Can We Lower Our Portfolio Volatility and Still Meet Our Equity Return Expectations?

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Analytic Investors LLC
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Summary

- What? A core equity strategy designed to deliver above market results with less downside risk

- Why? Lowering your equity volatility will in turn reduce your funding volatility “win by not losing”

- How? Speak to your consultant about implementing a Low Volatility equity strategy in place of your passive or core allocation
Employee Owned Quantitative Investment Manager

Organization

- 100% Employee Owned
- Headquarters: Los Angeles
- 51 Employees
- Investment professionals: 18
- Client Service/Marketing: 12

Portfolio Capabilities

- Benchmark Oriented (Beta 1)
  - Core Equity
  - Short Extension
- Risk Reduction
  - Low Volatility Equity
  - Covered Call
  - Equity Long/Short

Clients

- Total Clients: 58*
- 45% Financial Services
- 25% Public
- 11% Multiemployer
- 9% Corporations
- 4% Insurance
- 4% Superannuation/Sovereign Wealth Fund
- 2% Endowments/Foundations

Asset Composition

- Total Assets: $11.6B USD*
- $2.5B Benchmark Oriented
- $9.1B Risk Reduction

As of 12/31/2014
*Includes four clients and $1B of non-discretionary assets as of 12/31/2014, where Analytic does not have trading authority over the client portfolio.
A History of Continuing Research

The Not-So-Well-Known Three-and-One-Half Factor Model
Clarke, de Silva, Thorley (2014)

Risk Parity, Maximum Diversification, and Minimum Variance: An Analytic Perspective
Clarke, de Silva, Thorley (2013)

Exploiting the Volatility Anomaly in Financial Markets
de Silva (2012)

Minimum-Variance Portfolio Composition
Clarke, de Silva, Thorley
BERNSTEIN FABOZZI/JACOBS LEVY AWARD 2012

Know Your VMS Exposure
Clarke, de Silva, Thorley (2010)

Minimum Variance Portfolios in the US Equity Market
Clarke, de Silva, Thorley
BERNSTEIN FABOZZI/JACOBS LEVY AWARD 2007

Performance Attribution and the Fundamental Law of Active Management
Clarke, de Silva, Thorley
GRAHAM & DODD SCROLL AWARD 2005

A Factor Approach to Asset Allocation
Clarke, de Silva, Murdock
BERNSTEIN FABOZZI/JACOBS LEVY AWARD 2005

Portfolio Constraints and the Fundamental Law of Active Management
Clarke, de Silva, Thorley
GRAHAM & DODD AWARD OF EXCELLENCE 2002
Relationship Between Risk and Return

Across Asset Classes

- T-Bills
- Sovereign Debt
- Corporate Debt
- Emerging Markets
- Frontier Markets

STANDARD DEVIATION (%)

T-Bills
Sovereign Debt
Corporate Debt
Emerging Markets
Frontier Markets

STANDARD DEVIATION (%)

ANNUALIZED RETURN (%)

INVESTORS

1For illustrative purposes only
Performance by Beta Quintile – Persistently Negative Effects of Volatility 1997 – 2012

MSCI World Index

MSCI USA Index

MSCI Japan Index

MSCI Australia Index


Average return is the arithmetic average. Portfolios were formed monthly based on Barra’s beta forecast.

Sources: Compustat and MSCI Barra.
Cumulative Return of ETFs
May 2011 – February 2015

Source: Bloomberg

<table>
<thead>
<tr>
<th></th>
<th>Annualized Return</th>
<th>Standard Deviation</th>
<th>Beta</th>
<th>Volatility vs. S&amp;P 500</th>
<th>Sharpe Ratio</th>
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</thead>
<tbody>
<tr>
<td>S&amp;P Low Volatility</td>
<td>15.2%</td>
<td>11.9%</td>
<td>0.69</td>
<td>-24.0%</td>
<td>1.28</td>
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<tr>
<td>S&amp;P High Beta</td>
<td>11.2%</td>
<td>25.0%</td>
<td>1.49</td>
<td>+59.3%</td>
<td>0.44</td>
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<tr>
<td>S&amp;P 500</td>
<td>15.2%</td>
<td>15.7%</td>
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<td>0.97</td>
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</table>
Effective Portfolio Allocation – Lower Risk / Better Returns

For illustrative purposes only
10 Year Portfolio Impact - $1B Plan

<table>
<thead>
<tr>
<th>Hypothetical Plan Value</th>
<th>70% Russell 1000 / 30% Barclays US Agg</th>
<th>60% MSCI USA Minimum Volatility / 25% Russell 1000 / 15% Barclays Agg</th>
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<thead>
<tr>
<th></th>
<th>Traditional - 70% Russell 100, 30% Barclays US Agg</th>
<th>Risk Budgeting - 60% Min Vol, 25% Russell 1000, 15% Barclays US Agg</th>
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<tr>
<td>Return</td>
<td>7.57%</td>
<td>8.55%</td>
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<tr>
<td>Risk</td>
<td>10.56%</td>
<td>10.57%</td>
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Low Vol Benefits Take-Aways

- Riskier stocks do not pay a premium over less risky stocks over time.
- Risk Reduction and Risk Re-allocation can be achieved by simple asset allocation decisions based on long term proven results.
- Talk to your fellow trustees, investment staff and consultants about whether low volatility approaches are applicable to your plans to reduce risk without modifying total plan return expectations.