

Putting your Money where your Mouth is: Neoclassical and Behavioral Investment Management

This chapter explores one of the main divides in thinking about financial markets: do financial markets behave in a more or less efficient manner which would imply that excess returns are unachievable in the long run, or are there systematic and enduring deviations which can be exploited to provide superior returns? Some of the leading protagonists on both sides of this debate happen to be involved in professional asset management operations. The real-world performance of these operations is compared in terms of risk and return in order to provide a new perspective on the neoclassical vs. behavioral debate in finance.

3.1 INTRODUCTION

Two streams of thought dominate the thinking on how financial markets function. On the one hand there are those who adhere to some form of the Efficient Market Hypothesis: prices respond to available information and the resulting price is the best current estimate of the “right” price. The implication is that, in the long run, no excess returns can be made without taking on a corresponding risk; in other words, there are no persisting free lunches in financial markets. On the other hand there are those that believe that systematic and enduring deviations from market efficiency exist which can be exploited: the market can be beaten.

Both parties have extensive empirical support to back up their claims and counterarguments towards one another. Ironically, the abundance of data in financial markets and the ways to deal with those data (Lo & MacKinlay, 2001) are such that perfectly legitimate evidence can be found on both sides. Indeed, finance has always been proud of its empirical prowess: nowhere in economics are theories and models tested so thoroughly thanks to the prolific amount of data that the financial markets provide.

This chapter presents a different kind of empirical analysis. Deirdre McCloskey (1989) once posed what she labelled as “The American Question” to economists: “If you’re so smart, why ain’t you rich?” According to McCloskey, the one ultimate persuasive test for an economic theory claiming to predict the future is whether there is money to be made with it³⁹. For financial economics the obvious place to take that test is the financial market which has provided the input on which the various ideas about price information in such markets is based.

What follows is a comparison of the actual performance of a set of mutual funds from asset management firms with strong connections to leading academic figures in neoclassical and behavioral finance. The analysis presented here does not pretend to come to a final verdict on who’s right and who’s wrong with regard to market efficiency and asset pricing models. Actually, I believe both can be reconciled, which will be argued in the next chapter. Necessarily the sample only exists of four funds; meaningful comparisons with more funds was not achievable because of a lack of other comparable funds. Also, varying microfoundations and underlying ontological commitments of behavioral and neoclassical finance are not explored. Rather, it is an investigation of what difference, if any, in actual practice is observable, resulting from the two different approaches. In addition it might be possible to infer if there is any added value coming from strong academic pedigree.

39 “Making money” of course goes beyond financial markets: it applies to any economic idea which in some way produces profits.

There have been related studies. The investment professional Larry Swedroe published a short article in 2015 comparing the results of the same funds, solely focusing on returns. The analysis here is more elaborate and also focuses on risk, besides return. In 2008 Wright, Banerjee and Boney published an article called “Behavioral Finance: Are the disciples profiting from the doctrine?”, where they examine fourteen self-proclaimed behavioral funds. Their focus was not solely on performance but also on how much capital behaviorally inspired funds attract, compared to “regular” funds. In that way they hoped to be able to infer if behaviorally inspired investing really adds value or if the “behavioral” label helps to attract investment capital, i.e. that it has marketing value. The analysis here can be considered complementary to the study of Wright et al.

3.2 RESEARCH DESIGN

Involvement of economists in financial markets can be traced back to classical economists like Richard Cantillon and David Ricardo, running through Maynard Keynes and Irving Fisher (Raines & Leathers, 2000) to Fischer Black, Michael Jensen, Myron Scholes and Robert C. Merton. Ricardo started working as a stockbroker and did well in the bond markets while Cantillon was a banker and managed to make money on one of the most notorious investment disasters in history: the South Sea Bubble. Maynard Keynes, never one with a firm belief in the importance of financial markets and the efficient working of those markets, still was an active investor whose fortunes varied. Fisher, finally, was financially ruined by the Great Depression of the thirties (Blaug, 1997). Both Keynes and Fischer managed large funds for their universities.

Nowadays that is still the case: some of the main protagonists on both sides of the neoclassical-behavioral debate happen to be involved in professional investment management operations. 2013 Nobel laureate Eugene Fama, one of the fathers of the Efficient Market Hypothesis (Fama, 1965, 1970, 1998) and Kenneth French, who together with Fama has provided various ground-breaking contributions to asset pricing (Fama & French, 1992, 1993), sit on the board of Dimensional Fund Advisers (DFA) which as of June 30, 2018 manages \$582 billion in assets (September 30, 2010: \$187.9 billion in assets under management (AuM)). Affiliated at some point in one way or another have been Robert Merton, Myron Scholes, Merton Miller, George Constantinides, Roger Ibbotson and John Gould. All of these are or were amongst the most distinguished scholars in the field of finance (including three more Nobel laureates in Miller, Merton and Scholes), coming from institutions like the University of Chicago, Harvard, Stanford and Yale. DFA’s links to the University of Chicago, in particular its business school, are crystal clear. After an unprecedented donation of \$300

million by DFA co-founder and long-time executive David G. Booth, the business school was named after him: University of Chicago Booth School of Business.

DFA's investment philosophy can clearly be labelled neoclassical:

At Dimensional, our investment approach is based on a belief in markets. Rather than relying on futile forecasting or trying to outguess others, we draw information about expected returns from the market itself—letting the collective knowledge of its millions of buyers and sellers set security prices.

Letting markets do what they do best—drive information into prices—frees us to spend time where we believe we have an advantage, namely in how we interpret the research, how we design and manage portfolios, and how we service our clients. It means we take a less subjective, more systematic approach to investing—an approach we can implement consistently and investors can understand and stick with, even in challenging market environments.

The means by which this philosophy is implemented are multiple-factor models, based on a version of the multiple-factor models developed by Fama and French (e.g. 1992, 1996). The models can be regarded as a variation of William Sharpe's single factor Capital Asset Pricing Model (CAPM) (Sharpe 1964, but also Lintner, Treynor, Black)⁴⁰. Factors in addition to the CAPM beta, can be historic excess returns of smaller cap stocks over larger caps stocks and the historic excess returns of value stocks over growth stocks. Given its investment philosophy and investment process, it is no stretch to label DFA a neoclassical investment management firm.

Looking at the behavioral side of the spectrum provides interesting asset/investment management operations as well. 2017 Nobel laureate Richard Thaler, also from University of Chicago (though definitely not a Chicago School economist) and perhaps currently the best-known behavioral economist, is on the board of the firm he co-founded in 1993 and which bears his name: Fuller & Thaler Asset Management. Not only has Thaler been on the forefront of the behavioral challenge to the dominant paradigm of efficient markets academically (e.g. De Bondt & Thaler, 1984⁴¹, Barberis & Thaler, 2003) but he has also played a leading role in popularizing behavioral economics outside academic circles with his book "Nudge" (Thaler & Sunstein, 2008). Daniel Kahnemann from Princeton, 2002 Nobel laureate and the pioneering figure of behavioral economics together with Amos Tversky

40 Although one could argue that multifactor models are "less neoclassical" than CAPM because by adding factors apparently not all information was priced in in CAPM.

41 See also his "anomalies" series in the Journal of Economic Perspectives.

(Kahneman & Tversky, 1979), is on the board of Fuller & Thaler as well, while prominent behavioral economics and finance scholar Nicholas Barberis from Yale has been a member of the academic advisory panel. The firm has as of June 30 2018 in excess of \$9 billion in asset under management, having grown impressively (September 30, 2010: approximately \$1 billion in AuM). Its philosophy becomes quite clear on the webpage. On the front page it says:

Investors Make Mistakes. We Look For Them. At the individual stock level, we search for events that suggest investor misbehavior.

Founded in 1993, Fuller & Thaler Asset Management has pioneered the application of behavioral finance in investment management.

Primarily focused on U.S. small-cap equities, our strategies have historically delivered exceptional results. More importantly, our process differs significantly from traditional equity managers.

We believe our unique perspective and unconventional approach can provide meaningful diversification to our mutual fund and separate account clients.

More specifically Fuller & Thaler appears to look for investors' behavioral biases that may cause the market to overreact to old, negative information about a company and underreact to new, positive information. The premise is that markets frequently overreact and underreact (cf. Barberis, Shleifer and Vishny, 1998). Underreaction occurs when a positive event for an asset, such as an earnings surprise, is not immediately and fully priced in but rather gradually within a couple of months. In other words, positive news signals outperformance in the short term after the announcement. Overreaction is displayed in that companies that have made sequential negative announcements in the past tend to be undervalued while companies which have a good track record can be overvalued.

There is also LSV Asset Management where LSV is an acronym for Josef Lakonishok (University of Illinois at Urbana-Champaign), Andrei Shleifer (Harvard University) and Robert Vishny (University of Chicago). All three of them have been leading scholars, in particular with regard to behavioral finance (Lakonishok, Shleifer & Vishny, 1992, Shleifer & Vishny, 1997). LSV was founded in 1994 and currently manages approximately \$118 billion in assets under management (September 30, 2010: approximately \$59 billion in AuM). Lakonishok is still active in managing the funds while Shleifer and Vishny have retired from the firm. Here is what LSV states about itself:

The fundamental premise on which our investment philosophy is based is that superior long-term results can be achieved by systematically exploiting the judgmental biases and behavioral weaknesses that influence the decisions of many investors. These include: the tendency to extrapolate the past too far into the future, to wrongly equate a good company with a good investment irrespective of price, to ignore statistical evidence and to develop a “mindset” about a company.

LSV uses a quantitative investment model in what would be considered a bottom-up approach to choose out-of-favor (undervalued) stocks in the marketplace at the time of purchase and have potential for near-term appreciation. LSV believes that these out-of-favor securities will produce superior future returns if their future growth exceeds the market’s low expectations.

The competitive strength of this strategy is that it avoids introducing the process to any judgmental biases and behavioral weaknesses that often influence investment decisions.

LSV uses a proprietary asset pricing model but their investment process appears to have a lot in common with the strategy of Fuller & Thaler: looking for stocks that are undervalued because of a bad track record in the past and which haven’t reacted properly to more recent, more relevant good news. Given the stated investment philosophies and the implementation methods, both Fuller & Thaler and LSV can be regarded as behavioral investment management operations.

For both the “behavioral” and “neoclassical” funds it is assumed that actual investment operations are in accordance with their stated investment philosophies⁴².

3.3 DATA SETS

DFA, Fuller & Thaler and LSV all offer a range of varying products. For the purpose of this chapter only mutual funds have been considered for comparison.⁴³ That means that many of the products that are offered by these three firms are excluded. Mutual funds come in many guises: US only or international, small, mid and large caps, value versus growth orientation. For the purpose of this chapter the popular Morningstar methodology is the starting point. Morningstar classifies funds along two dimensions: size and nature of the investments made

42 While the cynical among us could be wary of this assumption, supervisors (and to some extent auditors) are supposed to check if business models match company statements.

43 A mutual fund is a professionally managed investment fund that pools money from many investors to purchase securities. These investors may be retail or institutional in nature.

by the fund. Size is differentiated in large, mid and small cap investments while for the nature of the investment a distinction between a value and growth orientation is made with a blend of both in between, resulting in nine possible categories. Only funds that fall in the same Morningstar category and thus seem comparable, have been examined.

That leaves two sets of comparisons between behavior-style mutual funds and neoclassical-style mutual funds. DFA's US Small Cap Value fund and Fuller & Thaler's Undiscovered Managers Behavioral Value Fund both fall in the category small cap/value⁴⁴. DFA's US Large Cap Value fund and LSV's Value Equity fund are both large cap/value types of funds. All these funds invest exclusively in American stocks. Table 1 shows some core characteristics of the funds like ticker symbol, size, turnover, category and associated expenses such as management fees and transaction costs⁴⁵:

Table 1. Fund characteristics

Fund	Ticker	Total assets	Expenses	Turnover	Category
DFA US Small Cap Value	DFSVX	\$ 16.2 billion	0.52 %	24.0 %	Small Value
F&T Undiscovered Managers Behavioral Value	UBVLX	\$ 6.0 billion	0.99 %	24.0 %	Small Value
DFA US Large Cap Value	DFLVX	\$ 31.2 billion	0.27 %	15.0 %	Large Value
LSV Value Equity	LSVEX	\$ 2.71 billion	0.66 %	15.0 %	Large Value

While all these funds have grown considerably over the years, looking at assets under management, the difference in the size of total assets between the DFA funds on the one hand and the F&T and LSV funds on the other hand is noticeable. This probably accounts at least partially for the differences in expenses between the funds: asset management is a business which displays economies of scale.

⁴⁴ Technically the Undiscovered Managers Behavioral Value Fund of Fuller & Thaler was offered by JP Morgan. F&T function as the sole subadvisor of these funds and can thus be regarded as responsible for the investment decisions.

⁴⁵ Data from Morningstar.

3.4 RATINGS & RETURNS

Comparison of performance should not be limited to looking solely at returns but should also include appraisal of the risk involved. Morningstar issues ratings to each mutual funds ranging from one to five stars, one being the worst and five stars being among the best. These rating are relative to the distribution of the performance of the whole population of funds within a category. The 10% of funds in each category with the highest risk-adjusted return receive five stars, the next 22.5% receive four stars, the middle 35% receive three stars, the next 22.5% receive two stars, and the bottom 10% receive one star. The star ratings take both return and risk into account. The basic concept is relatively straightforward: it assumes that investors have loss aversion and prefer steady returns above volatile ones, all else being equal. Ratings are computed for three, five and ten year periods. An overall rating is calculated using a (frontloaded) weighted average, taking into account the period of existence of the fund. Table 2 show the Morningstar ratings for the funds considered here⁴⁶:

Table 2. Morningstar ratings

Fund	Ticker	3-year	5-year	10-year	Overall
DFA US Small Cap Value	DFSVX	***	***	***	***
F&T Undiscovered Managers Behavioral Value	UBVLX	****	*****	*****	*****
DFA US Large Cap Value	DFLVX	****	****	***	****
LSV Value Equity	LSVEX	***	****	***	***

Most striking is the difference between the two small cap funds. The “behavioral” F&T small cap fund scores consistently excellent, while the “neoclassical” DFA small cap fund scores average ratings. Both large cap funds score average to slightly above average, with a slightly better rating for the “neoclassical” DFA fund over the “behavioral” LSV fund. With the exception of the “behavioral” F&T small cap fund, it would appear that funds that are heavily influenced by leading academics do not perform exceptionally well. Not bad, but also not great.

Having made those observations, there isn't yet very much to conclude with regard to how good or bad the neoclassical and behavioral approaches perform. In order to do so, the specific returns and various risk parameters have to be examined. One, three, five, ten and

⁴⁶ Data from Morningstar.

fifteen year returns are plotted below in tables 3 and 4 for the small cap value funds and large cap value funds⁴⁷. Returns from relevant benchmarks such as the Morningstar category, the Standard & Poor's 500 index (US large cap stocks) and the Russell 2000 index (US small cap stocks) are also included.

Table 3. Returns small cap value funds

Fund	Ticker	1-year	3-year	5-year	10-year	15-year
DFA US Small Cap Value	DFSVX	0.48 %	9.09 %	6.68 %	12.94 %	9.20 %
F&T Undiscovered Managers Behavioral Value	UBVLX	1.88 %	10.02 %	9.17 %	16.25 %	10.37 %
Benchmarks						
Category Small Value	SV	-0.26 %	8.84 %	5.83 %	11.99 %	8.35 %
S&P 500 index	SPX	10.13 %	13.13 %	11.95 %	13.81 %	8.97 %
Russell 2000 index	RUT	2.66 %	9.82 %	6.70 %	11.34 %	7.51 %

The returns clearly reflect the Morningstar ratings: outperformance by the “behavioral” F&T small cap fund, average performance by the “neoclassical” DFA small cap fund. Looking at returns it would appear we have a clear winner, which has also been able to consistently outperform the benchmarks.

For the large cap value funds the returns are given in table 4:

Table 4. Returns large cap value funds

Fund	Ticker	1-year	3-year	5-year	10-year	15-year
DFA US Large Cap Value	DFLVX	5.28 %	11.16 %	9.72 %	13.98 %	9.40 %
LSV Value Equity	LSVEX	0.24 %	9.37 %	9.11%	12.75 %	8.73%
Benchmarks						
Category Large Value	LV	5.03 %	9.91 %	8.52 %	11.67 %	7.79 %
S&P 500 index	SPX	10.13 %	13.13 %	11.95 %	13.81 %	8.97 %

⁴⁷ Data from October 22, 2019.

While the differences aren't enormous, DFA outperforms LSV in every time period considered. However, the performance of LSV seems affected by a bad recent year (2018), which also translates in a somewhat subpar 3-year return. The average Morningstar ratings for both funds are confirmed by the returns.

Looking at returns for value funds in general (both small cap and large cap) compared to the performance of the S&P 500 index, one can conclude that value has been an inferior investment category in terms of returns.

3.4.1 Risk-return performance small cap value funds

As noted before, comparisons of performance have to involve risk appraisal in order to draw a fair and complete picture. There is a number of ways to do so. Classical mean-variance analysis uses the volatility of the returns. The lower the standard deviation the less volatile the results of the fund are and, presumably, the less risky the investment.

Table 5. Standard deviations small cap value funds

Fund	Ticker	3-year SD	5-year SD	10-year SD	15-year SD
DFA US Small Cap Value	DFSVX	14.50 %	14.33 %	21.67 %	19.72 %
F&T Undiscovered Managers Behavioral Value	UBVLX	11.56 %	11.19 %	20.61 %	19.20 %
Benchmarks					
Category Small Value	SV	13.76 %	13.62 %	19.73 %	18.24 %
S&P 500 index	SPX	9.18 %	9.55 %	14.40 %	13.19 %
Russell 2000 index	RUT	13.07 %	13.44 %	19.36 %	17.89 %

The “neoclassical” DFA fund displays slightly higher volatility than both the “behavioral” F&T fund and the benchmarks. The low 3- and 5-year volatility of the “behavioral” F&T fund is remarkable, especially given the good returns the fund has provided.

Combined with the mean return the Sharpe ratio can be calculated by subtracting the risk-free rate of return from the return of the portfolio and dividing that result by the standard deviation of the portfolio's excess return. This can be regarded as an indication for in how far taking on more or less risk, as measured by the standard deviation, results in better returns. The higher the Sharpe ratio the better the risk-return tradeoff.

Table 6. Sharpe ratios small cap value funds

Fund	Ticker	3-year Sharpe ratio	5-year Sharpe ratio	10-year Sharpe ratio	15-year Sharpe ratio
DFA US Small Cap Value	DFSVX	0.93	0.65	0.57	0.53
F&T Undiscovered Managers Behavioral Value	UBVLX	1.22	1.02	0.74	0.60
Benchmarks					
Category Small Value	SV	0.95	0.63	0.41	0.53
S&P 500 index	SPX	1.69	1.36	0.84	0.67
Russell 2000 index	RUT	1.10	0.71	0.56	0.48

Using Sharpe ratios the quality performance of the “behavioral” F&T small cap fund becomes apparent. In all time intervals the “behavioral” fund scores better than the “neoclassical” DFA small cap fund. In addition, F&T outperforms both the Morningstar and Russell 2000 benchmarks in every single time-interval. The performance of the neoclassical” DFA small cap fund, as measured by Sharpe ratios, can be characterized as average.

Besides standard deviation and Sharpe ratio there are other measures to assess risk and return such as alpha, beta and R-squared. These have in common that performance is measured relative to the market as a whole, using CAPM. R-squared, the coefficient of determination, is a measure of the correlation between the returns of an asset and a relevant benchmark representing the market as a whole, generally the S&P 500 index. A coefficient of determination of 100 means that all movements in the price of the asset can be explained by movements of the market as a whole. A coefficient of determination between 85 and 100 is considered high; below 70 is considered low. The coefficient of determination is measured with reference to the S&P 500 index, the most commonly used broad market proxy.

Table 7. Coefficients of determination small cap value funds

Fund	Ticker	3-year R ²	5-year R ²	10-year R ²	15-year R ²
DFA US Small Cap Value	DFSVX	42.79	49.53	79.86	76.94
F&T Undiscovered Managers Behavioral Value	UBVLX	57.53	62.30	80.42	78.69
Benchmarks					
Category Small Value	SV	44.89	49.17	76.92	74.09

DFA's coefficient of determination is very much in line with the Morningstar benchmark for small value assets. F&T displays clearly higher correlation than both DFA and the Morningstar category. F&T's coefficient of determination deviates from the benchmark, which could indicate a different investment approach compared to typical small cap value funds. The DFA fund looks more like a typical small cap value fund. R-squared is not an unambiguous yardstick in that a higher or lower number is not simply better or worse. It does say something about the uniqueness of a fund compared to the market as a whole or a particular market segment. An interesting side note is the dramatic drop in the overall coefficient of determination of small cap value funds in general, compared to the broad S&P 500 index.

Beta is another measure to assess risk and return. It is a measure of the volatility, or systematic risk, in comparison to the market as a whole. Beta is calculated using regression analysis. A beta of 1 indicates that the security price will move in line with the market; a beta of less than 1 means that the security will be less volatile than the market; a beta of greater than 1 indicates that the security's price will be more volatile than the market.

Table 8. Betas small cap value funds

Fund	Ticker	3-year beta	5-year beta	10-year beta	15-year beta
DFA US Small Cap Value	DFSVX	1.03	1.06	1.34	1.31
F&T Undiscovered Managers Behavioral Value	UBVLX	0.96	0.93	1.28	1.29
Benchmarks					
Category Small Value	SV	0.98	0.98	1.20	1.15

Both funds in general have higher betas than the Morningstar benchmark, while F&T's low volatility in the 3 and 5-year intervals, as measured by standard deviation, appears to translate in lower betas for those time intervals.

An interesting performance measure is alpha. Alpha measures a fund manager's effectiveness. It displays the difference between a fund's actual returns (after fees) and its expected performance (based on CAPM), given its level of risk as measured by beta. Alpha can be considered as representing the value that a portfolio manager adds to or subtracts from a fund's return (Bernstein, 2007) Continued and sustained high alpha can be seen as an indication that a particular investment manager or team has special skills or some other form of edge.

For both funds alpha is negative in all but one of the observations. However, overall alpha for the Morningstar benchmark is negative, which implies that small cap value funds haven't provided the best opportunities to beat the market. The behavioral F&T fund still outperforms the benchmark. The neoclassical DFA fund more or less performs in line with the benchmark.

Table 9. Alphas small cap value funds

Fund	Ticker	3-year alpha	5-year alpha	10-year alpha	15-year alpha
DFA US Small Cap Value	DFSVX	-2.59	-4.38	-3.89	-1.03
F&T Undiscovered Managers Behavioral Value	UBVLX	-0.72	-0.59	-0.18	0.12
Benchmarks					
Category Small Value	SV	-2.37	-4.38	-3.21	-0.80

At first sight it would appear that in the case of these two small cap value funds the behavioral fund is superior to the neoclassical one: similar risk, better returns. Moreover, Fuller & Thaler's Undiscovered Managers Behavioral Value fund also beats the benchmarks consistently in both return and risk. DFA US Small Cap Value fund performs very much along the lines of the benchmarks. Perhaps that shouldn't come as a surprise. If the investment philosophy is that the market eventually processes all available information and can't be beaten in a consistent way over time, there is no edge to look for except good execution. However, it does mean that in the case of the DFA fund there is no "academic alpha". In the case of the F&T fund it is not possible to simply attribute its excellent performance causally to academic insights, i.e. behavioral finance/economics. What is clear though is that the F&T fund does something differently than the broad market, which might have provided better results.

Having said that a couple of important caveats need to be made. That superior performance is more visible in the shorter time intervals. If one observes the numbers for the 15-year interval, the differences are much less pronounced⁴⁸. Keeping in mind an old adage in asset management: "past returns are no guarantee for the future", we still have to conclude that in the case of these two small cap funds, the behavioral one wins out. Another caveat is the fact that access to the F&T fund has been restricted since 2016 in the sense that no new

⁴⁸ The author has conducted an earlier review in 2010, using the exact same research design. The conclusion in 2010 was that there wasn't much to choose between the neoclassical and the behavioral fund.

investors can participate in the fund anymore. While the reasons for this so-called “soft closure” are not known to me, one could conjecture that the supply of profitable opportunities might somehow not be unlimited. Taking on additional investment capital would then create downward pressure on returns. Could it be then that, yes, there are anomalies that can be profitably exploited, but, no, they are not abundant or endless? Which brings me to the possible impact of fund size. There appear to be advantages and disadvantages related to the size of investment funds. On the one hand expenses should relatively go down as a fund (or investment firm) grows bigger. That is clearly visible in table 1: DFA’s expense ratios being lower than those from F&T and LSV. On the other hand there is evidence that performance suffers from a growing number of the assets under management. Chen et al. (2004) find that for small cap funds smaller funds indeed perform better than larger ones. The analysis of the two funds analyzed here seems to confirm those findings somewhat. First, the smaller behavioral fund seems to perform slightly better than the neoclassical one. Second, the F&T fund has shown exceptional growth from \$36,2 million AuM in 2010 to \$6 billion AuM in 2020 (DFA fund: \$7.4 billion AuM in 2010, \$16,2 billion AuM in 2020). That growth might have given rise to the soft closure of the fund⁴⁹.

3.4.2 Risk-return performance large cap value funds

A similar analysis has been done for the large cap value funds:

Table 10. Standard deviations large cap value funds

Fund	Ticker	3-year SD	5-year SD	10-year SD	15-year SD
DFA US Large Cap Value	DFLVX	10.84 %	10.95 %	18.50 %	16.68 %
LSV Value Equity	LSVEX	10.75 %	10.80 %	16.93 %	15.44 %
Benchmarks					
Category Large Value	LV	9.82 %	10.03 %	15.24 %	14.09 %
S&P 500 index	SPX	9.18 %	9.55 %	14.40 %	13.19 %

Looking at standard deviation/volatility there isn’t much to choose between the two funds. Both though display slightly higher volatility than the benchmarks.

On a 5-, 10- and 15-year basis both funds provide very similar Sharpe ratio’s which are more or less in line with the benchmark values. Looking at the 3-year periods, DFA stays in line with the benchmarks but LSV lags somewhat.

⁴⁹ The expense ratio for the F&T fund also dropped with the growth of the fund: from 1,6% in 2010 to 0,99% in 2020 (DFA: 0,54% in 2010, 0,52% in 2020).

In the case of correlation with the S&P 500 index the “neoclassical” DFA fund displays a higher coefficient of determination than the benchmark for large cap value funds, while the metrics of the “behavioral” LSV fund are more in line with the benchmark. As was the case of small cap value funds, for large cap value funds the coefficient of determination drops, though less dramatically.

Table 11. Sharpe ratios large cap value funds

Fund	Ticker	3-year Sharpe ratio	5-year Sharpe ratio	10-year Sharpe ratio	15-year Sharpe ratio
DFA US Large Cap Value	DFLVX	1.30	1.03	0.66	0.59
LSV Value Equity	LSVEX	1.15	1.01	0.67	0.59
Benchmarks					
Category Large Value	LV	1.26	0.98	0.67	0.56
S&P 500 index	SPX	1.69	1.36	0.84	0.67

Table 12. Coefficients of determination large cap value funds

Fund	Ticker	3-year R ²	5-year R ²	10-year R ²	15-years R ²
DFA US Large Cap Value	DFLVX	85.18	86.82	94.33	93.16
LSV Value Equity	LSVEX	77.66	83.44	93.96	92,74
Benchmark					
Category Large Value	LV	79.42	83.46	91.35	90.36

Table 13. Betas large cap value funds

Fund	Ticker	3-year beta	5-year beta	10-year beta	15-year beta
DFA US Large Cap Value	DFLVX	1.09	1.07	1.25	1.22
LSV Value Equity	LSVEX	1.03	1.03	1.14	1.13
Benchmark					
Category Large Value	LV	0.95	0.96	1.01	1.01

Both funds display higher betas than the benchmark. LSV has lower beta for all periods considered. The numbers are in line with the standard deviation of returns, which was higher

for DFA than for LSV. Taken together it appears that DFA takes on a bit more non-systemic, idiosyncratic risk than LSV and the benchmark, while still maintaining higher correlation with the broad S&P 500 index. In other words, the DFA fund is more “different” from the benchmark/ typical large cap value fund than the LSV fund. That can be regarded as a surprise. One might expect that the behavioral investor is more inclined to deviate from the market proxy than the neoclassical investor since there are presumed to be inefficiencies within the market. That appeared to be the case in the examination of the two small cap funds. Here the evidence suggests otherwise.

Table 14. Alphas large cap value funds

Fund	Ticker	3-year alpha	5-year alpha	10-year alpha	15-year alpha
DFA US Large Cap Value	DFLVX	-2.82	-2.66	-2.90	-0.98
LSV Value Equity	LSVEX	-3.67	-2.58	-2.38	-0.87
Benchmark					
Category Large Value	LV	-2.52	-2.77	-2.07	-1.11

Negative alpha is displayed by both funds as well as the benchmark. Both funds score close to the benchmark with one exception: LSV’s 3-year alpha. This is probably attributable to the subpar 1-year performance of the fund in terms of returns, that was noticed earlier. In the long run these funds seem pretty evenly matched, with perhaps a slight advantage for the “neoclassical” fund. There is no indication of “academic” alpha. These are good mutual funds but by no means spectacular in their performance. As for size effects, the DFA fund being approximately 11,5 times bigger than the LSV fund (\$31,2 billion AuM vs. \$2,71 billion AuM), Chen et al. (2004) found that there is no clear effect of size on performance for large cap value funds. None is detectable here as well, except for the differences in expense ratios.

3.5 DISCUSSION OF RESEARCH METHODOLOGY

Before drawing conclusions some issues need to be addressed: is the methodology used sound and are the data representative? Concerning the applied methodology, this is probably not an approach that a financial economist trying to publish in a finance journal would employ. In that case one would expect a more sophisticated full-blown statistical analysis. However, the measures used here are customary ones for investment and asset management appraisal. Swedroe in his 2015 short article compared the results of funds of Fuller & Thaler and LSV

to the broader industry, focusing just on returns though instead of also incorporating risk. Wright, Banerjee and Boney (2008) examined sixteen mutual funds over the period 1992-2005 with either a self-proclaimed or media-identified association to behavioral finance, including the Fuller & Thaler and LSV funds discussed here. They first focus on returns and flow of funds in order to identify successful funds. Then they examine risk as well as the factors where successful performance stems from.

Asset management firms themselves typically market their products by pointing at past returns rather than risk-return measures. Some may argue that risk-return measures may be flawed because they are to a large extent developed from the traditional building blocks from neoclassical finance: Modern Portfolio Theory, Capital Asset Pricing Model. As such these measures will suffer from the same troubles that plague these theories such as the question if the distribution of returns resembles a lognormal pattern and the question how to define the market portfolio (and thus calculate correlation and beta). The former does not pose a problem because in the simple mean-variance analysis used here no assumption regarding the distribution of returns is necessary and thus the question of whether markets are efficient does not enter a priori in the analysis. The latter problem –what is the market portfolio?– is also neutral with regard to the analysis. Different conceptions of the contents of the market portfolio may alter correlation and beta but again it is impossible to establish a priori if a particular notion of the market portfolio skews the analysis one way or the other.

Questions could also be raised about the time intervals used. Do three, five, ten and fifteen year intervals provide a balanced enough picture⁵⁰? Without taking into account investor preferences, it would appear that the longest time horizon, i.e. the 15-year interval, presents the fairest comparison, smoothing out shorter term fluctuations. The 15-year interval also fully incorporates the great financial crisis (2007-2009) and the recovery period from the crisis. Grosso modo the 15-year intervals produce the smallest performance differences between the funds analysed here, both for small cap value equity funds as for large cap value equity funds. On the other hand, the most important differences show up in the 3-year intervals. The behavioral small cap equity value fund outperforms the neoclassical one in the short term, while in that same timeframe the neoclassical fund does better than its behavioral counterpart in the category large cap value equity funds. Whether these short-term differences in performance are persistent and eventually translate in more significant differences on the longer term, remains to be seen.

With regard to the second issue: is it fair to pass judgment on these asset management operations (and the people affiliated to those operations) based on the data analysed here? After

50 Wright et al. (2008) have examined the 1992-2005 period. Since their findings do not dramatically differ from the ones presented here, one could consider this as a kind of confirmation.

all, the data only consists of two sets of funds, while the firms considered here have many more products on offer. There are, however, good reasons to restrict the analysis to the funds considered. Most importantly, it wasn't easy to find comparable funds. While DFA offers a broad range of funds in all asset classes, F&T focuses on small and medium caps and doesn't provide large cap offerings. LSV concentrates on value investing.

The types of offerings by the behavioral asset managers, combined with their performance, beg the question if some asset classes are more suited to behavioral investing than other, i.e. value stocks and in particular small cap value stocks, given the good performance by the F&T Undiscovered Managers Behavioral Value Fund. Put another way: could it be that the market for small cap value stocks is less efficient than the market for large cap value stocks? The preference for value stocks above growth stocks is explainable. Value stocks are in general considered less risky, because future cash flow, dividends, etc. are deemed more predictable/less uncertain. Over- and underreaction, the basis for behavioral investment decisions, should thus be easier detectable/objective than in the case of growth stocks. Wright et al. (2008) find that two of the four behavioral funds they examined and that outperformed their defined benchmark (i.e. the Vanguard 500 Fund) focus on value investing. These two funds happen to be the exact same F&T and LSV funds examined here. However they add that, while UBVLX and LSVEX outperform the broad benchmark in the period 1992-2005, this is not the case in comparison to other value-oriented "non-behavioral" mutual funds⁵¹. In other words, the outperformance might very well stem from well-executed value investing in general, rather than behavioral-inspired investing.

One could hypothesize that information on large caps is more abundant, less ambiguous, less noisy, than is the case for small caps. If that is the case, the market for small cap value stocks is less informationally efficient than the market for large cap value stocks and thus may offer more opportunities for excess performance.

Fuller & Thaler originally ran another small cap fund: the Undiscovered Managers Behavioral Growth fund. This particular fund, focused on growth investments rather than value investments, closed in 2012. As Swedroe (2015) puts it: "It's rare, if not unheard of, for a fund to close when it has produced good returns." According to Swedroe the performance of the Undiscovered Managers Behavioral Growth fund was indeed lagging, at least up to 2010.

51 This result matches the findings in my earlier 2010 review which would compare better as far as the investigated time period is concerned.

3.6 DISCUSSION OF IMPLICATIONS

A final point for discussion is what exactly can be inferred from the analysis with regard to the ideas of those affiliated with the funds. In other words, to what extent do the results credit or discredit their theories about the functioning of financial markets? Some historical perspective may be helpful here. For involvement of academics in the practice of financial markets is and was nothing new. The list of great economists of the past with more than a passing interest in active investing is extensive and enduring.

For these economists of the past investing was an activity on the side. Professional involvement of academics in investing and financial markets goes one step further. There is a variety of such cases, ranging from cooperation between banks and academics to apply investment theory such as between Wells Fargo and Fischer Black, Michael Jensen and Myron Scholes, to full-fledged professionalism like Black becoming a partner at Goldman Sachs (Mehrling, 2005). Notorious are the exploits of Nobel laureates Robert C. Merton and Myron Scholes who were involved as partners in hedge fund Long Term Capital Management (LTCM). After posting stunning results in the first three years of its existence, the demise of the fund was equally spectacular. The blow-up of LTCM in 1998 shook the global financial markets to its core, mandating massive action from the monetary and supervisory authorities. Popular belief has it that hubris and an unbridled belief in quantitative modelling and markets were behind the downfall of LTCM, not unlike what many believe happened in the recent financial crisis. Indeed Merton and Scholes thought that the relentless arbitrage, which LTCM engaged in, would drive markets to more efficiency. But that massive arbitrage process made LTCM into such an important market participant that one of the basic conditions for an efficient market—atomistic agents in the market—was violated, resulting in faltering liquidity conditions. So the demise of LTCM was not so much a result of markets being inefficient. Rather, it was the failure to recognize certain risks, in particular concentration risk, associated with one of the conditions for the efficient functioning of market not being in place that was missed by LTCM (Scholes, 2000, Stulz, 2000). So the historic evidence is mixed, to say the least, with regard to the question whether great economists are also great investors.

Likewise in the cases described in this chapter. One behavioral fund (F&T) distinguishes itself from its neoclassical rival, the other (LSV) does not. The failure of a particular fund to distinguish itself decisively from its rival does not need to discredit or falsify the philosophy behind that fund. That notion is especially relevant with regard to the behavioral mutual funds. For it's the behavioral philosophy which claims that markets systematically deviate from efficiency because of psychological biases and that these deviations can be profitably exploited. This was also remarked by Wright et al. (2008): "If funds visibly associated with behavioral finance cannot generate abnormal returns, their strategies are, in our opinion,

of little interest”⁵². They do find that the flow of funds into behavioral funds is higher, suggesting that behavioral mutual funds are effectively attracting capital. They also find that the behavioral funds generally beat the S&P 500 Index funds on a raw, net-return basis. However, their risk-adjusted returns are neither significantly better nor worse than their matched counterparts. Finally they find that most of success of behavioral funds, relative to the S&P 500, is explained by loading on the value factor, which actually originates in Fama and French’s 1993 model. Thus they conclude that while behavioral investment strategies may differ from non-behavioral funds the differences aren’t providing their investors any abnormal returns. Going further, however, they suggest that publicizing and presumably using “behavioral finance” in a fund’s investment strategy does seem to offer advantages in terms of attracting capital and marketing purposes. Given the results presented however, something similar could be said with regard to the analysed Dimensional funds: that strong academic pedigree advertises well, but isn’t accompanied by superior results.

Lack of clearly superior results from behavioral mutual funds may shed doubts on market wide deviations from efficiency but can be consistent with the finding of psychological biases at the level of the individual agent. Indeed, the idea that despite people constantly behaving “irrationally”, market outcomes can be pretty efficient has been forcefully argued by many, in finance for instance by Merton Miller (1987) and Stephen Ross (2005) and in economics at large by Vernon Smith (1989)⁵³ and Deirdre McCloskey. The billion dollar question then isn’t any longer whether markets are efficient or not, but how exactly non-rational, non-optimizing behavior can lead to aggregated efficient outcomes. Various proposals are out there that attempt to bridge the gap between the individual level and the aggregated market level: Andrew Lo’s Adaptive Market Hypothesis (Lo, 2004 & 2005), Peter Bossaerts’ Efficient Learning Hypothesis (Bossaerts, 2002), Merton and Bodie’s Functional and Structural Finance (Merton & Bodie, 2005), and the various literature on noise trading emerging from Black (1986) and Kyle (1985)⁵⁴.

In the specific behavioral asset pricing literature (See Shefrin, 2008) the aggregation question is acknowledged. Shefrin tries to incorporate “sentiment”, i.e. false beliefs held by investors,

52 The title of Swedroe’s 2015 article “Behavioral finance falls short” doesn’t leave much doubt about his conclusion and opinion.

53 Smith actually appeared to be of the opinion that some assumptions (an infinite number of agents and various assets) which are deemed necessary for efficiency and equilibrium in the neoclassical sense, are not indispensable for efficient outcomes if there is sufficient communication and information in a market.

54 In the next chapter I propose an account of the arbitrage process that drives markets towards efficiency along the lines of Austrian market process theory which accommodates both behavioral and neoclassical perspectives.

in the price kernel-based asset pricing framework described by Cochrane (2005)⁵⁵. In the absence of sentiment the market is efficient. Whether sentiment enters the equation or the outcome is efficient then becomes an empirical matter.

The bottom line is that the neoclassical and behavioral perspectives are not rival in the sense that one being true necessarily implies that the other is completely false. Indeed these schools of thought can be considered as complementary because their main bite is situated on different levels of aggregation. The behavioral viewpoint is based on a strong body of evidence, both empirical and experimental, to back up claims about economic agents not behaving along the lines of homo economicus. The neoclassical corner has solid arguments, both theoretically and empirically, that given certain assumptions and conditions being fulfilled, market outcomes tend to efficiency. So it is by no means the case that the debate between neoclassical and behavioral finance is decisively finished by the analysis presented here.

3.7 CONCLUSION

What then can be concluded from the data? First of all, while the sample is small, it has become clear that academic excellence is no guarantee of real-world investing excellence. The mutual funds analyzed here, which share a strong academic pedigree, are by no means bad investments. In most cases they do better than the broad market benchmarks, but three of the four funds examined fail to distinguish themselves within the community of similar mutual funds: a particular academic alpha does not exist in those three cases⁵⁶. Fuller & Thaler's Undiscovered Managers Behavioral Value Fund then is the exception rather than the rule.

Second, there is no conclusive evidence that investment management operations which are advertised as based on principles of behavioral finance do provide consistently and persistently superior returns when compared to investment management operations which are advertised as inspired by principles of neoclassical finance, or the other way around for that

55 The price-kernel based asset pricing framework provides an integrated approach to asset pricing. Specific cases such as CAPM, the Fama-French multi-factor model and the Black-Scholes option-pricing formula can be derived as specific cases. The core idea behind the model is the idea of a stochastic discount factor (SDF), the price of an asset being determined by the expected value of the expected discounted cash flows. Specific cases give specific SDFs. A SDF can very well be behavioral, or behaviorally influenced (Cochrane, 2005, Shefrin, 2008).

56 In chapter five the impact of theory on practice in finance is discussed in depth. While it is true that in the area of investment and asset pricing theory has profoundly affected practice, the lack of "academic" alpha is interesting in that there appears to be no evidence here of performative or counterperformative effects (see MacKenzie, 2006 and MacKenzie et al., 2007). In the case considered in this chapter intervention by theoreticians does not appear to materially affect the practice.

matter. The behaviorally oriented small cap fund does perform better than its neoclassical rival, but with regard to the large cap funds the opposite can be argued. Differences are more pronounced in the short term. In the long term, what differences there are within both categories of funds, using the more advanced performance measures such as alpha and Sharpe ratio are neither spectacular in size nor persistent enough. At least in the case of the funds analyzed here, there is no evidence that a basic tenet of neoclassical finance – systematically and persistently beating the market in terms of risk and return is not easy or even possible – does not hold.