Endowment Spending and Other Changes
A Policy Framework for Perpetual Funds

William Jarvis, Managing Director, Commonfund Institute
Concurrent Sessions 503
Tuesday, October 7, 2014 | 1:30-2:30 p.m.
Agenda

- Four levers and the concept of intergenerational equity
- A primer on forecasting models
- Allocation policy
- Spending policy
# The Four Levers

Policy Drivers | A Framework

<table>
<thead>
<tr>
<th>Four Levers</th>
<th>Intergenerational Equity</th>
<th>Median Spend</th>
<th>Volatility of Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Allocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spending Rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spending Method</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“The trustees of endowed institutions are the guardians of the future against the claims of the present. Their task is to preserve equity among generations.”

- James Tobin
Yale University
The Importance of Real Returns

70% S&P 500, 30% Barclays U.S. Aggregate and **5.00%** Spend (Hypothetical Portfolio)

January 1966 – December 2013

Cumulative Value (Real Dollars)

The equity portion of the hypothetical portfolio is based on monthly returns of the S&P 500 Index (12/65-current quarter end), and the fixed income portion is based on monthly returns of the Barclays U.S. Aggregate Index (01/73-current quarter end) and the Ibbotson Associates Long Term Corporate Bond Index (12/65-12/72). HEPI data from 07/06 to current quarter end is estimated using the Commonfund Institute method based on regression analysis. Returns for this hypothetical portfolio assume that it is rebalanced to 70/30 annually on 1/1/yy and 5% is distributed annually on 1/1/yy.

Cumulative Inflation-Adjusted Performance

Source: Ibbotson, Bloomberg, Commonfund Institute

Endowment Spending | A Policy Framework | 7 Oct 2014
The Importance of Real Returns  | Effects of Spending  | CPI
70% S&P 500, 30% Barclays U.S. Aggregate and 4.66% Spend (Hypothetical Portfolio)
January 1966 – December 2013
Cumulative Value (Real Dollars)

Source: Ibbotson, Bloomberg, Commonfund Institute
The equity portion of the hypothetical portfolio is based on monthly returns of the S&P 500 Index (12/65-current quarter end), and the fixed income portion is based on monthly returns of the Barclays U.S. Aggregate Index (01/73-current quarter end) and the Ibbotson Associates Long Term Corporate Bond Index (12/65-12/72). HEPI data from 07/06 to current quarter end is estimated using the Commonfund Institute method based on regression analysis. Returns for this hypothetical portfolio assume that it is rebalanced to 70/30 annually on 1/1/yy and 5% is distributed annually on 1/1/yy.
The Importance of Real Returns  |  Effects of Spending  |  HEPI

70% S&P 500, 30% Barclays U.S. Aggregate and 4.05% Spend (Hypothetical Portfolio)
January 1966 – December 2013
Cumulative Value (Real Dollars)

Source: Ibbotson, Bloomberg, Commonfund Institute
The equity portion of the hypothetical portfolio is based on monthly returns of the S&P 500 Index (12/65-current quarter end), and the fixed income portion is based on monthly returns of the Barclays U.S. Aggregate Index (01/73-current quarter end) and the Ibbotson Associates Long Term Corporate Bond Index (12/65-12/72). HEPI data from 07/06 to current quarter end is estimated using the Commonfund Institute method based on regression analysis. Returns for this hypothetical portfolio assume that it is rebalanced to 70/30 annually on 1/1/yy and 5% is distributed annually on 1/1/yy.
Forecasting Models Available

Primarily, two types:

**Mean Variance Optimization based models**

- Generates optimal portfolios along an efficient frontier
- Based on historical data
- Relies on accuracy of user inputs / constraints

**Monte Carlo Simulation based models**

- Simulates future events and scenarios using random variables
- Generates ranges of potential outcomes and solutions
- Establishes probabilities of certain outcomes occurring

Source: Pertrac, As of September 30, 2007, Monthly

IMPORTANT: The projections or other information generated by the Allocation Planning Model™ regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes and key definitions at the end of this presentation.
Forecasting Models Available

Primarily, two types:

**Characteristics of Respective Models**

**Mean Variance Optimization**
- Generates optimal portfolios along an efficient frontier
- Based on historical data
- Relies on accuracy of user inputs / constraints

**IMPORTANT:** The projections or other information generated by the Allocation Planning Model™ regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes and key definitions at the end of this presentation.
Forecasting Models Available

Primarily, two types:

**Monte Carlo Simulation**

- Simulates future events and scenarios using random variables
- Generates ranges of potential outcomes and solutions
- Establishes probabilities of certain outcomes occurring

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- Based on historical data
- Relies on accuracy of user inputs / constraints

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- Simulates future events and scenarios using random variables
- Generates ranges of potential outcomes and solutions
- Establishes probabilities of certain outcomes occurring

**Characteristics of Respective Models**

Source: Pertrac, As of September 30, 2007, Monthly

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Why Monte Carlo simulation?

- Produces ranges of outcomes

- Generates meaningful statistical analysis from distributions

- Allows for “stress-testing” and “what if” scenario analysis

- Assists in understanding the probability of achieving long term goals
  - Commonfund’s APM is a financial forecasting tool which incorporates Monte Carlo simulation

IMPORTANT: The projections or other information generated by the Allocation Planning Model™ regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes and key definitions at the end of this presentation.
What are the inputs and outputs of the model?

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asset allocation from user’s perspective</td>
<td>• Distributions of model returns and market values</td>
</tr>
<tr>
<td>• Contributions / cash flow assumptions</td>
<td>• Probability of maintaining real purchasing power</td>
</tr>
<tr>
<td>• Spending rate</td>
<td>• Volatility of spending</td>
</tr>
<tr>
<td>• Spending method</td>
<td></td>
</tr>
</tbody>
</table>
The APM is only a model
The returns depicted by the APM are hypothetical and do not represent the actual returns earned by any investor or investment fund or product. The APM does not guarantee or assure any future investment results.

What is the APM?
The APM is an analytic tool that can assist investors in thinking about the potential distribution of returns of various investment strategies.

What isn’t the APM?
The APM should not be treated as a recommendation concerning any specific investment or asset class, or any mix thereof, or as a tool that can predict specific investment outcomes.

How does the APM work?
The APM takes the starting yield curve, uses Monte Carlo simulation to project 1,000 different yield curves for the next year by changing economic factors that affect the curve, and projects returns for a broad range of asset classes in each of the “new” yield curve environments. The model then takes each of the 1,000 “new” yield curves as the next starting point and simulates a new yield curve, building another 1,000 yield curves, and projecting returns in those environments. The model runs these simulations for twenty years into the future.

What are the limitations of the APM?
No model or simulation can predict the future or account for the infinite number of possible outcomes. The projections generated by Commonfund’s APM are based on assumptions about performance and risk characteristics of various asset classes that may prove to be incorrect, which limits the potential effectiveness of the APM. Commonfund cannot guarantee the accuracy of the data used by the APM, nor does Commonfund represent that the data will necessarily represent market conditions in the future. In fact, the model reflects the stance of monetary policy from 1985-2007, and therefore may not be appropriate for periods with alternative monetary policies. In addition, the APM’s underlying structural macroeconomic model reflects U.S. inflation, growth, monetary policy and interest rates, and therefore may not be informative for the macroeconomic environment in other countries.

The APM’s output will vary
The APM’s output will vary with each use (based upon changes in input assumptions and in the historical performance data on which the APM output is based) and over time.

Investment Risks
The investment asset classes depicted in the APM involve varying degrees of investment risk. Alternative assets in particular may involve reduced liquidity and risky investment strategies. Investors in any of these asset classes could lose some or all of their principal. In particular cases (including investments on margin, short selling and similar strategies), investors could lose more than their principal investment. See “Explanatory Notes”.

Definitions and details
Certain terms used in the following presentation (such as “standard deviation” and “mean variance optimization”), together with complete details of the assumptions underlying the APM, are included in "Explanatory Notes".

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IMPORTANT: The projections or other information generated by the Allocation Planning Model™ regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes at the end of this presentation.
Four Levels of Allocation Policy

- ASSETS
- LIQUIDITY
- CURRENCY
- RISK
### Analyzing the Impact of Policy Decisions | Asset Allocation

**Commonfund Benchmarks Study® Data**

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Liquidity</th>
<th>Traditional</th>
<th>Diversified</th>
<th>Highly Diversified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Large Cap Equity</td>
<td>Liquid</td>
<td>70.0%</td>
<td>25.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Domestic Small Cap Equity</td>
<td>Liquid</td>
<td>0.0%</td>
<td>1.9%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Developed International Equity</td>
<td>Liquid</td>
<td>0.0%</td>
<td>13.7%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>Liquid</td>
<td>0.0%</td>
<td>5.3%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>Illiquid</td>
<td>0.0%</td>
<td>6.0%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Venture Capital</td>
<td>Illiquid</td>
<td>0.0%</td>
<td>2.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Distressed Debt</td>
<td>Illiquid</td>
<td>0.0%</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>Equity Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>Liquid</td>
<td>0.0%</td>
<td>5.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Core Bonds</td>
<td>Liquid</td>
<td>30.0%</td>
<td>11.7%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Global Bonds</td>
<td>Liquid</td>
<td>0.0%</td>
<td>1.7%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Emerging Markets Debt</td>
<td>Liquid</td>
<td>0.0%</td>
<td>0.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>High Yield Debt</td>
<td>Liquid</td>
<td>0.0%</td>
<td>1.1%</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Fixed Income Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directional Hedge</td>
<td>Moderately Liquid</td>
<td>0.0%</td>
<td>10.8%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Relative Value</td>
<td>Moderately Liquid</td>
<td>0.0%</td>
<td>7.2%</td>
<td>8.4%</td>
</tr>
<tr>
<td><strong>Directional/Relative Value Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodities</td>
<td>Liquid</td>
<td>0.0%</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Natural Resources</td>
<td>Private</td>
<td>Illiquid</td>
<td>0.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>Opportunistic</td>
<td>Illiquid</td>
<td>0.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td><strong>Real Assets Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0%</td>
<td>7.0%</td>
<td>16.0%</td>
</tr>
</tbody>
</table>

| Total                             |           | 100.0%      | 100.0%      | 100.0%             |

*Traditional Allocation = 70/30 Equity/Fixed Income
*Diversified = 2013 NCSE $101-$500 Million Asset Allocation
*Highly Diversified = 2013 NCSE Over $1 Billion Asset Allocation
*Based on survey responses from 2013 NACUBO-Commonfund Study of Endowments Report*
Asset Allocation

Analyzing the Impact of Policy Decisions

<table>
<thead>
<tr>
<th>Traditional</th>
<th>Diversified</th>
<th>Highly Diversified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equities</strong></td>
<td><strong>Equities</strong></td>
<td><strong>Equities</strong></td>
</tr>
<tr>
<td>30%</td>
<td>70%</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Fixed Income</strong></td>
<td><strong>Fixed Income</strong></td>
<td><strong>Fixed Income</strong></td>
</tr>
<tr>
<td>70%</td>
<td>20%</td>
<td>52%</td>
</tr>
</tbody>
</table>

- **Traditional Allocation**: 70/30 Equity/Fixed Income
- **Diversified**: 2013 NCSE $101-$500 Million Asset Allocation
- **Highly Diversified**: 2013 NCSE Over $1 Billion Asset Allocation

Based on survey responses from 2013 NACUBO-Commonfund Study of Endowments Report
Asset Allocation | Distribution of Nominal Returns

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™.

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation. NOTE (1) Asset allocation and liquidity assumptions of hypothetical portfolios are illustrated on prior page.
Asset Allocation | Distribution of Real Market Values

5.0% Spend | Year-End Value | HEPI as Deflator

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Intergenerational Equity is calculated as the state in which the nominal market value (after spending) is equal to or greater than the inflation adjusted market value (grown at CPI or HEPI only). When the net market value is 0, the portfolio has maintained real purchasing power or equilibrium.

**Hypothetical Portfolios**
- Traditional
- Diversified
- Highly Diversified

<table>
<thead>
<tr>
<th>Hypo Portfolio</th>
<th>Traditional</th>
<th>Diversified</th>
<th>Highly Diversified</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td>-$138</td>
<td>-$113</td>
<td>-$87</td>
</tr>
<tr>
<td>25th</td>
<td>-$99</td>
<td>-$73</td>
<td>-$42</td>
</tr>
<tr>
<td>50th</td>
<td>-$61</td>
<td>-$33</td>
<td>-$7</td>
</tr>
<tr>
<td>75th</td>
<td>-$9</td>
<td>-$18</td>
<td>$67</td>
</tr>
<tr>
<td>95th</td>
<td>$111</td>
<td>$131</td>
<td>$200</td>
</tr>
</tbody>
</table>

**20 Years | Assets of $100 Million**

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

Distribution of Real Market Values
Gifts

What is the impact of giving?
Impact of Gifts | Distribution of Real Market Values

5.0% Spend | Year-End Value | HEPI as Deflator

Important: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation. NOTE (1) Asset allocation and liquidity assumptions of hypothetical portfolios are illustrated on prior page.

Intergenerational Equity

20 Years | Assets of $100 Million

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™.
# Informed Decision Making

## Policy Drivers

<table>
<thead>
<tr>
<th>Four Levers</th>
<th>Intergenerational Equity</th>
<th>Median Spend</th>
<th>Volatility of Spending</th>
</tr>
</thead>
</table>
| **Asset Allocation**  
(increased diversification) | ![Up Arrow] | ![Up Arrow] | ![Down Arrow] |
| **Contributions**   
(increased)          | ![Up Arrow] | ![Up Arrow] | ![Down Arrow] |
| **Spending Rate**   
(lower)              | ![Up Arrow] | ![Up Arrow] | ![Up Arrow] |
| **Spending Method**  
(smoothing effect)    | ![Up Arrow] | ![Up Arrow] | ![Up Arrow] |
A Closer Look at Spending
Spending Rate

What is the right long term rate?
Impact of a Change in Spending Rate

Spend Year-End Value | $1 million Gifts | HEPI as Deflator | Highly Diversified

Frequency

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

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20 Years | Assets of $100 Million

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

Intergenerational Equity

4% Spending Rate 5% Spending Rate 6% Spending Rate

5th -$31 -$61 -$91

25th $29 -$13 -$48

Median $95 $41 -$4

75th $175 $105 $50

95th $346 $248 $164

Intergenerational Equity 87% 68% 48%

Distribution of Real Market Values

20 Years | Assets of $100 Million

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

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# Spending Policy Examples

<table>
<thead>
<tr>
<th>Spending Policy Examples</th>
<th>Definition</th>
<th>Spending Equation</th>
<th>Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traditional</strong></td>
<td>Pre-specified percentage of moving average of market value – typically 5% of a three year moving average of beginning market values</td>
<td>Endowment x Rate</td>
<td>$5,000,000</td>
</tr>
<tr>
<td><strong>Inflation Based</strong></td>
<td>Increase spending each year based on rate of inflation (assume inflation of 3% prior year)</td>
<td>((\text{Endowment x Rate}) + \text{Inflation Adjustment})</td>
<td>$5,150,000</td>
</tr>
<tr>
<td><strong>Income Based</strong></td>
<td>Spend all current income (assume income of 4.5%)</td>
<td>Endowment Income (assume 4.5% income)</td>
<td>$4,500,000</td>
</tr>
<tr>
<td><strong>Banded Inflation</strong></td>
<td>Last year’s spending plus an inflation rate, but bound by ranges, e.g. – no more than 6.5% nor less than 3.5% of Market Value.</td>
<td>Take Prior Year Spend * 1+ Current Inflation Rate. If calculated spending dollars are below Lower Band then default to Lower Band amount and if dollars are above Upper Band then default to Upper Band.</td>
<td>$5,150,000</td>
</tr>
<tr>
<td><strong>Spending Reserve</strong></td>
<td>Segregation of 5-10% of market value in separate account, invested in 90 day treasury bills. Reserve is drawn down when endowment performance is less than policy target</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stabilization Fund</strong></td>
<td>A fund created from endowment returns in excess of the target spending rate which is used to control the long run growth of the total endowment. The stabilization fund is invested alongside the endowment, but with a different (higher) spending rate.</td>
<td>((\text{original endowment} \times \text{spend rate}) + (\text{stabilization fund balance at end of previous fiscal period} \times \text{spend rate}))</td>
<td></td>
</tr>
<tr>
<td><strong>Yale Rule</strong></td>
<td>The amount released under the spending rule is based on a weighted average of prior spending adjusted for inflation (80 percent weight) and the amount that would have been spent using 5 percent of current Endowment market value (20 percent weight).</td>
<td>Take Prior Year Market Value * Spending Rate times 20% plus prior year Spend *Inflation Rate times 80%</td>
<td>$5,120,000</td>
</tr>
<tr>
<td><strong>Stanford Rule</strong></td>
<td>The amount released under the spending rule is based on a weighted average of prior spending adjusted for inflation (60 percent weight) and the amount that would have been spent using 5 percent of current Endowment market value (40 percent weight).</td>
<td>Take Prior Year spend in dollars * 60% plus prior year Market Value* Target Payout Rate times 40%</td>
<td>$5,090,000</td>
</tr>
</tbody>
</table>
Spending Methods Used
Fiscal year ending June 30, 2013

Total Institutions

<table>
<thead>
<tr>
<th>Method</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend all current income</td>
<td>3%</td>
</tr>
<tr>
<td>Percentage of a moving average</td>
<td>77%</td>
</tr>
<tr>
<td>Average percentage</td>
<td>5%</td>
</tr>
<tr>
<td>Decide on an appropriate rate each year</td>
<td>12%</td>
</tr>
<tr>
<td>Spend a pre-specified percentage of beginning market value</td>
<td>3%</td>
</tr>
<tr>
<td>Average pre-specified percentage spent</td>
<td>5%</td>
</tr>
<tr>
<td>Last year's spending plus inflation with upper and lower bands</td>
<td>5%</td>
</tr>
<tr>
<td>Weighted average or hybrid method (Yale/Stanford Rule)</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
</tr>
</tbody>
</table>

Note: Multiple responses allowed
Source: NCSE 2013
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Spending Policy Examples | Traditional

Pre-specified percentage of moving average of market value – typically 5% of a three year moving average of beginning market values

Endowment x Rate at Year-End

$100,000,000 \times 5.0\% = $5,000,000
Spending Policy Examples | Inflation Based

Increase spending each year based on rate of inflation (assume inflation of 3% prior year, inflation year 2 - 5.3%)

Endowment x Inflation Rate

Year 1  $100,000,000 \times 5.0\% \times 1.03\% = $5,150,000

Year 2  $5,150,000 \times 1.053\% = $5,422,950
## Spending Policy Examples | Banded Inflation

Prior year’s spending plus an inflation rate factor, bound by an upper and lower band. (assume inflation of 5.3% in year-2 and 7.5% in year-3 with a lower band of 3% and an upper band of 6%)

<table>
<thead>
<tr>
<th>Year 1</th>
<th>$5,000,000</th>
<th>Lower Band (3%)</th>
<th>Upper Band (6%)</th>
<th>Asset Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>$5,000,000 x 1.053 = $5,265,000</td>
<td>$3,300,000 M</td>
<td>$6,600,000 M</td>
<td>$110,000,000</td>
</tr>
<tr>
<td>Year 3</td>
<td>$5,266,000 x 1.075 = $5,660,000</td>
<td>$2,610,000 M</td>
<td>$5,222,000 M</td>
<td>$87,000,000</td>
</tr>
</tbody>
</table>

Spend $5,220,000
The amount released under the spending rule is based on a weighted average of prior spending adjusted for inflation (80 percent weight) and the amount that would have been spent using 5 percent of current Endowment market value (20 percent weight).

(assume $100,000,000 endowment, 3% inflation and prior years spend of $5 million)

\[
\text{[(Prior Year Spend) x (Inflation Rate + 1)] x 80\%} + \\
\text{[(Endowment) x (Spending Rate)] x 20\%}
\]

\[
\text{[(($5,000,000) x (3.0\% + 1)) x 80\%] + [($100,000,000) x (5.0\%)] x 20\%]}
\]

= $5,120,000
Impact of a Change in Spending Method

5.0% Spend | $1 million Gifts | HEPI as Deflator | Highly Diversified

Frequency

Hypothetical
- Year End Value
- 3-Year Rolling
- Weighted (80/20)
- Banded 6% - 3%

Distribution of Real Market Values

Intergenerational Equity

| 20 Years | Assets of $100 Million |

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation. NOTE (1) Asset allocation and liquidity assumptions of hypothetical portfolios are illustrated on prior page.
Volatility of Spend | Percent Change in Annual Spending

5.0% Spend | $1 million Gifts | HEPI as Deflator | Highly Diversified

Frequency

<table>
<thead>
<tr>
<th>Percent Change</th>
<th>Year End</th>
<th>3-Year Rolling</th>
<th>Weighted (80/20)</th>
<th>Banded (3-6%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td>-8.5</td>
<td>-3.3</td>
<td>-1.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>25th</td>
<td>-1.0</td>
<td>1.2</td>
<td>2.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Median</td>
<td>4.6</td>
<td>4.5</td>
<td>4.2</td>
<td>2.8</td>
</tr>
<tr>
<td>75th</td>
<td>10.6</td>
<td>8.0</td>
<td>6.8</td>
<td>4.4</td>
</tr>
<tr>
<td>95th</td>
<td>19.6</td>
<td>13.4</td>
<td>11.0</td>
<td>13.0</td>
</tr>
</tbody>
</table>

Negative Spend

Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™.

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation. NOTE (1) Asset allocation and liquidity assumptions of hypothetical portfolios are illustrated on prior page.

20 Years | Assets of $100 Million
Cumulative Effect of Different Spending Methods | 1970 to 2013

Using a 5% Spending Rate, $100,000 portfolio

Source: Ibbotson, Bloomberg, Commonfund Institute

The equity portion of the hypothetical portfolio is based on monthly returns of the S&P 500 Index (12/1970-12/2011), and the fixed income portion is based on monthly returns of the Barclays Capital U.S. Aggregate Index (01/1973-12/2011) and the Ibbotson Associates Long Term Corporate Bond Index (12/1965-12/1972). Returns for this hypothetical portfolio assume that it is rebalanced to 70/30 annually on 1/1/yy and 5% is distributed annually on 1/1/yy.
## Informed Decision Making

### Policy Drivers

<table>
<thead>
<tr>
<th>Four Levers ▼</th>
<th>Intergenerational Equity</th>
<th>Median Spend</th>
<th>Volatility of Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Allocation (increased diversification)</td>
<td>![Arrow Up]</td>
<td>![Arrow Up]</td>
<td>![Arrow Down]</td>
</tr>
<tr>
<td>Contributions (increased)</td>
<td>![Arrow Up]</td>
<td>![Arrow Up]</td>
<td>![Arrow Down]</td>
</tr>
<tr>
<td>Spending Rate (lower)</td>
<td>![Arrow Up]</td>
<td>![Arrow Down]</td>
<td>-</td>
</tr>
<tr>
<td>Spending Method (smoothing effect)</td>
<td>-</td>
<td>-</td>
<td>![Arrow Down]</td>
</tr>
</tbody>
</table>
Questions to Address

- Who should set the spending rate?
- What are the needs of the institution?
- How should the spending rate be determined?
- What is the impact of giving?
- What is the effect of restricted versus unrestricted?
- What spending method should you use?
- What inflation rate should you use?
- How should you handle special distributions?
Commonfund Allocation Planning Model™

The APM is only a model
The returns depicted by the APM are hypothetical and do not represent the actual returns earned by any investor or investment fund or product. The APM does not guarantee or assure any future investment results.

What is the APM?
The APM is an analytic tool that can assist investors in thinking about the potential distribution of returns of various investment strategies.

What isn’t the APM?
The APM should not be treated as a recommendation concerning any specific investment or asset class, or any mix thereof, or as a tool that can predict specific investment outcomes.

How does the APM work?
The APM takes the starting yield curve, uses Monte Carlo simulation to project 1,000 different yield curves for the next year by changing economic factors that affect the curve, and projects returns for a broad range of asset classes in each of the “new” yield curve environments. The model then takes each of the 1,000 “new” yield curves as the next starting point and simulates a new yield curve, building another 1,000 yield curves, and projecting returns in those environments. The model runs these simulations for twenty years into the future.

What are the limitations of the APM?
No model or simulation can predict the future or account for the infinite number of possible outcomes. The projections generated by Commonfund’s APM are based on assumptions about performance and risk characteristics of various asset classes that may prove to be incorrect, which limits the potential effectiveness of the APM. Commonfund cannot guarantee the accuracy of the data used by the APM, nor does Commonfund represent that the data will necessarily represent market conditions in the future. In fact, the model reflects the stance of monetary policy from 1985-2007, and therefore may not be appropriate for periods with alternative monetary policies. In addition, the APM’s underlying structural macroeconomic model reflects U.S. inflation, growth, monetary policy and interest rates, and therefore may not be informative for the macroeconomic environment in other countries.

The APM’s output will vary
The APM’s output will vary with each use (based upon changes in input assumptions and in the historical performance data on which the APM output is based) and over time.

Investment Risks
The investment asset classes depicted in the APM involve varying degrees of investment risk. Alternative assets in particular may involve reduced liquidity and risky investment strategies. Investors in any of these asset classes could lose some or all of their principal. In particular cases (including investments on margin, short selling and similar strategies), investors could lose more than their principal investment. See “Explanatory Notes”.

Definitions and details
Certain terms used in the following presentation (such as “standard deviation” and “mean variance optimization”), together with complete details of the assumptions underlying the APM, are included in “Explanatory Notes”.

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes at the end of this presentation.
What is the APM?
Commonfund’s APM is a proprietary, financial simulation tool that can help investors understand the expected outcomes and potential risks of an investment strategy and the interrelationships of the underlying asset classes comprising that investment strategy. The APM results should not be treated, however, as a recommendation concerning any specific investment or asset class, or any mix thereof, or as a tool that can predict specific investment outcomes.

How does the APM work?
The APM takes the starting yield curve, uses Monte Carlo simulation to project 1,000 different yield curves for the next year by changing economic factors that affect the curve, and projects returns for a broad range of asset classes in each of the “new” yield curve environments. The model then takes each of the 1,000 “new” yield curves as the next starting point and simulates a new yield curve, building another 1,000 yield curves, and projecting returns in those environments. The model runs these simulations for twenty years into the future.

The APM is, at the core, a “term structure model.” That is, the model is based on the term structure of interest rates. We believe that the investment returns of the asset classes included in the model have been and will continue to be a function of the economic environment and in particular, changes in the yield curve. Fundamentally there are two principal processes at work in the APM: (1) simulating the term structure and (2) calculating the asset class returns.

Principal Process One – Simulating the Term Structure:
Our model takes the starting yield curve and uses Monte Carlo simulation to project 1,000 different yield curves for the next year. This is accomplished by changing the factors that affect the curve including: Inflation, Gross Domestic Product (GDP), 30-day U.S. T-Bill, 10-year U.S. Treasury Note, one-year 1 Year BBB Corporate Yield and 10-year BBB Corporate Yield.

The model then takes each of the 1,000 new yield curves as the next starting point and simulates a new yield curve, building another 1,000 yield curves for the next period. In order to have the ability to focus on the long term, the model runs these simulations for twenty years into the future, thereby effectively generating 20,000 data points (returns) for each asset class.

These changes in the yield curve can be significant and incorporate thousands of scenarios corresponding to low inflation - high GDP growth, low inflation - low GDP growth, high inflation - low GDP growth, etc. However, the evolution of the yield curve in each scenario will not generate in one year drastic or “unreasonable” changes such as a change in one year from negative inflation (deflation) to hyperinflation.

Principal Process Two – Calculating the Asset Class Returns:
The second fundamental process in the APM is generating projected asset class returns for each term structure scenario. This process begins with the selection of a representative index for each asset class. Data may go back as far as 1970 for certain indices but only as recently as 1996 for newer indices. Where no representative index exists, we have used historical data from Commonfund’s experience as an investor in this particular asset class (e.g. natural resources).

Individual asset class returns consist of four components. First, returns for each asset class’ representative index are regressed against the term structure model. The regression coefficients from these models identify how asset class returns are related to systematic variation in the yield curve. Thus, they ensure that time variation in returns will reflect changes in the shape of the yield curve over time. The residuals from these regressions are then used to construct a variance/covariance matrix for all asset classes. This matrix determines how the idiosyncratic (non-systematic) component of returns fit together.

Second, asset class average total returns are calibrated to Commonfund’s 20-year expected median passive return forecasts by adjusting the constant terms in the aforementioned regression. For hedge funds and private capital, these passive return forecasts are represented by the median active manager.

Third, asset class average total returns are further adjusted, using the constant term in the regression, to reflect Commonfund’s expectations for its ability to deliver returns in excess of the representative benchmarks net of fees. Thus, average returns from the simulation represent Commonfund’s performance expectations for its own programs.

Fourth, total volatility for each asset class is calibrated to match Commonfund’s 20-year expected volatility forecasts. These calibrations are achieved by adjusting the idiosyncratic volatility for individual asset classes in the variance/covariance matrix constructed from the residuals of the regression of asset class representative indexes on the term structure model.
Commonfund Allocation Planning Model™

What can you do with the APM?
Commonfund’s APM generates a distribution of potential outcomes simulated across thousands of different economic scenarios for given asset allocations. Every simulation describes a potential future trajectory of the economy and projects how the asset classes will perform based on the regression of historical data. Analyzing the distribution of thousands of returns, the model can derive statistical summaries including medians, standard deviations and percentiles for different outcomes for each asset class. With 20 year projections, we can calculate model annualized returns, medians, standard deviations, market values, and percentiles for different outcomes for entire portfolios over 5-year, 10-year, 15-year, and 20-year time periods. We are able to see the effects of compounding, in terms of both return and risk, as well as examine the “tail risk” of the distribution.

As a tool, the APM aids Commonfund in discussions with investors regarding their asset allocation decisions. It helps us think about how changing, adding, or removing an allocation to any given asset class will affect the risk-return profile of a portfolio. In addition, spending policies, gifts, and capital campaigns are important considerations in decision-making and are also incorporated into the model.

With the Commonfund APM, investors also have the ability to ask what if questions like “given a specific asset allocation and spending rate (or distribution), what is the model-generated probability of not achieving intergenerational equity or a stated investment objective over a defined period of time?” By focusing on determining how often, in terms of number of times in a random model, the nominal market value (after spending) is equal to or greater than the inflation-adjusted market value (grown at inflation only), an investor can gain valuable insight into the portfolio’s APM-generated probability of achieving intergenerational equity. By incorporating cash flows into the model like inflows from gifts and capital campaigns, and outflows from spending, distributions, or grants investors are able to understand the long-term ramifications of current asset allocation policies and cash flow situations and can gain valuable insight to help with forecasting their budgets.

How does the APM compare to other forecasting models?
Ultimately, the power of a model that incorporates Monte Carlo simulation lies in the ability to produce a range of returns and generate meaningful statistical analysis from the distribution. With historical-based inputs and/or user inputs, a mean variance optimization model can only produce an efficient frontier along which reside optimal portfolios for a given expected return and standard deviation. The APM, in contrast, considers asset allocations from the user’s perspective and then generates projected returns, standard deviations, distributions, and probabilities associated with that asset allocation. With this type of analysis, the user is able to understand the likelihood of achieving goals rather than merely focusing on a median and standard deviation of an “optimal” portfolio produced by a mean variance optimization.

The APM has many advantages over mean variance optimization. In addition to generating a distribution of potential outcomes and different economic scenarios as described above (which cannot be accomplished with mean variance optimization), the APM’s term structure model has advanced features that distinguish it from most other forecasting models that use Monte Carlo simulation. The model consistently simulates the term structure of interest rates at every point in simulation time, which provides a more realistic set of the expectations that drive interest rates and a better formulation of the documented dynamic properties of inflation and interest rates. Finally, the open design architecture of the APM makes it relatively easy to update and further develop.

The APM has been designed to be a state-of-the-art investment-planning tool. Although no analytical model can completely replace informed professional judgment, the APM can provide a better foundation on which to base that judgment.

What are the limitations of the APM?
Dependent on Select Historical Data and Judgment. No model or simulation can predict the future or account for the infinite number of possible outcomes. The projections generated by Commonfund’s APM are based on assumptions about performance and risk characteristics of various asset classes. Those assumptions are based on historical data and judgment that are believed to be accurate and on which the APM relies. The utility of the APM depends greatly on the accuracy of that historical data and its meaningfulness in simulating future events. Commonfund cannot guarantee the accuracy of the data nor does it represent that the data will necessarily represent market conditions in the future. In fact, the model reflects the stance of monetary policy from 1985-2007, and therefore may not be appropriate for periods with alternative monetary policies, such as the monetary policy experienced during the inflation of the 1970s and early 1980s as well as the zero

continued on next page
interest rate monetary policy experienced since the credit crisis in 2008. In addition, the APM’s underlying structural macroeconomic model reflects U.S. inflation, growth, monetary policy and interest rates, and therefore may not be informative for the macroeconomic environment in other countries.

**Dependent on the Accuracy of Commonfund Forecasting.** Fundamental to the APM’s asset class return components is the accuracy of Commonfund’s individual asset class 20-year expected return and volatility forecasts, which are based on a combination of historical data for active and passive investments, the academic literature, Commonfund historical investment outcomes, Commonfund’s assessment of future macroeconomic and financial variables and judgment. The forecasts are net of fees in all asset classes, based on Commonfund’s expectations, which may not be accurate. One of the factors assumed in Commonfund’s forecasts is that Commonfund’s active management will generate excess returns relative to passive investments in most asset classes over the long term. Commonfund’s expected return and volatility forecasts may, of course, prove to be incorrect, which limits the potential effectiveness of the APM.

**Designed for Long Term Analysis.** The model simulates the range of probable outcomes over a 20-year time horizon of varying combinations of asset allocations, inflation expectations, spending policies, capital gifts and rebalancing rules. The reasonableness of the input assumptions made by the user will affect the reasonableness of the simulations. In all cases, the statistical confidence in the predictions falls as the simulation period gets shorter.

**Analysis for Asset Classes, Not Investment Programs.** The results of the model will vary with any change to the inputs: asset allocation, spending rates or methods, contributions, or beginning market value. The results will also change with any periodic updates to the model starting point. Because the model uses asset class returns, it should not be used to evaluate or simulate the results of any specific investment program (or fund).

**General Guide, Not Specific Advice.** No APM simulation can replicate the exact experience of an institution. As such, the results of the APM should only be used as a general guide. In no way should the APM be a substitute for the important policy choices that an institution must make in developing its investment program.

**Key Terms**

- **Frequency distribution:** shows the number of observations within the ranges as defined by the horizontal axis.
- **Directional hedge strategies:** an investing strategy that consists of a core holding of long equities hedged at all times with short sales of stocks and/or stock index options. Depending on the mix of long and short positions the portfolio may have either a long or short bias. Not necessarily providing complete market neutrality, there will be some movement with the market.
- **Relative value strategies:** an investing strategy that typically targets some kind of absolute-return objective, without reference to any market index and emphasizes capital preservation and risk control. Examples of these strategies include several arbitrage strategies (convertible, fixed income and statistical) as well as credit strategies.
- **Mean variance optimization:** a quantitative asset allocation technique developed by Harry Markowitz that creates optimal portfolios using return, risk and correlation forecasts to combine assets into portfolios that maximize return for different levels of risk. A graph of all optimal portfolios is called the efficient frontier.
- **Percentile:** a value on a scale of one hundred that indicates the percent of a distribution that is equal to or below it.
- **Standard deviation:** a statistical measure of the degree to which an individual value in a probability distribution tends to vary from the mean of the distribution; the larger the standard deviation, the greater the degree of dispersion around the average value.
- **Daily/monthly/quarterly liquidity:** investment purchases and/or redemptions may be transacted once per day, month or quarter.
- **Illiquid:** investment purchases accepted at the commencement of the investment program (e.g. limited partnerships) while redemptions may be transacted only at liquidation of the investment program, typically after a number of years.
- **HEPI:** Higher Education Price Index.
- **CPI:** Consumer Price Index.
Market Beta: a measure of the volatility of a portfolio in comparison to a particular market as a whole (i.e. the S&P 500, Barclays US Aggregate Bond Index, etc).

Sharpe Ratio: A risk-adjusted measure, calculated using standard deviation and excess return to determine reward per unit of risk. A greater Sharpe Ratio indicates better historical risk-adjusted performance.

Value at Risk: measures the left tail risk of a distribution, calculated by estimating the probability of portfolio losses based on a confidence level of 95%. Larger Value at Risk (VaR) measures are more attractive than lower VaR measures (i.e. a VaR of -3% would be more attractive than a VaR of -10%).

Conditional Value at Risk: a measure of left tail risk on the condition that a given confidence level (95%) is exceeded, calculated by estimating the probability of portfolio losses beyond a given confidence level. Larger Conditional Value at Risk (CVaR) measures are more attractive than lower CVaR measures (i.e. a CVaR of -3% would be more attractive than a CVaR of -10%).

Sortino: a ratio used to measure risk-adjusted return (similar to Sharpe and Calmar Ratios), using downside deviation as the denominator. Higher values of Sortino ratios are more attractive than lower values.

Calmar: a ratio used to measure risk-adjusted return (similar to Sharpe and Sortino Ratios) using the maximum drawdown of a series of returns as the denominator. Larger Calmar ratios are more attractive than lower ratios.

Up/Down Capture: a ratio used to measure how well a portfolio was able to perform in an environment characterized by positive benchmark returns for Up Capture and negative benchmark returns for Down Capture. Larger values for Up Captures are more attractive than lower values. Smaller values for Down Captures are more attractive than larger values.

Max Drawdown: the peak-to-trough decline during a time agnostic period of a portfolio. Smaller values are more attractive than larger values; calculated by finding the largest peak to trough decline of the 1,000 projected scenarios.

Average Recovery Time: the length of time it takes a portfolio to regain its value from a peak-to-trough decline; calculated by finding the average length of time (in months) that a portfolio took to recover its value from the peak to trough decline (characterized by the Max Drawdown) given the 1,000 scenarios of monthly projections for 20 years.

Skew: a measure of asymmetry from the normal distribution. Skewness can come in the form of negative or positive skewness depending on whether the data points are skewed to the left (negative skew) or the right (positive skew) of the data mean.

Kurtosis: a statistical measure used to express the flatness or peakedness of a curve describing a frequency distribution in the region about its mean. Larger values of kurtosis (greater than 3) describes a leptokurtic distribution which have higher peaks around the mean due to lower variations within observations. Smaller values of kurtosis (less than 3) describe a leptokurtic distribution which has a flatter peak around its mean, a result from data being less concentrated around its mean due to large variations within observations.
## Indices Used to Define Asset Classes in the APM

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Series</th>
<th>Start Date</th>
<th>End Date</th>
<th>Asset Mix</th>
<th>Hedge Strategy</th>
<th>Direct Non-Dollar (USD) Exposure</th>
<th>Historical Annualized Return</th>
<th>Historical Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Large Cap Equity</td>
<td>S&amp;P500</td>
<td>Jan 1970</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>0.0%</td>
<td>10.1%</td>
<td>15.7%</td>
</tr>
<tr>
<td>Domestic Small Cap Equity</td>
<td>Russell 2000 (prior to 1/79 Ibbotson Small Cap)</td>
<td>Jan 1970</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>0.0%</td>
<td>11.4%</td>
<td>21.1%</td>
</tr>
<tr>
<td>REITS</td>
<td>NAREIT - Equity REITS</td>
<td>Jan 1972</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>0.0%</td>
<td>12.0%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Developed International Equity</td>
<td>MSCI World ex US</td>
<td>Jan 1970</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>100.0%</td>
<td>10.2%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Emerging Markets Equity</td>
<td>MSCI Emerging Markets Equity</td>
<td>Jan 1989</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>100.0%</td>
<td>12.6%</td>
<td>23.9%</td>
</tr>
<tr>
<td>Global Equity - ACWI</td>
<td>NDUEACWF Index</td>
<td>Jan 1999</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>50.0%</td>
<td>2.5%</td>
<td>17.1%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>Venture Economics (buy outs)</td>
<td>Jan 1972</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>60.0%</td>
<td>12.3%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Venture Capital</td>
<td>Venture Economics (venture capital)</td>
<td>Jul 1981</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>40.0%</td>
<td>14.1%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Distressed Debt - Liquid</td>
<td>HFRIDSI Index</td>
<td>Jan 1990</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>50.0%</td>
<td>11.3%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Distressed Debt - Illiquid</td>
<td>25%Altman, 75% HFRIREGD</td>
<td>Jan 1996</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>50.0%</td>
<td>9.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td>3-month US Government Bill (Cash)</td>
<td>Merrill Lynch 3-month Treasury Bill</td>
<td>Jan 1978</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>-</td>
<td>0.0%</td>
<td>5.7%</td>
<td>1.1%</td>
</tr>
<tr>
<td>10-Year US Government Note</td>
<td>Merrill Lynch US 10 year Index</td>
<td>Jan 1976</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Deflation</td>
<td>0.0%</td>
<td>8.4%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Core Bonds</td>
<td>Barclays US Aggregate Bond Index</td>
<td>Jan 1976</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Deflation</td>
<td>0.0%</td>
<td>7.8%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Global Bonds</td>
<td>Citigroup World Government WGBI Index</td>
<td>Jan 1985</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Deflation</td>
<td>60.0%</td>
<td>8.2%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Emerging Markets Debt - External</td>
<td>JPM Emerging Markets Bond Index EMBI+</td>
<td>Jan 1994</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>-</td>
<td>100.0%</td>
<td>10.2%</td>
<td>13.5%</td>
</tr>
<tr>
<td>High Yield Debt</td>
<td>Barclays US High Yield</td>
<td>Jan 1994</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>-</td>
<td>0.0%</td>
<td>6.9%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Directional Hedge</td>
<td>HFRIEHI Index</td>
<td>Jan 1990</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>50.0%</td>
<td>12.2%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Relative Value</td>
<td>HFRIRVA Index</td>
<td>Jan 1990</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>-</td>
<td>50.0%</td>
<td>9.8%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Managed Futures</td>
<td>CS-Tremont HFI Managed Futures</td>
<td>Jan 1994</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>-</td>
<td>50.0%</td>
<td>5.8%</td>
<td>11.8%</td>
</tr>
<tr>
<td>TIPS</td>
<td>Citigroup US Inflation Linked Securities</td>
<td>Jan 1990</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Inflation</td>
<td>0.0%</td>
<td>7.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Commodities</td>
<td>Dow Jones DJAIGTR Index</td>
<td>Jun 1970</td>
<td>Jun 2011</td>
<td>Equity</td>
<td>Inflation</td>
<td>0.0%</td>
<td>9.9%</td>
<td>15.1%</td>
</tr>
<tr>
<td>Natural Resources - Private</td>
<td>Composite Returns - CCI Energy Programs</td>
<td>Mar 1990</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>Inflation</td>
<td>0.0%</td>
<td>13.1%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Natural Resources - Public</td>
<td>SPGNRUT (since 12/2002); 67% SPTRENS, 33%SPTRMATR (10/89-11/2002)</td>
<td>Oct 1989</td>
<td>Dec 2011</td>
<td>Equity</td>
<td>Inflation</td>
<td>0.0%</td>
<td>10.4%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Core Real Estate</td>
<td>ODCE</td>
<td>Jan 1978</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Inflation</td>
<td>0.0%</td>
<td>8.1%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Opportunistic Real Estate</td>
<td>NCREIF/Townsend Opportunistic</td>
<td>Apr 1989</td>
<td>Dec 2011</td>
<td>Fixed</td>
<td>Inflation</td>
<td>0.0%</td>
<td>9.3%</td>
<td>7.2%</td>
</tr>
<tr>
<td>HEPI</td>
<td>Higher Education Price Index</td>
<td>Jun 1970</td>
<td>Jun 2011</td>
<td>-</td>
<td>-</td>
<td>n.a.</td>
<td>5.0%</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

Notes: For additional information on how Commonfund’s APM compares to other asset allocation models, please refer to “How Efficient is Your Frontier?”, a Commonfund white paper authored by the Commonfund Strategic Solutions Group. All U.S. Treasury Notes and Bonds are considered a deflation hedging strategy.
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