Empirical Research Partners
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June 15, 2022

# Stock Selection: Research and Results June 2022

## *The Failure Model at 18*

*Exploiting Toxic Controversies*

- Our failure models, that look for stocks poised to underperform the market, have been in day-to-day use for more than 18 years. The larger-cap one, that picks from a universe comprised of the top 1,000 issues, has generated (11) percentage points of alpha per annum over that span, and so far this year it's lagged by (28) points, the fifth-best annual result in the last 60 years and the second-best in the last eighteen. The failure candidates are down by (60)% nominally in the last twelve months. The small-cap version, that draws on the next 1,000 issues, has produced (12) points of excess returns per annum and is (23) points behind its benchmark this year. If we average the daily relative returns rather than compound them, the performance deficit in the large-cap market would be (10) points greater and in small-cap it would increase by (7) points. We saw gaps of that sort in the down markets of 2000, 2002 and 2008 too. Both models have generated alpha in more than 60% of all months, with a win rate of nearly 90% in down ones. A little more than 60% of failure candidates have underperformed their benchmark over one-year holding periods, and in no year did a majority of them outperform. These models have about twice the turnover of our other stock selection tools, and as is true for most quantitative approaches the results have been best in earnings reporting periods.
- The premise that underlies our approach has stayed the same over the years: we're looking for situations where expectations are high and there are signs that investors are starting to question the story. We measure the expectations of investors using a variety of valuation gauges, with a focus on gross and free cash flow generation. Those of managements are captured via their capital deployment decisions, with lots of spending and acquisitions signs of what could be overconfidence. We also look for cracks in earnings quality, relying on both traditional accounting measures and 10K/Q disclosures. We combine ten indicators of investor sentiment that capture among other things: unexpected volatility in returns, including that on days the stock is down, Supernovas (i.e., stocks with poor longer-term price trends that have spiked) and negative media sentiment. The failure candidates are typically controversial issues with high arbitrage and downside risk.
- A year ago we added a machine learning algorithm to the failure models, building on the methodologies we had previously incorporated in our other U.S. models. It draws from the building blocks we rely upon, weighting them based on its read of what's proven to be efficacious. The virtue of machine learning is its objectivity, and in the first year of use it's generated more than (31) percentage points of alpha, making it the second-best component of the model. Thus far it's proven to be flexible enough to adapt to changing market circumstances.
- The current failure candidates stand out in that they're unusually highly valued. Two-thirds of them are selling at forward-P/E multiples of 50 times or more, five times the typical share and a representation seen only once before, in 2000. More than 40% of them are losing money this year. They're now priced at six times trailing sales, down from a 16-to-one multiple a year ago. The candidates use stock-based compensation at about four times the rate of the average company. Many of them were revalued upward during the Pandemic, and the bar for revenue growth was raised in that period. What the failure model has picked up on were shifts in the macroeconomic backdrop, the difficulty of the comparisons, and changes in investors' perceptions of the severity of the rate shock.

*Conclusion: An Evolving Technology*

- The premise behind the failure model, that high expectations, optimistic managements and controversy are a toxic brew, dates to the mid-1990s. We still believe in it and over the years we've worked to improve the modeling techniques that we use to execute it. Machine learning looks to be a worthwhile addition to our tool kit. We think that failure is easier to uncover than success, as investors underreact to signals that the stories they're invested in, both literally and psychologically, are threatened. If you are interested in receiving the models' outputs, contact your salesperson.

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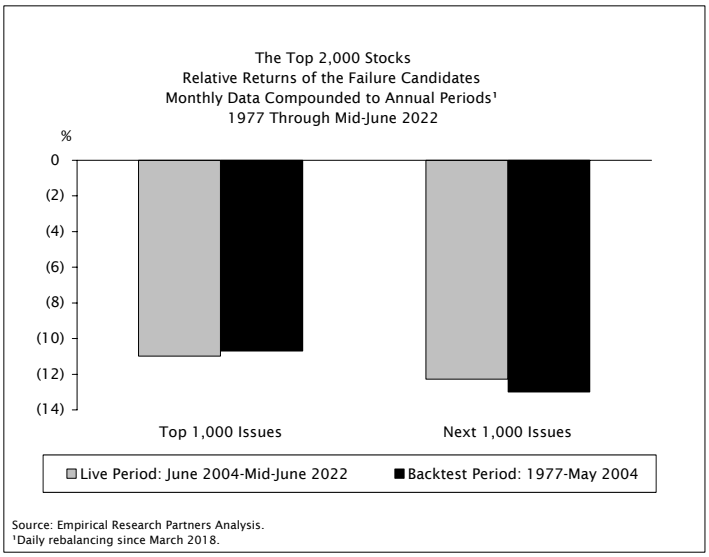
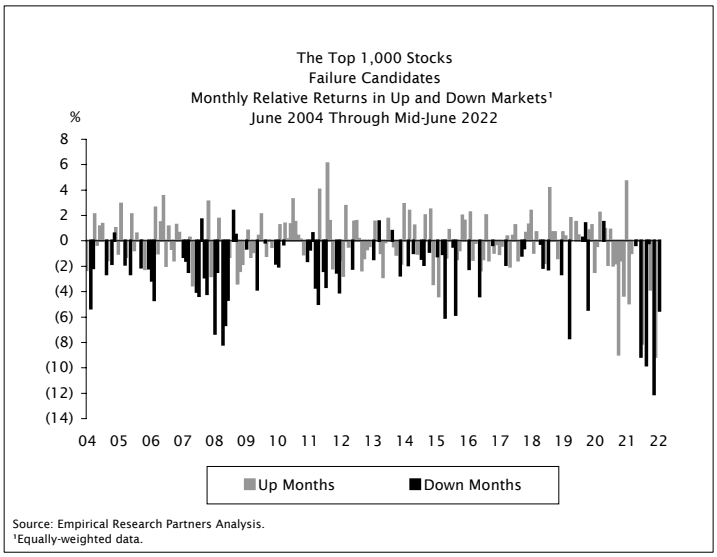
# Conclusions in Brief

- Our failure models have met expectations…



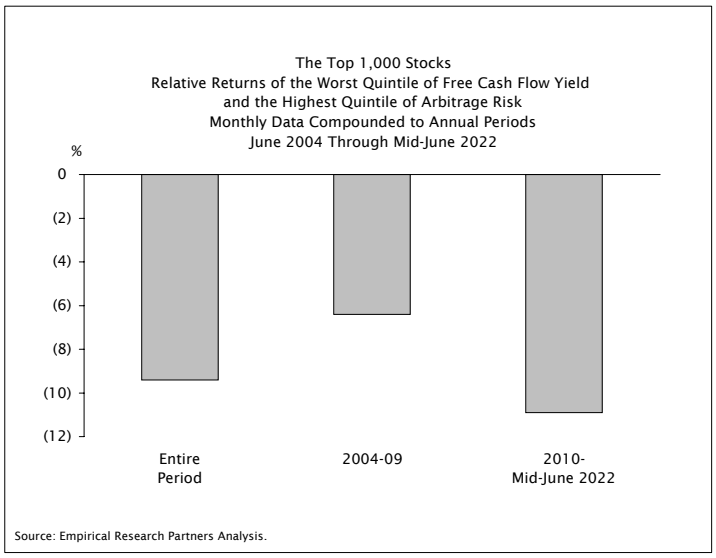

Source: Empirical Research Partners Analysis.
¹Daily rebalancing since March 2018.

- …Protecting capital in down markets:



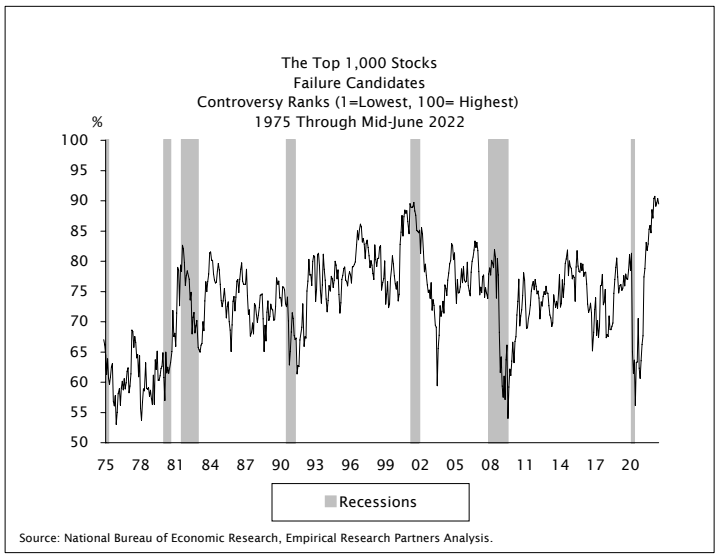

Source: Empirical Research Partners Analysis.
¹Equally-weighted data.

- Dispute in highly-valued stocks is often a problem…



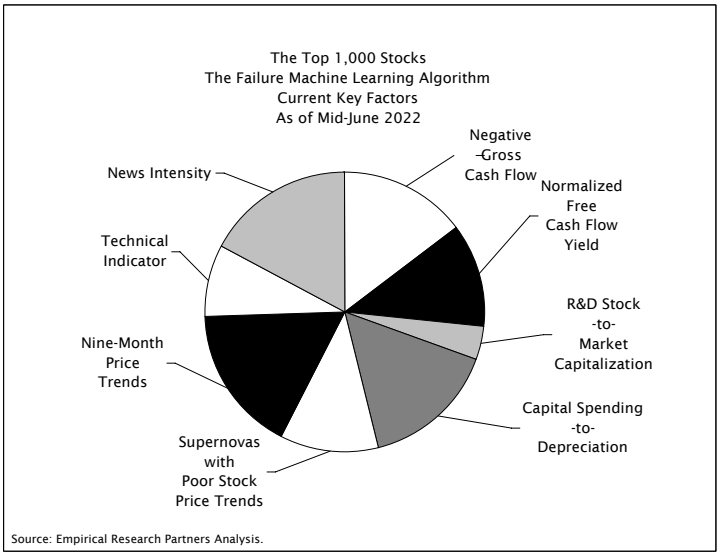

Source: Empirical Research Partners Analysis.

- …And today's candidates are a controversial lot:



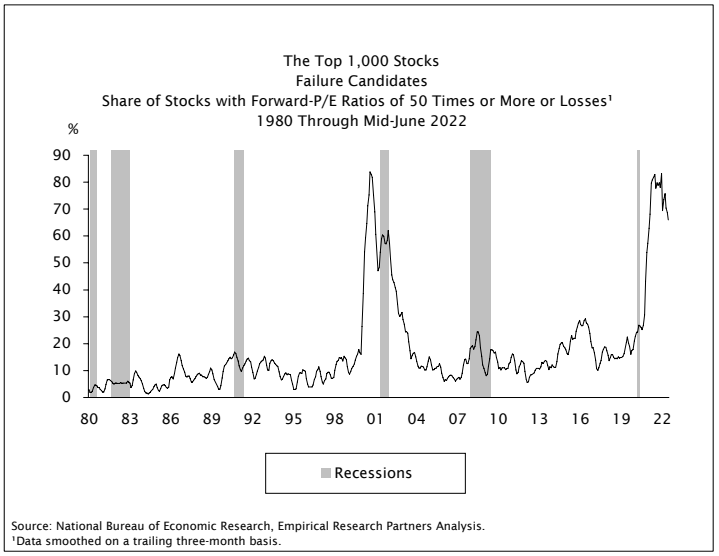

Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

- We've incorporated machine learning into our process:




Source: Empirical Research Partners Analysis.

- The current failure candidates are highly valued:



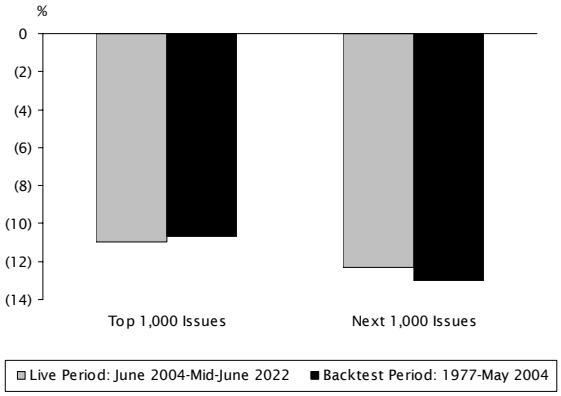

Source: National Bureau of Economic Research, Empirical Research Partners Analysis.
¹Data smoothed on a trailing three-month basis.

## The Failure Model at 18

### *Looking for Winning Odds*

Our failure models, that look for stocks poised to underperform the market, have largely met expectations in 18 years of day-to-day use at Empirical.[1] The larger-cap failure candidates have lagged their universe by (11) percentage points per annum over that span, while the small-cap ones have trailed their benchmark by (12) points (see Exhibit 1). The cap-weighted track records are nearly identical to the equally-weighted ones. Those results are comparable to what our initial backtests had indicated, a better-than-usual outcome. Of course today's very-favorable end point influences our read of performance. By comparison, the *worst* quintile of our core model has lagged its benchmark by (4) to (5) points per annum. The failure models have produced alpha in two-thirds of all months, and as illustrated by the black bars in the chart, they've underperformed in 87% of the months when the market was falling (see Exhibit 2). Just over 60% of the failure candidates have trailed their benchmark in the next year and in no year did a majority of them outperform (see Exhibit 3).

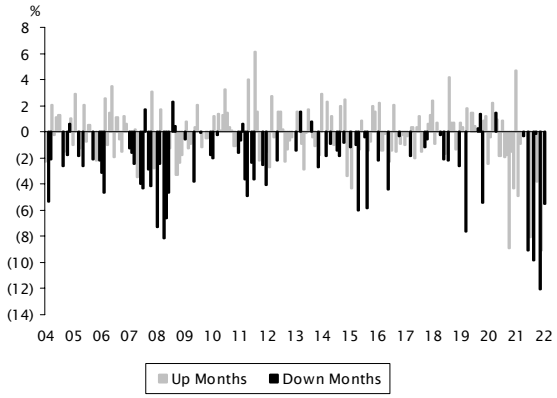
**Exhibit 1: The Top 2,000 Stocks**
**Relative Returns of the Failure Candidates**
**Monthly Data Compounded to Annual Periods[1]**
**1977 Through Mid-June 2022**




Source: Empirical Research Partners Analysis and Estimates.

[1]Daily rebalancing since March 2018.

**Exhibit 2: The Top 1,000 Stocks**
**Failure Candidates**
**Monthly Relative Returns in Up and Down Markets[1]**
**June 2004 Through Mid-June 2022**

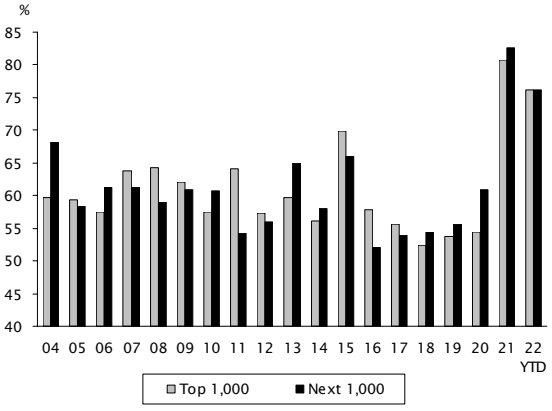



Source: Empirical Research Partners Analysis.

[1]Equally-weighted data.

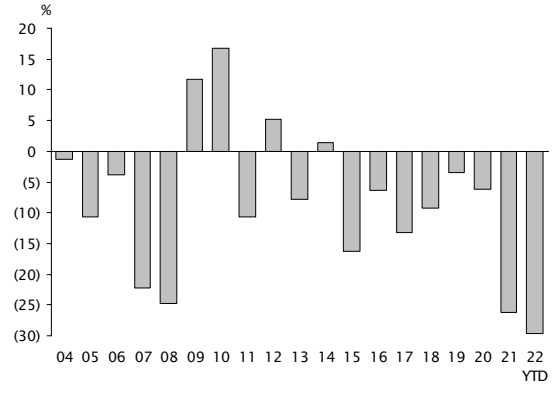
The model can be used as part of a veto strategy in the large-cap world, and the S&P 500 constituents that qualify as failure candidates have lagged the index by about (8) points per annum (see Exhibit 4).

**Exhibit 3: The Top 2,000 Stocks**
**Failure Candidates**
**Share Underperforming by Year**
**Measured Over One-Year Holding Periods**
**June 2004 Through Mid-June 2022**




Source: Empirical Research Partners Analysis.

**Exhibit 4: S&P 500 Failure Candidates**
**Relative Returns by Year[1]**
**Monthly Data Compounded to Annual Periods**
**June 2004 Through Mid-June 2022**




Source: Empirical Research Partners Analysis.

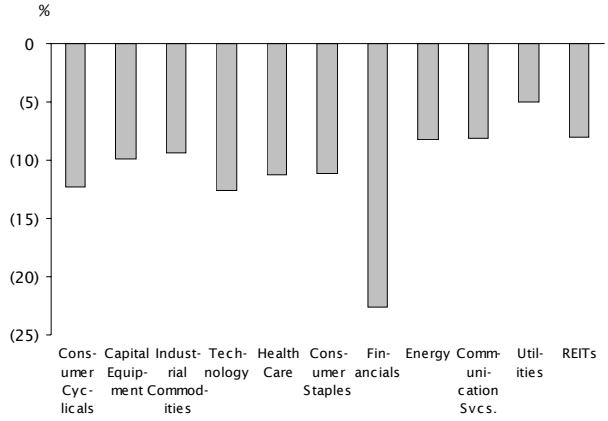
[1]Equally-weighted returns compared to the cap weighted returns of the S&P 500.

[1]*Stock Selection: Research and Results* May 2004. "Avoiding Big Losers – A Systematic Approach."

### *Broad Applicability, Higher Turnover*

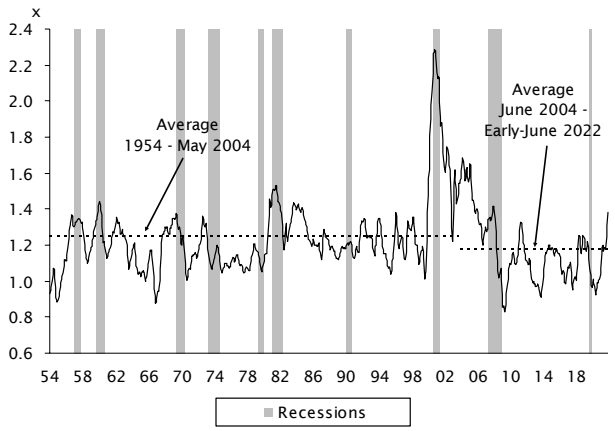
The model has produced alpha in all sectors, with the best results coming in those with more volatile fundamentals (see Exhibit 5). There've been relatively few candidates drawn from the financial sector, nevertheless, there've been some big losers among them. It's not surprising to find that the weakest results have been in the utilities sector. The typical failure candidate has a beta that exceeds that of the average stock in the universe, although in the 18-year period of day-to-day use it's been a bit lower than before (see Exhibit 6).

**Exhibit 5: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Returns by Sector**
**Monthly Data Compounded to Annual Periods**
**June 2004 Through Early-June 2022**




Source: Empirical Research Partners Analysis.

**Exhibit 6: The Top 1,000 Stocks**
**Failure Candidates**
**Beta Relative to That for the Average Stock[1]**
**1954 Through Early-June 2022**

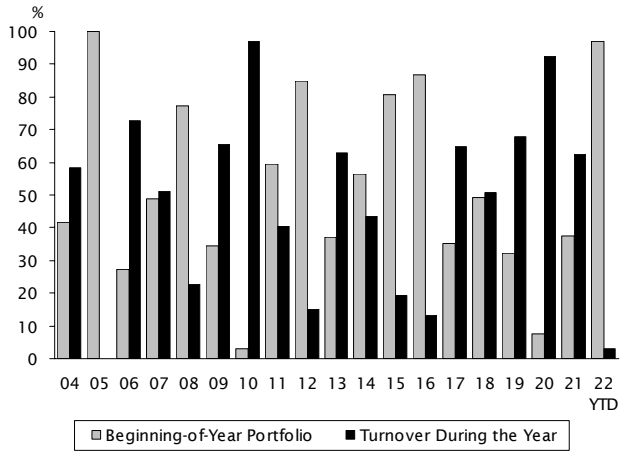



Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

[1]Failure candidates' beta relative to the equally-weighted average for the universe. Data smoothed on a trailing three-month basis.

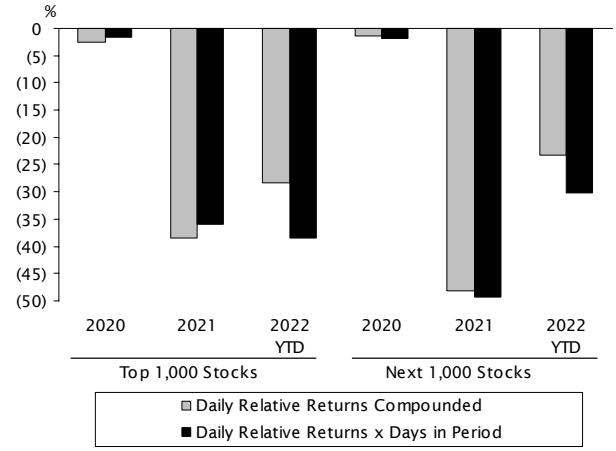
Failure is episodic and typically unfolds more quickly than does success. As a result, the model has higher turnover than do our generalized stocks selection tools. The average candidate stays on the list for six or seven months, although it continues to underperform in the six months thereafter. On average half of the relative returns the model generates in a year are attributable to the beginning-of-year candidates (see Exhibit 7). However, depending on the circumstances, the results can differ widely. For example, a whole new crop of candidates came to the fore during 2020 when the Pandemic produced some dramatic effects, while thus far in 2022 there's been minimal turnover. This year performance was materially better if we average the daily relative returns rather than compound them (see Exhibit 8). That's typical of a down market and we saw something similar in 2000, 2002 and 2008.

**Exhibit 7: The Top 1,000 Stocks**
**Failure Candidates**
**Share of Performance Attributable**
**to the Beginning-of-Year Portfolio**
**and Turnover During the Year**
**June 2004 Through Early-June 2022**




Source: Empirical Research Partners Analysis.

**Exhibit 8: The Top 1,000 and Next 1,000 Stocks**
**Relative Returns of the Failure Candidates**
**Two Alternative Methodologies**
**2020 Through Mid-June 2022**

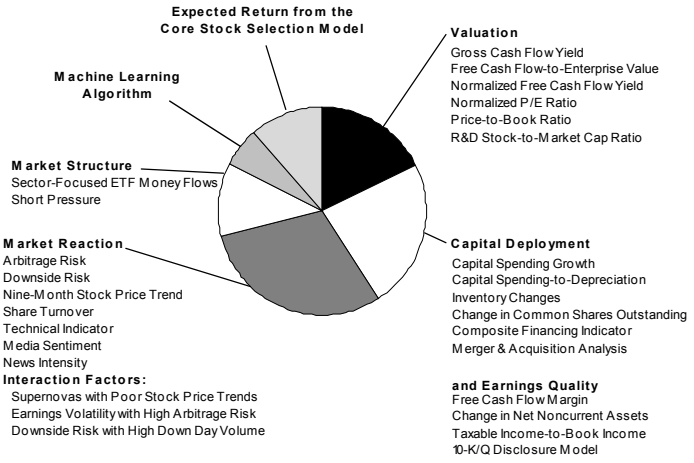



Source: Empirical Research Partners Analysis.

### *Looking for Controversy Where It's Likely to Prove Harmful*

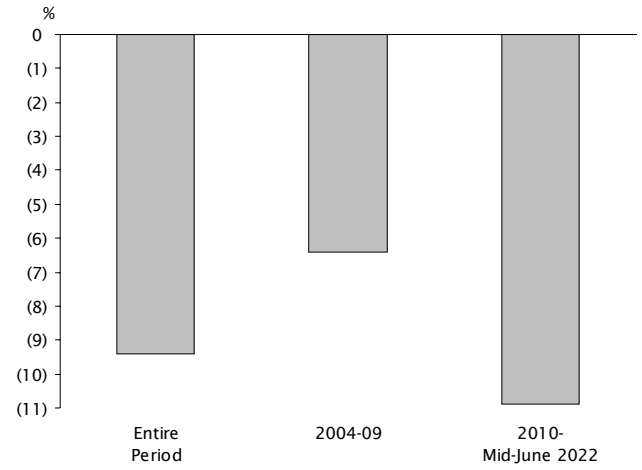
The basic ideas that underpin the approach haven't changed much over the years, but their implementation has evolved a great deal. We're looking for controversy in stocks where the expectations are set high, making it unwelcome. Exhibit 9 lays out the components of the current version of the model. Roughly a third of the model goes to identifying where the controversies lie, as captured via our specialized market reaction framework. There we look for unexplained volatility in a stock's performance (arbitrage risk), underperformance on days it's down (downside risk), and we also draw upon a host of other indicators of vulnerability. We measure expectations through a variety of valuation ratios and capture the confidence of managements too, as expressed in their capital deployment decisions. Earnings quality is taken into account, with an absence of free cash flow in a world that's been awash in it a negative. The combination of little-to-no free cash flow generation and high arbitrage risk has long been an engine of alpha generation (see Exhibit 10). As a group, the failure candidates are controversial stocks, lately more so than usual, and they're rarely defensive in down markets (see Exhibit 11 and 12).

**Exhibit 9: The Failure Model**
**Factor Weights**
**As of Early-June 2022**




Source: Empirical Research Partners Analysis.

**Exhibit 10: The Top 1,000 Stocks**
**Relative Returns of the Worst Quintile of Free Cash Flow Yield and the Highest Quintile of Arbitrage Risk**
**Monthly Data Compounded to Annual Periods**
**June 2004 Through Mid-June 2022**

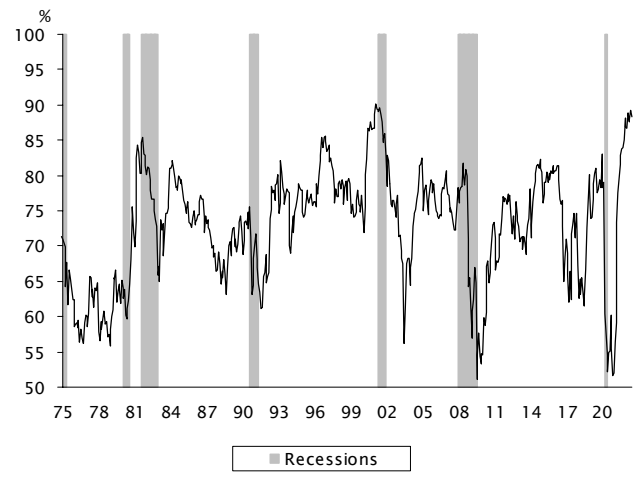



Source: Empirical Research Partners Analysis.

**Exhibit 11: The Top 1,000 Stocks**
**Failure Candidates**
**Controversy Ranks**
**(1=Lowest, 100= Highest)**
**1975 Through Mid-June 2022**


Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

**Exhibit 12: The Top 1,000 Stocks**
**Failure Candidates**
**Downside Risk Ranks[1]**
**(1=Lowest, 100= Highest)**
**1975 Through Mid-June 2022**




Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

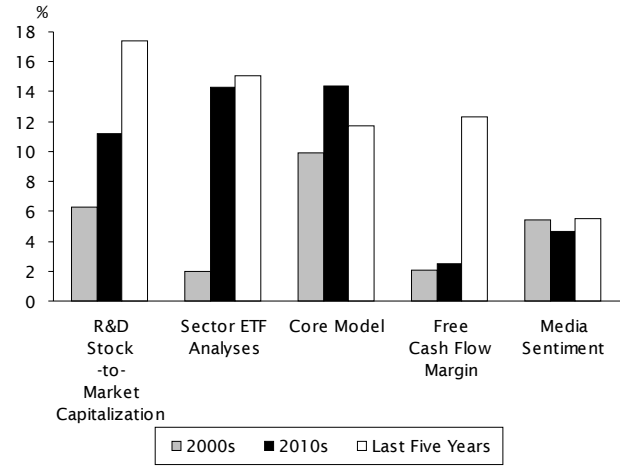
[1]Measured over the past 252 trading days, on days when the stock is declining.

### *Bringing Machine Learning Into the Fold*

A year ago we incorporated machine learning techniques into our failure model. We allow the machine to choose among the quantitative factors that we believe in. Thus far it's added considerable value, despite the wild swings in sentiment that have occurred. The stocks it's pinpointed have lagged the market by more than (31) percentage points in the past year, making it the second-best component of the model. Machine learning has the important virtue of being objective, and it can make us rethink our preconceptions about how the world works.

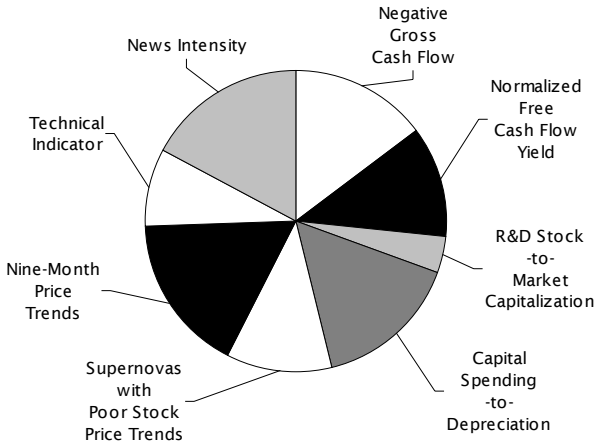
Like the algorithms that are incorporated into our other models, this one had picked up on the constructive relationship between R&D spending and free cash flow generation that's in the last decade been paramount to returns (see Exhibit 13). Flows into sector-focused ETFs, media sentiment and the expected returns of our core model also have figured into its recommendations. The current weightings differ though, and involve looking for capital-intensive companies without cash flow with poor price trends, that are receiving lots of coverage in the media (see Exhibit 14). The algorithm has the toughest time at turning points, when the rules are in flux (see Exhibit 15). Nevertheless, it helps us discriminate among the pool of stocks with failure attributes (see Exhibit 16).

**Exhibit 13: The Top 1,000 Stocks**
**The Failure Machine Learning Algorithm**
**Key Factors**
**2000 Through Mid-June 2022**



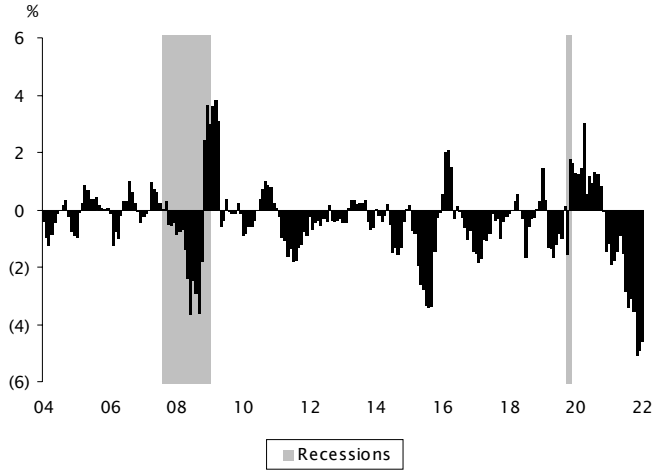

Source: Empirical Research Partners Analysis.

**Exhibit 14: The Top 1,000 Stocks**
**The Failure Machine Learning Algorithm**
**Current Key Factors**
**As of Mid-June 2022**




Source: Empirical Research Partners Analysis..

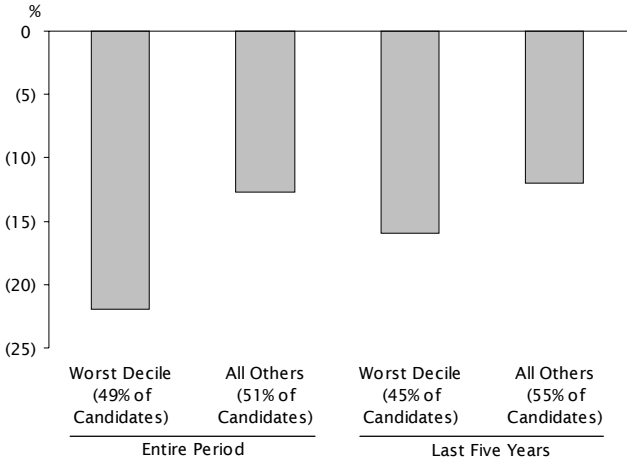
**Exhibit 15: The Top 1,000 Stocks**
**Relative Returns to the Failure Machine Learning Algorithm[1]**
**Measured Over Monthly Periods**
**June 2004 Through Mid-June 2022**




Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

[1]Data smoothed on trailing six-month basis.

**Exhibit 16: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Returns by Machine Learning Score**
**Monthly Data Compounded to Annual Periods**
**1980 Through Early-June 2022**

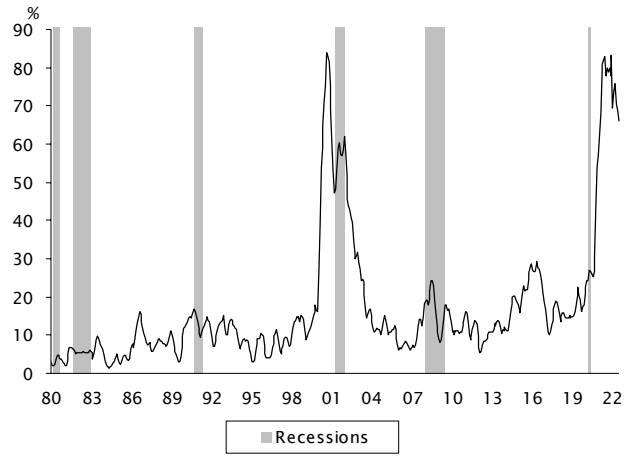



Source: Empirical Research Partners Analysis.

### *The Current Failure Candidates: An Unusual Lot*

The current crop of failure candidates are atypical in that they're valued at very-high P/E multiples, with more than two-thirds of them selling at 50 times or more forecast earnings (see Exhibit 17).

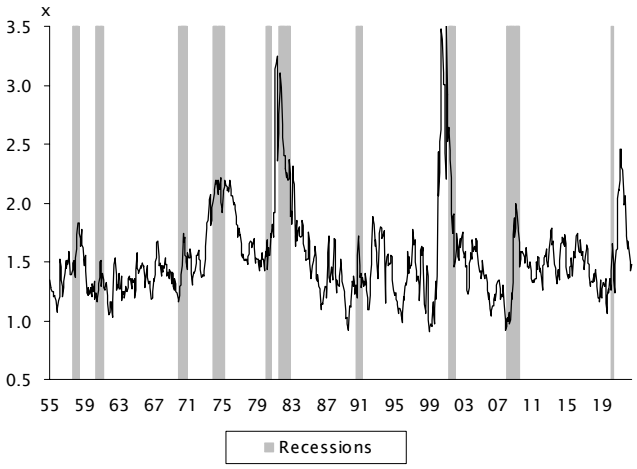
**Exhibit 17: The Top 1,000 Stocks**
**Failure Candidates**
**Share of Stocks with Forward P/E Ratios of 50 Times or More or Losses[1]**
**1980 Through Mid-June 2022**




Source: National Bureau of Economic Research, Bloomberg L.P., Empirical Research Partners Analysis.

[1]Data smoothed on a trailing three-month basis.

**Exhibit 18: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Price-to-Sales Ratios[1]**
**1955 Through Early-June 2022**

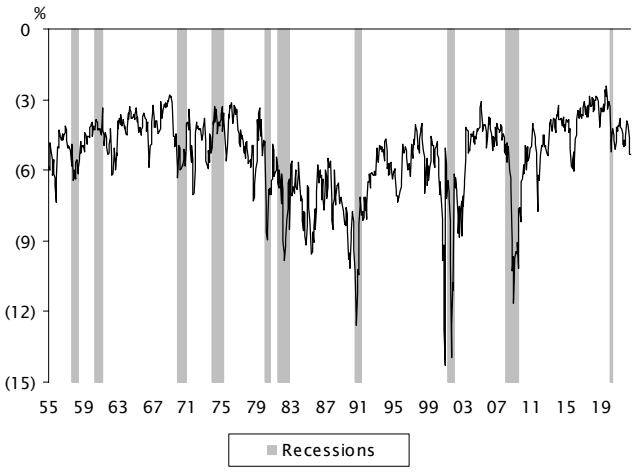



Source: National Bureau of Economic Research, Corporate Reports, Empirical Research Partners Analysis.

[1]Equally-weighted data.

Many of today's candidates were revalued upward in 2020, as their surging top lines and negative real rates came together in a potent manner. Their relative price-to-sales have since returned to earth and their free cash flow yield deficit is back in the normal range (see Exhibits 18 and 19). A significant part of the candidates' revenues go to stock-based employee compensation, with the median ratio to sales around 5.5%, compared to just 1.5% for the market as a whole (see Exhibit 20). Our research on this topic suggests that investors largely ignore that compensation, until something goes wrong. Today the more difficult conditions for raising capital look to be weighing on loss-making companies.

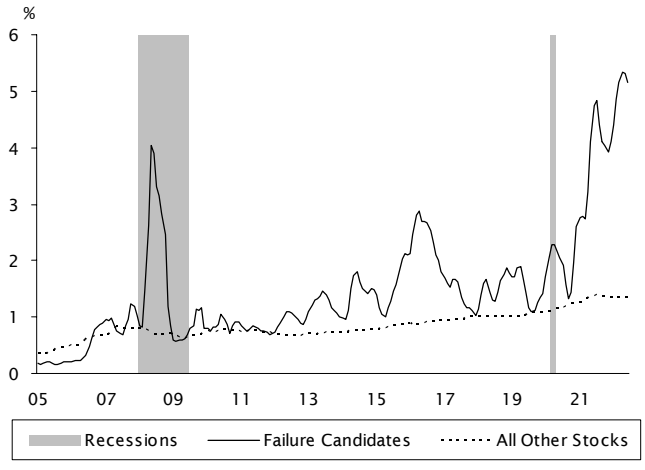
**Exhibit 19: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Free Cash Flow Yields[1]**
**1955 Through Early-June 2022**




Source: National Bureau of Economic Research, Corporate Reports, Empirical Research Partners Analysis.

[1]Equally-weighted data.

**Exhibit 20: The Failure Candidates and All Other Stocks**
**Aggregate Stock-Based Compensation**
**as a Share of Revenues[1]**
**2005 Through Early-June 2022**

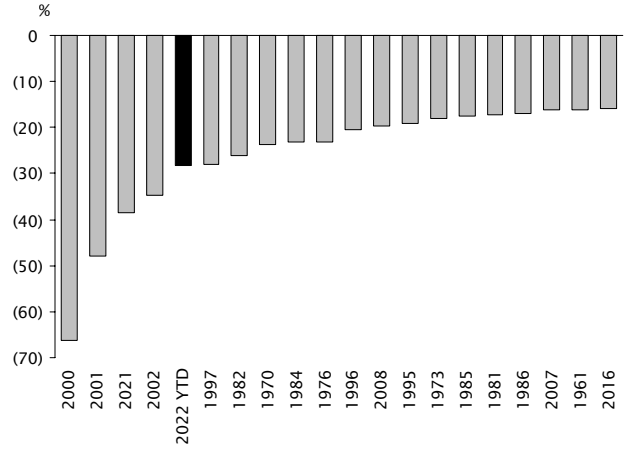



Source: National Bureau of Economic Research, Empirical Research Partners Analysis.

[1]Data smoothed on a trailing three-month basis.

This year the larger-cap failure candidates have lagged their benchmarks by almost (30) percentage points while the deficit for the smaller-cap ones has been (23) points. That is one of the better results of the last 18 years, although it was topped by what happened last year as well as at the turning point of the New Economy era (see Exhibit 21). What we've seen in the last couple of years has followed a similar trajectory to what happened back then (see Exhibit 22). So far in 2022, more than 75% of the candidates have lagged the market, the second-best result in the last 18 years (see Exhibit 23). The current list of failure candidates is overweight in the technology, internet retailing and health care industries (see Exhibit 24).

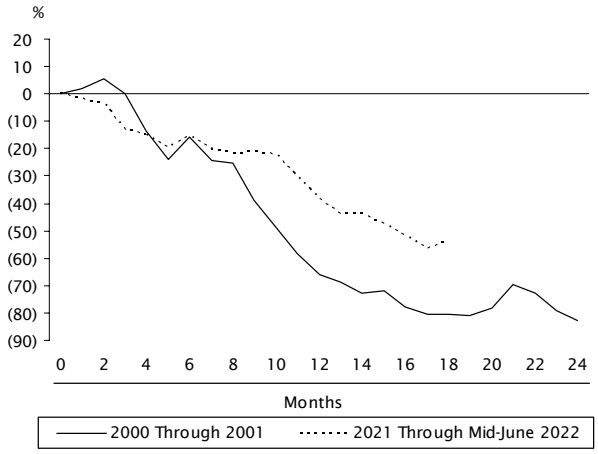
**Exhibit 21: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Returns in the 20 Best Performing Years[1]**
**Sorted from Best to Worst**
**1954 Through Mid-June 2022**




Source: Empirical Research Partners Analysis.

[1]Equally-weighted data.

**Exhibit 22: The Top 1,000 Stocks**
**Failure Candidates**
**Relative Growth of a Dollar[1]**
**2000 Through 2001 and**
**2020 Through Mid-June 2022**



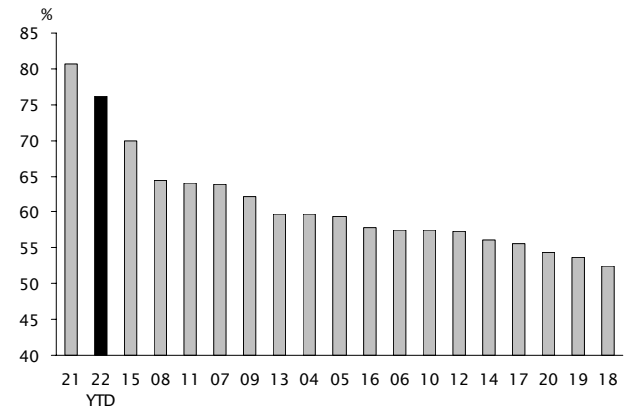

Source: Empirical Research Partners Analysis.

[1]Equally-weighted daily data.

### *Conclusion: Engineering Matters*

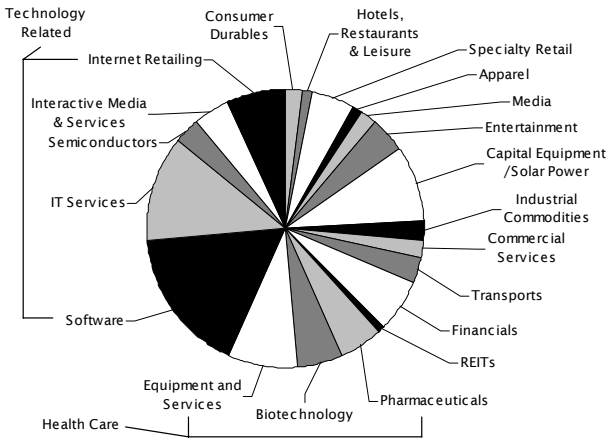
The premise behind the failure model, that high expectations, optimistic managements and controversy are a toxic brew, dates to the mid-1990s. We still believe in it and over the years we've worked to improve the engineering we used to exploit it. So far Machine Learning and Big Data have proven to be valuable additions to our tool kit. So too has the technology we use to bring the disparate factors together. We continue to think that failure is easier to exploit than success, as investors underreact to signals that the stories they're invested in, both literally and psychologically, are threatened. If you are interested in receiving the output of our failure models please contact your salesperson.

**Exhibit 23: The Top 1,000 Stocks**
**Failure Candidates**
**Share Underperforming By Year**
**Sorted from Best to Worst**
**Measured Over One-Year Holding Periods**
**June 2004 Through Mid-June 2022**




Source: Empirical Research Partners Analysis.

**Exhibit 24: The Top 1,000 Stocks**
**Failure Candidates**
**Mix by Industry**
**As of Early-June 2022**




Source: Empirical Research Partners Analysis.