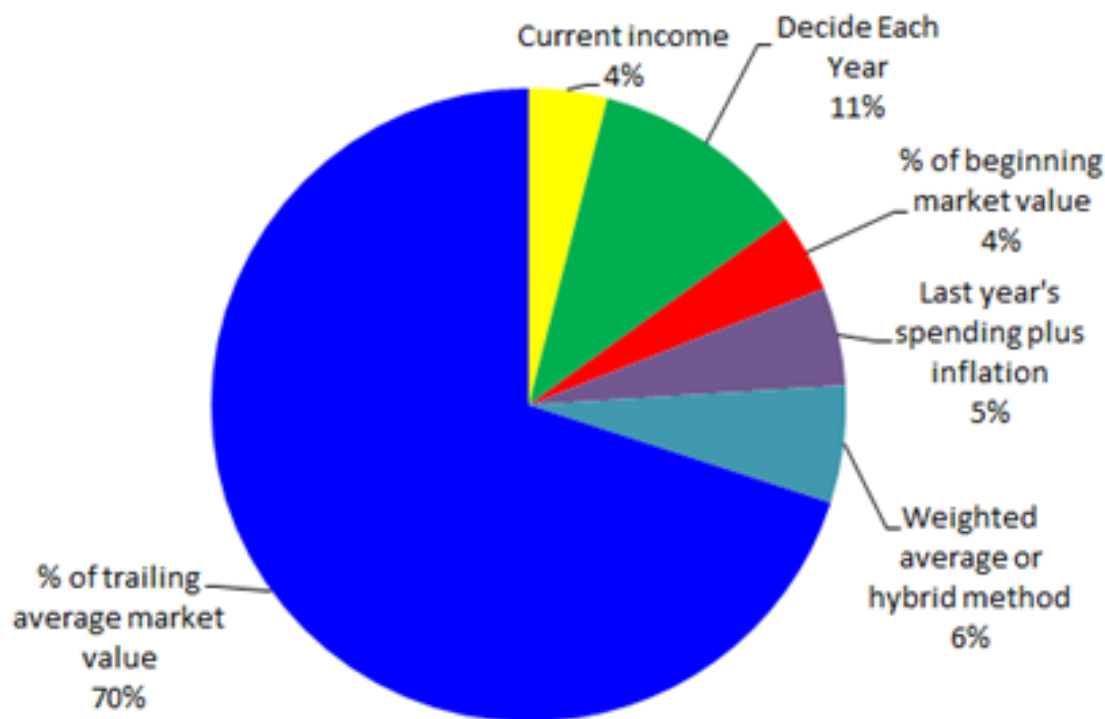


- ▶ Monte Carlo analysis can also incorporate varying cash flows (inflows and outflows), varying inflation scenarios, and translate results into “real” wealth values.

# Spending Policy Options

- ▶ Spending policy methodologies vary widely
- ▶ RVK can help you analyze the pros and cons of each approach, and select the methodology that best meets your needs

**Determination of Spending Rate in Fiscal Year 2011**



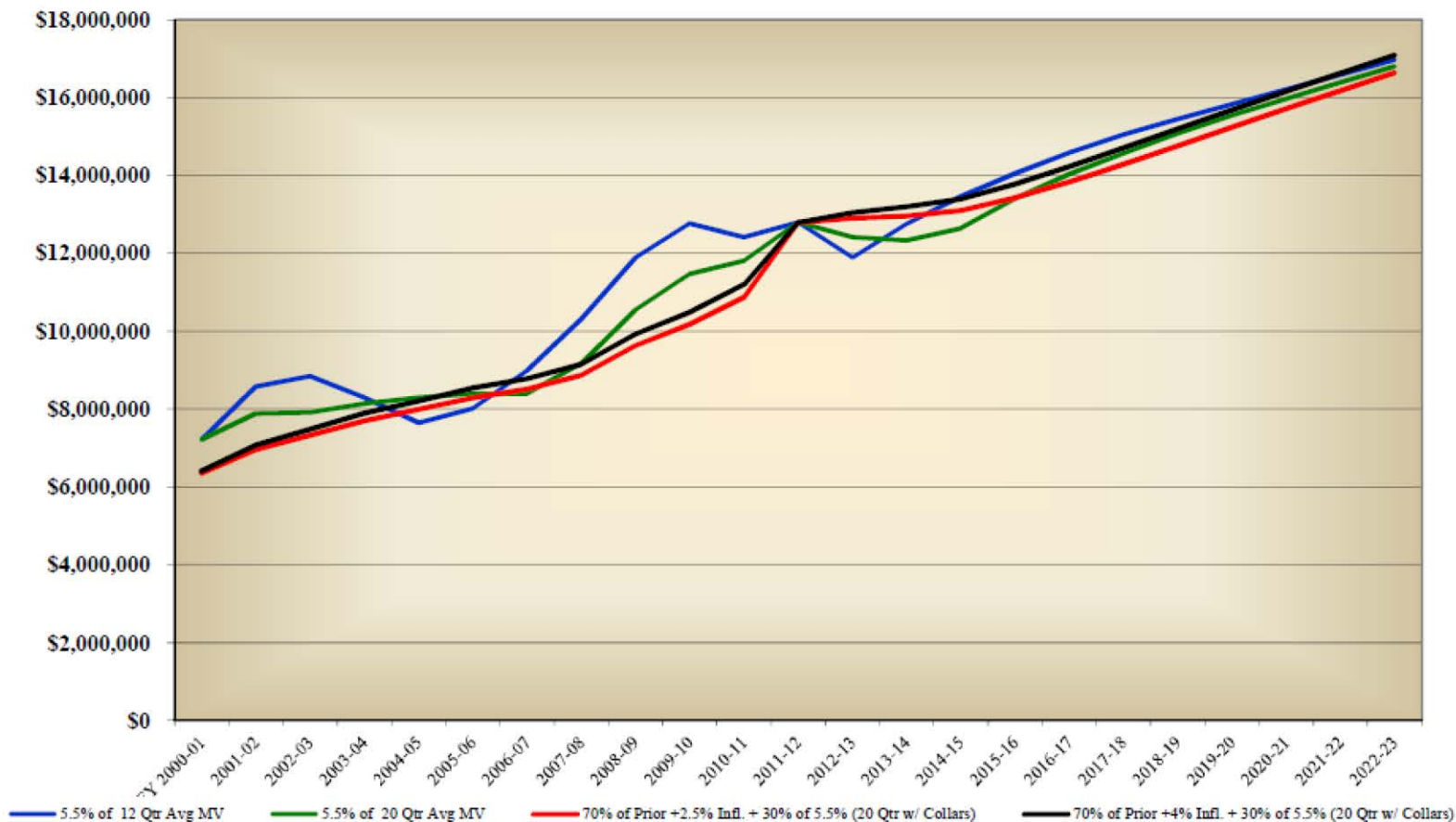
Source: NACUBO-Commonfund Study of Endowments 2011





# Sample Spending Policy Analysis

Projected Draw  
Historical FY 2000 - 2010  
Projected FY 2011 - 2023 (7% Return)





# Why RVK?

---

**RVK is committed to providing a highly productive partnership with the North Dakota Legacy Fund. Areas where we believe RVK may be uniquely qualified include the following:**

- ▶ Highest quality advice and work products
- ▶ Providing full reach into our firm's resources
- ▶ Ongoing Board and Staff education
- ▶ Continued innovation with client needs in mind, not for RVK recognition
- ▶ Senior proposed consulting team
- ▶ Extensive experience with similar plans
- ▶ No conflicts of interest culture and an objective business model
- ▶ 100% employee-owned

**We would be honored to have the opportunity to serve the North Dakota Legacy Fund.**



# Appendix

## QUESTIONS THE SECURITIES AND EXCHANGE COMMISSION AND THE DEPARTMENT OF LABOR HAVE RECOMMENDED ALL PLAN FIDUCIARIES ASK THEIR INVESTMENT CONSULTANTS

1. Are you registered with the SEC or a state securities regulator as an investment adviser? If so, have you provided us with all disclosures required under those laws (including Part II of Form ADV)?

**Yes, our firm is a Registered Investment Advisor with the Securities and Exchange Commission and has provided all clients with all applicable and required disclosures. Our SEC Form ADV, including Parts I and II, are available upon request to any client at any time.**

2. Do you or a related company have relationships with money managers that you recommend, consider for recommendation, or otherwise mention to the plan for our consideration? If so describe those relationships.

**We have no relationships with any money managers that we recommend, consider for recommendation, or otherwise mention to any clients. Our firm has no relationships with any money management firms whose products we might recommend to our clients. Our firm does not sell money management products directly or indirectly. We do not sell products to money managers nor do we permit money managers to sponsor and fund conferences or other client meetings/seminars we may hold for clients. Our firm does not permit its employees to receive gifts, dinners or any similar transfers from money managers nor assume travel expenses for our firm. One hundred percent of our revenues are derived from cash-based fees for investment consulting provided directly to fund fiduciaries.**

3. Do you or a related company receive any payments from money managers you recommend, consider for recommendation, or otherwise mention to the plan for our consideration? If so, what is the extent of these payments in relation to your other income (revenue)?

**We do not receive any payments from money managers that we recommend, consider for recommendation, or otherwise mention to clients.**



# Appendix

## SEC Questionnaire Responses (continued)

4. Do you have any policies or procedures to address conflicts of interest and to prevent these payments or relationships from being considered when you provide advice to your clients?

**Yes. We have attached our policy concerning “Code of Conduct and Ethics.”**

5. If you allow a plan to pay consulting fees using a plan’s brokerage commissions, do you monitor the amount of commissions paid and alert plans when consulting fees have been paid in full? If no, how can a plan make sure that it does not over-pay its consulting fees?

**No. No portions of our fees are paid by brokerage commissions. Our firm derives 100% of our revenues from cash fees generated from consulting to our institutional clients and high-net-worth families. We do not derive any revenue or profits from commission recapture programs.**

6. If you allow plans to pay your consulting fees using the plan’s brokerage commission, what steps do you take to ensure that the plan receives best execution for its securities trades?

**Not applicable. 100% of our revenues are in the form of cash payments directly from our clients.**

7. Do you have any arrangements with broker-dealers under which you or a related company will benefit if money managers place trades for their clients with such broker-dealers?

**No, we have no such arrangement with any broker-dealer.**

8. Will you acknowledge in writing that you have a fiduciary obligation as an Investment advisor to the Plan while providing consulting services?

**Absolutely. RVK will acknowledge in writing that we have a fiduciary obligation as an investment advisor to the plan while providing consulting services.**



# Appendix

## SEC Questionnaire Responses (continued)

9. Do you consider yourself a fiduciary under ERISA with respect to the recommendations you provide to a plan?

**Our firm does act as a fiduciary while serving as a pension fund investment consultant. RVK is a Registered Investment Advisor and we view ourselves as co-fiduciaries in all the relationships we have with our clients. However, our role as a fiduciary is narrowly defined, since we do not have discretionary authority to manage the assets. The investment decisions rest with our clients**

10. What percentage of your plan's clients utilize a money managers, investment funds, brokerage services or other service providers from whom you receive fees?

**Zero.**



# Appendix

## RVK Code of Conduct and Ethics

### **Guiding Principle**

At R.V. Kuhns & Associates, Inc. (RVK), it is essential that all employees conduct business with uncompromising integrity and professionalism. Therefore we shall ensure that our clients receive the highest level of service without a real or perceived conflict of interest.

### **Contact with Other Financial Intermediaries**

The cornerstone of our business philosophy is that we will provide our clients with the highest standard of investment consulting in our industry. We take pride in the fact that we do not have any relationships with investment managers, or other service providers that create conflicts of interest. In keeping with this philosophy RVK employees shall observe the following guidelines:

1. Employees will not accept gratuitous considerations from investment managers, custodians, or any organizations or individuals in investment related fields. This includes meals, gifts, travel, favors, or anything of value that compromises the firm's commitment to conflict-free investment consulting.
2. Employees will not become involved in situations that compromise, or give the appearance of compromising, the firm's or the employee's independence and objectivity.
3. Each of the firm's employees is expected to protect the confidentiality of the client, firm, and third-party information at all times. Employees will be held personally accountable for safeguarding information that is not readily available in the public domain.

### **Contact with Clients**

Providing counsel and assistance to our clients is our responsibility. Our services are directed at helping clients set appropriate goals and objectives so they achieve superior investment results through performance monitoring, investment manager selection, strategic asset allocation, investment policy review and formulation, and portfolio expense monitoring.



# Appendix

## RVK Code of Conduct and Ethics

To accomplish these goals and objectives, our employees will conduct business by the following principles:

1. Employees who consult and render services to our clients must be completely familiar with and understand the investment goals and objectives of the client. For any of the services we provide, consultants are expected to carefully consider the needs and circumstances of the client before making recommendations. Consultants must always give attention to the appropriateness and suitability of any and all recommendations they make.
2. R.V. Kuhns & Associates, Inc.'s employees shall not make recommendations or give advice about individual securities. Discussions involving securities shall be of a general nature and only to the extent of security classes.
3. Our firm assumes the responsibility for ensuring that standards and general principles are upheld in the analysis of client investment strategies and portfolios. All employees will assist our clients in the following manner:
  - Ensuring that our clients' investment policies and investment allocations are appropriate, meeting their short and long-term objectives.
  - Helping our clients better understand and monitor the results of their investment program.
  - Seeking ways to reduce our client's investment portfolio expenses.
  - Helping improve our client's overall rate of return.

Because we wish to maintain the highest ethical standards in our firm, R. V. Kuhns & Associates, Inc. reserves the right, at any time and under its discretion, to modify any or all of the provisions explained in this Code of Conduct and Ethics, (Code). The standards contained herein are intended to serve only as general information and provide guidelines by which employees conduct business. In no way are these guidelines intended to cover all situations, but rather to provide the framework for understanding the standards we wish to uphold.



**Response To Request for Special Project Proposal**  
**~Asset Allocation Study & Spending Policy Analysis~**

# **North Dakota Legacy Fund**

**September 7, 2012**

# **RVKuhns**

▶ ▶ ▶ **& ASSOCIATES, INC.**

111 SW Naito Parkway  
Portland, Oregon 97204  
503.221.4200 f: 503.802.6912  
[www.rvkuhns.com](http://www.rvkuhns.com)



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September 10, 2012

North Dakota Retirement and Investment Office  
Darren Schulz, CFA  
Interim Chief Investment Officer  
P.O. Box 7100  
Bismarck, ND 58507-7100

**RE: Request for Special Project Proposal – Asset Allocation Study & Spending Policy Analysis**

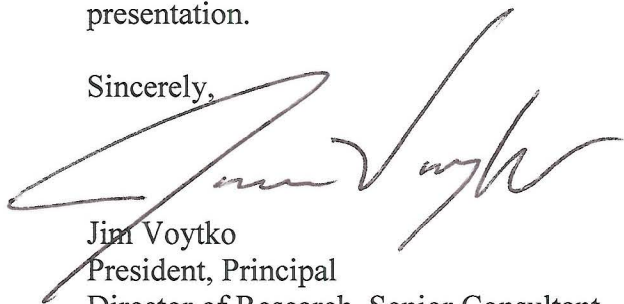
Dear Mr. Schulz:

Enclosed you will find our proposal for completing an asset allocation and spending policy study for the North Dakota Legacy Fund. We have also attached sample asset allocation and spending policy materials for your review.

As you will see in our proposal, we have proposed a senior team with highly relevant experience working with investment programs that are very similar in nature to yours. We are grateful for the opportunity to provide this proposal, and very excited about the prospect of working with you on this project. If selected, we would work very hard to make sure that the project is a success on all levels.

If you have any questions about the proposal or the sample materials, please do not hesitate to contact us. Please contact Allison Grebe Lee, Director of Business Development, via telephone at (503) 221-4200, facsimile at (503) 802-6912 or by her e-mail address, [Allison.GrebeLee@rvkuhns.com](mailto:Allison.GrebeLee@rvkuhns.com). We thank you for your consideration of RVK and look forward to the opportunity to make a personal presentation.

Sincerely,



Jim Voytko  
President, Principal  
Director of Research, Senior Consultant  
R. V. Kuhns & Associates, Inc.  
111 SW Naito Parkway  
Portland, OR 97204  
(503) 221-4200 phone  
503-802-6912 fax

JMV/amd



**Special Project Proposal – Asset Allocation Study & Spending Policy Analysis**  
**North Dakota Legacy Fund**  
Submitted September 14, 2012

---

R.V. Kuhns & Associates, Inc. (“RVK”) currently provides our retainer and project consulting clients with periodic asset allocation reviews and recommendations. We employ a highly consultative and collaborative approach, viewing each asset allocation review as an independent assessment of distinct client goals and objectives in order to determine the appropriate asset allocation to meet the Fund’s needs.

In this proposal, we have outlined a special project scope we believe would be highly beneficial to the North Dakota Legacy Fund. We have proposed a competitive and fully inclusive project retainer fee that reflects our strong interest in completing further work for the North Dakota Legacy Fund. We have relevant experience conducting asset allocation studies for many of your peers, including mineral extraction related funds in Wyoming, New Mexico, Montana, Oklahoma, and Texas. Our proposed service team consists of experienced professionals that understand the unique needs of a portfolio such as yours. We have also included sample studies, along with a supplemental document that addresses frequently asked questions. We would be happy to also provide additional information or samples of our work upon request.

**Background Information About R.V. Kuhns & Associates, Inc.:**

R.V. Kuhns & Associates, Inc. (RVK) was founded in 1985. Since inception, RVK has focused solely on providing investment advice to institutions, including endowments & foundations, permanent funds, pension plans, defined contribution plans, insurance companies, and special purpose funds. RVK has grown steadily since its founding and now is one of the ten largest consulting firms as reported by *Pension & Investments*. RVK is headquartered in Portland, Oregon and also has offices in Seattle, New York and Chicago. The consulting staff offers a broad array of services, covering all critical elements of a general consulting mandate.

RVK is led by Becky Gratsinger as CEO and Jim Voytko as President and Director of Research. A five-member Board of Directors composed of senior consultants oversees the firm’s operating policy. RVK is 100% employee-owned and is an S-corporation. All RVK owners are active in the business and expect to remain so for the foreseeable future.

RVK provides its clients a full range of services, including:

- Plan Evaluation
- Asset Allocation
- Investment Policy Review
- Spending Policy Analysis

- Investment Manager Search & Selection
- Performance Analysis & Monitoring
- Market Research & Special Projects
- Client Education
- Trust and Custody Evaluation & Search Selection
- Manager Structure Analysis
- Performance Attribution
- Defined Contribution Decision Structure & Design Services

RVK provides manager research in both traditional and alternative asset classes. In 2008, RVK added a dedicated team of professionals for specialty real estate and infrastructure consulting. In recent years, the firm has expanded its special projects capabilities in multiple areas, most notably in the areas of alternatives research, asset custody, risk management, and securities lending. We continue to expand our professional staff, investment capabilities, and academic qualifications and have added 25 investment professionals over the past 5 years. We currently have 18 CFA charter holders as well as 24 employees with additional advanced degrees.

RVK currently employs over 100 professionals across four offices and provides investment consulting services to more than 400 client plans with total assets under advisement exceeding one trillion dollars. The firm does not have any affiliates or parent company and does not have any legal or regulatory issues.

Our consulting philosophy is centered on developing, implementing and monitoring successful investment programs for our clients. We believe that we need to be independent, objective and focused to be a valued partner for our clients. True to this belief, RVK maintains a strict no conflicts of interest policy, and we generate revenue exclusively from fees that clients pay directly for services rendered. We offer no asset management products, nor do we sell services to investment managers or accept any form of compensation from managers. Our commitment to serving our clients' interests ahead of all others is becoming increasingly unique in our industry, but we feel this gives us a distinct and sustainable competitive advantage relative to our competitors. This independence also allows us to accept projects for ongoing monitoring and evaluation of outsourced providers, which we feel makes us a good fit to work with you in this capacity.

Additional information on the organization is included in the "Frequently Asked Questions" attachment.

### **Asset Allocation Philosophy and Capabilities:**

Multiple academic studies demonstrate that strategic asset allocation is by far the single most important determinant of total fund performance and portfolio risk. While successful manager evaluation decisions will contribute to the historical performance track record, they cannot make up for a poorly structured asset allocation policy that is inefficient on a risk-adjusted basis. RVK believes that setting an appropriate long-term, strategic asset allocation is a critical component to investment policy and fiduciary governance.

Since every entity has different objectives, goals and liquidity needs we believe no one optimal portfolio will suit all clients and plan types. The portfolio's guidelines and overall structure should reflect careful consideration of risk/return objectives, in addition to tolerances and constraints, including but not limited to: time horizon, liquidity, and legal/regulatory requirements.

Asset allocation optimization studies are the foundation of the strategic asset allocation process. Studies are based on mean variance optimization ("MVO"), which produces a set of optimal portfolios that provide the highest level of expected return for a given level of risk or the lowest level of risk for a stated level of return. Risk can be measured a number of ways including standard deviation (or volatility of returns) in addition to permanent loss of capital which is typically captured through a Monte Carlo analysis which serves as a useful adjunct to standard MVO analysis.

To fully appreciate the rigor of our studies, there are several elements that are worthy of discussion:

- **Capital Markets Assumptions**—The critical inputs of an asset allocation study are the expected risk, return, and correlations of a multitude of unique asset classes. Each year, RVK completes an extensive asset allocation assumptions setting process that requires participation from virtually all members of the firm. Teams are assigned to review the historical performance, current dynamics, and future economic expectations of each asset class (in excess of 20) to set expected risk, return, and correlations. Given the long time nature of these expectations (10+ years), annual adjustments are relatively small, but they ensure that evolving market dynamics are captured and appropriately influence the asset allocation process.
- **Adjustments for "Non-Normality" of Asset Class Returns**—A common criticism of MVO is that by predicting portfolio returns and risk based on standard deviations, it assumes that future asset class returns fit a "normal distribution." However, history has proven that returns do not fit this pattern—in fact significant outlier events (often referred to as "fat tail" events) happen much more frequently than expected—consider 2008 as a recent example. Realizing this potential weakness, RVK has employed advanced statistical techniques to ensure that our return distributions properly reflect and compensate for these "fat tail" or black swan events and provide our clients with more realistic expectations of portfolio volatility over short and long time periods.
- **Qualitative Analysis Informed by Quantitative Results**—MVO is a powerful tool, but it is not a suitable replacement for human judgment. For example, perhaps the most significant drawback of MVO is that it defines "risk" solely in terms of standard deviation of returns despite the fact that there are many other risks with which Trustees must be concerned. This is particularly true for plans that are established to satisfy a specific liability or spending policy. Another risk that is considered is liquidity (i.e., will the portfolio be able to meet spending requirements). To ensure that risk is viewed holistically, RVK supplements an MVO analysis with a qualitative

review to shape optimal portfolios that consider objectives and risks beyond simple metrics of risk and return.

In summary, although no asset allocation process is perfect in isolation, we employ a rigorous methodology that leverages quantitative tools to inform human judgment. We believe the resulting discussions with clients enhance the alignment between plan objectives and portfolio structure.

## **Scope of Work**

### **Asset Allocation Study:**

The proposed asset allocation review project will include the following key steps:

- **Information Gathering** – Understanding and documenting the unique requirements and needs of your organization is paramount to the process of an asset allocation study. We look forward to the opportunity to tailor a process of information gathering with your organization. Specific emphasis will be on understanding potential future cash flows (in and out of the portfolio) as well as unique drivers of those cash flows (specific mineral spot prices, production volume, etc...).
- **Education** – RVK considers education a key element of a productive consulting relationship. Our deliverables will include detailed, client-focused education on the key concepts of asset allocation, including asset allocation basics, capital market assumptions, and detailed modeling simulations. We also provide RVK's Asset Allocation Assumptions White Paper, an explanatory document that provides the background on our asset allocation assumption-setting process as well as a more detailed analysis of our return, risk, and correlation expectations for each asset class.
- **Analysis** – RVK will perform an asset allocation and spending policy analysis in order to identify, test, and recommend alternative asset mixes and investment strategies that are most likely to meet the Plan's objectives, while minimizing expected risk. We also will analyze the correlation of each asset class to the "sources of income" that fund the investment program; specifically the spot prices for the natural resources in your State that fund the Legacy Fund. We believe that an understanding of these relationships is critical in addressing "total fund risk" which includes not only the investment returns generated by the Fund, but also the levels of cash flow provided to the Fund. We will provide supplemental projections utilizing various levels of contributions and disbursements. Finally, we will assist with education on spending policy alternatives and the sustainability of varying asset allocation and spending policy combinations.
- **Presentation** – RVK will present our findings and recommendations to an Investment Committee, Board of Trustees, or alternate fiduciary bodies as requested and required through a written report and/or an oral presentation.

### **Proposed Service Team:**

RVK strongly believes in the value of a team approach to the completion of project engagements. Our proposed team for this project specifically consists of a senior consultant, a consultant, and an investment associate as your primary team with a secondary senior consultant serving as senior advisor. We will commit additional technical resources as necessary. Biographies for the key members of the project team are provided below:

#### ***Primary Consulting Team:***

##### **Joshua R. Kevan, CFA – Senior Consultant, Principal**

Josh Kevan is a Senior Consultant with R.V. Kuhns & Associates, Inc. He is based in Boise, Idaho and is supported by our Portland office. Josh joined RVK in 2000. As a Senior Consultant he advises a diverse mix of clients that include defined benefit plans, defined contribution plans, insurance companies, and other special purpose funds. In addition to his consulting relationships, he is involved in the firm's investment manager research and due diligence efforts.

Josh earned a Bachelor of Arts degree in Business from the University of Washington and holds the Chartered Financial Analyst designation. Josh is a shareholder, and also serves on the company's board of directors and its executive committee.

##### **John P. McLaughlin, CFA – Consultant**

John joined R.V. Kuhns & Associates, Inc. in 2009 and was promoted to Consultant in 2012. John is located in our Chicago office. Prior to joining RVK, John worked for Moss Adams LLP where he consulted nationally to investment management and advisory firms on strategic business issues. His previous experience includes working as an Analyst at Russell Investment Group where he worked with a team that managed derivative portfolios for the firm's institutional client base and an internship at Mercer Consulting where he conducted research for executive compensation projects at publically traded clients.

John graduated Magna Cum Laude from Seattle University where he earned his Bachelor of Arts degree in Business Administration with a major in Finance and a minor in Economics. John also holds the Chartered Financial Analyst designation. He is a member of the CFA Institute and the CFA Society of Portland.

##### **William Lee – Investment Associate**

William joined RVK is an Investment Associate and is located in our Chicago office. Prior to joining RVK, he worked at Cambridge Associates as an International Investment Performance Analyst. His responsibilities within that role included leading a cross-functional team in coordination performance reporting for endowed institutions and high-net-worth private clients. William's previous experience also includes working at The Proctor and Gamble Company as a Finance and Accounting Analyst, interning at the Wolf Trap Foundation for the Performing Arts, and experience with the Phi Kappa Tau Executive Offices as a senior project manager.

William earned a Bachelor of Science degree in Business with a major in Finance and a minor in Chinese from the Farmer School of Business at Miami University, Oxford, Ohio.

***Senior Advisor:***

**Ronald L. Klotter, CFA – Director of Midwest Consulting Operations, Senior Consultant**

Ron Klotter is a Senior Consultant and Director of Midwest Consulting with R.V. Kuhns & Associates, Inc. and is located in our Chicago office. Ron has 27 years of experience working in the investment consulting and investment management industries. Prior to joining RVK, Ron most recently was Principal and Practice Leader for Endowments and Foundations at Hewitt EnnisKnupp. Ron also has held senior investment management positions with Wellington Management Company, Brinson Partners/UBS, and INVESCO. In addition to his consulting responsibilities, Ron has responsibility for coordinating and overseeing our Midwest consulting activities.

Ron has extensive experience working with a wide range of clients, including endowments and foundations, corporations, and public entities. Ron has conducted extensive research on several key topics in the investment consulting industry, including endowment spending policy, integrating long-short equity investment within an equity portfolio, total active risk analysis, and policy structure. Ron is a frequent speaker at major industry conferences.

Ron earned his Bachelor of Science degree in Finance with honors from Miami University in Oxford, Ohio and a Master of Business Administration degree from Northwestern University in Evanston, Illinois. Ron holds the Chartered Financial Analyst designation. He is a member of the CFA Institute and a member of the Chicago Society of Financial Analysts.

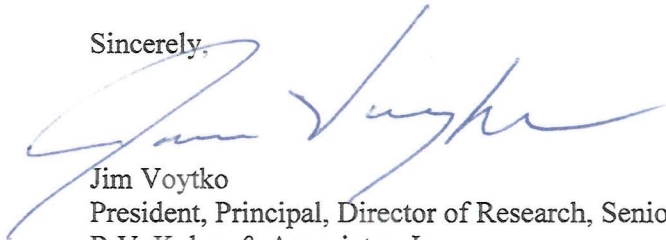


**Fee Proposal:**

RVK proposes the one-time project fee of \$70,000 for the asset allocation and spending policy study. This fee proposal is intended to be all-inclusive, covering the scope detailed above, two in-person meetings in North Dakota, and all reasonable costs associated with the completion of the project. This fee is to be payable upon completion of the described services. If more than two in-person meetings are needed to successfully complete the project, we would propose an additional fee of \$4,000 per additional meeting. All fees are inclusive of travel and related expenses.

We hope this proposal is responsive to your needs. If you have any additional questions please do not hesitate to reach out to us. We believe we are a very strong fit for this project for the Legacy Fund, as we have demonstrated successfully our asset allocation and spending policy abilities with many organizations similar to yours. We have proposed a senior team with highly relevant experience. In closing, we thank-you for the opportunity to submit this proposal; we would welcome the opportunity to add the North Dakota Legacy Fund as a valued client.

Sincerely,



Jim Voytko  
President, Principal, Director of Research, Senior Consultant  
R.V. Kuhns & Associates, Inc.  
111 SW Naito Parkway  
Portland, OR 97204  
(503) 221-4200 p  
(503) 802-6912 f  
[James.Voytko@rvkuhns.com](mailto:James.Voytko@rvkuhns.com)

JMV/amd

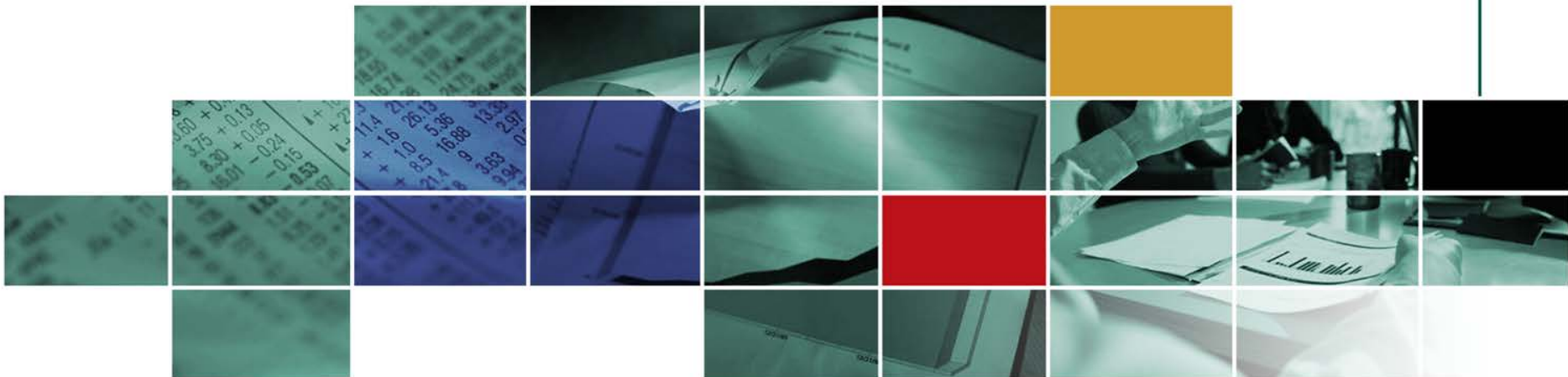
# RVKuhns

►►► & ASSOCIATES, INC.

## Asset Allocation Modeling and Approaches

Client Name

May 2011





# Overview

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- ▶ **This presentation focuses on:**
  - ▶ Timeline for Asset Allocation Review
  - ▶ Introduction to Asset Allocation
  - ▶ Modeling asset allocation using two separate analytical techniques:
    - ▶ Mean-Variance Optimization
    - ▶ Monte Carlo simulation
  - ▶ Discussion of approaches to asset allocation:
    - ▶ Granular
    - ▶ Broad
    - ▶ Thematic



# Timeline for Asset Allocation Review



# Timeline

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- ▶ **The Asset Allocation Review process over the next four months will focus on the financial assets. The Client's Investment Council's relationship with the Client's hard assets will be addressed in a follow-on study within the year.**
  - ▶ May 2011 – Introduction to Asset Allocation: purpose, asset allocation modeling, assumptions setting, analytical techniques, and approaches.
  - ▶ June 2011 – Asset Allocation Analysis: review of methodology, first analysis of efficient asset mixes, discussion of risk and return implications and refinement of specifications and assumptions.
  - ▶ July 2011 – Asset Allocation Analysis: second analysis of modeling output, discussion of implications and further refinement of assumptions, if necessary..
  - ▶ August 2011 – Decision on allocation of financial assets.



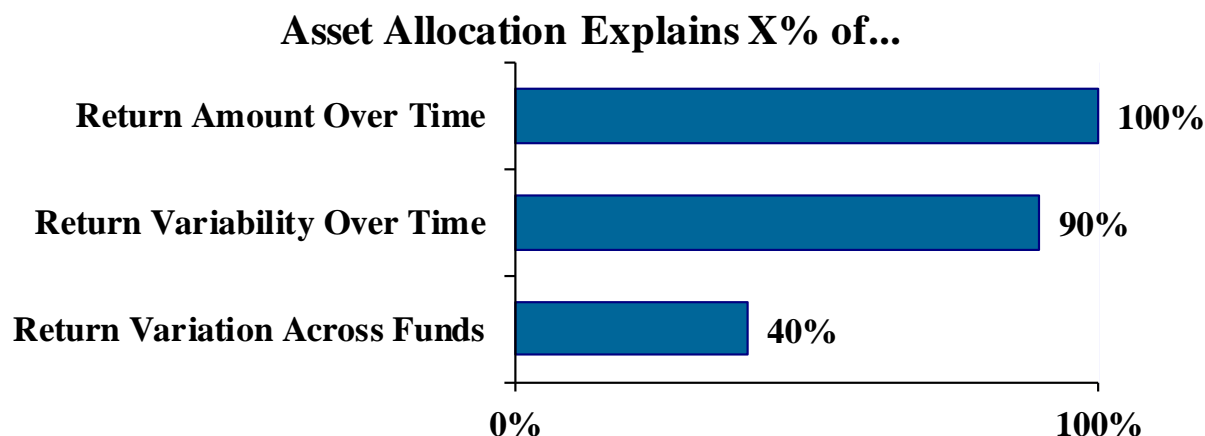
# Asset Allocation Introduction



# Asset Allocation & Performance

## Introduction

- ▶ **Strategic asset allocation is the most powerful determinant of total fund performance in the long run.**
  - ▶ While good manager evaluation decisions will unquestionably add to performance, they cannot makeup for a poorly diversified, risk/return inefficient allocation.
- ▶ **Multiple studies calculated the effects of asset allocation on portfolio returns and concluded that asset allocation “drives” portfolio return.**
  - ▶ The findings are summarized below:



Source: Ibbotson, Roger G. and Paul D. Kaplan, 2000. “Does Asset Allocation Policy Explain 40%, 90%, or 100% of Performance?”. Financial Analysts Journal. January/February 2000, Vol.56, No.1, pp.26-33.



# Asset Allocation & Performance

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## Summary

- ▶ **Asset allocation “drives” portfolio return.**
- ▶ **We believe institutional decision makers should devote more effort to setting an appropriate strategic asset allocation than to manager evaluation.**
- ▶ **Making asset allocation decisions is an exercise in uncertainty, as it involves making judgments about the magnitude and patterns of future returns and risks.**





# Asset Allocation Modeling



# Asset Allocation Modeling

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## Summary

- ▶ **The basic framework of Mean Variance Optimization (MVO), combined with appropriate forward looking Capital Markets research, provides a structured approach to assisting with asset allocation decisions.**
- ▶ **The purpose of asset allocation modeling is to optimize a fund's exposure to broad asset classes.**
- ▶ **Goal is not to “beat the market” but rather establish the policy risk for a fund.**



# Asset Allocation Modeling

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## Summary

- ▶ **Reflects the translation of investment policy and should reflect the return requirements and risk tolerance of the fund.**
- ▶ **Designed to meet the long-term goals of the fund.**
- ▶ **Asset allocation modeling only as good as its inputs and the principle of garbage in, garbage out applies.**



# Asset Allocation Modeling

## Benchmarking Difficulties

- ▶ **Modeling broad asset classes presents difficulties.**
- ▶ **Specifically, isolating the market exposure of strategies whose style and exposure are dependent on moving among asset classes introduces challenges:**
  - ▶ Absolute return
  - ▶ Real return
  - ▶ Fixed income which may have the flexibility to move among plus and other sectors and away from simple index-like exposures.



# Asset Allocation Modeling

## Mean-Variance Optimization

- ▶ **Using inputs of expected return, risk, and correlation Mean-Variance optimization (“MVO”) seeks to identify “efficient” portfolios.**
  - ▶ Maximize return for a given level of risk, or minimize risk for a given level of return.
  - ▶ Primary advantage is that the process is widely understood and accepted.
  - ▶ Drawbacks include the number and nature of estimates, estimation biases, and the inherent static (one-period) approach.



# Asset Allocation Modeling

## Mean-Variance Optimization

- ▶ **Inputs to MVO driven by a capital markets assumptions setting process.**
- ▶ **These assumptions are *forward-looking* estimates of the behavior of asset classes (i.e. groups of closely related investment opportunities).**
- ▶ **Forward-looking is long-term—10-years or greater.**
- ▶ **Correctly estimating “absolute” and “relative” assumptions important:**
  - ▶ Incorrect absolute forecasts could drive investors targeting a specific return into an overly aggressive portfolio.
  - ▶ Incorrect relative forecasts could drive investors into an inappropriate portfolios as well.



# Asset Allocation Modeling

## 2011 RVK Assumptions

- Below are a sample of RVK's 2011 forward-looking assumptions for asset class returns and risk.

| Asset Class                | Arithmetic Return Assumption | Standard Deviation Assumption |
|----------------------------|------------------------------|-------------------------------|
| <b>Liquid</b>              |                              |                               |
| Broad US Equity            | 8.15%                        | 18.10%                        |
| Broad International Equity | 8.65%                        | 20.10%                        |
| Int. Duration Fixed Income | 4.50%                        | 5.50%                         |
| Cash Equivalents           | 2.25%                        | 3.00%                         |
| <b>Partially Liquid</b>    |                              |                               |
| Real Return                | 6.25%                        | 11.25%                        |
| Absolute Return            | 7.50%                        | 9.00%                         |
| <b>Illiquid</b>            |                              |                               |
| Core Real Estate           | 7.00%                        | 12.50%                        |
| Private Equity             | 12.25%                       | 30.25%                        |

# Asset Allocation Modeling

## 2011 RVK Assumptions – Broad US Equity

|                         | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|-------------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                         | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
| Large/Mid Cap US Equity | 8.00%                  | 17.50%                | 6.61%                | 8.00%                  | 17.75%                | 6.57%                | 0.00%                  | 0.25%                 | -0.04%               |
| Small/Mid Cap US Equity | 9.00%                  | 21.50%                | 6.94%                | 8.75%                  | 21.75%                | 6.64%                | -0.25%                 | 0.25%                 | -0.30%               |
| Broad US Equity         | 8.15%                  | 17.75%                | 6.72%                | 8.15%                  | 18.10%                | 6.67%                | 0.00%                  | 0.35%                 | -0.06%               |

- ▶ **Bottom-up decomposition is primary methodology for estimating returns:**
  - ▶ Dividend Yield
  - ▶ Earnings Growth
  - ▶ Inflation
  - ▶ Change in Price/Earnings Ratio
- ▶ **Mean Revision also considered.**
- ▶ **Bond Yield plus equity premium also utilized.**
- ▶ **Return assumptions held constant from previous year's assumptions.**
- ▶ **Current return assumptions remain lower than historical index averages.**
- ▶ **Risk assumptions modified upward from previous year's assumptions as a result of closer reflection of environment and historical experience.**



# Asset Allocation Modeling

## 2011 RVK Assumptions – Broad International Equity

|                                  | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|----------------------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                                  | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
| Global Equity                    | 8.32%                  | 17.10%                | 6.99%                | 8.45%                  | 17.85%                | 7.01%                | 0.13%                  | 0.75%                 | 0.02%                |
| Dev'd Large/Mid Cap Int'l Equity | 8.25%                  | 18.50%                | 6.70%                | 8.00%                  | 18.75%                | 6.41%                | -0.25%                 | 0.25%                 | -0.29%               |
| Dev'd Small/Mid Cap Int'l Equity | 9.25%                  | 22.50%                | 7.00%                | 8.75%                  | 22.75%                | 6.45%                | -0.50%                 | 0.25%                 | -0.56%               |
| Emerging Markets Equity          | 10.50%                 | 28.00%                | 7.11%                | 10.50%                 | 28.50%                | 7.00%                | 0.00%                  | 0.50%                 | -0.12%               |
| Broad International Equity       | 8.60%                  | 19.15%                | 6.95%                | 8.65%                  | 20.10%                | 6.84%                | 0.05%                  | 0.95%                 | -0.11%               |

- ▶ **Primary methodology is analyzing data for return/risk premium over U.S. equity.**
- ▶ **Mean reversion analysis conducted to assess potential impact on future returns.**
- ▶ **International equity premium eliminated.**
- ▶ **Current return assumptions remain lower than historical averages.**
- ▶ **Risk assumptions modified upward from previous year's assumptions as a result of expected volatility and historical averages.**

# Asset Allocation Modeling

## 2011 RVK Assumptions – Fixed Income

|                            | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|----------------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                            | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
| Int. Duration Fixed Income | 5.00%                  | 5.00%                 | 4.88%                | 4.50%                  | 5.50%                 | 4.36%                | -0.50%                 | 0.50%                 | -0.53%               |
| Non-US Fixed Income UH     | 5.00%                  | 9.25%                 | 4.59%                | 4.25%                  | 9.75%                 | 3.80%                | -0.75%                 | 0.50%                 | -0.80%               |

- ▶ **Current yields are low.**
- ▶ **Uncertain interest rate environment going forward.**
- ▶ **Fixed income expectations lowered for 2011.**
- ▶ **Risk assumptions have increased year-over-year:**
  - ▶ Index volatility has been declining in recent years.
  - ▶ However, potential for additional volatility given economic uncertainties and subsequent interest rate movements.



# Asset Allocation Modeling

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## Alternative Asset Classes

- ▶ **Alternative asset classes present the opportunity for diversification and active management.**
- ▶ **Common features include:**
  - ▶ Lower liquidity
  - ▶ Attractive diversification properties
  - ▶ Higher levels of due diligence
  - ▶ Less efficient than traditional asset classes



# Asset Allocation Modeling

## Alternative Asset Classes

- ▶ Alternatives can provide exposure to asset classes that stocks and bonds can not provide (e.g. real estate and commodities).
- ▶ Exposure to skill based strategies (e.g. hedge funds).
- ▶ Special strategies and unique asset classes (e.g. private equity and distressed funds).

| Asset Class    | Risk/Return Features  | Liquidity        |
|----------------|---|------------------|
| Real Estate    | Risk/Return dependent on split between core, value-added and opportunistic. Good diversification properties.                                  | Low              |
| Hedge Funds    | Historically have had equity-like returns with bond-like volatility.  | Partially Liquid |
| Private Equity | Start-up and middle-market private companies have higher risk and the potential for higher returns than investments in established companies. | Low              |
| Real Return    | Risk/Return dependent on underlying strategy. Goal is to have positive correlation with inflation.  | Partially Liquid |

# Asset Allocation Modeling

## 2011 RVK Assumptions – Core Real Estate

|                  | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                  | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
| Core Real Estate | 7.00%                  | 10.50%                | 6.49%                | 7.00%                  | 12.50%                | 6.28%                | 0.00%                  | 2.00%                 | -0.21%               |

- ▶ Over the past 30 years, the majority of returns in core real estate funds have come from income rather than appreciation. We believe over the longer term, core returns will revert back to the historical trend.
- ▶ Core real estate fundamentals stabilized and gradually improved in 2010
- ▶ Investors have driven cap rates swiftly lower in a search for yield.
- ▶ Real estate return assumption held constant year-over-year.
- ▶ Risk assumptions modified upward from previous year's assumptions.



# Asset Allocation Modeling

## 2011 RVK Assumptions – Absolute Return

| Absolute Return | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|-----------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                 | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
|                 | 7.75%                  | 8.50%                 | 7.42%                | 7.50%                  | 9.00%                 | 7.13%                | -0.25%                 | 0.50%                 | -0.29%               |

- ▶ Return and risk assumption driven by “triangulation” between other component asset classes (particularly equities, fixed income and cash).
- ▶ Updated risk assumption makes greater provision for left-tail years.
- ▶ Return assumption lowered.
- ▶ Risk assumption modified upward from previous year’s assumption as a result of closer reflection of environment and historical experience.

# Asset Allocation Modeling

## 2011 RVK Assumptions – Private Equity

|                | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|----------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
| Private Equity | 12.25%                 | 29.75%                | 8.50%                | 12.25%                 | 30.25%                | 8.38%                | 0.00%                  | 0.50%                 | -0.12%               |

- ▶ Over a 28+ year period of quarterly return observations incorporating multiple economic cycles, time-weighted private equity returns have averaged an annualized premium of approximately 433 bps over domestic large cap equities.
- ▶ Private Equity's observed volatility is biased downward by interim valuation methods and does not capture the illiquidity risk inherent in the asset class and therefore favor a higher volatility assumption.
- ▶ Return assumption held constant.
- ▶ Risk assumption modified upward from previous year's assumption.

# Asset Allocation Modeling

## 2011 RVK Assumptions – Real Return

| Real Return Strategies | 2010                   |                       |                      | 2011                   |                       |                      | Change (2011 - 2010)*  |                       |                      |
|------------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|------------------------|-----------------------|----------------------|
|                        | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) | Return<br>(Arithmetic) | Standard<br>Deviation | Return<br>(Compound) |
|                        | 6.75%                  | 10.50%                | 6.24%                | 6.25%                  | 11.25%                | 5.66%                | -0.50%                 | 0.75%                 | -0.58%               |

- ▶ **Assumptions based largely on assumption adjustments associated with the underlying component strategies:**
  - ▶ TIPS: Return down 0.25%, Risk up 0.50%
  - ▶ Broad Commodities: Risk up 0.25%
  - ▶ REITs: Return down 0.25%
- ▶ **Real return strategies include investments expected to perform well in inflationary environments.**
- ▶ **Return assumption lowered:**
  - ▶ Triangulates to a 3.5% to 4.0% return premium above inflation assumption of 2.5%
- ▶ **Volatility assumption increased.**





# Asset Allocation Modeling

## 2011 RVK Assumptions – Correlations

- Correlation attempts to capture the degree to which two variables are related—in this case asset class returns.

|                            | Broad US Equity | Broad International Equity | Int. Duration Fixed Income | Real Return | Core Real Estate | Absolute Return | Private Equity | Cash Equivalents |
|----------------------------|-----------------|----------------------------|----------------------------|-------------|------------------|-----------------|----------------|------------------|
| Broad US Equity            | 1.00            | 0.84                       | 0.21                       | 0.63        | 0.31             | 0.50            | 0.71           | 0.03             |
| Broad International Equity | 0.84            | 1.00                       | 0.02                       | 0.75        | 0.39             | 0.70            | 0.71           | -0.11            |
| Int. Duration Fixed Income | 0.21            | 0.02                       | 1.00                       | 0.25        | -0.04            | 0.14            | -0.25          | 0.25             |
| Real Return                | 0.63            | 0.75                       | 0.25                       | 1.00        | 0.47             | 0.62            | 0.48           | -0.08            |
| Core Real Estate           | 0.31            | 0.39                       | -0.04                      | 0.47        | 1.00             | 0.35            | 0.45           | 0.25             |
| Absolute Return            | 0.51            | 0.70                       | 0.14                       | 0.62        | 0.35             | 1.00            | 0.53           | 0.19             |
| Private Equity             | 0.71            | 0.71                       | -0.25                      | 0.48        | 0.45             | 0.53            | 1.00           | -0.02            |
| Cash Equivalents           | 0.03            | -0.11                      | 0.25                       | -0.08       | 0.25             | 0.19            | -0.02          | 1.00             |

# Asset Allocation Modeling

## MVO – Efficient Frontier

Asset classes used in the study. Each asset class has a unique assumption regarding return, risk and correlation.

Asset class constraints that specify the minimum/maximum amount of exposure the model can select. Constraints are based on investment policy objectives and qualitative judgment.

Efficient portfolios constructed by the optimization model based on risk, return and correlation to other assets.

Your portfolios' target allocation

Thematic investing allocations that bucket the asset classes into four distinct investment objectives.

Capital Appreciation includes US and Int'l Equities. Capital Preservation includes Fixed Income. Alpha includes Absolute Return. Inflation includes Real Return and Real Estate.

Expected Return = the long-term weighted average return of the portfolio based on the asset mix identified above.

Risk = the expected portfolio volatility based on the individual asset volatilities, correlations, and asset mixes for each portfolio.

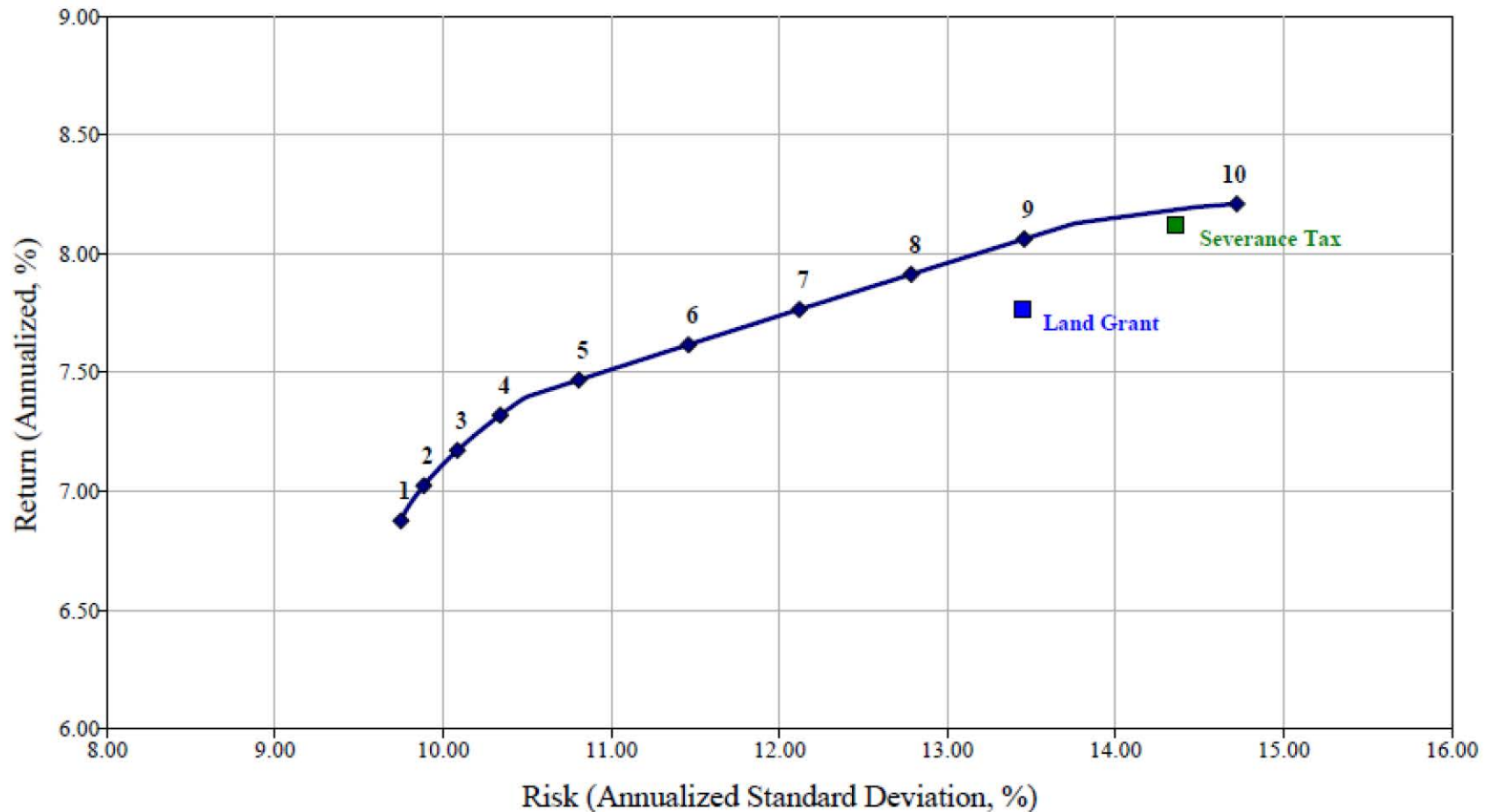
|                                      | Min | Max | 1    | 2    | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|--------------------------------------|-----|-----|------|------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| Broad US Equity                      | 0   | 60  | 40   | 34   | 30    | 27    | 24    | 28    | 32    | 36    | 40    | 50    | 51         | 48            |
| Broad International Equity           | 0   | 10  | 4    | 7    | 7     | 7     | 10    | 10    | 10    | 10    | 10    | 10    | 10         | 10            |
| Int. Duration Fixed Income           | 10  | 30  | 30   | 30   | 30    | 30    | 28    | 24    | 20    | 16    | 12    | 10    | 15         | 12            |
| Core Real Estate                     | 0   | 6   | 6    | 6    | 6     | 6     | 6     | 6     | 6     | 6     | 6     | 0     | 3          | 3             |
| Absolute Return                      | 0   | 20  | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Private Equity                       | 0   | 12  | 0    | 3    | 7     | 11    | 12    | 12    | 12    | 12    | 12    | 12    | 6          | 12            |
| Total                                |     |     | 100  | 100  | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100   | 100        | 100           |
| Capital Appreciation                 |     |     | 44   | 44   | 44    | 44    | 46    | 50    | 54    | 58    | 62    | 72    | 67         | 70            |
| Capital Preservation                 |     |     | 30   | 30   | 30    | 30    | 28    | 24    | 20    | 16    | 12    | 10    | 15         | 12            |
| Alpha                                |     |     | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Inflation                            |     |     | 6    | 6    | 6     | 6     | 6     | 6     | 6     | 6     | 6     | 0     | 3          | 3             |
| Expected Return                      |     |     | 6.88 | 7.02 | 7.17  | 7.32  | 7.47  | 7.62  | 7.77  | 7.91  | 8.06  | 8.21  | 7.77       | 8.12          |
| Risk (Standard Deviation)            |     |     | 9.75 | 9.88 | 10.08 | 10.34 | 10.81 | 11.46 | 12.12 | 12.78 | 13.46 | 14.72 | 13.45      | 14.36         |
| Return (Compound)                    |     |     | 6.44 | 6.57 | 6.70  | 6.83  | 6.93  | 7.01  | 7.09  | 7.16  | 7.23  | 7.22  | 6.94       | 7.18          |
| Return/Risk Ratio                    |     |     | 0.71 | 0.71 | 0.71  | 0.71  | 0.69  | 0.66  | 0.64  | 0.62  | 0.60  | 0.56  | 0.58       | 0.57          |
| RVK Expected Eq Beta (LC US: Eq = 1) |     |     | 0.52 | 0.52 | 0.53  | 0.54  | 0.55  | 0.59  | 0.63  | 0.67  | 0.71  | 0.79  | 0.73       | 0.77          |
| RVK Liquidity Metric (T-Bills = 100) |     |     | 76   | 73   | 69    | 66    | 65    | 65    | 66    | 66    | 66    | 72    | 77         | 71            |

Return (Compound) = the long-term compounding return that considers portfolio volatility  
 Return/Risk Ratio = A measure of the relative return per unit of risk, similar to a Sharpe Ratio  
 RVK Expected Equity Beta = A measure of the movements of the portfolio relative to LS US Equity  
 RVK Liquidity Metric = A measure of portfolio liquidity based on custom liquidity ratings for each asset



# Asset Allocation Modeling

## MVO – Efficient Frontier





# Monte Carlo Simulation



# Monte Carlo Simulation

## Summary

- ▶ **Monte Carlo simulation overcomes the static nature of typical Mean-Variance optimization by “stress-testing” portfolios.**
- ▶ **Incorporates the effects of various assumed capital market factors.**
- ▶ **Provides insight into the performance of asset allocation by examining randomly sampled return outcomes.**
- ▶ **RVK uses 10,000 random samples and assumes a fat-tailed<sup>1</sup> distribution.**

1. Mean-Variance optimization assumes asset class returns are normally distributed. Empirical asset class returns have been non-normal, however, exhibiting a greater probability of extreme outcomes than would be predicted by a normal distribution.

# Monte Carlo Simulation

Given a downside log-stable distribution of portfolio returns, the percentiles below correspond with the simulated returns, by percentile, for each efficient portfolio.

Example: The simulated median return, over a one year period, for the Land Grant pool is 7.61%. The simulated median three year return for the Land Grant pool is 7.20%.

Your portfolios' target allocation.

| 1 Year          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Land Grant | Severance Tax |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|---------------|
| 1st Percentile  | -23.10 | -22.53 | -22.06 | -21.96 | -22.60 | -24.34 | -26.15 | -27.59 | -29.31 | -31.61 | -31.38     | -31.41        |
| 5th Percentile  | -10.18 | -9.81  | -9.49  | -9.30  | -9.70  | -10.58 | -11.52 | -12.33 | -13.29 | -15.15 | -14.67     | -14.70        |
| 25th Percentile | 0.36   | 0.61   | 0.86   | 1.08   | 1.01   | 0.65   | 0.35   | 0.03   | -0.30  | -1.00  | -0.96      | -0.84         |
| 50th Percentile | 6.91   | 7.04   | 7.23   | 7.39   | 7.49   | 7.59   | 7.71   | 7.87   | 8.02   | 8.08   | 7.61       | 7.98          |
| 75th Percentile | 13.41  | 13.45  | 13.52  | 13.59  | 13.90  | 14.50  | 15.10  | 15.70  | 16.32  | 17.21  | 16.45      | 16.98         |
| 95th Percentile | 23.45  | 23.30  | 23.21  | 23.17  | 23.74  | 25.09  | 26.36  | 27.74  | 29.03  | 31.44  | 30.07      | 31.01         |
| 99th Percentile | 30.64  | 30.56  | 30.28  | 30.36  | 31.27  | 33.10  | 35.01  | 36.91  | 38.75  | 42.22  | 40.00      | 41.49         |

| 3 Years         | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | -4.23 | -3.89 | -3.60 | -3.35 | -3.50 | -4.11 | -4.74 | -5.35 | -5.98 | -7.21 | -7.07      | -7.10         |
| 10th Percentile | -1.42 | -1.09 | -0.86 | -0.66 | -0.74 | -1.14 | -1.56 | -2.02 | -2.51 | -3.39 | -3.36      | -3.32         |
| 25th Percentile | 2.61  | 2.84  | 3.06  | 3.27  | 3.26  | 3.06  | 2.84  | 2.64  | 2.43  | 1.97  | 1.84       | 2.04          |
| 50th Percentile | 6.65  | 6.78  | 6.96  | 7.13  | 7.25  | 7.34  | 7.42  | 7.52  | 7.60  | 7.60  | 7.20       | 7.55          |
| 75th Percentile | 10.54 | 10.64 | 10.75 | 10.89 | 11.13 | 11.48 | 11.83 | 12.18 | 12.56 | 13.04 | 12.42      | 12.88         |
| 90th Percentile | 14.00 | 14.05 | 14.09 | 14.24 | 14.62 | 15.24 | 15.84 | 16.46 | 17.07 | 17.97 | 17.10      | 17.72         |
| 95th Percentile | 16.11 | 16.11 | 16.14 | 16.20 | 16.60 | 17.34 | 18.09 | 18.88 | 19.65 | 20.85 | 19.92      | 20.54         |

5<sup>th</sup> percentile return interpreted as 95% of the time I would expect my annualized return over a 3 year period return to be greater than -7.07% given my asset return assumptions and the distribution assumption of those returns.



# Monte Carlo Simulation

| 5 Years         | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | -1.95 | -1.62 | -1.37 | -1.13 | -1.16 | -1.65 | -2.15 | -2.62 | -3.14 | -4.13 | -4.01      | -3.96         |
| 10th Percentile | 0.29  | 0.57  | 0.81  | 1.04  | 0.99  | 0.62  | 0.28  | -0.07 | -0.44 | -1.13 | -1.26      | -1.09         |
| 25th Percentile | 3.43  | 3.66  | 3.86  | 4.08  | 4.13  | 4.01  | 3.88  | 3.75  | 3.60  | 3.24  | 3.01       | 3.28          |
| 50th Percentile | 6.62  | 6.77  | 6.90  | 7.07  | 7.19  | 7.30  | 7.39  | 7.49  | 7.58  | 7.55  | 7.19       | 7.52          |
| 75th Percentile | 9.68  | 9.79  | 9.95  | 10.08 | 10.28 | 10.57 | 10.89 | 11.21 | 11.51 | 11.92 | 11.31      | 11.80         |
| 90th Percentile | 12.41 | 12.50 | 12.58 | 12.66 | 12.90 | 13.43 | 13.94 | 14.47 | 14.97 | 15.75 | 15.05      | 15.54         |
| 95th Percentile | 14.02 | 14.08 | 14.13 | 14.25 | 14.60 | 15.20 | 15.82 | 16.44 | 17.06 | 18.05 | 17.21      | 17.82         |

| 10 Years        | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | 0.25  | 0.49  | 0.71  | 0.93  | 0.92  | 0.62  | 0.26  | -0.02 | -0.40 | -1.16 | -1.25      | -1.06         |
| 10th Percentile | 1.81  | 2.07  | 2.30  | 2.51  | 2.53  | 2.28  | 2.01  | 1.74  | 1.47  | 0.86  | 0.76       | 0.92          |
| 25th Percentile | 4.17  | 4.38  | 4.58  | 4.74  | 4.81  | 4.74  | 4.65  | 4.58  | 4.47  | 4.18  | 3.97       | 4.17          |
| 50th Percentile | 6.49  | 6.67  | 6.81  | 6.97  | 7.09  | 7.17  | 7.26  | 7.33  | 7.41  | 7.39  | 7.01       | 7.32          |
| 75th Percentile | 8.68  | 8.81  | 8.94  | 9.08  | 9.27  | 9.51  | 9.75  | 9.98  | 10.21 | 10.48 | 9.95       | 10.36         |
| 90th Percentile | 10.64 | 10.72 | 10.80 | 10.91 | 11.15 | 11.53 | 11.93 | 12.31 | 12.67 | 13.17 | 12.55      | 13.01         |
| 95th Percentile | 11.68 | 11.72 | 11.82 | 11.94 | 12.20 | 12.64 | 13.07 | 13.54 | 13.99 | 14.66 | 13.97      | 14.48         |



# Liquidity Analysis





# Liquidity Analysis

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- ▶ **One drawback of Mean-Variance optimization is the model's assumption of liquid asset classes.**
- ▶ **This presents challenges for non-marketable (less liquid) asset classes in MVO simulations:**
  - ▶ Private equity
  - ▶ Real estate
  - ▶ Absolute return
  - ▶ Real return
- ▶ **These asset classes are viewed favorably through a MVO analysis for their return, risk, and diversification properties.**



# Liquidity Analysis

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- ▶ **While non-marketable asset classes provide exposure to unique risk factors their favorable characteristics warrant additional examination:**
  - ▶ Are high expected returns simply risk premiums for assuming illiquidity risk?
  - ▶ Are diversification benefits due to unique risk exposures or the infrequent valuations associated with less liquid assets?
- ▶ **This shortfall can be addressed by modeling a fund's liquidity profile.**



# Asset Allocation Approaches



# Asset Allocation Approaches

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## Summary

- ▶ **The focus of an asset allocation discussion may take a variety of perspectives:**
  - ▶ Granular approach
    - ▶ Structure studies used to achieve this level of detail.
  - ▶ Broad approach
    - ▶ Asset class categories are the focus.
    - ▶ This is the current approach adopted in the asset allocation study.
  - ▶ Thematic approach
    - ▶ Objective of each investment is the focus.



# Asset Allocation Approaches

## Granular Approach

### ▶ Pros:

- ▶ Potential for better integration of sub-components in asset strategy.
- ▶ Potential elimination of asset structuring as an additional step.

### ▶ Cons:

- ▶ Potential for information overload (for decision-makers and the model).
  - ▶ Optimization procedures are most effective with heterogeneous asset classes—sub asset classes can be homogeneous and highly correlated.
- ▶ Potential for emphasis on component detail rather than driving toward total fund behavior modeling.
- ▶ Does not formally address investment objectives as it drives toward modeling total fund behavior.



# Asset Allocation Approaches

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## Broad Approach

- ▶ **Pro:**
  - ▶ Focused discussion, with an emphasis on strategy over detail.
  
- ▶ **Cons:**
  - ▶ Potential need for a separate and additional structuring discussion.
  - ▶ Does not formally address investment objectives as it drives toward modeling total fund behavior.



# Asset Allocation Approaches

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## Thematic Approach

- ▶ **Pro:**
  - ▶ Objectives-based discussion, focused on investment themes.
  
- ▶ **Con:**
  - ▶ Potential need for additional structuring decisions.



# Asset Allocation Approaches

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## Thematic Categories

- ▶ **We believe, at its simplest, the foundational purpose of any investment is either to grow or preserve capital.**
- ▶ **However, as purchasing power protection is also of significant interest to most investors we believe there is merit to further granularity by including an Inflation category. We understand that some inflation assets will be more growth oriented and others will be more preservation oriented.**
- ▶ **We also believe that further granularity is also warranted for an Alpha category. Even though Alpha mandates may invest in the same assets as other categories, an Alpha investment can include an expanded tool set, has a different objective, and can provide attractive portfolio diversification benefits.**





# Asset Allocation Approaches

## Thematic Categories – Capital Appreciation

- ▶ **The objective of Capital Appreciation investments is to be the growth engine of the portfolio. This growth is usually obtained through investments that are lower in the capital structure<sup>1</sup> and typically less liquid. They also tend to be more volatile, but likely provide greater potential for return over time.**
- ▶ **Categories include:**
  - ▶ Public Equity
  - ▶ Private Equity
  - ▶ High Yield
  - ▶ Convertible Fixed Income
  - ▶ TALF Funds
  - ▶ Distressed Debt
  - ▶ Emerging Market Fixed Income
  - ▶ Preferred Securities
  - ▶ Value Added Real Estate
  - ▶ Opportunistic Real Estate

<sup>1</sup>In other words, represent a residual claim on assets and/or are unsecured.



# Asset Allocation Approaches

## Thematic Categories – Capital Preservation

- ▶ The objective of Capital Preservation investments is to be the *safety net* of the portfolio. This safety is typically obtained through investments with more emphasis on income production, higher quality, and typically lower volatility.
- ▶ Categories include:
  - ▶ Core Fixed Income
  - ▶ CMBS Fixed Income
  - ▶ Asset Backed Fixed Income
  - ▶ Domestic Core Plus Fixed Income
  - ▶ Long Duration Fixed Income
  - ▶ Mortgage Backed Fixed Income
  - ▶ Int'l Developed Fixed Income
  - ▶ Cash Equivalents
  - ▶ Stable Value



# Asset Allocation Approaches

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## Thematic Categories – Alpha

- ▶ **The objective of Alpha investments is to provide diversification. This diversification is obtained through investments that seek absolute performance rather than relative, rely on manager skill rather than market growth, and allow for flexibility of tools and allocations.**
- ▶ **Categories include:**
  - ▶ Absolute Return Strategies
  - ▶ Currency Overlay



# Asset Allocation Approaches

## Thematic Categories – Inflation

- ▶ The objective of Inflation investments is to provide *purchasing power protection* for the portfolio. This protection can be obtained through investments at any level of the capital structure or within any sector that exhibits hedging characteristics.
- ▶ Categories include:
  - ▶ TIPS
  - ▶ Real Estate
  - ▶ Real Return
  - ▶ Inflation Hedges
  - ▶ REITs
  - ▶ Commodities



# Asset Allocation Approaches

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## Thematic Categories – Summary

- ▶ **A Thematic approach to allocation can help:**
  - ▶ Deemphasize asset class details.
  - ▶ Emphasize investment fundamentals.
  - ▶ Emphasize fund objectives.



# **Asset Allocation Modeling with Real Return Strategies**

# Asset Allocation Modeling

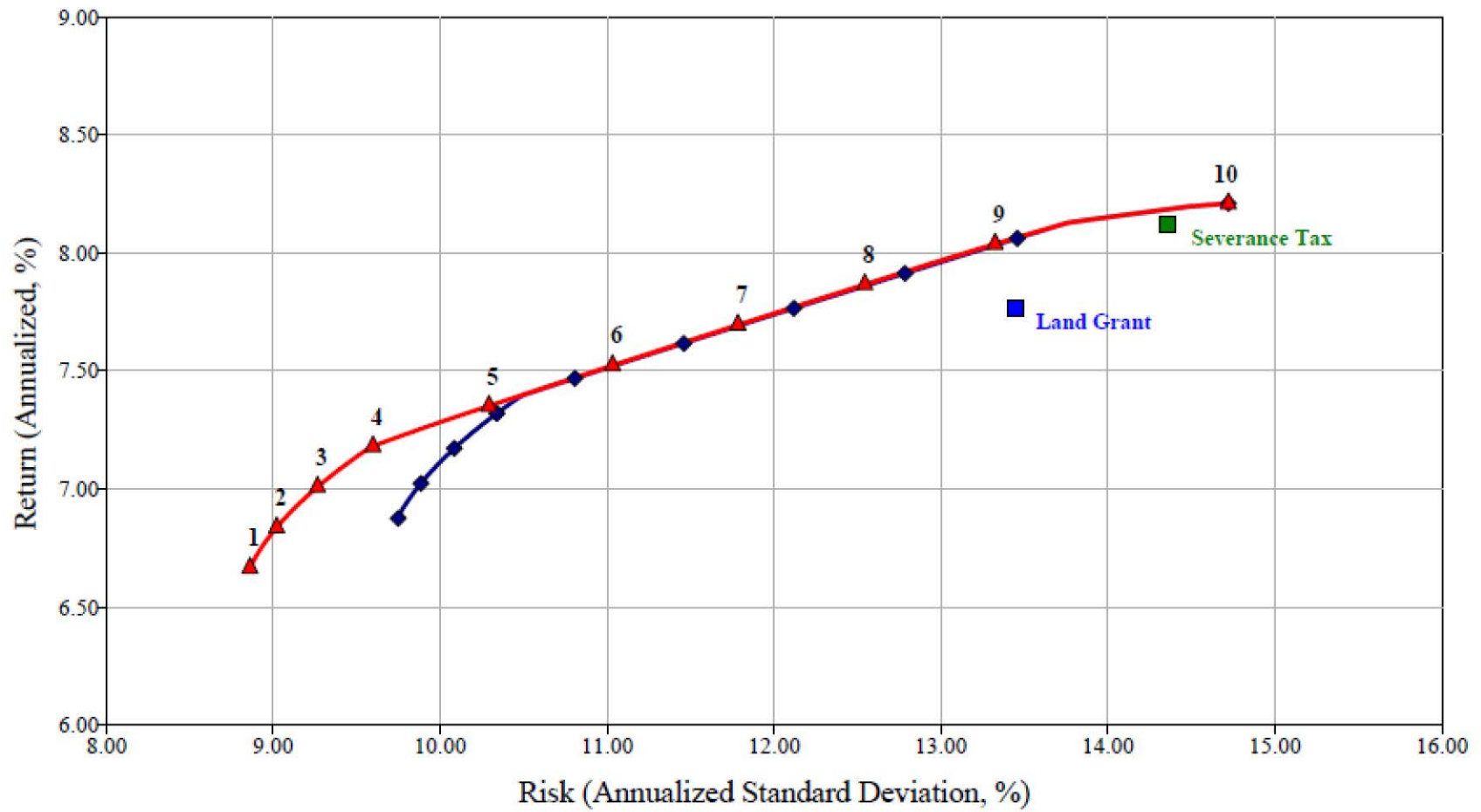
## MVO – Efficient Frontier

|                                      | Min | Max | 1    | 2    | 3    | 4    | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|--------------------------------------|-----|-----|------|------|------|------|-------|-------|-------|-------|-------|-------|------------|---------------|
| Broad US Equity                      | 0   | 60  | 34   | 29   | 25   | 17   | 19    | 22    | 26    | 30    | 37    | 50    | 51         | 48            |
| Broad International Equity           | 0   | 10  | 0    | 1    | 1    | 5    | 10    | 10    | 10    | 10    | 10    | 10    | 10         | 10            |
| Int. Duration Fixed Income           | 10  | 30  | 30   | 30   | 30   | 30   | 29    | 23    | 18    | 12    | 10    | 10    | 15         | 12            |
| Real Return                          | 0   | 10  | 10   | 10   | 10   | 10   | 5     | 6     | 8     | 10    | 5     | 0     | 0          | 0             |
| Core Real Estate                     | 0   | 6   | 6    | 6    | 6    | 6    | 6     | 6     | 6     | 6     | 6     | 0     | 3          | 3             |
| Absolute Return                      | 0   | 20  | 20   | 20   | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Private Equity                       | 0   | 12  | 0    | 4    | 8    | 12   | 12    | 12    | 12    | 12    | 12    | 12    | 6          | 12            |
| Total                                |     |     | 100  | 100  | 100  | 100  | 100   | 100   | 100   | 100   | 100   | 100   | 100        | 100           |
| Capital Appreciation                 |     |     | 34   | 34   | 34   | 34   | 41    | 44    | 48    | 52    | 59    | 72    | 67         | 70            |
| Capital Preservation                 |     |     | 30   | 30   | 30   | 30   | 29    | 23    | 18    | 12    | 10    | 10    | 15         | 12            |
| Alpha                                |     |     | 20   | 20   | 20   | 20   | 20    | 20    | 20    | 20    | 20    | 18    | 15         | 15            |
| Inflation                            |     |     | 16   | 16   | 16   | 16   | 11    | 12    | 14    | 16    | 11    | 0     | 3          | 3             |
| Expected Return                      |     |     | 6.67 | 6.84 | 7.01 | 7.18 | 7.35  | 7.52  | 7.70  | 7.87  | 8.04  | 8.21  | 7.77       | 8.12          |
| Risk (Standard Deviation)            |     |     | 8.86 | 9.02 | 9.27 | 9.60 | 10.29 | 11.03 | 11.78 | 12.54 | 13.32 | 14.72 | 13.45      | 14.36         |
| Return (Compound)                    |     |     | 6.30 | 6.46 | 6.61 | 6.75 | 6.86  | 6.96  | 7.06  | 7.15  | 7.23  | 7.22  | 6.94       | 7.18          |
| Return/Risk Ratio                    |     |     | 0.75 | 0.76 | 0.76 | 0.75 | 0.71  | 0.68  | 0.65  | 0.63  | 0.60  | 0.56  | 0.58       | 0.57          |
| RVK Expected Eq Beta (LC US Eq = 1)  |     |     | 0.47 | 0.47 | 0.48 | 0.48 | 0.52  | 0.56  | 0.60  | 0.64  | 0.69  | 0.79  | 0.73       | 0.77          |
| RVK Liquidity Metric (T-Bills = 100) |     |     | 71   | 68   | 64   | 60   | 63    | 62    | 62    | 62    | 64    | 72    | 77         | 71            |



# Asset Allocation Modeling

## MVO – Efficient Frontier





# Monte Carlo Simulation

| 1 Year          | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Land Grant | Severance Tax |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|---------------|
| 1st Percentile  | -23.10 | -22.53 | -22.06 | -21.96 | -22.60 | -24.34 | -26.15 | -27.59 | -29.31 | -31.61 | -31.38     | -31.41        |
| 5th Percentile  | -10.18 | -9.81  | -9.49  | -9.30  | -9.70  | -10.58 | -11.52 | -12.33 | -13.29 | -15.15 | -14.67     | -14.70        |
| 25th Percentile | 0.36   | 0.61   | 0.86   | 1.08   | 1.01   | 0.65   | 0.35   | 0.03   | -0.30  | -1.00  | -0.96      | -0.84         |
| 50th Percentile | 6.91   | 7.04   | 7.23   | 7.39   | 7.49   | 7.59   | 7.71   | 7.87   | 8.02   | 8.08   | 7.61       | 7.98          |
| 75th Percentile | 13.41  | 13.45  | 13.52  | 13.59  | 13.90  | 14.50  | 15.10  | 15.70  | 16.32  | 17.21  | 16.45      | 16.98         |
| 95th Percentile | 23.45  | 23.30  | 23.21  | 23.17  | 23.74  | 25.09  | 26.36  | 27.74  | 29.03  | 31.44  | 30.07      | 31.01         |
| 99th Percentile | 30.64  | 30.56  | 30.28  | 30.36  | 31.27  | 33.10  | 35.01  | 36.91  | 38.75  | 42.22  | 40.00      | 41.49         |

| 3 Years         | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | -4.23 | -3.89 | -3.60 | -3.35 | -3.50 | -4.11 | -4.74 | -5.35 | -5.98 | -7.21 | -7.07      | -7.10         |
| 10th Percentile | -1.42 | -1.09 | -0.86 | -0.66 | -0.74 | -1.14 | -1.56 | -2.02 | -2.51 | -3.39 | -3.36      | -3.32         |
| 25th Percentile | 2.61  | 2.84  | 3.06  | 3.27  | 3.26  | 3.06  | 2.84  | 2.64  | 2.43  | 1.97  | 1.84       | 2.04          |
| 50th Percentile | 6.65  | 6.78  | 6.96  | 7.13  | 7.25  | 7.34  | 7.42  | 7.52  | 7.60  | 7.60  | 7.20       | 7.55          |
| 75th Percentile | 10.54 | 10.64 | 10.75 | 10.89 | 11.13 | 11.48 | 11.83 | 12.18 | 12.56 | 13.04 | 12.42      | 12.88         |
| 90th Percentile | 14.00 | 14.05 | 14.09 | 14.24 | 14.62 | 15.24 | 15.84 | 16.46 | 17.07 | 17.97 | 17.10      | 17.72         |
| 95th Percentile | 16.11 | 16.11 | 16.14 | 16.20 | 16.60 | 17.34 | 18.09 | 18.88 | 19.65 | 20.88 | 19.92      | 20.54         |

# Monte Carlo Simulation

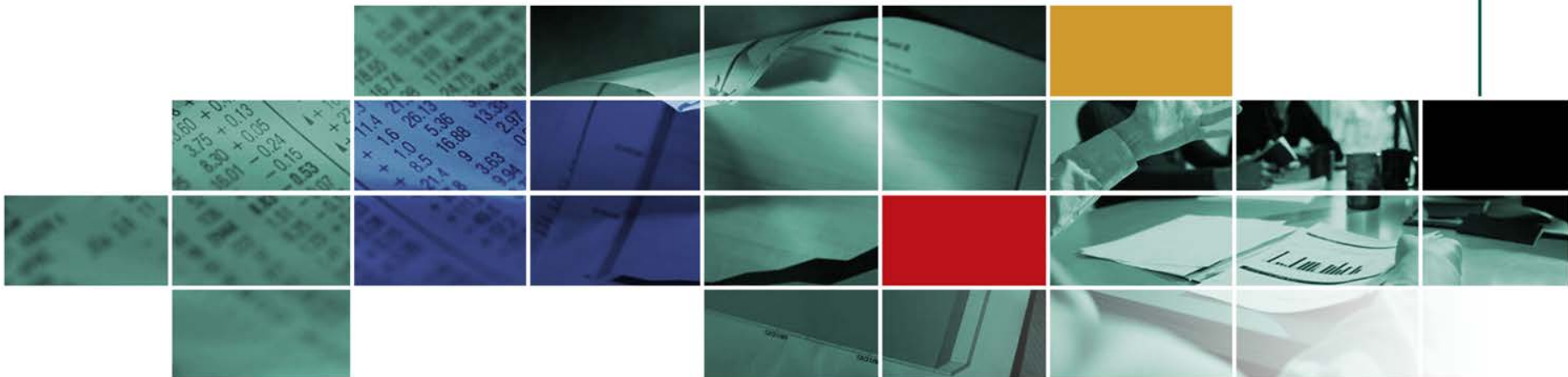
| 5 Years         | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | -1.95 | -1.62 | -1.37 | -1.13 | -1.16 | -1.65 | -2.15 | -2.62 | -3.14 | -4.13 | -4.01      | -3.96         |
| 10th Percentile | 0.29  | 0.57  | 0.81  | 1.04  | 0.99  | 0.62  | 0.28  | -0.07 | -0.44 | -1.13 | -1.26      | -1.09         |
| 25th Percentile | 3.43  | 3.66  | 3.86  | 4.08  | 4.13  | 4.01  | 3.88  | 3.75  | 3.60  | 3.24  | 3.01       | 3.28          |
| 50th Percentile | 6.62  | 6.77  | 6.90  | 7.07  | 7.19  | 7.30  | 7.39  | 7.49  | 7.58  | 7.55  | 7.19       | 7.52          |
| 75th Percentile | 9.68  | 9.79  | 9.95  | 10.08 | 10.28 | 10.57 | 10.89 | 11.21 | 11.51 | 11.92 | 11.31      | 11.80         |
| 90th Percentile | 12.41 | 12.50 | 12.58 | 12.66 | 12.90 | 13.43 | 13.94 | 14.47 | 14.97 | 15.75 | 15.05      | 15.54         |
| 95th Percentile | 14.02 | 14.08 | 14.13 | 14.25 | 14.60 | 15.20 | 15.82 | 16.44 | 17.06 | 18.05 | 17.21      | 17.82         |

| 10 Years        | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Land Grant | Severance Tax |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|---------------|
| 5th Percentile  | 0.25  | 0.49  | 0.71  | 0.93  | 0.92  | 0.62  | 0.26  | -0.02 | -0.40 | -1.16 | -1.25      | -1.06         |
| 10th Percentile | 1.81  | 2.07  | 2.30  | 2.51  | 2.53  | 2.28  | 2.01  | 1.74  | 1.47  | 0.86  | 0.76       | 0.92          |
| 25th Percentile | 4.17  | 4.38  | 4.58  | 4.74  | 4.81  | 4.74  | 4.65  | 4.58  | 4.47  | 4.18  | 3.97       | 4.17          |
| 50th Percentile | 6.49  | 6.67  | 6.81  | 6.97  | 7.09  | 7.17  | 7.26  | 7.33  | 7.41  | 7.39  | 7.01       | 7.32          |
| 75th Percentile | 8.68  | 8.81  | 8.94  | 9.08  | 9.27  | 9.51  | 9.75  | 9.98  | 10.21 | 10.48 | 9.95       | 10.36         |
| 90th Percentile | 10.64 | 10.72 | 10.80 | 10.91 | 11.15 | 11.53 | 11.93 | 12.31 | 12.67 | 13.17 | 12.55      | 13.01         |
| 95th Percentile | 11.68 | 11.72 | 11.82 | 11.94 | 12.20 | 12.64 | 13.07 | 13.54 | 13.99 | 14.66 | 13.97      | 14.48         |

## Endowment Spending Policy Discussion Material

Client Name

September 11, 2012





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# Current Environment

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- ▶ **Spending policy has become a higher profile topic with many higher education institutions for a variety of reasons:**
  - a) Broad adoption of UPMIFA has provided clarity of the key components to be considered when establishing a spending policy.
  - b) Weak capital markets have made protection of corpus very difficult.
  - c) 2008/2009 crisis highlighted the lack of language in many policies to account for extreme market and organizational situations.
  - d) Low absolute interest rates make the historical 5.0% “typical” spending rate appear increasingly unrealistic.
  - e) Spending pressures on higher education institutions are increasing due to decreased funding for public institutions and widespread pressure on giving/donations.
  - f) Institutions have shown an increased interest in CPI and hybrid policies.



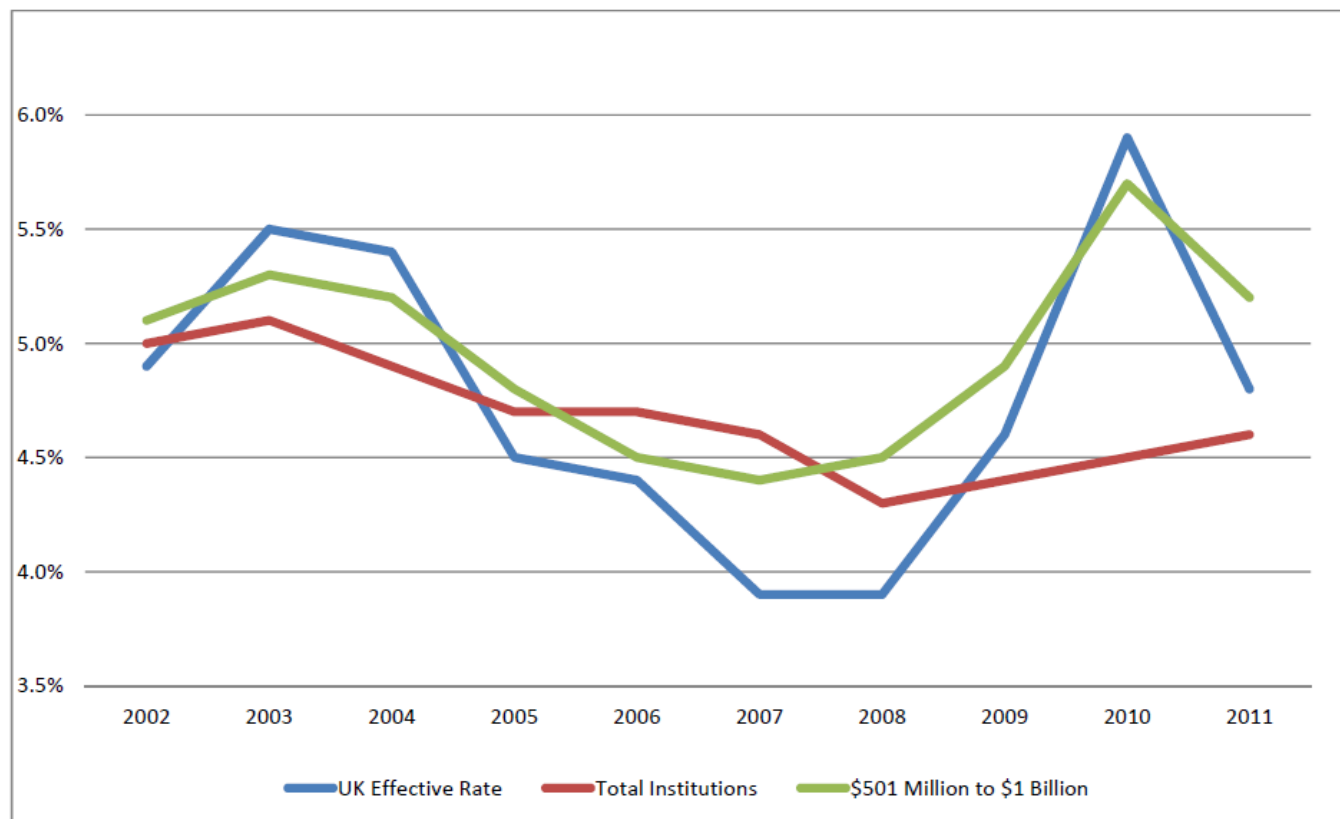
# UPMIFA Summary

- ▶ The Uniform Prudent Management of Institutional Fund Act (UPMIFA) effectively has replaced the 1972 Uniform Management of Institutional Funds Act (UMIFA). UPMIFA has been adopted by 49 states.
- ▶ The Act provides guidance on investment decisions and endowment expenditures for nonprofit and charitable organizations.
- ▶ One major change in UPMIFA is that institutions can spend on funds with a value below the original value of contributions. Instead, the new requirement states that investing and spending will be at a rate that preserves the long-term purchasing power of principal.
- ▶ The seven prudence factors related to spending policy, according to UPMIFA, are :
  1. Duration and preservation of the endowment fund.
  2. Purposes of the institution and the endowment fund.
  3. General economic conditions.
  4. Possible effect of inflation or deflation.
  5. Expected total return – income and appreciation of investments.
  6. Institution's other resources.
  7. Institution's investment policy.



# Peer Data Analysis

## Annual Reported Effective Spending Rates for Total Institutions for Fiscal years 2001-2011



Source: NACUBO-Commonfund Study of Endowments 2001-2011 and Client



# Peer Data Analysis – Percentage of Operating Budget Funded by Endowment

|   | Total Institutions | Over \$1 Billion | \$501 MM - \$1 Billion | Client |
|---|--------------------|------------------|------------------------|--------|
| Participants                                      | 823                | 73               | 66                     | NA     |
| Average % of operating budget funded by endowment | 9.2%               | 15.0%            | 16.9%                  | 1.6%*  |
| Median % of operating budget funded by endowment  | 3.2%               | 8.1%             | 13.1%                  | NA     |
| Increased   | 24                 | 27               | 23                     |        |
| Decreased   | 33                 | 40               | 44                     | ✓      |
| No change   | 28                 | 8                | 13                     |        |
| Uncertain   | 15                 | 25               | 20                     |        |

Source: NACUBO-Commonfund Study of Endowments 2011

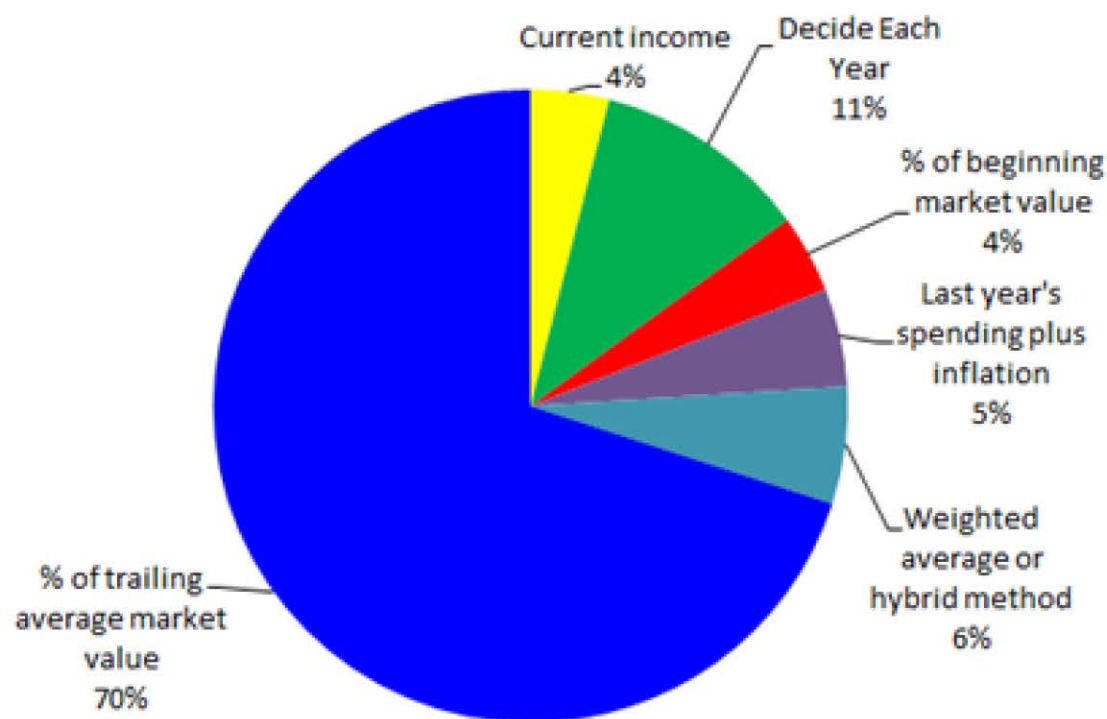
\*Low % is due to inclusion of medical center in consolidated financial statements. FY10 return was 1.8%





# Spending Policy Options— Spending Policy Methodologies Used by Endowments

**Determination of Spending Rate in Fiscal Year 2011**



Source: NACUBO-Commonfund Study of Endowments 2011



# Spending Policy Options

## 1. Percentage of Weighted Average Market Value

- ▶ The most prevalent spending policy calculation methodology for endowments today is this option.
- ▶ The primary components to the calculation are: defining the percentage of market value, and defining the period for averaging the market value of the portfolio. For example,
  - ▶ **Annual Spending = 4.5% of the average market value of the endowment for the trailing 12 quarters.**
- ▶ **Advantages** of this spending policy option include:
  - ▶ Averaging values over multiple quarters reduces the impact of a rapid change in market value.
  - ▶ The actual spending rate is stated.
  - ▶ The formula is widely recognized.
- ▶ **Disadvantages** of this spending policy option include:
  - ▶ Spending varies more with this spending policy than with other spending policies.
  - ▶ Annual spending is somewhat unpredictable.
  - ▶ Spending tends to fall when the need may be the highest.
  - ▶ The process for selecting the smoothing period (T-8, T-12, T-24) is somewhat arbitrary.



# Spending Policy Options

## 2. Inflation-Linked Spending

- ▶ With an inflation linked spending policy, annual spending changes are a function of the previous year's spending plus the change in inflation.
  - ▶ **Annual spending = spending amount from the previous year plus/minus the change in the CPI index for the most recent 12 months.**
- ▶ Inflation can be expressed as the percentage change in CPI, or the change in CPI plus a certain amount (for example, CPI + 0.5%), or using a different inflation benchmark (HEPI or a subset of the broad CPI index).
- ▶ **Advantages** of this spending option include:
  - ▶ Spending will increase each year unless CPI is negative.
  - ▶ The volatility of spending over time is lower than a market value-based spending policy.
  - ▶ The calculation methodology is relatively straightforward.
- ▶ **Disadvantages** of this spending option include:
  - ▶ Potential to “overspend” under certain economic scenarios such as stagflation.
  - ▶ An inflation formula must be selected.
  - ▶ Spending will tend to be lower during periods of low inflation than under other spending options.



# Spending Policy Options

## 3. Hybrid Spending Policy

- ▶ With a hybrid spending policy, spending policy incorporates both a market value component and an inflation linked component. The allocation to each component will vary based on the specific circumstances of the institutions.
  - ▶ **Annual spending = 70% based on the spending amount from the previous year plus/minus the change in the CPI index for the most recent 12 months; 30% based on 4.5% of the average market value of the endowment for the trailing 12 quarters.**
- ▶ Hybrid spending policies have been adopted by the majority of large private university endowments.
- ▶ **Advantages** of this spending option include:
  - ▶ Provides a blend of the primary spending options.
  - ▶ Less volatile than a pure market value based approach.
  - ▶ Percentage allocations to each component can be customized.
  - ▶ Minimizes some issues involved with using just market value or just inflation.
- ▶ **Disadvantages** of this spending option include:
  - ▶ More complex than other options.
  - ▶ May be harder to communicate to constituents than other options.



# Upper and Lower Spending Bands

- ▶ Regardless of the spending policy option selected, an increasingly large number of institutions have adopted or are considering adopting upper and lower limits, or bands, on annual spending.
  - ▶ **Example: Minimum annual spending = previous year's spending + 1.0%;**  
**Maximum annual spending = previous year's spending + 7.0%**
- ▶ Annual spending limits provide some assurance on the “best case” and “worst case” spending scenarios for annual spending and thus aid in annual budgeting. If implemented correctly, bands do not have a meaningful impact on corpus over time.
- ▶ If annual spending bands are implemented, an institution needs to carefully model and monitor the correct upper and lower limits given their asset mix and their spending policy formula.



# Client Endowment Spending History

| <b><u>Fiscal Year</u></b>    | <b><u>Spending Policy:</u></b> |                           | <b>Mgt.</b>       |
|------------------------------|--------------------------------|---------------------------|-------------------|
|                              | <b><u>Rate</u></b>             | <b><u>Avg. Period</u></b> | <b><u>Fee</u></b> |
| <b>1993-1998</b>             | <b>5.0%</b>                    | <b>36 mos.</b>            | <b>None</b>       |
| <b>1999-2005</b>             | <b>5.0%</b>                    | <b>36 mos.</b>            | <b>1.0%</b>       |
| <b>2006</b>                  | <b>4.75%</b>                   | <b>36 mos.</b>            | <b>0.75%</b>      |
| <b>2007-2010<sup>1</sup></b> | <b>4.5%</b>                    | <b>36 mos.</b>            | <b>0.5%</b>       |
| <b>2011<sup>1</sup></b>      | <b>4.375%</b>                  | <b>60 mos.</b>            | <b>0.375%</b>     |
| <b>2012<sup>2, 3</sup></b>   | <b>4.25%</b>                   | <b>60 mos.</b>            | <b>0.25%</b>      |
| <b>2013<sup>4</sup></b>      | <b>4.25%</b>                   | <b>60 mos.</b>            | <b>0.25%</b>      |

## **Notes:**

- 1. Replenish difference between spending distribution and actual income on state portion of RCTF underwater endowments for fiscal years 2010 and 2011.*
- 2. Spending distributions reduced by 25% on all endowments underwater by more than 10%.*
- 3. Spending distributions limited to actual income on state portion of RCTF underwater endowments.*
- 4. Spending distributions limited to actual income on entire amount of RCTF underwater endowments.*



# Spending Analysis - Overview

- ▶ To help compare and contrast the three primary spending options, RVK prepared the following data to help provide an "apples-to-apples" comparison of the three options.
- ▶ We used the following assumptions in our analysis:
  - ▶ Starting Market Value: \$100mm
  - ▶ Starting Year: 1976
  - ▶ Asset Mix Assumptions: We used the following constant asset mix for the endowment:
    - ▶ 55% U.S. Equity
    - ▶ 20% International Equity
    - ▶ 25% Fixed Income
  - ▶ Rebalancing Frequency: Annual



# Spending Analysis - Overview

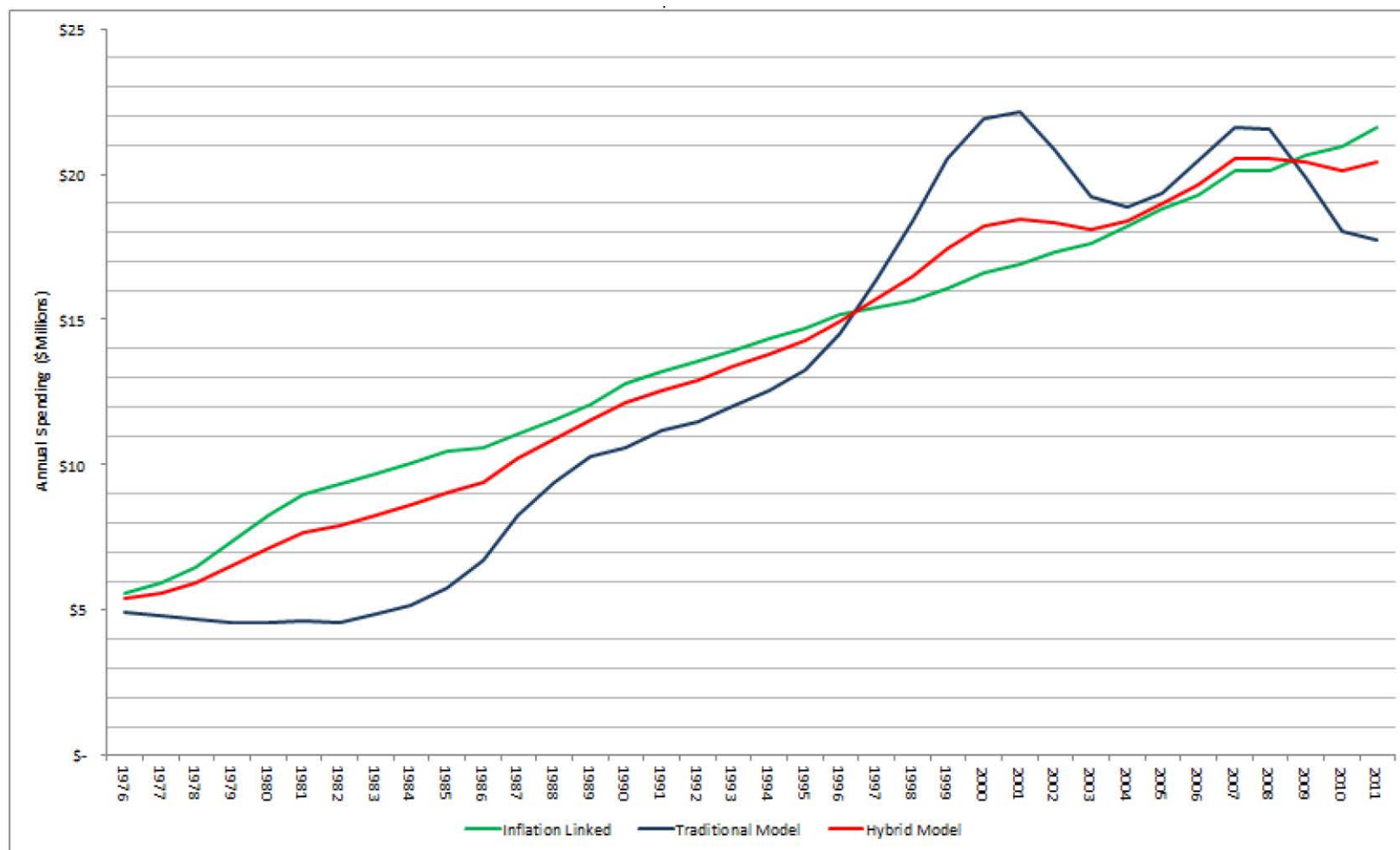
- ▶ Specific Spending Policies Modeled:
  - ▶ *Inflation Linked* – Annual change in CPI-U
  - ▶ *Traditional Model* - 4.5% of the average trailing 12 quarters' market value
  - ▶ *Hybrid Model* - 70% Inflation Linked and 30% Traditional Model.
- ▶ Starting Annual Spending Amount (1977):
  - ▶ *Inflation Linked* - \$5.6mm
  - ▶ *Traditional Model* - \$4.9mm
  - ▶ *Hybrid Model* - \$5.4mm
- ▶ Return Assumptions: We used index returns for each asset class, as follows:
  - ▶ 55% DJ Industrial Avg. Index
  - ▶ 20% MSCI World ex-US Index
  - ▶ 25% Barclays Capital Aggregate Bond Index





# Analysis of Spending Patterns

## Comparison of Annual Spending Models from 1976 - 2011





# Spending Analysis - Summary

|                                       | Inflation Linked | Traditional Model | Hybrid Model |
|---------------------------------------|------------------|-------------------|--------------|
| Average Annual Spending               | \$13.9mm         | \$12.9mm          | \$13.6mm     |
| Largest Annual Spending               | \$21.6mm         | \$21.9mm          | \$20.6mm     |
| Lowest Annual Spending                | \$5.6mm          | \$4.6mm           | \$5.4mm      |
| Standard Deviation of Annual Spending | 3.3%             | 5.0%              | 3.7%         |
| Cumulative Spending                   | \$500.6mm        | \$465.9mm         | \$490.2mm    |

- ▶ The CPI based option, “Inflation Linked” has the lowest volatility of spending, and spending always increases (so long as CPI is positive).
- ▶ The market value based option, “Traditional Model” captures the benefits of increased market values, and absorbs some of the "pain" of decreased market values. Smoothing techniques help somewhat.
- ▶ The Hybrid Model captures some of the benefits of each option used on its own.
- ▶ In actual real-life circumstances , the specific details associated with each option are critical.



# Other Discussion Items

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- ▶ Delayed spending distributions for new endowment gifts
- ▶ Reduced spending on underwater endowments