Empirical Research Partners

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# Portfolio Analytics January 2017

## *Empirical Analyses of Decision Making*

*Portfolio Analytics: Understanding Patterns in Decision Making*

- We developed a system to analyze portfolio decision making that draws upon our stock selection models and their wide-ranging components. It rolls up the attributes of the individual positions held over time, identifying what's worked, what hasn't, and changes in stock picking and portfolio construction methodologies. Most portfolio analytics measure exposures to things like oil prices and interest rates, that can be virtues or burdens depending on the circumstances. Our focus is in fundamentals, the market's reaction to them, and factors that should, and have, generated alpha over the long run. Our frameworks have multi-decade, real-time track records and they can help us reach some definitive conclusions about the odds of success. We believe that self-knowledge is an undervalued asset in the money management business.
- To illustrate how our system works we analyzed the holdings of three successful funds: a large-cap growth mutual fund, a large-cap value mutual fund and a long/short hedge fund. While all three are focused on the U.S. market, we can do similar analyses in the international and global ones. The work utilizes monthly, and in the case of the hedge fund quarterly data, covering the past 15 years, comparing the funds' attributes not only to those for the universe of stocks they're picking from but also to those for a composite of competitor funds. We assess the character of the bets made over time as well as their return consequences.
  - The growth fund, that has more than $10 billion in assets, has outperformed its benchmark by more than +2 percentage points per annum over the last 15 years, and by +1.25 points a year since 2010. It did that by following a more value-like approach than most of its peers, holding on to positions for many years. It's tilted toward companies producing so-so top-line growth but generating lots of free cash flow, that in turn was used to buy back their own shares. Its holdings weren't controversial, their share bases turned over slowly, and they failed to attract the interest of hedge funds and other aggressive investors. They did however generally produce positive price momentum. The manager employed a philosophy akin to that used in our growth model, more than a quarter of its positions were top ranked, and they outperformed by nearly +9 points per annum. In this decade the reapers beat the sowers, and that's worked to the benefit of this fund.
  - The value fund, that also has assets that exceed $10 billion, won by being less value-oriented than its peers. It has generated almost +3 points of alpha per year, including in this decade, in part by owning companies with growth profiles that look more like those of the market than those held by its value-oriented competitors. It didn't emphasize stocks with high dividend yields or exceptionally-low price-to-book ratios and instead turned toward companies offering above-market free cash flow yields that were repurchasing their own stock. The positions it held that ranked well in our value model, about a quarter of the portfolio, outperformed the market by almost +6 points per annum.
  - The long/short fund has a profile that resembles that of other large equity-oriented hedge funds. It's owned Big Growers with strong price action that are controversial and held by other hedge funds. In general those stocks have weak valuation support, at least according to most traditional measures, and they tend to have an event-driven character, with track records that are derived from big moves on a handful of days. The strategy is akin to walking a tightrope, and over the long run a great deal of skill (and a strong sell discipline) has been required for it to succeed. Crowding has become a problem because the ecosystem hedge funds operate in is delicate and fraught with peril.
- Analyzing decision making is useful because it tells us about how the game is being played and the associated odds of success. If you are interested in learning more about this service, contact your salesperson.

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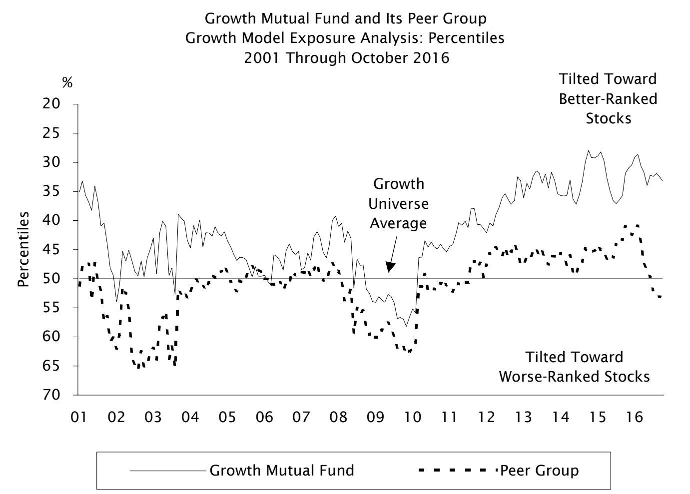
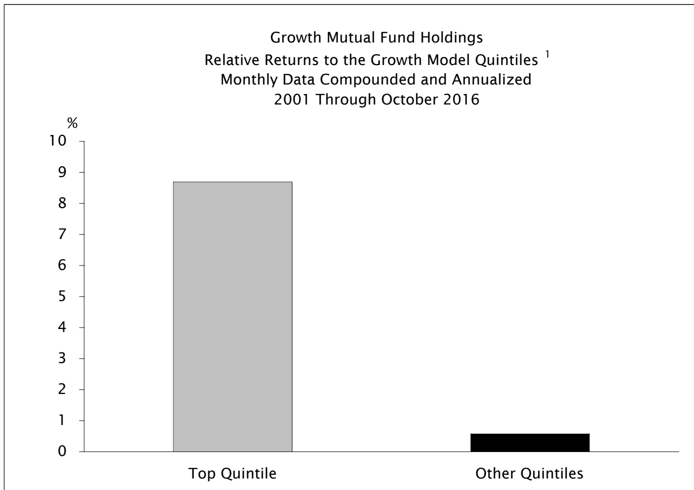
# Conclusions in Brief

- Some portfolio exposures…



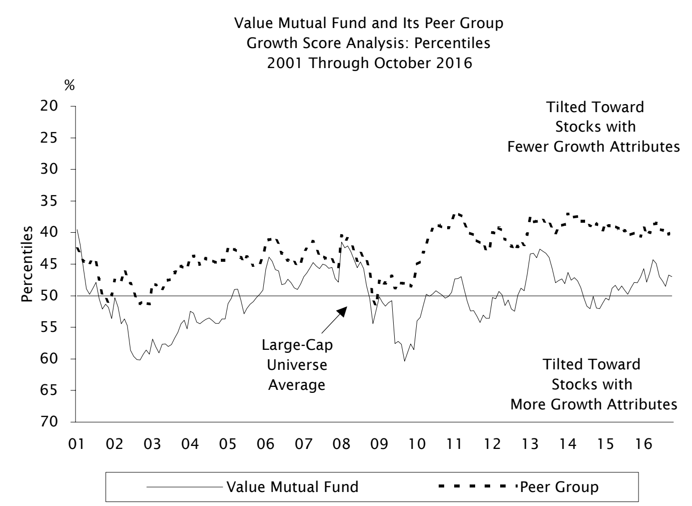

Source: Empirical Research Partners Analysis.

- …Work out better than others:



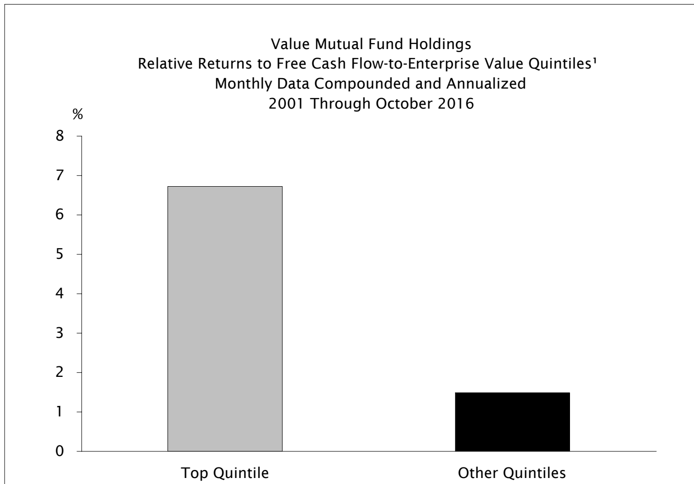

Source: Empirical Research Partners Analysis.
[1] Returns relative to the large-cap growth universe.

- Value is a moving target…



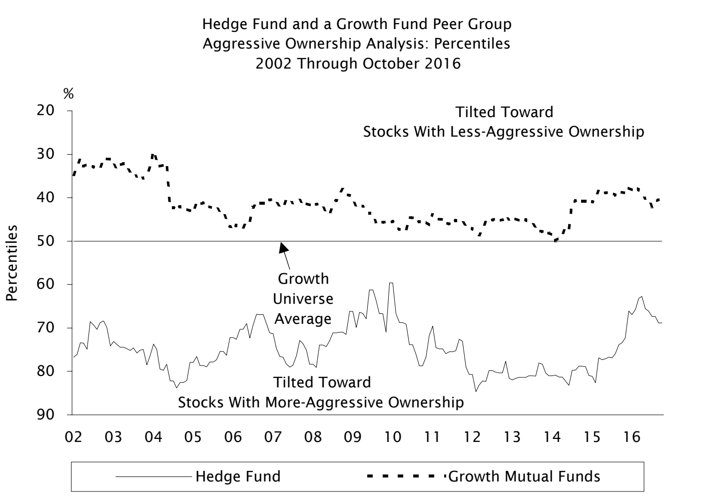

Source: Empirical Research Partners Analysis.

- …Although some virtues have held up:



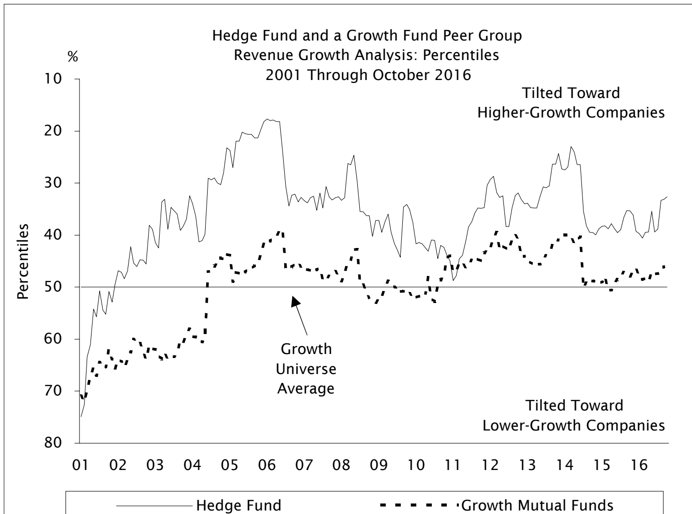

Source: Empirical Research Partners Analysis.
[1] Returns relative to the entire large-cap universe.

- Hedge funds tend to have similar holdings…




Source: Empirical Research Partners Analysis.

- …With top-line growth front and center:




Source: Empirical Research Partners Analysis.

## Portfolio Analytics: Understanding Patterns in Decision Making

We're in the opinion business and our quantitative models embody our views about what's important when picking stocks. Empirical evidence figures large in our processes, but so too does judgment. The frameworks we use try to capture truths about fundamentals, and more broadly, human nature. As our assessments of how economies and companies work have evolved over time, so do the methodologies we employ. For example, the rise of protectionism could be a material and potentially destructive development after decades of declining tariffs and the associated gains in free cash flow production.

In general we're not fans of traditional analyses of the factor exposures of portfolios. The problem is that many of them rely on independent variables that are difficult, if not impossible, to forecast. For example, an outsized exposure to oil prices could be a good or bad thing depending in part on the price paid for it.

We've developed a system to analyze patterns in stock picking and portfolio construction using frameworks that we believe, more often than not, generate alpha. Some capture fundamentals such as free cash flow yields, multiples of normalized earnings and growth rates in revenue and capital expenditures, while others illuminate market behaviors such as arbitrage and downside risk along with the aggressiveness of the shareholder base. The expected returns coming out of our stock selection models, including those that search for failure, inform our conclusions too.

What we're looking for are recurring patterns in decision making, some of which added to returns, others not. We assess the attributes of the portfolio's holdings over time, vis-à-vis those of the benchmark as well relative to those for a peer group of funds. We believe there's considerable merit in examining the long history, as growing pressures to perform and changing casts of characters can often lead to inconsistent results.

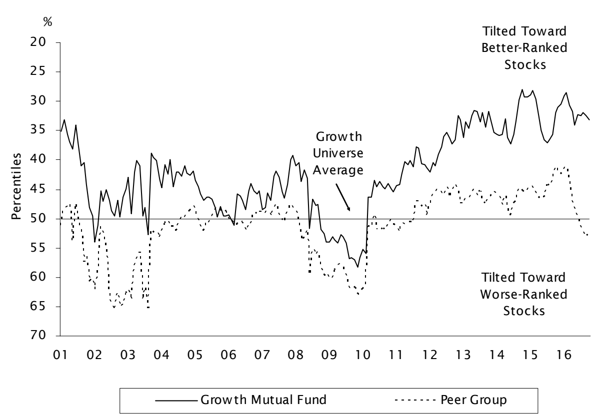
### *Three Examples: A Growth Fund, a Value Fund, a Hedge Fund*

To illustrate our approach we present analyses of three portfolios, drawing upon their holdings of the last 15 years. The first two are highly-successful mutual funds, both of which have amassed assets that exceed $10 billion, one large-cap growth, the other large-cap value, while the third is a prominent long/short hedge fund. The growth mutual fund has outperformed its benchmark by +2.3 percentage points a year since 2001, while the value one delivered +2.9 points of alpha. Both of the mutual funds have exceptionally-long holding periods while the hedge fund turns over at a much faster rate.

### *A Growth Fund, with a Value Bias*

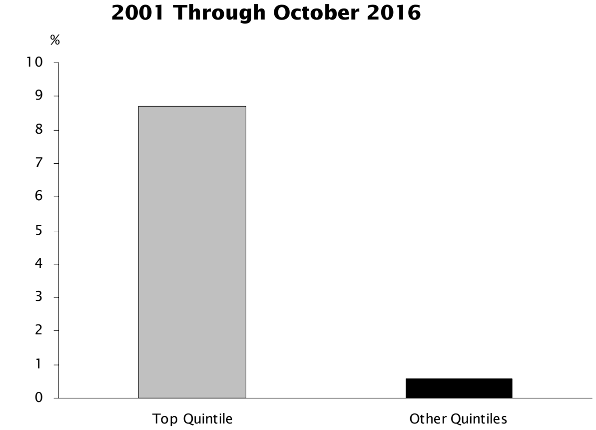
We start with the large-cap growth fund, that's been overweight stocks that rank well in our growth stock selection model, even more so in the last five years than before (see Exhibit 1). The higher the black line goes the greater the fund's exposure to the highly-ranked issues. The dotted line presents the same statistics for the peer group, that in this case is comprised of 28 large-cap growth mutual funds. The solid line at the 50th percentile is the average for all growth stocks. Some of the fund's record has come from the stellar performance of positions it's held that rank in the top quintile of our growth model, that have constituted 28% of the portfolio (see Exhibit 2).

**Exhibit 1: Growth Mutual Fund and Its Peer Group**
**Growth Model Exposure Analysis: Percentiles**
**2001 Through October 2016**




Source: Empirical Research Partners Analysis.

**Exhibit 2: Growth Mutual Fund Holdings**
**Relative Returns to the Growth Model Quintiles[1]**
**Monthly Data Compounded and Annualized**
**2001 Through October 2016**

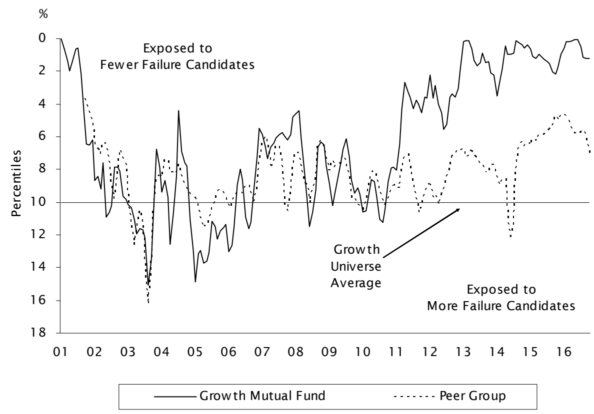



Source: Empirical Research Partners Analysis.

[1]Returns relative to the large-cap growth universe.

We see a similar profile when we run the fund's holdings through our failure model (see Exhibit 3). In this cycle it's had a much smaller exposure to stocks poised for failure than that of its universe, with those positions constituting just one to two percent of the portfolio. That exposure is well below that of its peers.

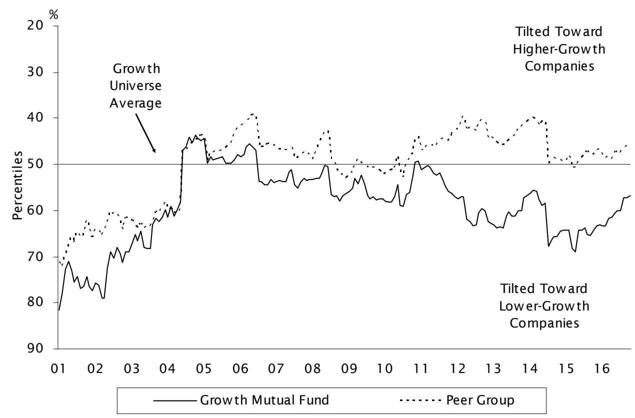
**Exhibit 3: Growth Mutual Fund and Its Peer Group Failure Model Exposure Analysis: Percentiles[1] 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

[1]Smoothed on a trailing three-month basis.

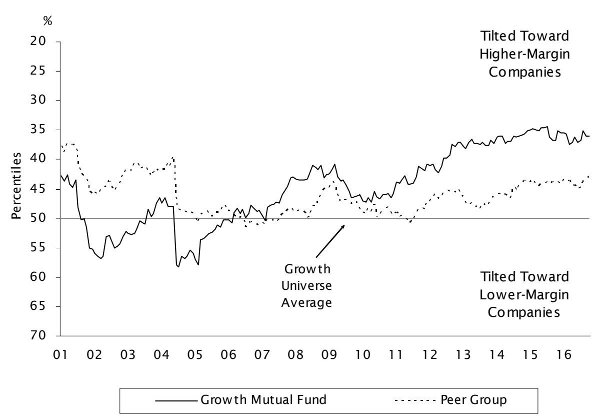
**Exhibit 4: Growth Mutual Fund and Its Peer Group Revenue Growth Analysis: Percentiles 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

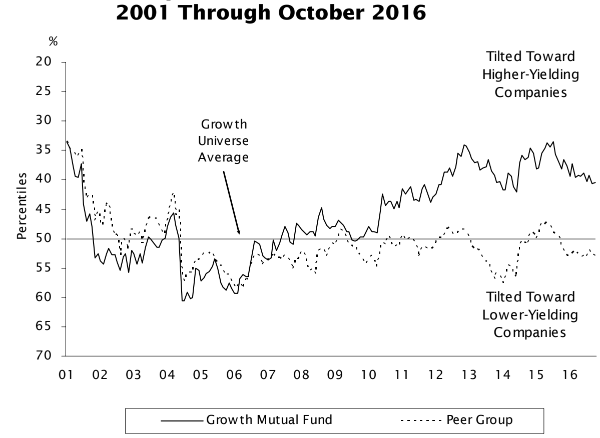
This particular fund has been chronically tilted toward the slower-growing issues in the growth universe (see Exhibit 4). Fortunately those companies have generated prodigious amounts of free cash flow and offered above-average free cash flow yields (see Exhibits 5 and 6). Those portfolio exposures, that developed in earnest during the current expansion, distinguish the fund from its peers. It's bet on high-free-cash-flow-yielding companies has been a key and continuing source of alpha (see Exhibit 7).

**Exhibit 5: Growth Mutual Fund and Its Peer Group Free Cash Flow Margin Analysis: Percentiles 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

**Exhibit 6: Growth Mutual Fund and Its Peer Group Free Cash Flow-to-Enterprise Value Analysis: Percentiles 2001 Through October 2016**



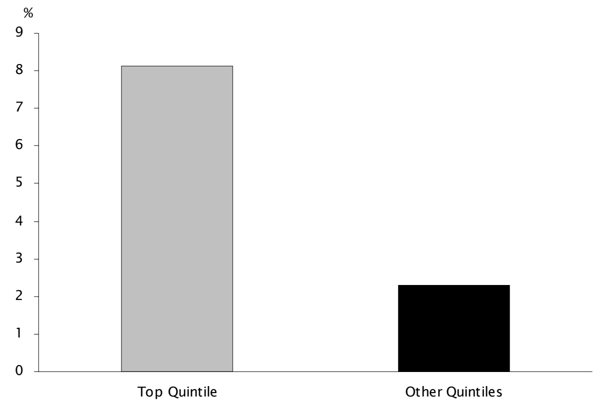

Source: Empirical Research Partners Analysis.

The fund also fares well in our capital deployment framework, that evaluates what management does with its cash flow (see Exhibit 8). That's in part because the stocks its held have grown their capital expenditures at rates well below that of the typical growth stock and were buyers of their own shares (see Exhibits 9 and 10).

In the post-crisis years the manager turned toward companies that were exploiting assets already in place and that move has yielded significant excess returns (see Exhibit 11). The capital deployment part of the equation was crucial to performance (see Exhibit 12). With growth rates in decline, cash flow production became a bigger part of the return equation, even in the elite world of growth stocks.

The fund's conservative bias is apparent in our behavioral analyses as well. The stocks it owns haven't caught the attention of aggressive owners and turn over at below-average rates (see Exhibits 13 and 14). Nor are they controversial and haven't proven vulnerable when the market turns down (see Exhibits 15 and 16).

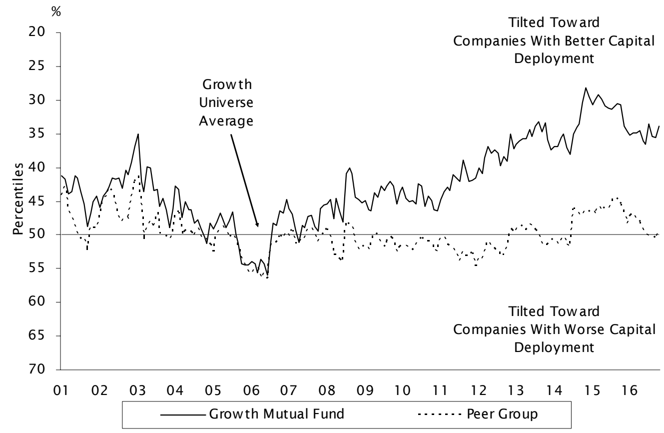
**Exhibit 7: Growth Mutual Fund Holdings**
**Relative Returns to Free Cash Flow-to-Enterprise Value Quintiles[1]**
**Monthly Data Compounded and Annualized**
**2001 Through October 2016**




Source: Empirical Research Partners Analysis.

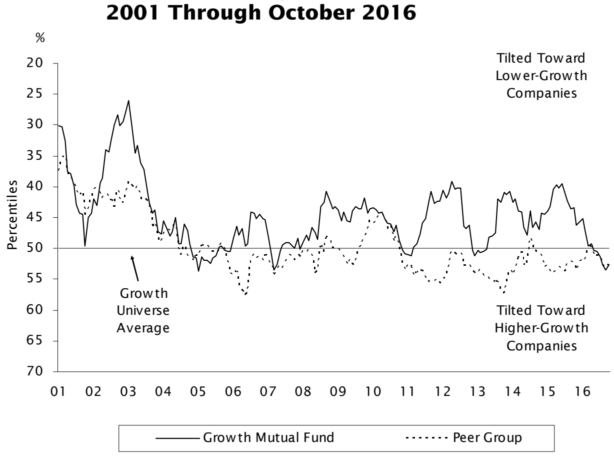
[1]Returns relative to the large-cap growth universe.

**Exhibit 8: Growth Mutual Fund and Its Peer Group**
**Capital Deployment Analysis: Percentiles**
**2001 Through October 2016**



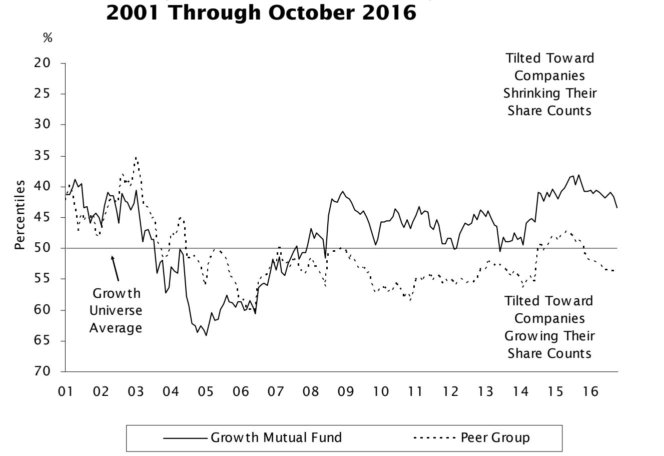

Source: Empirical Research Partners Analysis.

**Exhibit 9: Growth Mutual Fund and Its Peer Group**
**Capital Spending Growth Analysis: Percentiles**
**2001 Through October 2016**



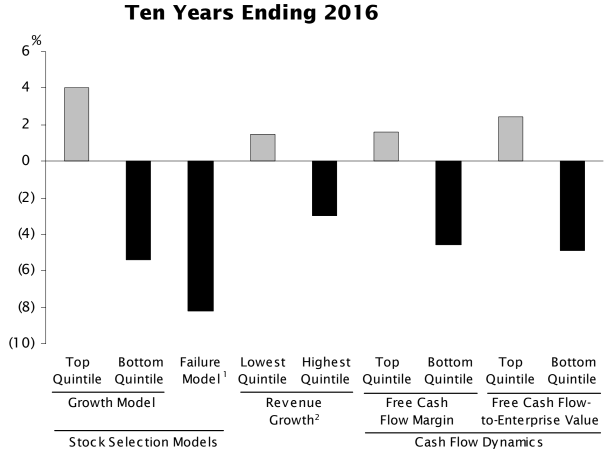

Source: Empirical Research Partners Analysis.

**Exhibit 10: Growth Mutual Fund and Its Peer Group**
**Change in Shares Outstanding Analysis: Percentiles**
**2001 Through October 2016**




Source: Empirical Research Partners Analysis.

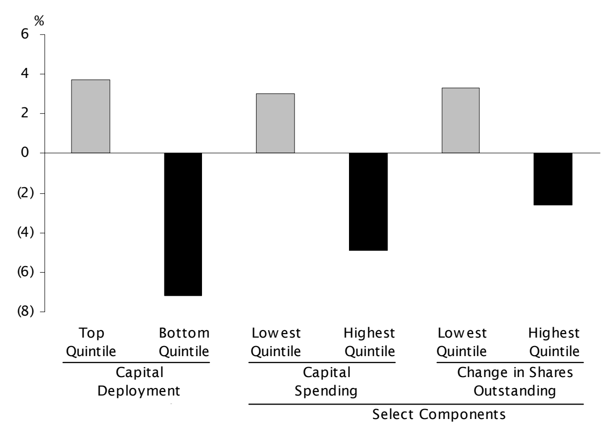
**Exhibit 11: Large-Capitalization Growth Stocks**
**Relative Returns to the Stock Selection Models, Revenue Growth and Valuation Factors**
**Monthly Data Compounded and Annualized**
**Ten Years Ending 2016**




Source: Empirical Research Partners Analysis.

[1]Returns relative to a 1,000 stock universe.
[2]Return relative to the entire large-cap universe, all other factors are relative to the growth universe.

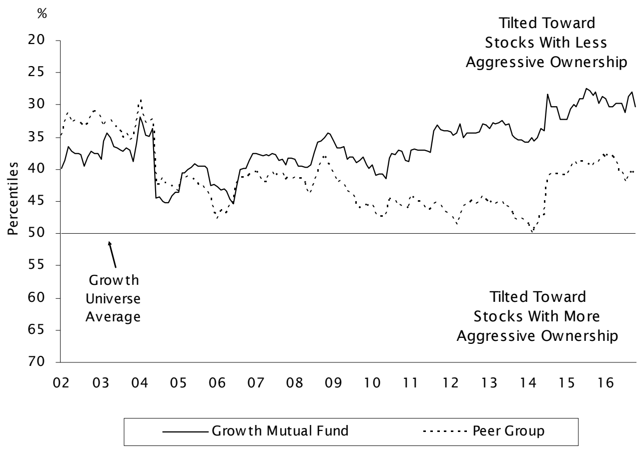
**Exhibit 12: Large-Capitalization Growth Stocks**
**Relative Returns to Capital Deployment[1]**
**Ten Years Ending 2016**




Source: Empirical Research Partners Analysis.

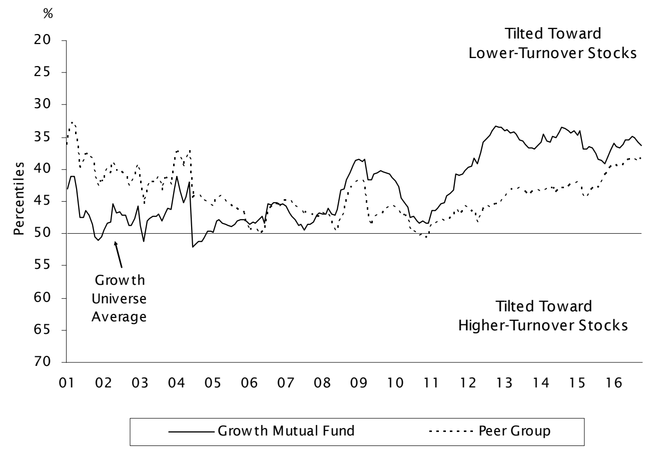
[1]Relative to the growth universe.

**Exhibit 13: Growth Mutual Fund and Its Peer Group**
**Aggressive Ownership Analysis: Percentiles**
**2002 Through October 2016**



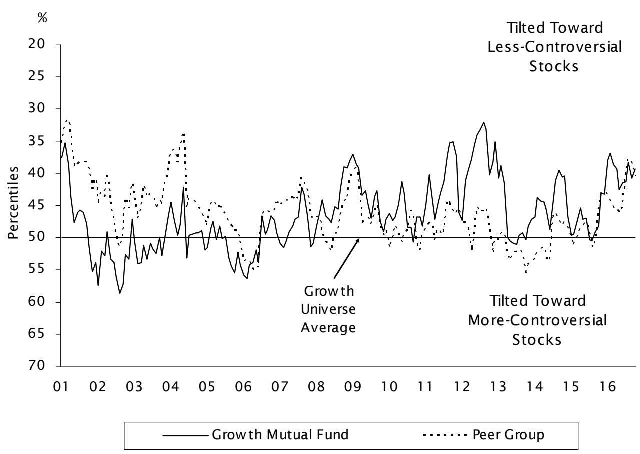

Source: Empirical Research Partners Analysis.

**Exhibit 14: Growth Mutual Fund and Its Peer Group**
**Share Turnover Analysis: Percentiles**
**2001 Through October 2016**



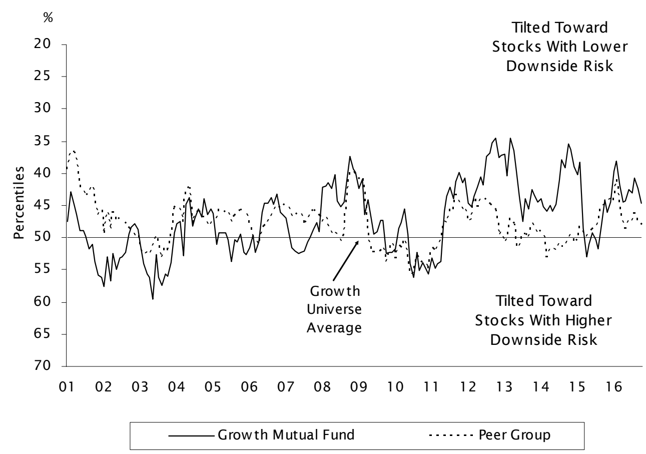

Source: Empirical Research Partners Analysis.

**Exhibit 15: Growth Mutual Fund and Its Peer Group**
**Arbitrage Risk Analysis: Percentiles**
**2001 Through October 2016**



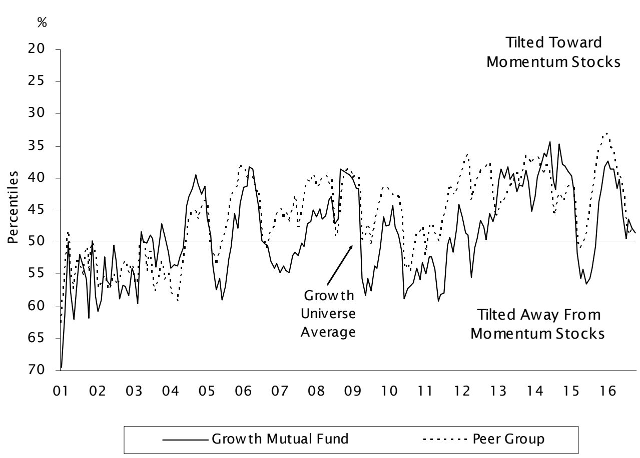

Source: Empirical Research Partners Analysis.

**Exhibit 16: Growth Mutual Fund and Its Peer Group**
**Downside Risk Analysis: Percentiles**
**2001 Through October 2016**



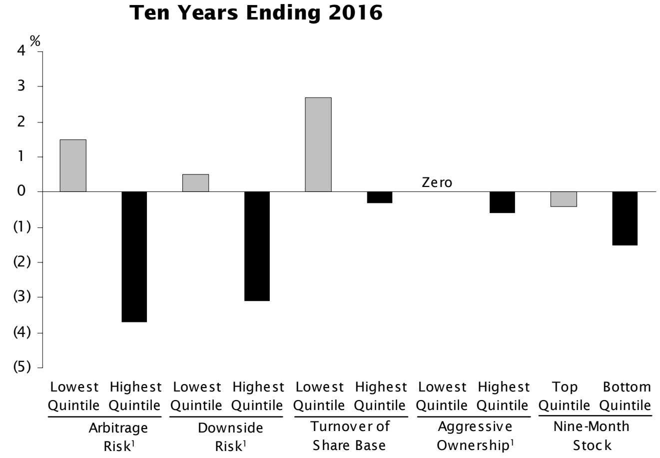

Source: Empirical Research Partners Analysis.

**Exhibit 17: Growth Mutual Fund and Its Peer Group**
**Nine-Month Stock Price Trends Analysis: Percentiles**
**2001 Through October 2016**




Source: Empirical Research Partners Analysis.

**Exhibit 18: Large-Capitalization Growth Stocks**
**Relative Returns to Analyses of Investor Behavior**
**Monthly Data Compounded and Annualized**
**Ten Years Ending 2016**




Source: Empirical Research Partners Analysis.

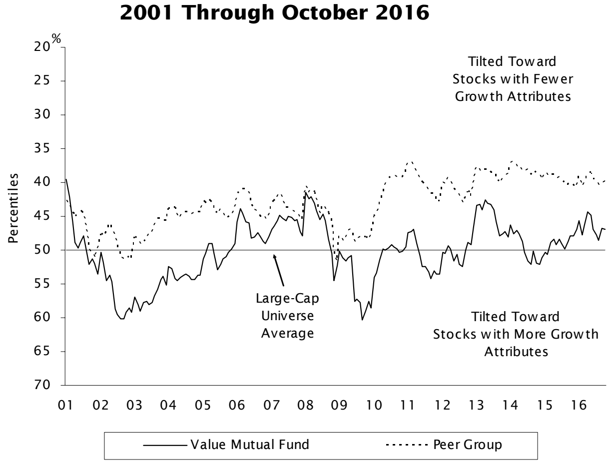
[1]Relative returns across the entire large-cap universe, all other factors relative to the growth universe.

Although the fund's holdings have a decidedly different character than those of their peers, its overall price momentum profile is comparable (see Exhibit 17 overleaf). In the early stages of the last two expansions its bets were contrarian and as the cycle wore on the manager wisely held on to winners. Staying away from the crowd has paid off as has avoiding disputes (see Exhibit 18 overleaf). That's because with economic growth at a snail's pace, the fights were more often than not won by the bears. The character of the fund's holdings changed markedly in this cycle compared to the last one, taking on more of a GARP-like character. That decision proved to be the right one.

### *A GARP(y) Value Fund*

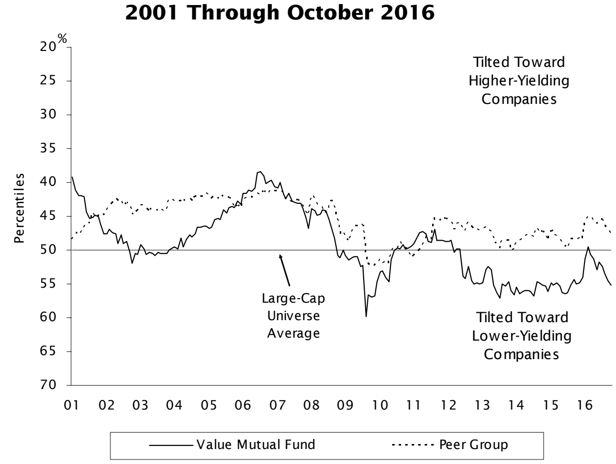
While the growth fund succeeded by being more value-like than its competition, the value fund, one of the industry's leading asset gainers, won by being more growth-like than its peers. For example, the stocks it held had market-like growth profiles, not the case for the holdings of its peer group, and sold at lower dividend yields (see Exhibits 19 and 20). Up until recently they also had higher price-to-book multiples, although they still were at a discount to the market (see Exhibit 21). What the stocks had in common were declining share counts (see Exhibit 22). They also had more stable fundamentals than those typically seen in value funds, and from 2010 through 2014 they offered a free cash flow yield advantage too (see Exhibits 23 and 24). As was true for the growth fund, the high-free-cash-flow-yielding companies carried the day (see Exhibit 25). The positions held by the fund generally screened well in our value stock selection model, and its top-ranked ones produced excess returns that were three times that of the rest (see Exhibits 26 and 27). Once again this manager's biases turned out to be the correct ones, and the combination of high free cash flow yields, declining share counts and stability in fundamentals was a winning hand (see Exhibit 28).

**Exhibit 19: Value Mutual Fund and Its Peer Group Growth Score Analysis: Percentiles 2001 Through October 2016**



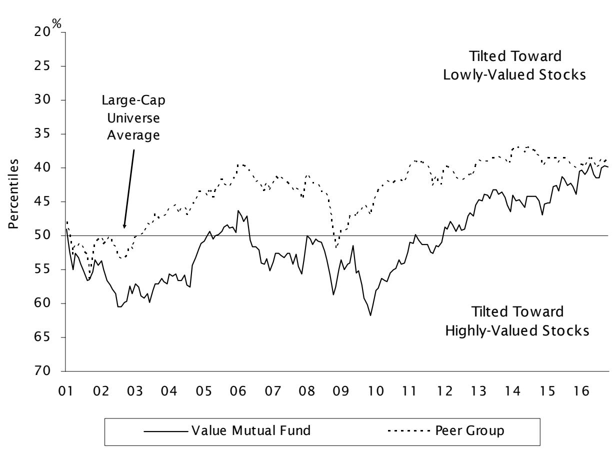

Source: Empirical Research Partners Analysis.

**Exhibit 20: Value Mutual Fund and Its Peer Group Dividend Yield Analysis: Percentiles 2001 Through October 2016**



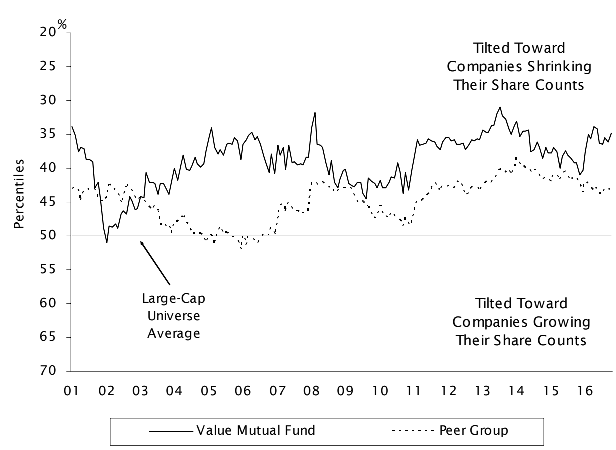

Source: Empirical Research Partners Analysis.

**Exhibit 21: Value Mutual Fund and Its Peer Group Price-to-Book Value Analysis: Percentiles 2001 Through October 2016**



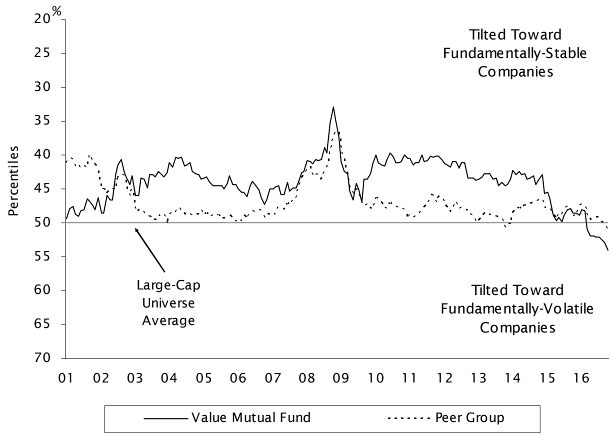

Source: Empirical Research Partners Analysis.

**Exhibit 22: Value Mutual Fund and Its Peer Group Change in Shares Outstanding Analysis: Percentiles 2001 Through October 2016**



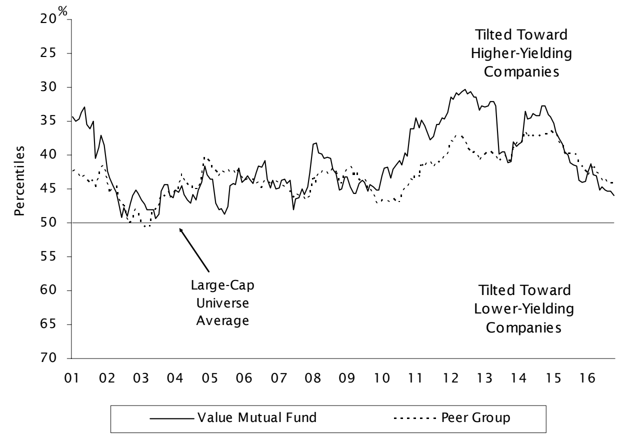

Source: Empirical Research Partners Analysis.

**Exhibit 23: Value Mutual Fund and Its Peer Group Stability Score Analysis: Percentiles 2001 Through October 2016**



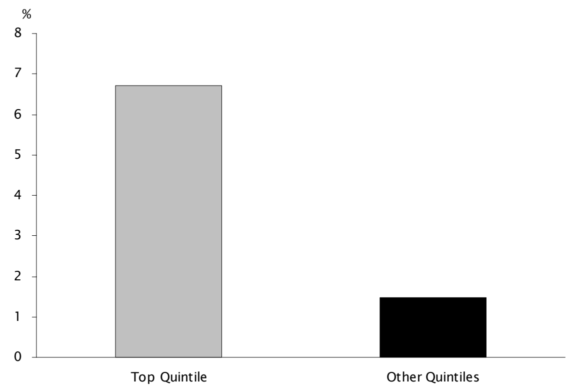

Source: Empirical Research Partners Analysis.

**Exhibit 24: Value Mutual Fund and Its Peer Group Free Cash Flow-to-Enterprise Value Analysis: Percentiles 2001 Through October 2016**



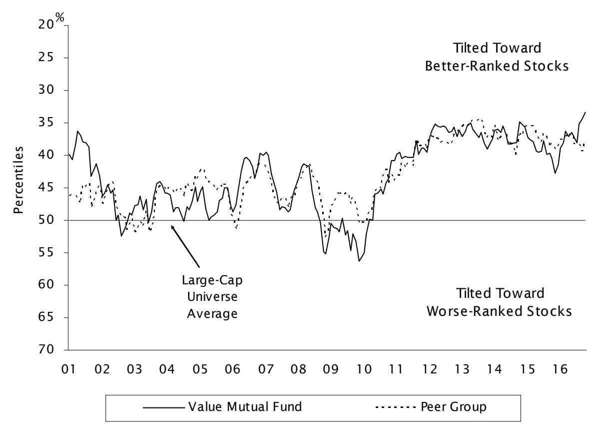

Source: Empirical Research Partners Analysis.

**Exhibit 25: Value Mutual Fund Holdings Relative Returns to Free Cash Flow-to-Enterprise Value Quintiles[1] Monthly Data Compounded and Annualized 2001 Through October 2016**



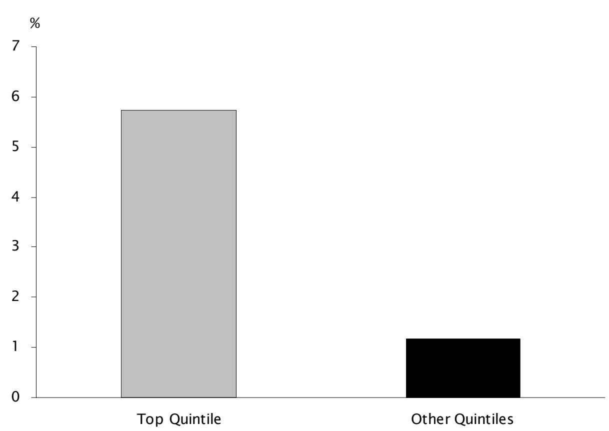

Source: Empirical Research Partners Analysis.
[1]Returns relative to the entire large-cap universe.

**Exhibit 26: Value Mutual Fund and Its Peer Group Value Model Analysis: Percentiles 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

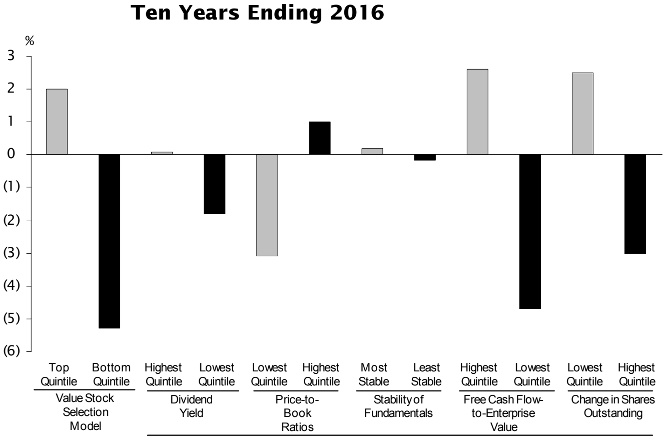
**Exhibit 27: Value Mutual Fund Holdings Relative Returns to the Value Model Quintiles Monthly Data Compounded and Annualized 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

[1]Returns relative to the entire large-cap universe.

**Exhibit 28: Large-Capitalization Stocks Relative Returns to the Value Stock Selection Model and Other Factors[1] Monthly Data Compounded and Annualized Ten Years Ending 2016**




Source: Empirical Research Partners Analysis.

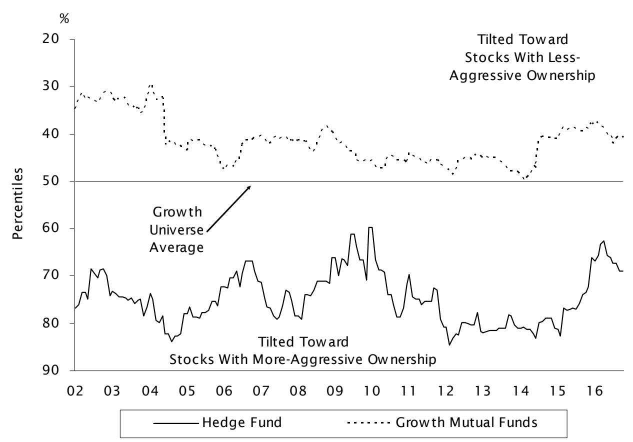
[1]Return relative to the large-cap universe.

### *A Hedge Fund, Playing Long-Odds Hands*

Large hedge funds are typically overexposed to controversial, high-growth stocks that also happen to be owned by their peers. A good deal of stock picking skill is needed when playing the game that way because the odds aren't in their favor, and they need to bet big on the right hand to overcome them.

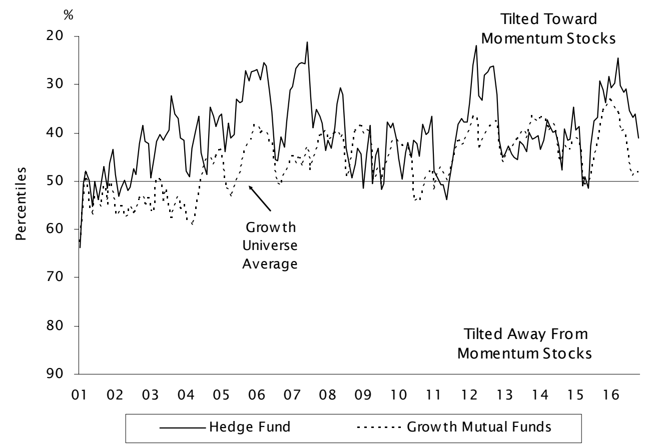
For this final example we analyzed the long exposures of a successful long/short equity hedge fund that typifies the stylistic biases seen throughout the industry. In the charts we compare its attributes to those of growth mutual funds, a stable group that tends to own stocks with the same profile. This fund's positions have typically been among the favorites of other hedge funds, although that's been less the case recenlty (see Exhibit 29). They have strong price momentum, are controversial, and have return histories characterized by high skewness, meaning that much of their performance has come on a few big days (see Exhibits 30 and 31). They're story-driven with valuation support that's generally been unimpressive (see Exhibit 32).

**Exhibit 29: Hedge Fund and a Growth Fund Peer Group
Aggressive Ownership Analysis: Percentiles
2002 Through October 2016**



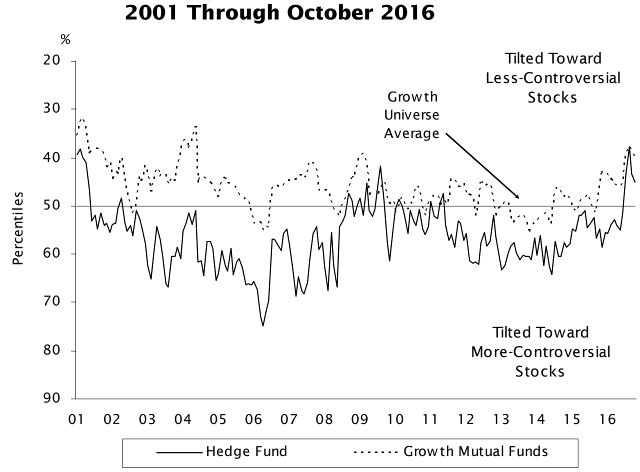

Source: Empirical Research Partners Analysis.

**Exhibit 30: Hedge Fund and a Growth Fund Peer Group
Nine-Month Price Trends Analysis: Percentiles
2001 Through October 2016**



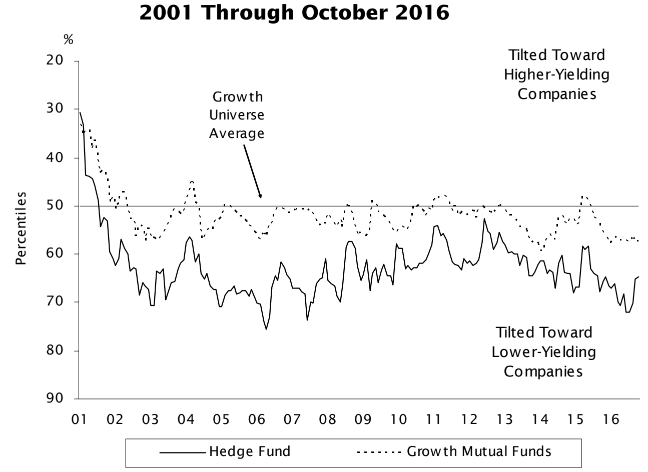

Source: Empirical Research Partners Analysis.

**Exhibit 31: Hedge Fund and a Growth Fund Peer Group
Arbitrage Risk Analysis: Percentiles
2001 Through October 2016**




Source: Empirical Research Partners Analysis.

**Exhibit 32: Hedge Fund and a Growth Fund Peer Group
Gross Cash Flow Yield Analysis: Percentiles
2001 Through October 2016**

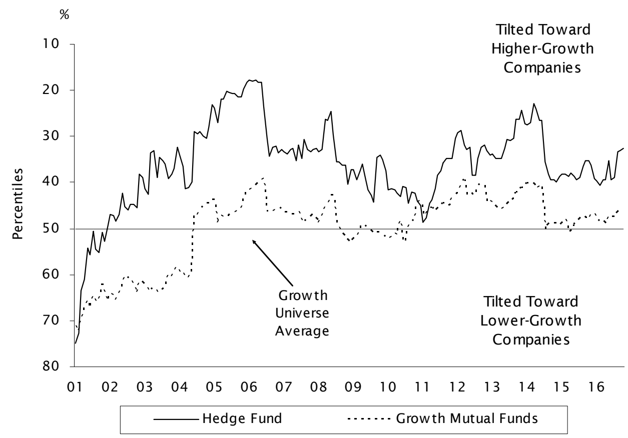



Source: Empirical Research Partners Analysis.

The fund has consistently favored companies with the best top-line trajectories, that reinvest at high rates, issue new shares and as a result rank poorly in our capital deployment framework (see Exhibits 33 and 34). On average around a tenth of its long positions have screened as failure candidates and they've performed poorly, trailing the rest of the portfolio by (16) percentage points per annum (see Exhibit 35).

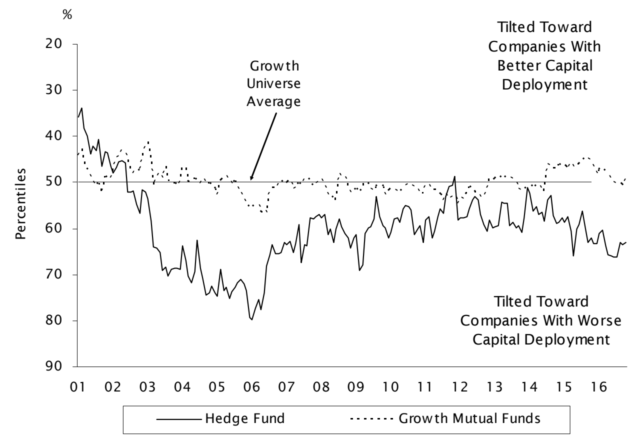
The fund has put up impressive numbers despite being overexposed to characteristics that usually prove problematic to performance (see Exhibit 36). Crowding has mattered to the hedge fund industry because the underlying ecosystem is fragile and depends on catching big-growth stories early and selling them ruthlessly when they falter.

**Exhibit 33: Hedge Fund and a Growth Fund Peer Group Revenue Growth Analysis: Percentiles 2001 Through October 2016**



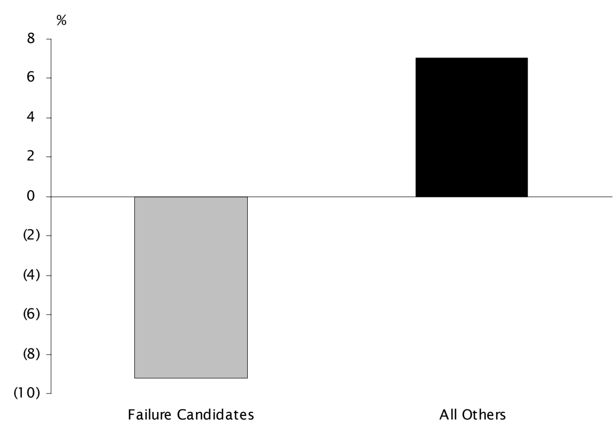

Source: Empirical Research Partners Analysis.

**Exhibit 34: Hedge Fund and a Growth Fund Peer Group Capital Deployment Analysis: Percentiles 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

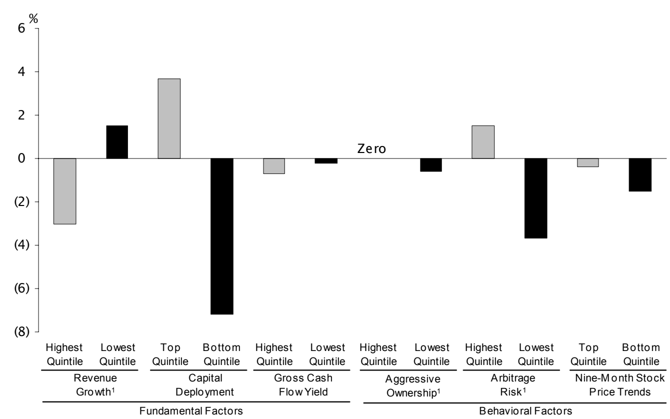
**Exhibit 35: Hedge Fund Holdings Relative Returns to the Failure Model[1] Monthly Data Compounded and Annualized 2001 Through October 2016**




Source: Empirical Research Partners Analysis.

[1]Returns relative to the large-cap growth universe.

**Exhibit 36: Large-Capitalization Growth Stocks Relative Returns to Select Fundamental and Behavior Factors[1] Monthly Data Compounded and Annualized Ten Years Ending 2016**




Source: Empirical Research Partners Analysis.

[1]Returns relative to the large-cap growth universe.

## *Conclusion: Self Awareness is a Virtue*

Analyzing the history of stock selection and portfolio construction decisions is a useful exercise because it utilizes empirical evidence to inform the odds that a given approach will work out over time. While some managers can regularly defy the odds, most cannot. The law of large numbers eventually catches up to most organizations and that's why the quality and consistency of the decision-making process separates the winners from the losers.

Central to this work is the idea that the frameworks we believe in are generators of alpha, and as such there are good and bad exposures. Any assessment of portfolio decision making depends on judgments about how the world works. The rules are not set in stone, that's why the business is so challenging.

If you are interested in learning more about this service, contact your salesperson.