Why DFA’s New Research is Flawed
By Michael Edesess
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*DFA was provided with an advance copy of this article and chose not to respond to it

Dimensional Fund Advisors (DFA) is a company with a laudable history, founded on solid principles and a valuable product concept. From its launch, the investment firm identified and filled a need at low cost to the client, based on elementary but sound theory and simple, compelling, transparent empirical research. It later increased its value to clients by pioneering passive trading strategies. I admire its founders and their accomplishments.

But I am afraid the company has succumbed to a dreadful descent into scientism.

The famed Austrian economist Friedrich Hayek defined scientism as “slavish imitation of the method and language of science” when applied to the social sciences such as economics. Scientism takes on the trappings of science without its depth or rigor.

DFA recently advocated for tilting an equity portfolio toward companies with higher profitability. The company’s argument begins with a spurious pseudo-mathematical “derivation” of a reason why companies with higher profitability should have higher expected returns. It then, without further ado, enshrines the results of this deeply flawed analysis into theory, using phrases such as “financial economics shows that...,” as if the principle were an integral part of a long-standing and thoroughly proven theoretical framework. DFA provides historical evidence for the relationship that is poorly presented and looks suspicious. Then, without further discussion or explanation, the company simply extrapolates the results found in historical returns to become “expected returns” – all the while displaying with each exhibit the obligatory statement: “Past performance is no guarantee of future results.”

I will first provide a brief sketch of DFA’s history and legacy. Then I will explain exactly what is wrong with DFA’s reasoning for its latest strategy. Last, I will speculate on how a fine company that has hired the top graduates of top universities could fall into such a slough of error. My speculation applies more broadly, unfortunately, to what I see as rampant developments in the financial industry as a whole.

The DFA legacy

In the late 1960s and early 1970s, academics and graduates of economics and finance programs began to realize that according to theory, the most efficient investment portfolio would mirror the entire market for liquid securities.
This realization launched several efforts to create “index funds” of stocks that would mimic a cross-section of the whole equity market. Those efforts involved some of the original leading-edge principals, co-founders and supporters of DFA, including Rex Sinquefield, David Booth, John McQuown and Eugene Fama.

The first index funds were too small to mirror the whole equity market. To include smaller companies in the same proportions as in the market portfolio, it would be necessary to buy less than a single share in some cases.

The solution was to mirror only the larger companies, the ones in the S&P 500 index. Thus, the S&P 500 index fund was born, and it became popular among pension funds.

DFA’s founders, Booth and Sinquefield, pointed out that holding an S&P 500 index fund did not reflect the entire U.S. domestic market for equities. According to theory, it was therefore not ideally diversified. Furthermore, small stocks had performed far better than large stocks over a 50-year history. Booth and Sinquefield built DFA to provide a small-stock index fund with a low expense ratio, which could supplement the index fund portfolios of pension funds. However, their fund required a high minimum investment of $250,000.

DFA later made a valuable addition to its strategy by recognizing that even while investing in a fund that replicated the market, it was not strictly necessary to adhere precisely to market weights. Hence, instead of trading aggressively to restore market weightings immediately whenever the fund’s market-mirror grew a little blurry, the fund could wait passively. This strategy turned out to add a surprisingly large number of basis points to DFA’s performance.

A little more than 10 years ago, a group of financial advisors approached DFA asking if they could gain access to DFA’s index funds by aggregating their clients’ portfolios to meet the required minimum investment of $250,000. DFA, after considering this carefully, decided to vet certain advisors who would be allowed access to their funds. The result was rocketing growth in DFA’s assets under management, which now approach $300 billion.

DFA is now a large company. It hired top marketing professionals and an array of PhDs and other top talent from the finest universities. This, as we shall see, may have been its downfall.

**A Parable: Bonds have a higher expected return than stocks**

I posit that the expected return on bonds is greater than the expected return on stocks. Here is my reasoning:
A discount model shows that the current price of a security is equal to its expected future income stream discounted to the present by its expected return. Hence, holding the security’s price constant, the greater the expected income stream the greater the expected return. Bonds produce more income than stocks. Therefore they have a higher expected return.

The empirical data confirm this theoretical result. Bonds have outperformed stocks in the last 40 years. A regression of monthly bond returns against equity returns in the past 40 years shows a large and statistically significant positive alpha for bonds.

All of these things are true. Therefore, the expected return on bonds is higher than the expected return on stocks.

What is wrong with this?

There are two key errors made in the parable above that lead to the incorrect conclusion.

The problem lies in the statement, “holding the security’s price constant, the greater the expected income stream the greater the expected return.” This is true. However, in the real world, the security’s price does not remain constant when the income stream increases – it increases. So though the statement is formally true, it has no application to the real world.

The statement was used to justify the empirical analysis and conclusion that followed. An empirical analysis does indeed show that long-term bond returns over a recent 40-year period have exceeded equity returns, and it is certainly true that a regression of monthly bond returns against equity returns will show a highly positive and statistically significant alpha for bonds.

But does that mean that expected returns for bonds are higher than for stocks? Of course not. Bond returns were higher than stock returns in the last 40 years for reasons that cannot be extrapolated into the future — namely, the decline in interest rates.

How the DFA argument is flawed

In a series of proprietary papers provided to Advisor Perspectives by DFA, DFA argues that profitability is a “dimension” of expected return that should be included in portfolio design. That is, DFA believes that portfolios should “tilt” toward companies with higher profitability. DFA’s portfolios already tilt toward higher book-to-market ratio and lower capitalization stocks. “Profitability” is approximately the ratio of net income to book value, though DFA develops a similar measure it calls “direct profitability” that it argues is more
appropriate for the purpose. (DFA is not alone in this strategy – AQR has also launched funds that tilt toward profitability.)

DFA’s argument begins with a very brief paper in its first-quarter 2013 Quarterly Institutional Review by Eugene Fama and Ken French. (The same argument forms the introduction to a longer paper by Fama and French that is available on the web.) This paper presents the theoretical argument for why higher profitability should be associated with higher expected return.

Perhaps because the paper’s argument is centered on mathematical formulas, the vast majority of readers will not scrutinize it seriously and will take its conclusions as a given. However, the argument is just as spurious as my argument for bonds’ expected return being higher than stocks’. After presenting a discount model formula, Fama and French write: “Suppose we fix the price $M_t$ and the values of everything else in equation (3) except for expected future earnings and the discount rate (the expected stock return). Then the equation tells us that higher expected future earnings imply higher expected stock returns. This is the motivation for tests of a positive relation between expected stock returns and expected profitability.”

Of course, just as the price of a bond or stock changes as the expected income stream changes, the price in Fama and French’s model cannot be fixed – not in the real world – as expected future earnings change. Nevertheless, they present this as motivation for tests of the relationship.

Now, one can argue that any motivation for an empirical study, no matter how flimsy, is acceptable if it turns out that the empirical study reveals an important truth. But the motivation presented by Fama and French is not treated in the subsequent research as being flimsy. For example, in the next paper in the same Quarterly Institutional Review, titled Expected Profitability: A New Dimension of Expected Returns, the authors repeatedly refer to Fama and French’s result as “financial economics,” as in, “financial economics suggests…” and “financial economics shows…”

But “financial economics” is nothing but playing around with formulas. If Fama and French’s result is considered financial economics, that should tell us something about how rigorous a field financial economics is.

The authors of this second paper, Gerard O’Reilly, DFA’s head of research, and Savina Rizova, a vice president, form historical portfolios of stocks with high profitability and portfolios with low profitability. Their study finds differences in return between the portfolios of around 5% between 1975 and 2012, with lower standard deviations for the high-profitability portfolios. This, presumably, is their confirmation of the “financial economics” derived from theoretical considerations by Fama and French.
My eyes popped open at seeing these results. Five percent better performance of one portfolio over another over a 38-year period? However, in another article by Jay D. Franklin and Mark Hebner of Index Fund Advisors, an advisory firm that uses DFA funds, they show a premium for the high-profitability portfolio of only about half a percent. Their numbers turn out to be the same as the numbers in two subsequent papers by O’Reilly and Rizova in DFA’s Quarterly Institutional Review.

Then what are the numbers in the table in the first DFA paper? O’Reilly’s and Rizova’s explanation of the tables in which they present their results is lacking in clarity and details.

Furthermore, the paper leaps from finding that high-profitability portfolios historically outperform to stating that these portfolios have higher expected returns without a single note of explanation or analysis. If the result had been, per my earlier parable, that bonds had outperformed stocks in the past 40 years, there would surely have been some discussion – beyond the mere presentation of historical data – before extrapolating that historical result into the future. Why no such discussion in DFA’s papers?

There is more wrong with DFA’s analyses. For example, the company justifies using current profitability as a proxy for the entire future profitability stream on the grounds that current profitability correlates with future profitability. It’s no surprise that current profitability correlates with profitability in a few subsequent years, but that doesn’t necessarily make it a good proxy for the entire future profitability stream.

**How does this happen?**

Whenever I encounter this kind of pseudoscience in the financial field, I wonder all over again how on earth this could happen. O’Reilly and Rizova have undergraduate and PhD degrees from top universities. Fama and French are respected academics. How can they come up with such poorly constructed and poorly presented nonsense?

I admit this is wildly speculative, but here is my psychosocial explanation based on a little personal experience with the phenomenon together with a hefty dose of popular homegrown psychology:

People regarded as gurus can become cynical about that appellation – especially if it is for work they possibly do not believe deserves being so elevated. (In Fama-French’s 1992 article on the three-factor model, often regarded as a landmark, they write that their results “are not economically satisfying.”) It becomes too easy for anything they say to be regarded as gospel, and results in their work become less subject to important outside criticism, especially when their new work builds upon their now-accepted prior work.
Meanwhile, newly minted PhDs are excited to find themselves hired for high-paying jobs by a firm with the finest reputation for financial science. They are brought within touching distance of the top gurus in the whole industry. They may sniff something wrong with the gurus’ work, but they think it must be right because they are gurus, and they set out to follow in their footsteps. Feeling a little shaky nonetheless about the whole enterprise, they resort to fuzziness in their writing and their presentations. They find that this fuzziness and lack of clarity is actually beneficial, because their audiences assume that these PhDs are on a higher level and presenting technically sophisticated information. This impresses customers.

Pardon my cynicism – if that’s what it is – but something is seriously wrong here. The facade of science that the industry presents – of which DFA is only one example – is nothing more than that, a facade, and an especially transparent one at that.

I don’t know what the denouement of this sad story will be, but I am afraid we have seen a foretaste of it already. In the run-up to the 2007-2009 financial crisis, inappropriate and poorly applied mathematical models substituted for good judgment. Let us pray that we can find a solution before a worse crisis occurs.

DFA’s justifications for its portfolio tilts toward small stocks and value and now toward profitability are presented as the results of scientific findings. But they are all extrapolations of past results into the future. At least one of these tilts – toward small stocks – has already proved questionable, as I have previously shown. Past outperformance of an investment strategy has almost invariably been shown to be an unreliable indicator of future performance. Will we ever move beyond lip service to this ubiquitous warning?

DFA would have been on more solid theoretical and empirical ground if it had not departed from the precepts on which its earlier history was built. There, it rested on a solid foundation and was a pathbreaker. I have been and remain one of the company’s most ardent well-wishers, and hope that it can return to more sound, even if perhaps more modest, claims to greatness.

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