# Bickford Investment Management Services

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# Fama/French Three Factor Model

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*This article discusses the Fama/French Three-Factor Model
and its importance to serious investors without complicated formulas.*

**Abstract:**  The Fama/French model shows that value stocks have provided much better return than growth stocks and that small stocks have provided much better return than large stocks over time and around the world.  By intelligent application of the model when building a diversified portfolio, investors can achieve improved expected returns with low volatility risk, resulting in a much better risk/reward position.

## Understanding the Research

Along the horizontal axis in Figure 1 is the company type.  These are sorted from growth through neutral to value.  Growth companies for this discussion are companies who's stock price is high relative to their book value per share (book value is the accounting term approximating "replacement cost").  Value companies' stock prices are low compared to their book value.

On the vertical axis is company size, with the smallest companies in the top row of the chart and the largest companies in the bottom row.

The number Inside each box is the historical annual return *beyond riskless treasury bills* of all companies with that size and value characteristic (sorted each year) from 1963 to 2002.  Note that small companies (the upper area of the chart) have provided much higher returns (darker green) than large companies (lower area).  Similarly, value companies (right side of the chart) have provided much better returns than growth companies (left side).

**Return in excess of what T-bills delivered (1963-2002)  Percent per year**

*Low (Book Value)/(Stock Market Value)*          *High (Book Value)/(Stock Market Value)*

| Company size | Growth | Growth-like | Neutral | Value-like | Value |
|---|---|---|---|---|---|
| Smallest | 1.7 | 8.4 | 9.4 | 11.9 | 12.8 |
| Small | 3.7 | 6.8 | 10.0 | 10.7 | 11.2 |
| Medium | 4.0 | 7.8 | 7.9 | 9.5 | 11.3 |
| Big | 5.5 | 5.3 | 7.6 | 9.1 | 10.2 |
| Biggest | 4.7 | 5.0 | 5.5 | 6.7 | 6.2 |

Data provided by Eugene Fama DFA Conference 2003

**Figure 1**

In reviewing the research, we find that there is a nearly linear and independent relationship between these company characteristics and their historical return.

When Professors Eugene Fama, and Kenneth French originally published these results, the modern finance community received it with some skepticism. This is typical of any new theory or data that almost totally dismisses the currently accepted model. There were complaints that perhaps the results were only characteristic of the 1964 to 1990 (originally published) time frame. More recently, graduate student Jim Davis began to work with Fama and French to extend the study back to 1927. He obtained the same results over the longer time period. One additional criticism was that the study may only describe a US-based characteristic. When international equities were examined, the same results held true. At this point in time, the Fama/French three factor model is generally accepted and is taught in all of the top US business schools.

## What we learn from the research

This model can be used by serious investors to construct a better investment portfolio. By plotting a potential mutual fund's weighted average size and value characteristics on the table (or more precisely by running it through the three-factor model equation), one can obtain the "expected" return of the fund. Constructing a portfolio with investments that have greater size and value tilts (into the dark green region of the chart) as a part of a balanced portfolio results in greater portfolio expected returns.

We generally wouldn't want to put all of our investments in the upper right green box because our portfolio would be extremely risky and would therefore have a poor risk/reward ratio. To minimize risk and optimize the risk/reward ratio, extremely broad and international diversification is necessary. By building a stock portfolio out of individually high return risky bets we can achieve the desired goal of a portfolio with high expected return and low volatility risk.

## How to implement a portfolio based on the findings

As I have discussed with many clients, actively managed stock funds have predictably high expenses and tax consequences along with statistically random future performance. This is why we prefer index funds and other low-cost passively managed funds for our portfolios. It is also difficult to find actively managed funds that have precise and consistent exposure to our desired value and size factors for portfolio construction.

Index funds are the do-it-yourself investor's best choice for stock portfolio construction. They have predictably low expenses and tax burden. Unfortunately though, deep value exposure is not currently available with index funds. This is because index funds in general have growth-like stock compositions.

Most index funds are capitalization weighted. This means that large companies (such as General Electric) carry a greater percentage of the index than smaller companies (such as American Greetings). Because growth companies on average have higher stock prices and higher stock market values than value companies, they compose a larger percentage of a typical index. Similarly, the beaten down current prices of value companies means that they will carry a smaller percentage weighting in a capitalization weighted index.

Vanguard, who is the undisputed leader in index funds, does have large and small value index funds. However, because they are capitalization weighted, these are actually growth-like value funds. As such, they are not placed in the far-right (darkest green) value column in the model.

Presently, the only provider of deep-value passively managed funds is Dimensional Fund Advisors (DFA). Their funds are much farther to the right (deepest green) on the chart. In addition, they offer small and value foreign funds which are excellent for diversifying a US stock portfolio with uncorrelated and high-expected return investments. DFA is presently the only provider of passively managed funds with these characteristics.

For estimating future return, we use the longest running three-factor model data to extrapolate from.  For US stocks, this data goes back to 1927 and for international stocks, it goes back to 1975.  Based on this data, we can plot the expected future return of some DFA passive and Vanguard index funds.  This plot is shown in Figure 2.  Notice that except for US Large growth, DFA's funds have significantly higher three-factor expected returns.  In both cases, US large growth is represented by an S&P 500 index fund and are therefore equivalent.
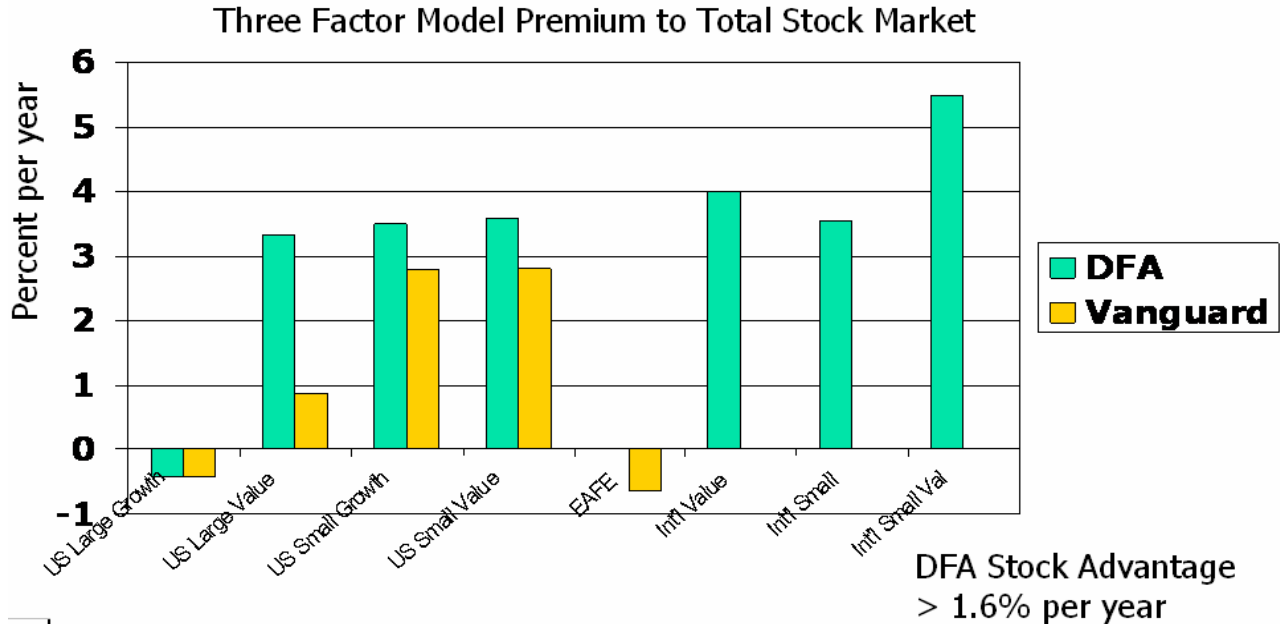


**Figure 2**

Due to the higher expected returns discussed here, a large percentage of our personal and client portfolios are invested in various DFA funds at this time.  Unfortunately for the do-it-yourself investor, DFA funds are only offered to institutional investors and through some fee-only (no-commission) investment advisors.

## Historical Portfolio Performance

Figure 3 shows the historical performance of broadly diversified DFA portfolios* with different stock/bond mixes and compares it to the total return of the S%P 500 index from January 1973 through November 30, 2003.  Note that the broadly diversified DFA portfolio with 40% stocks and 60% bonds (yellow line) would have actually beaten a 100% S&P 500 stock portfolio (magenta) with much lower volatility.
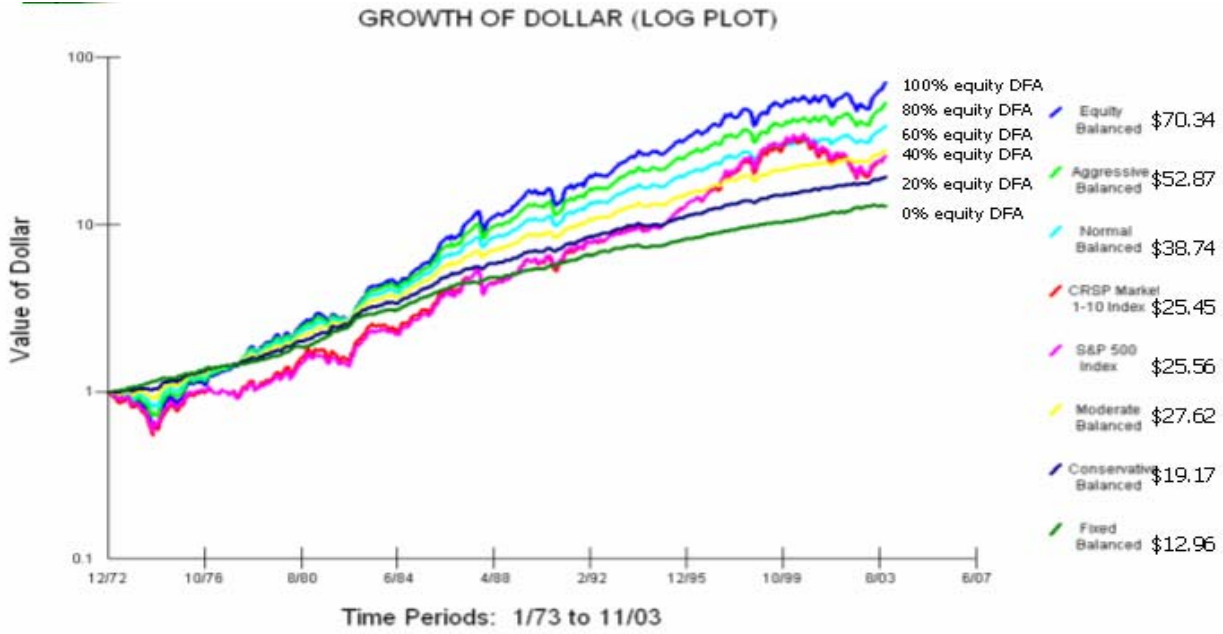
**Figure 3**

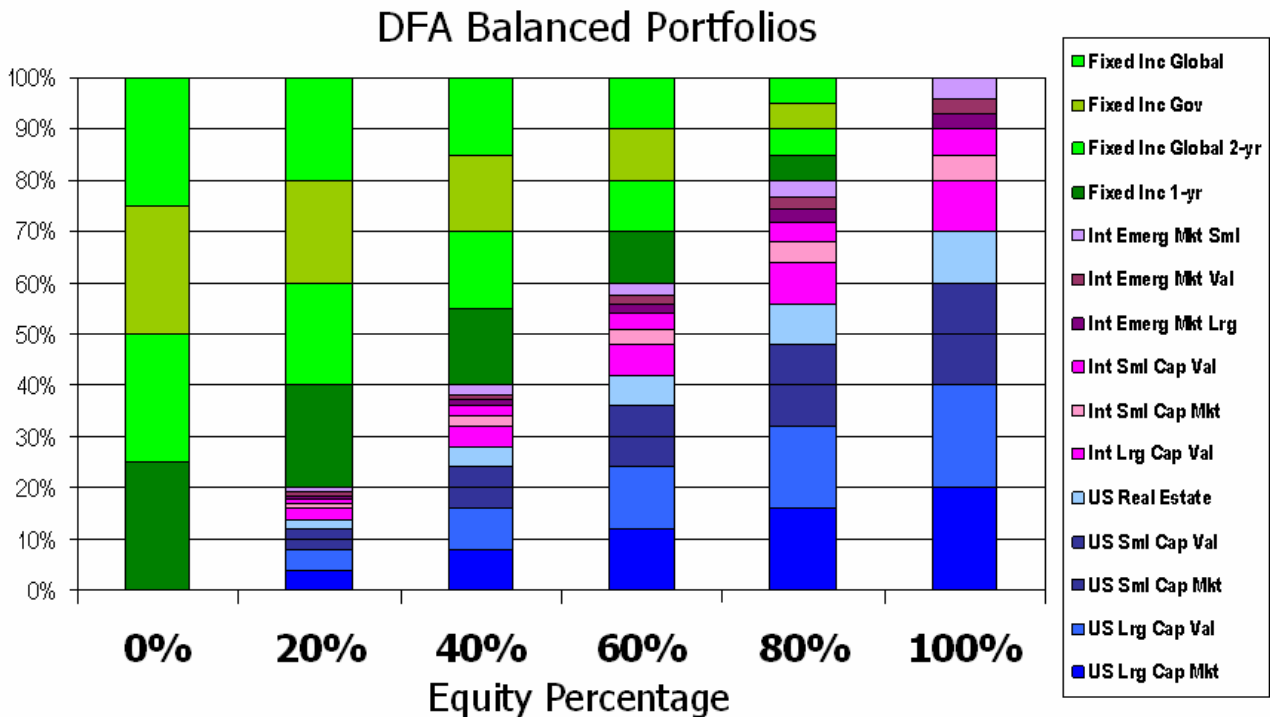The composition of the different DFA portfolios from Figure 3 is shown in Figure 4.



**Figure 4**

## Conclusions

Value stocks have provided much better return than growth stocks and that small stocks have provided much better return than large stocks over time and around the world.  By intelligent application of the model when building a diversified portfolio, improved expected returns can be achieved with low volatility risk, resulting in a much better risk/reward position than can be achieved without the model.  By intelligently constructing a stock portfolio out of individually high-return risky bets we can achieve the desired goal of a portfolio with high expected return and low volatility risk.

*Bickford Investment provides clients with intelligent investment portfolio construction*
*and management through DFA and other investment vehicles*
*at less than half the fees charged by the average investment advisor.*

\* DFA Simulation of passively managed portfolios prior to fund's inceptions.