



Swedroe: Improving On Fama-French

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First there was the Fama-French three-factor model, then four factors. How about a fifth?

In 1993, the Fama-French three-factor (beta, size and value) model replaced the single-factor capital asset pricing model (CAPM) and became the standard model in finance, explaining more than 90 percent of the variation of returns of diversified portfolios.

While the model was a big improvement over the CAPM, it couldn't explain some major anomalies. In 1997, Mark Carhart augmented the three-factor model with a fourth factor: momentum. By addressing one of the biggest anomalies, the momentum factor made a large contribution to the explanatory power of the factor model.

The four-factor model has been the workhorse model since.

But like all models, even the four-factor model had problems—there were many

anomalies that it couldn't explain. Kewei Hou, Chen Xue and Lu Zhang, authors of the September 2012 study, "[Digesting Anomalies: An Investment Approach](#)," proposed a new four-factor model that goes a long way toward explaining many of the anomalies that neither the Fama-French three-factor nor the four-factor models explain. They called it the q -factor model. The four factors are:

- The market excess return (beta)
- The difference between the return on a portfolio of small-cap stocks and the return on a portfolio of large-cap stocks
- The difference between the return on a portfolio of low-investment stocks and the return on a portfolio of high-investment stocks. Note that the investment factor is highly correlated with the value premium, suggesting that this factor plays a similar role to that of the value factor.
- The difference between the return on a portfolio of high return on equity stocks and the return on a portfolio of low return on equity stocks. Note that the profitability factor has a high correlation with the momentum factor, meaning it would play a similar role to the momentum factor in analyzing performance.

Among their important findings was that the investment and profitability (return on equity) factors are almost totally uncorrelated, meaning that they are independent, or unique, factors.

Professors Fama and French, in a June 2013 paper, "[A Five-Factor Asset Pricing Model](#)," took a close look at the new model, to see if these new factors—investment and profitability—added explanatory power. In other words, if they knew in 1993 what they know today, which model would they have chosen? The following is a summary of their findings:

- While a five-factor (beta, size, value, profitability and investment) doesn't fully explain the cross section of returns (there are still anomalies), it provides a good description of average returns.

- The model's main problem is its failure to explain the low average returns on small stocks that invest a lot despite low profitability. (Note that the Fama-French three-factor model has a problem explaining the poor performance of small growth stocks.)
- The performance of the model is not sensitive to the specifics of the way its factors are defined.
- A four-factor model that excludes the value factor (what is referred to as "HML," or the return of high book-to-market stocks minus the return of low book-to-market stocks) captures average returns as well as any other four-factor model considered.
- A five-factor model (including HML) doesn't improve the description of average returns from the four-factor model. The reason is that average HML return is captured by the exposures of HML to other factors. Thus, in the five-factor model, HML is redundant for explaining average returns, but may have value in other ways.