Segal Rogerscasey

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ALPHA GROUP TOPIC
The Alpha Group researches investment managers.



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Implementation of Low Volatility Equity Portfolios

In recent years, low volatility equity portfolios (LVEPs) — generally consisting of long-only securities with a market-like return profile that seek to reduce volatility by 20 percent or more versus the market — went from a novel concept to a high-profile strategy. Virtually every quantitative investment firm either has launched, is in the process of launching or has considered launching an LVEP product. Prominent index providers, such as MSCI, Standard & Poor's and Russell, have started specialty indices against which LVEPs can be measured.

LVEPs, which are typically constructed using sophisticated quantitative techniques,[1] have offered a superior risk/reward trade-off relative to capitalization-weighted portfolios.[2] Despite the advantages of and broad interest in LVEPs, investors have been slow to adopt them. Based on Segal Rogerscasey's conversations with plan sponsors and investment managers, one of the hurdles that institutions face in adopting LVEPs is the lack of clarity on how these strategies should be implemented. This *Investment Insight* addresses implementation mechanics. It defines Segal Rogerscasey's investment philosophy with respect to LVEPs and discusses asset allocation, manager selection and performance evaluation issues related to LVEPs.

Investment Philosophy

It is Segal Rogerscasey's expectation that **over a full market cycle, LVEPs will post returns that are comparable to capitalization-weighted indices with meaningfully lower volatility.**

Segal Rogerscasey bases this expectation on in-house back-tests that cover periods from 1988 to 2008.[3] These back-tests revealed that LVEPs have outperformed capitalization-weighted portfolios, although the magnitude of this outperformance has been modest.[4] (See Table 1 below.) While LVEPs' outperformance was not statistically significant, the volatility reduction was, in fact, statistically significant.

[1] Many fundamentals-based strategies, particularly those that emphasize high quality, dividend-paying stocks, also have lower volatility than the broad market. However, unlike LVEPs, for fundamentals-based strategies, the volatility reduction is merely a fallout of the stock-picking process. As a result, they generally do not achieve the same magnitude of volatility reduction as LVEPs.

[2] An October 2010 white paper, "Low Volatility Equity Portfolios," which includes back-testing and analysis of the LVEPs, is available on the following page of the Segal Rogerscasey website: http://www.segalrc.com/publications-and-resources/archives/dmdocuments/wp_lowvol.pdf

[3] For more details on the back-testing conducted, please refer to the white paper cited in footnote 2.

[4] Segal Rogerscasey's back-tests exclude transaction costs and management fees. Further, they include two periods of unusually severe market distress, 2000-2002 and 2007-2008, which had a significant positive impact on the performance of LVEPs versus capitalization-weighted indices.

Table 1: Back-Test Summary

	Return	Standard Deviation**	Return/Standard Deviation
Portfolio	9.14%	10.22%	0.89
Constrained Portfolio*	9.54%	11.59%	0.82
Russell 1000 Index	8.90%	14.41%	0.62

* The constraints employed for the construction of the Constrained Portfolio included: sector constraints of +/- 10% and risk-factor constraints of +/- .5 versus the Russell 1000 Index; beta (market risk) constraint of 0.7 to 1.0; and individual position constraint of 5% maximum.

** Standard deviation is a measure of the distribution of results around the average (mean). In a normal distribution, one standard deviation above and below the mean includes about 67% of all samples.

Source: MSCI Barra and Segal Rogerscasey

"Segal Rogerscasey suggests investors implement LVEPs for volatility reduction, not return enhancement."

Despite the results above, Segal Rogerscasey is skeptical that, over the long term, the LVEP outperformance will persist prospectively. Segal Rogerscasey suggests investors implement LVEPs for volatility reduction, not return enhancement. This expectation has important implications for how Segal Rogerscasey approaches asset allocation, manager selection and performance-evaluation of LVEPs.

Asset Allocation

This section examines where LVEPs fit within the overall program structure, which sub-asset classes should be managed through LVEPs as opposed to "conventional" portfolios and what should be the size of the LVEP allocation.

Should This Strategy Be Viewed as Traditional or Alternative?

There are two areas where investors could potentially fit LVEPs: within traditional equity programs or within alternatives programs. The argument for including LVEPs among alternatives is that on the surface they serve as a reasonable substitute for hedge fund portfolios, given their attractive Sharpe ratios[5] and relatively modest drawdowns.

"Segal Rogerscasey's preference is to include LVEPs among traditional and not alternative investments."

Segal Rogerscasey's preference is to include LVEPs among traditional and not alternative investments. Segal Rogerscasey believes that LVEPs' transparency, liquidity, lack of operational complexity and fee structure makes them fit naturally as a traditional investment. Segal Rogerscasey also thinks that LVEPs are best used as complements to, not substitutes for hedge fund programs, given their generally modest correlations with various hedge fund strategies. Intuitively, it is unreasonable to expect high correlations between LVEPs and hedge funds, since they have distinct performance drivers.

[5] Sharpe ratio is a measure of excess return per unit of risk.

Table 2: Low Volatility/Hedge Fund Correlation Matrix, January 1990 – December 2011

	MSCI World Min Vol Index	HFRI Emerging Markets Index	HFRI Equity Hedge Index	HFRI Event-Driven Index	HFRI Macro Index	HFRI Relative Value Index	HFRI Fund Weighted Composite Index	HFRI Fund of Funds Composite Index
MSCI World Min Vol Index	1.00							
HFRI Emerging Markets Index	0.62	1.00						
HFRI Equity Hedge Index	0.61	0.73	1.00					
HFRI Event-Driven Index	0.61	0.75	0.84	1.00				
HFRI Macro Index	0.37	0.57	0.56	0.51	1.00			
HFRI Relative Value Index	0.48	0.61	0.67	0.75	0.34	1.00		
HFRI Fund Weighted Composite Index	0.64	0.86	0.95	0.90	0.65	0.72	1.00	
HFRI Fund of Funds Composite Index	0.48	0.79	0.82	0.75	0.67	0.67	0.87	1.00

Source: Segal Rogerscasey

Which Sub-Asset Classes?

The next step in LVEP implementation is the determination of appropriate sub-asset classes to which the low volatility construct should be applied. Because Segal Rogerscasey does not believe that investors in LVEPs should expect return enhancement, using LVEPs in relatively inefficient sub-asset classes, where active management can generate significant alpha (or excess return),[6] carries an opportunity cost. Thus, Segal Rogerscasey would not consider LVEPs for U.S. or international small cap mandates or emerging-markets mandates.

Instead, **we believe LVEPs should be employed in areas with limited alpha generation potential, where investors traditionally employed passive or enhanced index strategies.** These sub-asset classes include U.S. large cap core and, to a lesser extent, developed large cap core equities.

What Should the Allocation Be?

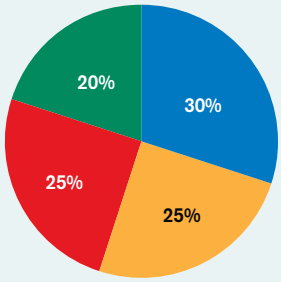
Segal Rogerscasey's position paper for 2012, "European Condition: Implications for 2012 and Beyond,"[7] recommends that investors shift at least 50 percent, and up to 100 percent, of their passive U.S. large cap core allocation to LVEPs. Segal Rogerscasey recommends higher allocation to LVEPs for plans where surplus volatility (or funded status volatility) is one of the primary measures of risk.

"Segal Rogerscasey...recommends that investors shift at least 50 percent, and up to 100 percent, of their passive U.S. large cap core allocation to LVEPs."

Another framework for thinking about LVEP allocation is that it should account for at least 20 percent of the equity program, as a smaller allocation simply would not "move the needle" for reducing the volatility of the program. A 20 percent allocation to an LVEP strategy that targets a 25 percent reduction in volatility produces an expected 5 percent reduction in the equity program volatility, assuming no correlation changes; a 30 percent allocation produces an expected 7.5 percent volatility reduction.

Consider an example for incorporating a low volatility manager into an investor's overall domestic equity program. The example starts with a model domestic equity portfolio from Segal Rogerscasey's Implemented Investment Solutions Group illustrated in the adjacent graph. Then, the S&P 500® Index allocation is replaced with an allocation to a "best idea" low volatility portfolio in 5 percent increments. The low volatility portfolio targets volatility reduction of roughly 25 percent versus the broad market. Table 3 on page 4 shows the predicted standard deviation and tracking error changes for the overall portfolio using Barra analytics. A "full" 30 percent allocation to the low volatility portfolio provides a 7.6 percent volatility reduction versus the initial portfolio, roughly in line with Segal Rogerscasey's expectations. However, it also increases the program-level tracking error from 1.1 percent to 2.2 percent.

Model Domestic Equity Portfolio



Key:

- S&P 500® Index
- "Best-Idea" Active Large Cap Growth Managers
- "Best-Idea" Active Large Cap Value Managers
- "Best-Idea" Active Small and Small/Mid Cap Managers

"Ultimately, the specific allocation to LVEPs is a function of investor preferences for trading lower volatility for higher tracking error in the equity program."

Ultimately, the specific allocation to LVEPs is a function of investor preferences for trading lower volatility for higher tracking error in the equity program. Table 4 on page 4 compares some pertinent characteristics of passive portfolios tracking capitalization-weighted indices and LVEPs.

[6] Alpha, a measure of performance, is defined as beta (market risk) adjusted return over a stated benchmark.

[7] That position paper is available on the following page of Segal Rogerscasey's website: http://www.segalrc.com/publications-and-resources/archives/dmdocuments/2012position.pdf

Table 3: Volatility vs. Tracking Error Trade-Off Example

S&P 500 Allocation	Low Volatility Allocation	Standard Deviation	Standard Deviation Reduction	Tracking Error*
30.0%	0	19.7%	0	1.1%
25.0%	5.0%	19.4%	1.5%	1.2%
20.0%	10.0%	19.2%	2.5%	1.3%
15.0%	15.0%	18.9%	4.1%	1.5%
10.0%	20.0%	18.7%	5.1%	1.7%
5.0%	25.0%	18.4%	6.6%	2.0%
0	30.0%	18.2%	7.6%	2.2%

* Tracking error is a measure of how closely a portfolio follows its benchmark. The tracking error shown in this table is for the total portfolio.

Sources: MSCI Barra and Segal Rogerscasey

Table 4: Capitalization-Weighted Passive Portfolios vs. LVEPs

	Passive	LVEP
Beta	1.0	0.6-0.8
Volatility	100% of Index	60-80% of Index
Tracking Error	Minimal	Typically > 6%
Risk-Factor Exposures	In Line with Benchmark	Depends on Specific Strategy
Fees*	Typically < 10 bps	15-70 bps

* For rules-based portfolios, which generally carry lower fees, the fees represent a relatively modest (15-35 basis points) mark-up in absolute terms vis-à-vis passive capitalization-weighted portfolios.

Source: Segal Rogerscasey

Manager Selection

This section examines two issues that relate to selecting LVEP managers: rules-based versus actively managed strategies, and strategies constructed with absolute versus benchmark-relative portfolio construction constraints.

Rules-Based vs. Actively Managed LVEPs

LVEPs can be broadly divided into two camps:

- ***Rules-based Strategies*** Segal Rogerscasey defines rules-based strategies as those that are implemented based on a set of rules aimed at achieving a target level of volatility.[8] They may aim to replicate a specific low volatility index; alternatively, they may be managed based on a custom set of portfolio construction rules aimed at minimizing predicted volatility subject to sector, industry, risk factor or other constraints.

- ***Actively Managed Strategies*** In contrast to rules-based strategies, actively managed strategies have the dual objectives of reducing volatility level and generating alpha. The latter is typically achieved by using a multi-factor alpha model overlay when constructing portfolios, although there are some fundamental research firms looking to combine their ratings with a low volatility approach. Such models may include valuation, growth and quality-oriented factors.

Given Segal Rogerscasey's philosophical belief that LVEPs should be used for volatility reduction, not return enhancement, it is not surprising that **our bias is toward rules-based and away from**

[8] In the October 2010 white paper referenced in footnote 2, we referred to them as "passive" and "managed passive" strategies.

actively managed LVEPs. In our opinion, there are potential issues with implementing actively managed LVEPs.

First, the dual objectives for actively managed LVEPs may interfere with one another. In other words, the volatility in the performance of the alpha factors may hinder the manager's ability to achieve the volatility objective for the portfolio, particularly during market crises when volatility and correlations rise.

Second, we also believe that adding alpha within the low volatility universe is more difficult than adding alpha within the broad universe of stocks, for several reasons:

- Low volatility stocks represent a more challenging universe for stock-pickers, fundamental and quant alike. (Readers who are interested in a mathematical definition of the relationship between alpha and volatility should refer to the text box below.)
- Another inherent difficulty of using alpha models in the low volatility space is that factors effective within the broader universe may be less effective for low volatility stocks. By analogy, using height as a predictor of an individual's ability to play basketball is effective within the general population, but less so within professional basketball, where all athletes are already tall.[9]
- There is also the question of breadth. The low volatility universe is narrower, by definition, than the broad universe of stocks, as some of the more volatile stocks will be excluded, be it through a screening process or through optimization. (The text box below provides a formula for connecting returns to concepts of skill and breadth.)

Alpha, Volatility and Active Management: Doing the Math

Richard Grinold and Ronald Kahn* describe the relationship between alpha and volatility in the following equation, which implies that it is harder to generate alpha in the low volatility universe:

Alpha = Volatility * Information Coefficient * Standardized Forecast

Grinold and Kahn's Fundamental Law of Active Management connects a measure of risk-adjusted returns, information ratio (IR), to concepts of skill and breadth through the following formula:

IR = Information Coefficient * √ (Breadth)

Information Coefficient (IC), a measure of skill, is the correlation of each forecast with actual outcomes. Breadth is the number of independent forecasts. Even if one assumes an unchanged IC, cutting the universe (as an example) by 50 percent through the exclusion of the more volatile stocks, reduces the projected information ratio for the portfolio by roughly 30 percent.

* Richard C. Grinold and Ronald N. Kahn, *Active Portfolio Management* (New York: McGraw Hill 2000)

Absolute vs. Relative Constraints

Another dimension along which LVEPs can be defined is in the use of risk constraints, such as sector/industry weights or risk factors, to construct portfolios. All LVEPs use some sort of constraints, since unconstrained, "pure" minimum volatility portfolios would be unpalatable to the vast majority of investors. For example, the back-tests showed that the unconstrained portfolio was overweight to the utilities sector by almost *3,000 basis points*,[10] making it doubtful that investors would consider it a viable substitute for the broad market.[11]

In our experience, LVEPs typically use one of two sets of constraints, absolute or relative to a benchmark (typically, a capitalization-weighted index). To make a sweeping generalization,

[9] On the other hand, customizing alpha models to the low volatility universe presents its own challenges, such as avoiding overfitting, a phenomenon that occurs when a statistical model is excessively and unnecessarily complex.

[10] As a reminder, 10 basis points (bps) equal 0.1 percent.

[11] While the sector and style biases of LVEPs may vary based on the portfolio construction methodology, Segal Rogerscasey's back-tested portfolios displayed small cap value bias, as well as bias toward defensive sectors, such as consumer staples and utilities, and away from more volatile sectors, such as consumer cyclicals, technology and financials.

LVEPs with absolute constraints have lower betas and achieve higher reduction in volatility than LVEPs with relative constraints; this is because relative constraints tend to be tighter and become binding[12] during optimization. At the same time, using absolute constraints in the optimization process, depending on their severity, may result in "unusual-looking" portfolios that are highly concentrated in top holdings and have a large disconnect between the portfolio sector allocations and the economic significance of said sectors.

While Segal Rogerscasey does not rule out recommending LVEPs with absolute constraints, **our current bias is toward the relative constraint construction, which we view as a reasonable compromise that allows an investor to avoid more "extreme" low volatility portfolios while still achieving a substantial reduction in volatility.** Sector weights of a capitalization-weighted benchmark also somewhat indicate the economic prominence of each sector; while capitalization-weighted indices are prone to bubbles, such as financials in the 2000s and technology in the 1990s, we hold the view that investors should not outright ignore information provided to them by the market.

Performance Evaluation

This section examines two issues pertaining to evaluating the performance of LVEPs: the choice of an appropriate benchmark and the actual mechanics of the performance evaluation.

Benchmarking

Investors have two basic options for benchmarking LVEPs: low volatility indices (published or custom) and capitalization-weighted indices. **While both low volatility and capitalization-weighted indices are useful for benchmarking LVEPs, Segal Rogerscasey's bias is for the latter**.

We recognize that it is possible to argue that benchmarking to low volatility indices has the advantage in that the risk profile of the portfolio in question is more directly comparable to that of a low volatility index than to a capitalization-weighted index. However, that advantage might be less significant than it seems at first. The portfolio and the index may target different levels of volatility reduction; if the managed portfolio has a beta of roughly 0.65 and the index has a beta of 0.80, the index still has a volatility mismatch relative to the portfolio.

Also, low volatility indices are not "passive" benchmarks akin to capitalization-weighted indices in the sense that they represent an inclusive universe of low volatility stocks; rather, they are rules-based portfolios not unlike the LVEPs run by investment managers. In effect, with low volatility benchmarks, one is comparing one rules-based portfolio (LVEP) to another (Index).

Finally, low volatility indices are difficult to integrate into a program-level capitalization-weighted benchmark. Of the three major low volatility index providers, only Russell offers a completeness index.

Benchmarking LVEPs to capitalization-weighted indices offers two major advantages. First, as alluded to above, unlike their low volatility brethren, capitalization-weighted indices are considered the most pure passive portfolios. Second, benchmarking to capitalization-weighted indices makes measuring the opportunity cost of an LVEP straightforward.

Performance Evaluation

As with any other investment, we believe the performance evaluation of LVEPs should incorporate two major elements: risk and return. The risk dimension is arguably straightforward: one simply needs to compare the volatility of the LVEP with that of the index to ensure that the target volatility reduction has in fact been achieved.

Segal Rogerscasey does not consider tracking error as a critical risk measure for LVEPs. In our view, it is important to analyze the tracking error on a program-level basis; however, given that the objective of LVEPs is volatility reduction, tracking error should clearly be a distant secondary consideration in evaluating LVEPs. In fact, one may argue that it is partly because of investors' obsession with tracking error that the low volatility anomaly exists in the first place.

[12] A constraint is considered binding if changing it affects the optimization solution.

As for evaluating LVEPs' returns, **in the long run — over a market cycle — Segal Rogerscasey sets the hurdle for returns to be comparable to capitalization-weighted indices. In the short term, we monitor the LVEPs' performance by looking not at simple excess returns, but rather at beta-adjusted performance metrics, such as Jensen's Alpha.**[13]

Conclusion

Plan sponsors are well aware of the quandary they face as they seek to minimize their funded status volatility and achieve more predictable required contributions. For corporate plans, predictable contributions translate to predictable earnings and higher earnings multiples. For non-corporate plans, predictable contributions translate to fewer unpleasant budgetary surprises.

The issue of funded status volatility has become even more germane in recent years. The global financial crisis and its aftershocks have led to a spike in market volatility, which in turn resulted in higher funded status volatility. This increase in volatility was further exacerbated by regulatory changes over the past decade, such as the adoption of the Pension Protection Act of 2006 and Financial Accounting Standard 158, which left plan sponsors with fewer "smoothing" options.

Segal Rogerscasey believes that LVEPs are a solution that addresses a real need in the marketplace: lowering volatility without sacrificing returns. We believe that LVEPs are an efficient way to achieve that goal.

We recommend implementing LVEPs within traditional equity programs, particularly in place of capitalization-weighted index portfolios. As discussed in this *Investment Insight,* Segal Rogerscasey concludes the following:

- Over a typical market cycle (three to five years plus), LVEPs will post returns that are comparable to capitalization-weighted indices with meaningfully lower volatility, achieving higher Sharpe ratios.
- Investors should implement LVEPs for volatility reduction, not return enhancement. Consequently, LVEPs may be of particular interest to investors concerned with pension surplus volatility.[14]
- LVEPs should be included within traditional, as opposed to alternatives, programs.
- Investors should favor rules-based, as opposed to actively managed, LVEPs and LVEPs constructed with benchmark-relative, as opposed to absolute, risk constraints.
- Over a full cycle, LVEPs should post market-like performance with substantially lower volatility. During shorter periods, their performance should be measured using beta-adjusted performance metrics, such as Jensen's Alpha. ■

[13] Jensen's Alpha is calculated as Portfolio Return – [Risk Free Rate + Portfolio Beta * (Market Return – Risk Free Rate)]. In essence, Jensen's Alpha adjusts for the difference in the risk profile of a manager and its benchmark.

[14] Pension surplus (or deficit) as the difference between pension assets and liabilities.

Questions? Contact Us.

For more information about low volatility equity portfolios, contact your Segal Rogerscasey consultant, the nearest Segal Rogerscasey office (http://www.segalrc.com/about-us/contact-us-locations/) or Arman Gevorgyan, CFA at 203.621.3690 or agevorgyan@segalrc.com

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