SBCERA’s Informed Rebalancing: A Simple Innovation That Added Meaningful Value

NCPERS:
PUBLIC PENSION FUNDING FORUM
New Haven, CT

August 2016
Agenda
Investment Strategies to Close the Funding Gap in a Low Return Environment

SBCERA Implemented an Innovative Strategy

Options Available to CIOs

Informed Rebalancing = Untapped Alpha

How SBCERA Earned $575 mn (or 1% p.a.) and Improved Risk Management*

Summary: Funds Can Easily Improve Returns with Minimal Effort/Cost and No Change in Policy or Manager Line-Up

*Source: SBCERA and Russell Investments. Please see Disclaimer. Past performance is no guarantee of future performance. Data is monthly from July 2005 – April 2016. Includes transactions costs but does not include Russell Investment implementation fees.
Options To Improve Total Portfolio Returns
Assume that the Fund Wants to Improve Total Returns by 1 Percent

1. Add New Assets to SAA
   - Even a 10% Allocation Must Generate 10% More Returns! Equals More Risk!

2. Get More Alpha
   - Can All Managers Increase Alpha Given Environment? Again, More Risk!

3. Improve Rebalancing
   - Mechanical Decision all Funds Make
   - Impacts 100% of Fund
   - Be Informed: Add Value/Manage Risk
   - Can Do in Addition to Above Choices
Philosophy

Traditional Rebalancing Approaches Fail in Dynamic/Volatile Markets

Informed Rebalancing Improves any Portfolio

- Traditional rebalancing is a “bet”
- Result is similar to being short options
- Causes bad drawdowns in bear markets
- Is a coin-toss and can lose money

Can easily improve governance, risk management and performance
From Happenstance To Being Informed
Add Alpha and Improve Risk Management: Improve a Mechanical Decision

- Dynamically link asset allocation to current market conditions
- Work within Board approved strategic Policy ranges
- Major beta exposures: Stocks, Bonds, Commodities and FX
- Utilizes a rigorous and well-grounded investment process
- Use futures for implementation – does not disrupt existing portfolio/manager line-up
SBCERA Overview

✓ San Bernardino County Employees’ Retirement Association
  ✓ $8 billion public pension fund
  ✓ 81% funded
  ✓ 35,000 members
  ✓ Governed by a nine member Board (two alternates)

✓ Investment Staff: 5 (with 2 admin)

✓ Consultant:
  ✓ General and Alternatives: NEPC

Source: SBCERA. Please see Disclaimer. Data as of May 2016.
Rationale for Informed Rebalancing

✓ Wanted to ensure that they built the flexibility to explicitly manage the asset allocation, sub-allocations, and periodic cash flows.

✓ Managing beta in an informed manner could produce meaningful alpha, at a very low cost, in a transparent manner.

✓ Previous range based rebalancing method was implicitly making active decisions. Informed Rebalancing made active rebalancing decisions explicit.

Source: SBCERA. Please see Disclaimer.
The Approval Process

- Back tested the Informed rebalancing program.
  - Compared results to other rebalancing methodologies.
  - Consultant requested specific time period testing to assess how informed rebalancing would fair in a “flat” market (1962-1982)*

- Ran the program on a paper-only basis

- Presented recommendation to Board.

- Implemented on July 1, 2005.

- Monthly Reporting to Board

Source: SBCERA. Please see Disclaimer.
*The period the consultant requested for the testing was out-of-sample.
Liquid Portfolio Tested: 40% R3000, 20% ACWI ex US, 30% Barclays Aggregate, 10% Barclays Global Aggregate ex US
Typical (Mechanical) Rebalancing Approaches

- **Buy and Hold Approach**
  - ❌ Rejected as less effective than asset ranged based rebalancing

- **Ranged Based Approach**
  - ✅ Common rebalancing method +/-3% ranges

- **Calendar Based Approach**
  - ❌ Rejected as less effective than asset ranged based rebalancing

- **Volatility-Based Asset Range Approach**
  - ✅ Normalizes ranges based on annualized volatility (1x volatility)
  - ✅ Higher volatility assets are given wider ranges and vice-versa

Source: SBCERA Please see Disclaimer. Data is daily from 1/2/1997 – 5/10/2016. Calendar-based was not tested just because it is not commonly adopted. All results predicated on liquid test portfolio – other asset allocations will differ.
## Summary Statistics – Impact on Total Returns

<table>
<thead>
<tr>
<th>Data</th>
<th>Annualized Excess Return (%)</th>
<th>Impact on Portfolio Level Risks</th>
<th>Success Rate (% months positive)</th>
<th>Annual Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy and Hold</td>
<td>-0.21%</td>
<td>Higher Volatility, Higher Drawdown</td>
<td>49%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Asset Range +/-3%</td>
<td>-0.01%</td>
<td>Higher Volatility, Higher Drawdown</td>
<td>44%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Volatility Adjusted Asset Range</td>
<td>-0.08%</td>
<td>Higher Volatility, Higher Drawdown</td>
<td>41%</td>
<td>3%</td>
</tr>
<tr>
<td>Informed Rebalancing</td>
<td>+0.92%</td>
<td>Higher Volatility, Lower Drawdown</td>
<td>53%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Can easily add 0.75% - 1% to total returns with no policy changes

Source: SBCERA and AEGIS. Please see Disclaimer. Data is daily from 1/2/1997 – 5/10/2016, but statistics frequency for Success Rate is monthly (and measured as number of positive months/total months). “Impact on Risks” evaluates the impact on Total Portfolio Volatility and Drawdown (Worst Decline from Peak to Trough). Includes transactions costs of 0.25% for Fixed Income; 0.15% for US Equity and 0.2% for International Equity.
Buy and Hold (Annual Excess Return/Risk)

For the last 19 years this strategy has been disappointing.

Source: SBCERA and AEGIS. Please see Disclaimer. Data is daily from 1/2/1997 – 5/10/2016. Includes transactions costs of 0.25% for Fixed Income; 0.15% for US Equity and 0.2% for International Equity.
Asset Range Based Rebalancing: +/- 3% (Annual Excess Returns/Risk)

✓ Significant improvement over Buy and Hold. Best option is to widen ranges further (??)

Source: SBCERA and AEGIS. Please see Disclaimer. Data is daily from 1/2/1997 – 5/10/2016. Includes transactions costs of 0.25% for Fixed Income; 0.15% for US Equity and 0.2% for International Equity
Volatility-Based Range Rebalancing
(Annual Excess Return/Risk)

☒ Some improvement over Buy and Hold over 19 years. No real basis to add value.

Source: SBCERA and AEGIS. Please see Disclaimer. Data is daily from 1/2/1997 – 5/10/2016. Includes transactions costs of 0.25% for Fixed Income; 0.15% for US Equity and 0.2% for International Equity.
Actual SBCERA Performance (July 2006 – April 2016)

Annualized Total Fund Gain 1.00%

Cumulative $576 million gain since inception

Excess Returns negatively correlated to policy

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Gain/Loss</th>
<th>Portfolio Return</th>
<th>Perfect Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>April, 2016</td>
<td>17,334,838.07</td>
<td>0.22%</td>
<td>0.27%</td>
</tr>
<tr>
<td>Fiscal YTD</td>
<td>(143,448,015.07)</td>
<td>-1.82%</td>
<td>-1.87%</td>
</tr>
<tr>
<td>One Year</td>
<td>(162,620,356.78)</td>
<td>-2.05%</td>
<td>-2.30%</td>
</tr>
<tr>
<td>Two Years</td>
<td>41,362,891.55</td>
<td>0.25%</td>
<td>0.07%</td>
</tr>
<tr>
<td>Three Years</td>
<td>178,123,378.62</td>
<td>0.80%</td>
<td>0.69%</td>
</tr>
<tr>
<td>Annualized Since Inception</td>
<td>58,617,866.43</td>
<td>1.00%</td>
<td>0.90%</td>
</tr>
<tr>
<td>Cumulative Since Inception</td>
<td>575,737,901.81</td>
<td>10.31%</td>
<td>9.17%</td>
</tr>
</tbody>
</table>

Source: SBCERA and Russell Investments. Please see Disclaimer. Data is monthly from July 2005 – Apr 2016. Includes transactions costs but does not include Russell Investment fees.
Process: Informed Simply Re-Adjusts Allocations
Simple Concise Table Summarizes Analysis; Indicates Relative Attractiveness

<table>
<thead>
<tr>
<th>Current Allocation Monitor</th>
<th>Allocation Tilt vs. Benchmark (Percent of Portfolio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Large Cap</td>
<td>![Green Arrow] 0.5%</td>
</tr>
<tr>
<td>US Small Cap</td>
<td>![Blue Arrow] 0%</td>
</tr>
<tr>
<td>International Stocks</td>
<td>![Red Arrow] -0.5%</td>
</tr>
<tr>
<td>US Bonds</td>
<td>![Red Arrow] -1.5%</td>
</tr>
<tr>
<td>Commodities</td>
<td>![Green Arrow] 1%</td>
</tr>
<tr>
<td>Cash</td>
<td>![Red Arrow] -1.5%</td>
</tr>
</tbody>
</table>

Source: AEGIS. Please see Disclaimer. This is a hypothetical example for illustration purposes only and is not meant as investment advice.
Risk Management Benefits
Innovative and Bespoke Program Provides Many Layers of Risk Management

Try to participate in Bull markets while hedging risk in Bear markets

Correlate positively to “safe” investments and negatively to “risky” assets

Dynamic negative correlation to the SAA. Best way to get paid to minimize fund drawdowns

Funds Can Design Program to Lower Risks

Perform well in market disruptions

Not a generic Macro/CTA strategy. Designed to improve returns and reduce risk
Performance/Risk Management: Client Case Study

Had Strong Performance in 2008 When Most Funds Struggled

Achieved Design Goal => Minimize Drawdowns (did Well When SAA Underperformed)

Full Transparency; Executed Through Existing Overlay Manager

Ranges:
Equities (+/-5%);
Fixed Income (+/-5%)
Commodities (+/-5%)

Public Pension Plan ($8bn notional)

Summary: SMART and SECURE
Can Easily Add Alpha and Improve Risk Management

- **Smart** approach provides discipline and robust process
- **Enhances** total portfolio performance
- **Customized** actively managed overlay using futures
- **Untapped** alpha source; Policy and manager line-up unchanged
- **Risk** management and improved governance
- **Easy, timely** reporting and full transparency
Disclaimer

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General Disclosures: The simulated performance presented may differ from live performance experienced using the strategy for the following reasons:

The simulation assumes that we adjust the allocations to each asset on a daily basis after the close and at the closing price on that day, whereas the live product may not adjust the allocations exactly at that time or at that price and may have execution lags that affect the execution prices.

The simulation assumes certain transaction costs with respect to trades made, whereas the live portfolio might incur different transaction costs.

The simulation assumes implementation of the allocation shifts by buying and selling the underlying indices, whereas live portfolios may use other instruments (i.e. futures, forwards, active or passive managers) with a different return or cost.

Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not actually been executed, the results may have under or over compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown.
Process Review: Develop Rules on Many Factors
Use Time and Factor Diversification in a Systematic Investment Process

**Momentum**
(Short Term)
**Examples:** Moving Averages, Technical Indicators, Oscillators

**Valuation**
(Medium Term)
**Examples:** Dividend Yields, P/E Ratios, Profits

**Sentiment**
(Short to Medium Term)
**Examples:** VIX, Credit Spreads, Volatility

**Economic/Macro**
(Medium to Long Term)
**Examples:** Leading Indicators, Interest Rates, Baltic Dry Index

**Balanced Model**
Background on AEGIS and $M^\text{cube}$

Over a Decade of Award-Winning Innovations to Help Asset Owners

<table>
<thead>
<tr>
<th>Best Tactical Manager</th>
<th>(CIO Magazine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Pension Software</td>
<td>(Global Pensions)</td>
</tr>
</tbody>
</table>

Over $1billion of performance gains by software clients using similar approach (no investment advisory relationship)

$1.2 bn in notional AUM. One client to potentially raise AUM by $4bn. Tentatively, go live for first OCIO Client in Q3 (appx $850mn)

Work in Partnership with Clients to Achieve Results

Over 20+ years experience in fund management, trading, investment research and software development


Background on AEGIS and M$^\text{cube}$