Factor-Based Investing: Plain Talk

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Factor-based investing represents an extraordinarily effective and efficient approach to portfolio management. Unfortunately, trying to explain the approach in simple, accurate and understandable terms is a challenge. The subject is loaded with academic jargon and heavy statistical analysis.

In this paper, we will take on the challenge and attempt to deliver an understandable explanation of factor-based investing. In subsequent papers, we will describe the individual factors that the academic world has found useful in building investment portfolios.

What is a Factor?

> "Factors are the underlying drivers that influence and explain the way an investment behaves."
> *-Antonio Picca, Director of Vanguard Factor ETFs*

Investors have access to mountains of data about publicly traded stocks. Companies produce quarterly statements of income, cash flow and balance sheets, which are loaded into databases that reach into the distant past. A company's stock and bond prices are also important historical data. From this wealth of numerical information, investment professionals and academic researchers engage in exhaustive studies attempting to identify objective characteristics that might predict future returns and risks of companies in the stock market. Any quantifiable characteristic is called a "factor".

Examples include:

- stock price to net earnings ratios (P/E)
- gross profits divided by total assets (gross profitability)
- stock price change over the past 12 months (momentum)

Researching Factors

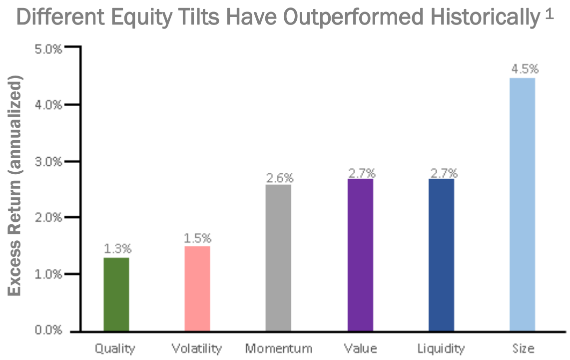
How do we know if a factor is valuable for building investment portfolios?

Let's look at a simplified example of the process. First, researchers pick the factor, the universe of stocks and the time period. In this example we will use P/E, S&P 500, and 1965 to 2017, respectively. *[For reference, the S&P 500 is an index made up of the 500 largest public companies in the US.] T*hey calculate the P/E for each company in the S&P 500 on a given date each year and rank from best (lowest) value to most expensive companies based on the P/E ratios. The 500 stocks are then separated into 5 groups, the top 100, the next 100 and so on. The stock price performance of each stock and the five groups is recorded over the next 12 months. If the cheapest 100 stocks consistently outperformed the most expensive 100 stocks, the researchers may be on to something. If there is a statistically significant excess return associated with the low P/E stocks, they might have found a persistent (useful) factor, which can be used to predict return in the future.

This type of test has been done on thousands of factors. The research shows that most factors have no predictive power on future stock returns. However, a handful have been proven to provide statistically significant excess returns.

Persistent Winners

Through the years, academic research has identified the following factors that provide important predictors of return and risk in the stock market:



- **Value:** cheaper stocks beat more expensive stock
- **Size:** small capitalization stocks beat large caps
- **Momentum:** stocks that have outperformed recently tend to continue to outperform
- **Volatility:** stocks that have more consistent returns outperform volatile stocks
- **Quality/Profitability:** companies with higher profits outperform less profitable companies

While the long-term results are good, each factor exhibits long periods of performance that both beat and lag the market index. During extended periods of lagging performance, it is difficult for many to stick with the strategy despite the long-term performance advantage.

Smoothing the Ride

The factor returns noted above are not highly correlated with one another. This creates an attractive opportunity to combine two or more of these factors within a portfolio.

Low correlation of excess return can diversify active risk [2]

Correlation of monthly excess returns: 2002-2016

	Value	Quality	Volatility	Momentum	Size	Liquidity
Value						
Quality	-0.59					
Volatility	-0.38	0.49				
Momentum	-0.11	0.37	0.37			
Size	0.43	-0.3	-0.15	0.1		
Liquidity	0.57	-0.44	-0.13	0.08	0.63	

High: >0.7 Medium: 0.3-0.7 Low: <0.3

Sources: Vanguard Calculations, using data from Thompson Reuters Datastream, MSCI, Bloomberg, and FTSE

A correlation of 1.0 indicates the factors' returns move in perfect lockstep, whereas a correlation of -1.0 would indicate a perfectly inverse relationship. As shown in the adjacent table, Value and Quality have a negative 0.59 correlation. This means that usually, when the value factor (portfolios emphasizing cheap stocks) is beating the market, the quality factor (portfolios emphasizing high relative profitability stocks) is usually lagging its normal performance and vice versa. Both beat the market over time, so using both in a portfolio should lead to good returns in the long run but with more consistency in year to year returns because of their offsetting behavior. Thus, the combination of useful factors in a "multi-factor" approach can offer a smoother ride and better solutions than reliance on a single factor.

Summary

1. Factors are quantifiable characteristics (valuation, profitability, momentum, etc.)
2. An elite subgroup of ~6 factors are persistent and effective predictors of future risk and return
3. When existing market indexes such as the S&P 500 are reranked by any these six factors the result is excess return or muted risk relative to the market original market index.
4. A Multi-Factor approach should provide a smoother ride year over year for investors, due to the reduced correlation between factors

1. Douglas Grim, Scott Pappas, Ravi Tolani, and Savas Kesidis, Equity factor-based investing: A practitioner's guide (June 2016), Page 5
Note: Excess returns are calculated relative to the MSCI World Total Return Index (USD). All results are as of September 30, 2016

2. Douglas Grim, Scott Pappas, Ravi Tolani, and Savas Kesidis, *Equity factor-based investing: A practitioner's guide* (June 2016), Page 12
Note: Data cover 12/31/2001 through 9/30/2016. Excess returns are calculated relative to the MSCI World Total Return Index (USD)