

## A Third Way: The Genesis of Multi-Factor Investing

- *The Capital Asset Pricing Model (CAPM) was proposed in 1964, and was the first market model that attempted to describe the process that drives equity returns. Under CAPM, the expected return of a stock is determined by a single factor, the market return.*
- *By the 1980s, empirical evidence was accumulating that investment strategies biased towards small-cap and value securities might generate higher returns over the long term than predicted by CAPM, both in the US and abroad.*
- *In 1992, Fama and French proposed the Three-Factor Model, which explained historical US market returns more accurately than CAPM, by using three factors –market, size, and value. This model demonstrated that investors would be well compensated for adding factor tilts to small and value stocks to the single-factor market strategy.*

I recently kicked off a series of articles to explain, from the ground up, the theory and practice of quantitative multi-factor investing, an investment style that I believe has distinct advantages over both passive indexing and active management (I invite readers to review the initial posting, [A Third Way: Quantitative Multi-Factor Investing Explained](#)). In this second installment in the series, I will briefly trace some of the early history and evolution of what I have called a third way of investing.

### From One to Multiple Factors

Assuming they were listening in class, all students of modern financial theory will be familiar with the Capital Asset Pricing Model (CAPM), which was formulated and described in an article published in 1964 by William Sharpe. CAPM, or the market model, was the first attempt to describe the process that drives equity returns, and assumes that all explainable variation in asset returns is related to a single factor, the market return. Under CAPM, the expected return of a stock is the sum of the risk-free rate (for which a proxy such as T-bills is used) and a premium for bearing the stock market's risk<sup>[1]</sup>. Historically (from January 1926 to August 2015), the so-called equity risk premium has been 6.6% (Source: Bloomberg).

In this model, beta ( $\beta$ ) measures a security's risk, or volatility, in relation to the overall market. Thus, a stock with a beta greater than 1 (the market average) should earn a higher excess return than the market but with higher volatility. In effect, under CAPM a security's expected return is determined simply by its beta relative to the market. But this single-factor model idea—where expected return is a linear function of the risk factor of equity beta—was fairly quickly debunked with the rise of multi-factor models and the availability of much more data on the behavior of security prices.

The first multi-factor model was the Arbitrage Pricing Theory (APT), proposed in 1976<sup>[2]</sup> by Stephen A. Ross, a finance professor at MIT. APT asserted that there are multiple sources of priced risk (i.e., risks for which investors expect to be compensated for bearing risk), and not just the single market risk, that explain security returns (the term "arbitrage" is used to denote that these risk factors cannot be arbitrated, or diversified away). Ross' theory did not specify which factors to use, but examples include both economic factors (e.g., surprises in macroeconomic variables such as inflation, interest rates and economic growth that help to explain equity returns)

and stock-specific, or fundamental, factors, which are characteristics of companies (such as book-to-price ratios or leverage) that help to explain cross-sectional differences in stock prices.<sup>[3]</sup>

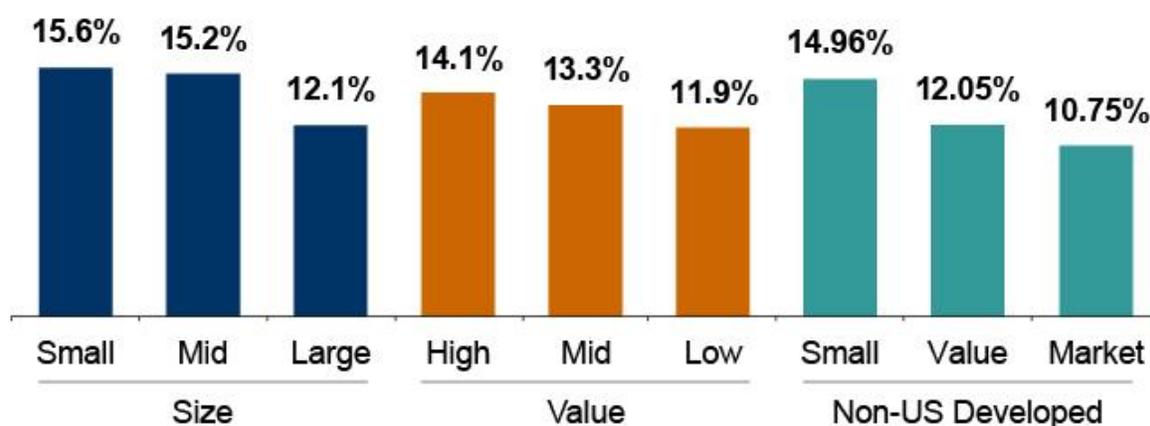
### The Three-Factor Model

A great conceptual breakthrough in multi-factor investing came in 1992, when Eugene Fama and Kenneth French published a landmark paper<sup>[4]</sup> proposing their so-called three-factor model to explain US equity market returns. Fama and French suggested that three factors (or styles)—market, size, and value—and not just one (the equity market factor), explained historical market returns more accurately than simply CAPM theory. By size, we mean small-capitalization stocks vs. large-cap stocks (SMB, or small minus big, to measure the premium for small-cap stocks); and by value (HML, or high book-to-market minus low book-to-market portfolios), we're comparing value to growth.

Interestingly, by the 1980s empirical evidence was accumulating that, in the US and elsewhere, investment strategies biased towards small-cap and value securities might generate higher returns over the long term than predicted by CAPM. In 1981, Rolf Banz published a paper on the size premium<sup>[5]</sup>; and value-investing pioneer Ben Graham had been extolling the virtues of investing in stocks with very low prices relative to fundamentals (i.e., the value premium) at least as far back as 1934, when he co-authored (with David Dodd) the classic text *Security Analysis* in the teeth of the Depression. The Fama-French model demonstrated that investors would be well compensated for adding factor tilts to small and value stocks to the single-factor market strategy. Exhibit 1 illustrates the size and value premiums during the past 40 years in the US and international-developed markets.

### Exhibit 1: Historical Factor Performance and Premiums

Monthly Data from Jan. 1, 1975 – Dec. 31, 2014



Sources: Fama/French, Dimensional, MSCI, Gerstein Fisher Research

Average compound annual returns (%) in US dollars. Indices are not available for direct investment. Their performance does not reflect the expenses associated with the management of an actual portfolio. Past performance is not a guarantee of future results. US portfolios are based on CRSP market portfolios divided into bottom 30%, middle 40%, and top 30% segments for respective factors and calculated on a value-weighted basis. Non-US Developed returns for small, value, and market are represented by Dimensional International Small Cap Index, MSCI EAFE Value Index, and MSCI EAFE Index, respectively.

## Conclusion

Factor-based investment theory has come a long way from the 1960s days of CAPM. Since Fama and French proposed their three-factor model in the early 1990s, academics have uncovered a number of other factors that help to explain security returns. Drawing on this research, quantitative multi-factor investing has become more and more broadly adopted by investment practitioners. In my next posting in this series, I will discuss several important factors uncovered by more recent research, including momentum.

[1] The CAPM formula is  $E(R) = RFR + \beta[E(R \text{ Market}) - RFR]$ , where  $E(R)$  is expected return,  $RFR$  is the risk-free rate, and  $[E(R \text{ Market}) - RFR]$  is the expected excess return of the market. [2] The Arbitrage Theory of Capital Asset Pricing, Stephen A. Ross, *Journal of Economic Theory*, December 1976. [3] The APT formula is:  $E(R) = RFR + \beta_1 f_1 + \beta_2 f_2 + \dots + \beta_n f_n$ , where  $\beta_n$  is the sensitivity of the asset to factor 'n' and  $f_n$  is the return of factor 'n'. [4] The Cross-Section of Expected Stock Returns, Eugene F. Fama and Kenneth R. French, *Journal of Finance*, June 1992. [5] The Relationship Between Return and Market Value of Common Stocks, Rolf W. Banz, *Journal of Financial Economics*, 1981.

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