Envestnet Factor-Enhanced Index Series:

A Systematic Approach to Capturing a Combination of Robust Factor Exposures

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Introduction

As more sophisticated means of analyzing stock price performance have emerged over the years, "factor" investing increasingly has become a viable and important approach to portfolio management. In this paper, we discuss the intuition behind factor investing and why it is relevant. We also provide an in-depth overview of the Envestnet Factor-Enhanced Index Series, which is designed to capture the performance characteristics of a combination of some of these factors.

When applied to investing, a factor is generally considered to be a characteristic common to a group of stocks that helps to explain the risk and return of that group. There are certain factors that academic research has shown persistently generate a significant excess return, or a *risk premium*, over a market capitalization-weighted index. Factor investing is the systematic process by which these risk premia are captured.

There have been many factors identified by researchers over the past 60 years or so, with a handful being the focal point of much of the research. **Value, Momentum, Size, Volatility, Profitability** and **Liquidity** are among the most prominent factors. There is a large body of academic literature supporting the existence of, and intuition behind, these factors.

The remainder of this paper is organized as follows: Section I provides a general background on factors, including a brief survey of some important literature. We will discuss how various factors are identified, and the asset pricing models that evolved over time as a result. In Section II we present the methodology for constructing the Envestnet Factor-Enhanced Index Series. Section III provides pertinent performance statistics and characteristic data resulting from our index construction methodology. Section IV concludes.

I. Background

What are Factors?

A "factor" is generally considered to be a characteristic common to a group of stocks that helps to explain the risk and return of that group. For at least six decades academic researchers have attempted to develop models that explain stock price movements through identification of these factors. The capital asset pricing model (CAPM), introduced in the early 1960s by Sharpe (1964) and Lintner (1965) built upon the seminal Modern Portfolio Theory (MPT) work of Markowitz (1952) over a decade earlier. The CAPM is a so-called single-factor model in that it attempts to explain stock returns as being a function of one risk factor – the market risk, which is proxied by the market's excess return (the return on the broad market less the risk-free rate). A stock's sensitivity or exposure to the market risk is measured by the stock's beta.

While the CAPM provides a simple and intuitive framework for measuring the relationship between risk and expected return, its critics cite numerous shortcomings that have been

manifested in poor empirical results. The importance the CAPM places on beta alone as explaining asset price returns was called into question as early as the 1970s as researchers began to uncover various security characteristics, such as valuation measures (e.g., ratio of book value-to-market price, or, book-to-market) and market capitalization, that exhibited greater explanatory power.

Important Asset Pricing Factors

Connor and Korajczyk (2009) provide a helpful overview of the three primary types of factor models: statistical, macroeconomic and fundamental (also referred to as characteristic-based). A significant percentage of the academic research has been focused on fundamental factors, with many hundreds of such factors being identified over the past 60 years. But not all of these factors survive the test of time. Harvey, Liu and Zhu (2014) conclude that most historically discovered factors would not be statistically significant on an out-of-sample basis.

In a series of seminal papers, Fama and French (1992, 1993 and 1996) set forth a model for U.S. equity returns consisting of three factors: (1) a "market" factor (as represented by the market's excess return); (2) a "value" factor (measured by the ratio of book value-to-market price); and (3) a "size" factor (measured by market capitalization). A fourth factor—momentum (the tendency of a stock's recent performance trend to continue)—was added based on the work of Carhart (1997) and Jegadeesh and Titman (1993). The resulting model is now widely referred to as the "Fama-French four-factor model." Table 1 provides a short description of some of the most well-known of these factors.

Table 1: Widely Recognized Asset Pricing Factors

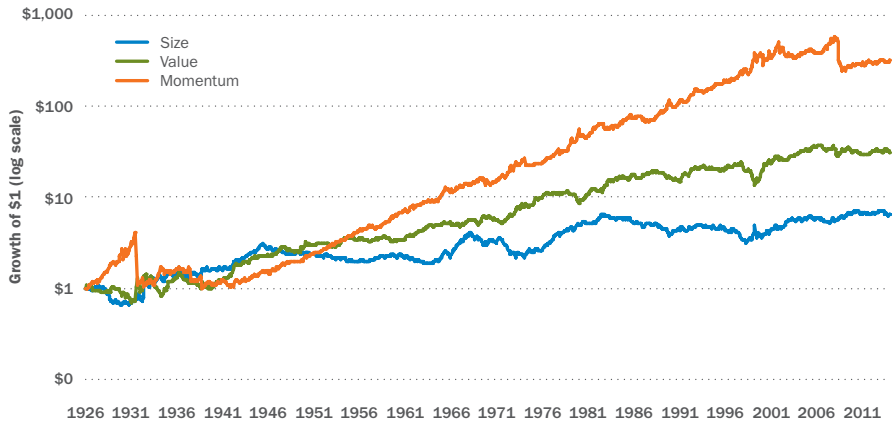
Factor	Characteristics
Value	Stocks with lower prices relative to measures of fundamental value (e.g., book value, earnings, cash flow, sales, etc.) tend to outperform those with higher valuations.
Momentum	The tendency for stocks that have risen recently to continue to rise, and for stocks that have declined recently to continue to decline.
Size	Smaller stocks tend to outperform larger stocks.
Profitability	Stocks of firms that are more profitable (as measured by gross profit-to-assets, ROE, etc.) tend to outperform those of less profitable firms.
Liquidity	Less liquid stocks tend to outperform more liquid stocks.
Volatility	Stocks that exhibit less volatility (as measured by standard deviation of returns, beta, etc.) tend to outperform those that are more highly volatile.

Each of the three non-market factors—value, momentum and size—comprising the Fama-French model generate *risk premia*—persistent excess risk-adjusted returns over long periods of time. For instance, from 7/31/1926 through 12/31/2014, the average high-momentum portfolio outperformed the average low-momentum portfolio by 0.68% per month, and the highest book-to-market portfolio outperformed the lowest book-to-market portfolio by 0.39% per month (see Figure 1).[1]

Research has also shown that many of these risk premia span global asset classes. Asness, Moskowitz and Pedersen (2013) showed that, in addition to U.S. equities, the value and momentum risk premia are evident in all of the primary asset classes, including international equities, global government bonds, currencies and commodities.

[1] According to data obtained from the Kenneth R. French Data Library (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Figure 1: Performance of Major Asset Pricing Factors (12/31/1926 – 12/31/2014)



Source: Kenneth French Data Library

While these risk premia deliver excess returns over the long-term, they are time-varying, meaning there are periods when they do not perform well. For example, value performed very poorly in the late 1990s as valuations became extended during the technology bubble. Similarly, as the market rebounded sharply from its lowest point in early 2009 following the financial crisis, the momentum factor performed poorly as beaten-down, negative-momentum stocks surged.

However, one of the important characteristics of certain factors—particularly value and momentum—is that they exhibit negative correlation: when value is out of favor, momentum tends to perform well, and vice versa (see Table 2). Such a relationship has implications for index and portfolio construction, as combining exposures to negatively correlated factors can reduce portfolio volatility and enhance risk-adjusted returns.

Table 2: Correlations of Major Factors (1/1927 – 12/2014)

	Size	Value	Momentum
Size	1		
Value	0.12	1	
Momentum	-0.16	-0.40	1

Source: Kenneth R. French Data Library

Drivers of Factor Performance

What is driving the excess returns associated with these factors? Researchers often refer to these excess returns as anomalies, because they are not explained by the CAPM. There are two primary schools of thought as to why these anomalies occur. Those adhering to the efficient market hypothesis (EMH) (such as Fama and French (1992, 1993 and 1996)) generally believe that the excess returns are a form of compensation for some sort of risk that is characteristic to the factor. In other words, according to EMH adherents, the reason various factors deliver excess returns is that stocks with above-average exposure to these risk factors are in some way riskier, and that investors in these strategies are bearing some additional

fundamental risk that must be compensated. Behaviorists, on the other hand, argue that the excess return is related to irrational behavior whereby the investor overreacts, extrapolating what has happened in the past—whether good or bad—too far into the future. More simply, behaviorists (such as Lakonishok, Shleifer and Vishny (1994)) contend that investors underprice stocks with low exposure to a particular risk factor and overprice stocks with higher exposure to this risk factor (e.g., value vs. growth stocks).

II. Envestnet Factor-Enhanced Index Series

Overview

The Envestnet Factor-Enhanced Index Series (see Table 3) combines exposures to three of the factors recognized as generating the most persistent risk premia over time: value, momentum and volatility. We have combined these factors in one index rather than creating separate value and momentum indices because of the factors' ability to individually generate excess returns that are negatively correlated. The risk adjustment to momentum strategies improves the performance characteristics of the momentum risk factor by avoiding the so-called "momentum crashes" (Daniel and Moskowitz (2013) and Barroso and Santa-Clara (2013)). The proprietary index construction methodology we employ is well-grounded in academic theory; provides balanced exposures to the factors; and constrains turnover and active risk. The result is an index series designed to provide consistent excess returns relative to traditional market-capitalization weighted indices, within acceptable tracking error allowances.

With a traditional market capitalization-weighted index, each index constituent is assigned a weight proportional to its market capitalization. With the Envestnet Factor-Enhanced Index Series, we use the market capitalization weighting as a starting point, and apply an over- or underweight to a particular stock based on its value, momentum and volatility characteristics. The difference is often referred to as the stock's "active weight," as a decision is being made to deviate from the capitalization-based weight.

Table 3: Envestnet Factor-Enhanced Index Series

Index	Objective
Envestnet Factor-Enhanced Large Cap Index	For each market capitalization, we attempt to systematically capture excess returns associated with the value, momentum and volatility factors.
Envestnet Factor-Enhanced Small Cap Index	
Envestnet Factor-Enhanced All Cap Index	

The remainder of this section provides a detailed outline of our multi-step index construction methodology and process.

Step 1 – Selection of Index to Track

In order to create a factor-enhanced index, we first select the parent index whose constituent weightings will be adjusted. The first consideration in the selection process is determining the asset classes for which we would like to provide the factor exposures. We have initially concentrated on the domestic U.S. large cap, small cap and all cap asset classes, as some combination of these typically represent the largest allocation in a U.S. investor's portfolio.

The next consideration is to select the family of traditional capitalization-weighted indices for use as the starting point upon which we base our active weighting decisions. For the Envestnet Factor-Enhanced Index Series we use the Russell family of indices for two primary reasons: first, the Russell indices provide wide coverage of the desired asset classes, with a significant number of constituents in each index. Second, the Russell indices have gained broad acceptance by institutional managers as the benchmarks of choice. A somewhat less

important consideration is that we use the Russell indices as our domestic equity asset class benchmarks on the Envestnet platform, meaning they have recognition among our advisor clients.

Step 2 – Selection of Factors

Once the parent index is chosen, we must then make the important decision as to which factors should carry increased exposure in the enhanced index. As noted above, researchers have identified hundreds of potential factors, but most prove not to be statistically significant over time. Our objective is to incorporate factors that are, among other things: (1) statistically and economically robust; (2) persistent across time periods and different segments of the market; (3) not highly correlated; and (4) easily implemented.

The number of factors which meets these criteria is few. *Value* and *momentum* are two that have gained much attention in the literature over the past twenty years, and which have provided a sustained risk premium not only for equities, but also across a wide range of other asset classes (Asness et al (2013)). They also have the beneficial attribute of being negatively correlated: they each tend to perform well at different times. Adrian and Rosenberg (2008), among others, demonstrate that *short-term volatility*—the tendency for stocks exhibiting less recent volatility to outperform more volatile issues—is also an important factor. In their helpful and comprehensive evaluation of hundreds of published factors, Harvey *et al* (2014) provide evidence that each of these three factors are robust when subjected to a battery of tests of statistical significance.

Because these three factors—value, momentum and volatility—meet our established criteria, they represent the exposures we attempt to capture through the Envestnet Factor-Enhanced Index Series. There are several well-known factors for which we have no explicit active exposure, including *size* and *liquidity*. Some researchers have questioned whether the size factor actually exists (*e.g.*, Shumway (1997)), and in any event, Harvey *et al* (2014) suggest that size does not stand up to rigorous significance tests. The liquidity factor—the tendency for less liquid stocks to outperform more liquid names—generates a robust risk premium, but by its very nature is not easily implemented, and for that reason we do not attempt to explicitly capture it.

Step 3 – Constructing the Factors

We next define and construct each of the factors, using methodologies grounded in academic research. The following is a general description of the factors employed, and the process we employ in their construction.

Value

Most of the academic research involving the value factor has focused on the price-to-book (P/B) ratio (or its inverse, book-to-market) used by Fama and French (1992) in their seminal study. Other researchers (such as Lakonishok, Shleifer and Vishny (1994), among many others)have shown that other valuation measures such as price-to-earnings (P/E), price-to-sales (P/S) and price-to-cash flow (P/CF) also serve as robust proxies for the value factor. In constructing the Envestnet Factor-Enhanced Index Series we construct our own measure of value, incorporating several valuation metrics in order to obtain a diversified representation of the factor.

Momentum

For the momentum calculation, our proprietary formulation is grounded in measuring exposure of every stock to the standard 12-month momentum factor approach long used in the literature. Under this classic approach, the returns over the past 12 months for a universe's constituents are used to calculate the momentum exposure of every stock. The most recent

month's return is excluded from this calculation in order to avoid the short-term reversal in stock returns, as outlined by, among others, Jegadeesh (1990).

Volatility
Our volatility measure is embedded as part of the momentum calculation in order to mitigate the effects of sharp reversals in the returns of the momentum strategy, which Daniel and Moskowitz (2013) refer to as "momentum crashes." While infrequent, these reversals typically occur after a significant decline in equity prices and during a subsequent explosive rebound in prices.[2] The volatility adjustment effects of our momentum factor also assist in mitigating what Antune et al (2012) refer to as "optionality," or the tendency for beaten-down, negative-momentum stocks to surge in a market rebound after a correction. Optionality is a primary driver of momentum crashes.

Step 4 – Ranking Constituents Based on Factor Exposures

On a semi-annual basis, we rank the constituents of each parent index independently on the value and volatility-adjusted momentum factors. We conduct the ranking process independently for each of the factors, with the combining of factors occurring in Step 5.

When calculating the factor rankings, we first construct the universe of rankable constituents, using only those stocks having (1) at least one of our value measures available at the time of ranking, and (2) at least 12 months of returns so that momentum can be derived.

Value Ranking
For the value factor, we then rank the universe cross-sectionally on each of our value measures, so that each constituent has a separate rank for each measure. These ranks are then averaged, with the averages themselves in turn being ranked, resulting in the final value rank. The final value rank is then translated into an active weight (i.e., an over- or underweight relative to the constituent's weight in the parent index). The final weight is derived by adding the active weight to the constituent's weight in the parent index.

Momentum Ranking
The momentum ranking process proceeds in a similar fashion, whereby we cross-sectionally rank the universe according to our momentum factor formulation. The result constitutes the final momentum ranks. The final momentum rank for each constituent is then translated into an active weight. As with the value factor calculation, the final momentum weight is derived by adding the volatility-adjusted active momentum weight to the constituent's weight in the parent index.

In order to ensure the index is representative of the parent index we set target maximum active weights for each factor ranking. The target maximum active weights for the Envestnet Factor-Enhanced Large Cap, Small Cap and All Cap Indexes are 1%, 0.50%, and 0.25%, respectively. These targets were established by evaluating the tracking error of the Index relative to the parent index's volatility.

Step 5 – Combining the Factors

The final step in the index construction process is to combine the value and volatility-adjusted momentum components. In this step we equally weight each element, so that the final value weight (i.e., the constituent's weight in the parent index plus (minus) the active value weight) and the final momentum weight (i.e., the constituent's weight in the parent index plus (minus)

[2] Since momentum strategies are effectively a bet on past winners, a momentum crash can occur when past losers significantly outperform, and this often occurs coming out of market bottoms. The two most pronounced momentum crashes occurred in 1932 and 2009, as the market rebounded sharply from the Great Depression and the financial crisis, respectively.

the active volatility-adjusted momentum weight) have the same allocation in the constituent's final combined weight in the Envestnet Factor-Enhanced Index.

Rebalancing plays an important role in index performance generally, and particularly so for indexes having a momentum component. Typically, indexes attempting to capture a factor's excess return generate improved results with more frequent rebalancing. Of course, for passive strategies designed to track an index—such as ETFs, index funds and separate accounts—more frequent rebalancing typically equates to higher implementation costs. For that reason, we rebalance the Envestnet Factor-Enhanced Indexes on a semi-annual basis, on June 30 and December 31[3], striving to maximize the excess return captured while recognizing the implementation costs when tracking an index can be substantial.

III. Results

The extent to which the Envestnet Factor-Enhanced Index Series can be a means of capturing the combination of the value, momentum and volatility factors is evidenced in the historical results. Table 4 provides various annualized statistics for each of the Envestnet Factor-Enhanced Indexes. It is important to note that indexes do not reflect strategy implementation costs such as market impact and transactions costs, which can often be significant.

The historical results of the combined strategy are very impressive. The Indexes each generate superior total and risk-adjusted returns relative to their respective parent indexes (see Figures 2 -4 for wealth graphs). In addition, tracking error is maintained within a reasonable margin (see Table 4).

Perhaps the most notable attribute of the Indexes is the consistency of excess returns generated. Figure 5 shows the calendar year excess returns, while Figure 6 graphs the cumulative monthly excess returns in basis points. To be sure, there are long periods where the Indexes essentially perform in line with the benchmarks, but overall the factors contribute positively on a consistent basis. The very high information ratios evidence the level and consistency of excess returns.

Table 4: Envestnet Factor-Enhanced Index Series | Summary Statistics (12/31/1996 – 12/31/2014)

	FEI Large Cap	FEI Small Cap	FEI All Cap
Annualized Return	12.4%	13.7%	12.6%
Parent Index	8.0%	8.3%	8.0%
Annualized Std. Deviation	17.8%	20.9%	18.3%
Parent Index	15.8%	20.5%	16.0%
Annualized Excess Return	4.3%	5.0%	4.6%
Sharpe Ratio	0.75	0.72	0.74
Parent Index	0.57	0.49	0.57
Tracking Error	5.3%	4.1%	5.8%
Information Ratio	0.82	1.22	0.80

Source: Russell, Envestnet

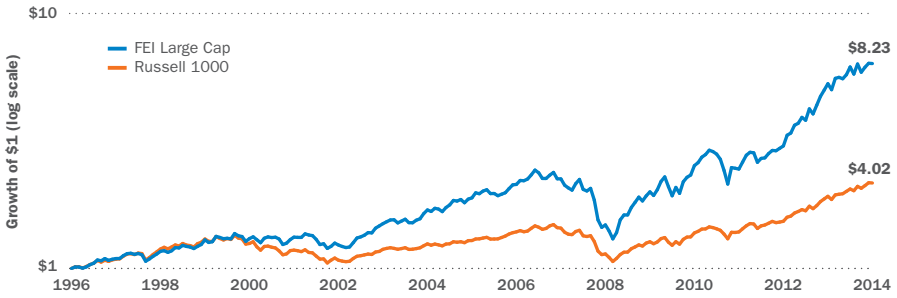
[3] The rebalancing dates were not chosen arbitrarily. A significant body of research has documented the so-called "January effect," a seasonal anomaly where stocks earn higher returns than in any other month (see, e.g., Rozeff and Kinney (1976) and Thaler (1987)). There is also evidence that the value premium earns higher returns in January as well. By rebalancing the indexes on December 31, we are able to better position the indexes to benefit from these anomalies.

Table 5: Correlation of Monthly Excess Returns (12/31/1996 – 12/31/2014) of Value and Volatility-Adjusted Momentum Factors

	FEI Large Cap	FEI Small Cap	FEI All Cap
FEI Large Cap	-0.13		
FEI Small Cap		-0.51	
FEI All Cap			0.17

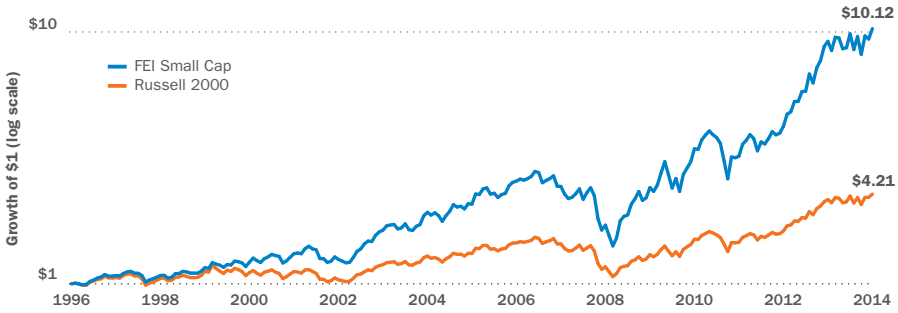
Source: Russell, Envestnet

Figure 2: Envestnet Factor-Enhanced Large Cap Index | Growth of $1 (12/31/96 – 12/31/14)



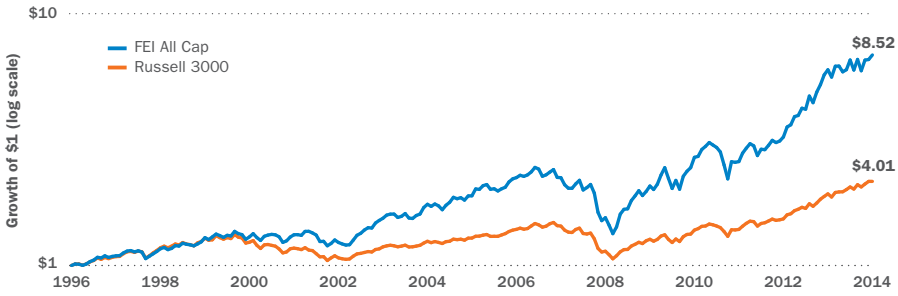
Source: Russell, Envestnet

Figure 3: Envestnet Factor-Enhanced Small Cap Index | Growth of $1 (12/31/96 – 12/31/14)



Source: Russell, Envestnet

Figure 4: Envestnet Factor-Enhanced All Cap Index | Growth of $1 (12/31/96 – 12/31/14)



Source: Russell, Envestnet

Figure 5: Envestnet Factor-Enhanced Index Series | Calendar-Year Excess Returns (1997 – 2014)

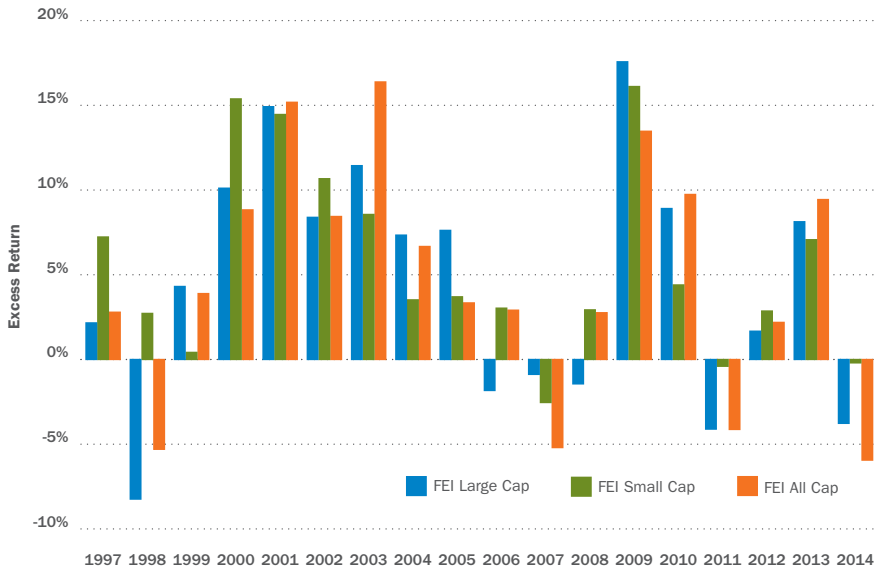
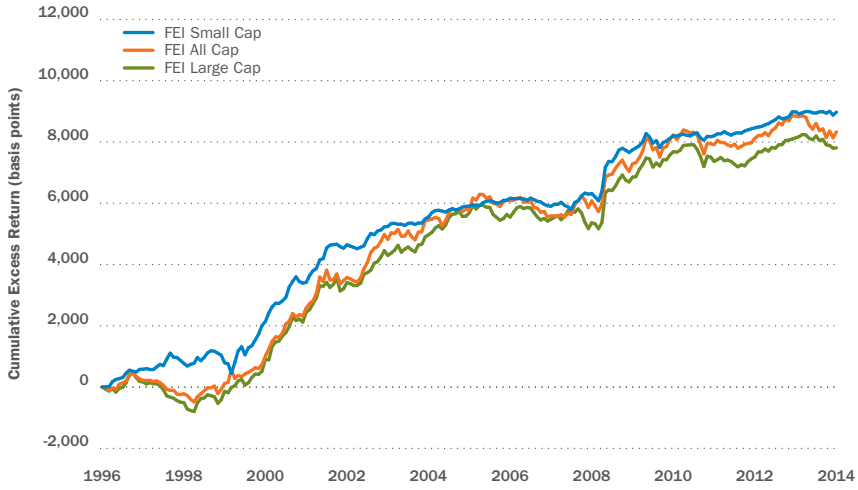


Figure 6: Envestnet Factor-Enhanced Index Series | Cumulative Monthly Excess Returns (12/31/96 – 12/31/14)



Source: Russell, Envestnet

The key contributor to the success of the overall strategy is the low—or negative—levels of correlation between the various factors (see Table 5). Each factor strategy on its own would generate excess returns, but the combination results in a classic case of diversification. Intuitively, value tends to perform well when momentum is out of favor, and conversely, when momentum is doing well valuation is less of a driving force.

While the strategy used to construct the Indexes has resulted in substantial excess returns and superior risk-adjusted performance historically, such performance may not be achievable on a prospective basis. There is still significant debate as to the reasons why the factors we have selected generate such anomalous results. While these factors have been known about and tested for decades, it is possible that if investors increasingly implement strategies designed to augment exposures to these factors, excess returns may decline or completely disappear. In addition, even though we have taken great care to minimize the effect of data snooping in the construction of the Indexes, there is a possibility of some type of inadvertent look-ahead bias. At the very least, it should be expected that there will be periods of significant length during which the Indexes will not generate material excess return relative to their respective parent index.

IV. Conclusion

Factor investing has become a viable and increasingly important approach to index and portfolio construction. Strategies that tilt exposures toward factors that are statistically and economically significant, persistent and sustainable can produce superior risk-adjusted performance through consistent excess returns. With the Envestnet Factor-Enhanced Index Series we attempt to systematically capture the excess returns associated with three of the most robust and widely researched factors—value, momentum and volatility. In doing so, we develop a proprietary multi-dimensional measure of value, as well as a modified measure of momentum which attempts to mitigate the adverse effects of so-called momentum crashes. Importantly, we combine these factors in a single index, providing investors a convenient benchmark of the most impactful exposures for various domestic market capitalization implementations.

Disclosure and authors' disclaimer

The contents and data made available for the Envestnet Factor-Enhanced Index Series performance charts, any stated index values, and other information is intended for illustrative and informational purposes only and is not intended to represent actual results that could be considered a recommendation of an investment or investment strategy a user could rely on to make an investment decision. The performance charts represent **hypothetical results** that are based on information over a defined period of time. The charts themselves attempt to follow a standardized and consistent methodology for performance reporting. While we believe the performance data is gathered from reliable sources, the information that generates charts and performance results, uses **historical data** that has not been audited and validated, and may contain errors in pricing or other conditions. Further, Envestnet relies on third-party content providers for market data and information as the basis for the calculations it generates. However, Envestnet cannot be held responsible for the accuracy and timeliness of the content provided. Note, the Envestnet Factor-Enhanced Index Series results are **hypothetical** and no actual money was invested.

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