

## Stock Selection: Research and Results September 2018

### *The Failure Model: Adding More Big Data Into the Mix Media Sentiment in the Growth and Small-Cap Worlds*

#### *Using the Media to Better Time Failure*

- We developed a Media Sentiment Indicator that draws upon story-level information from two big data providers to influence entry and exit decisions. The indicator provides a better signal over a month or two than conventional momentum factors. When it's at an extreme it helps us distinguish the losers from the winners among our 100 failure candidates. Media darlings are less likely to fail and we should be more confident if the commentary is vitriolic. On average, media sentiment will source 4% to 5% of the failure model's expected return, making it one thing among many. It improves our short game.
- Another change we're making to the failure model is to add the ratio of capital spending-to-depreciation back into the mix. It was a component of the model in its early years. Large-cap stocks with the highest-decile ratios have underperformed the market by almost (6.5) percentage points per annum over the past 65½ years and by a like amount during the 18 years of the Bretton Woods II era. In a capital-lite world companies needing to spend large sums have chronically found themselves behind the eight ball.

#### *Failure Model Performance Dynamics*

- Our large-cap failure model has underperformed the market by (7) percentage points on both an equally- and cap-weighted basis in more than 14 years of day-to-day use. In recent years the cap-weighted ones have been better than the equally-weighted ones. The key to the model's success has been its win rate and 58% of failure candidates have underperformed. The win rate improves out to holding periods of at least two years, making it a viable tool for investors. The model has generated most of its alpha in down markets and when small-cap stocks were lagging. It performs best when investors are running away from controversies and in value-oriented market regimes.
- The investing environment in April through June of this year was hostile to our failure modeling efforts. The combination of tariff talk, a resolute Fed, a strong Dollar and evidence of a pull forward of capital spending caused investors to bid up controversial stocks with little cash flow and dilution. They were looking for companies that could power through a slowdown. That behavior is consistent with the precedents during Fed tightening episodes. While the model alters its weighting scheme in such settings, so far it's only been able to generate a trivial amount of alpha this year on an equally-weighted basis, although on a cap-weighted basis the deficit has been just shy of (6) percentage points. The latest revisions to the model would have improved the equally-weighted result by about (150) basis points and the cap-weighted one by more than twice that amount.

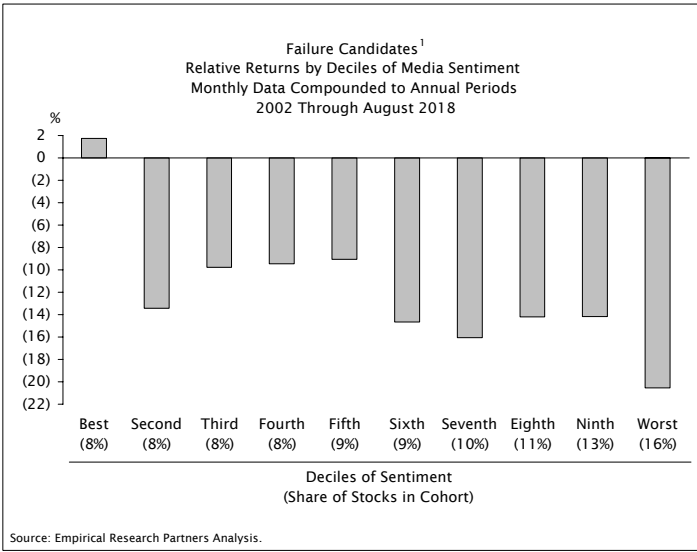
#### *Media Sentiment: More Helpful in Growth and Small-Cap*

- Clients have asked whether paying attention to media sentiment is more helpful in the growth and small-cap arenas than in the large-cap market as a whole. What we found was that the returns in small-cap were marginally better than those in large-cap, similar to what we observed in developed markets outside the U.S. The advantage is greater in the growth world, where the stakes are always high and everything matters. The weight accorded to media sentiment in that model reflects that advantage.

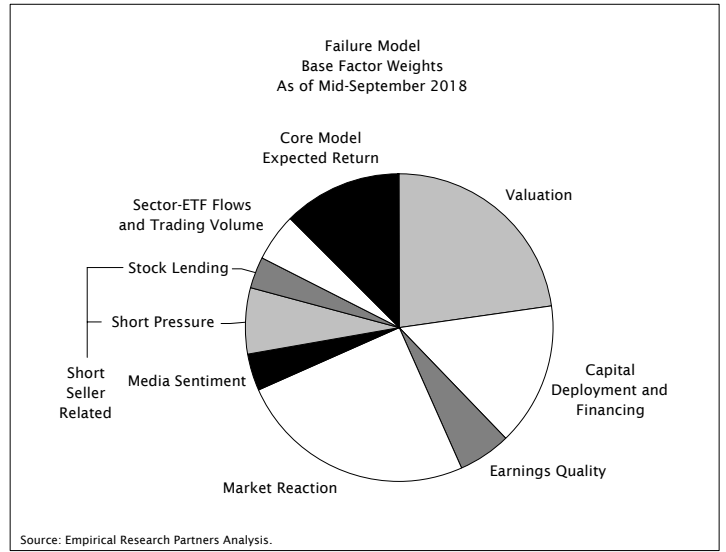
Sungsoo Yang (212) 803-7925 Yi Liu (212) 803-7942 Yuntao Ji (212) 803-7920 Longying Zhao (212) 803-7940 Janai Haynes (212) 803-8005

## Conclusions in Brief

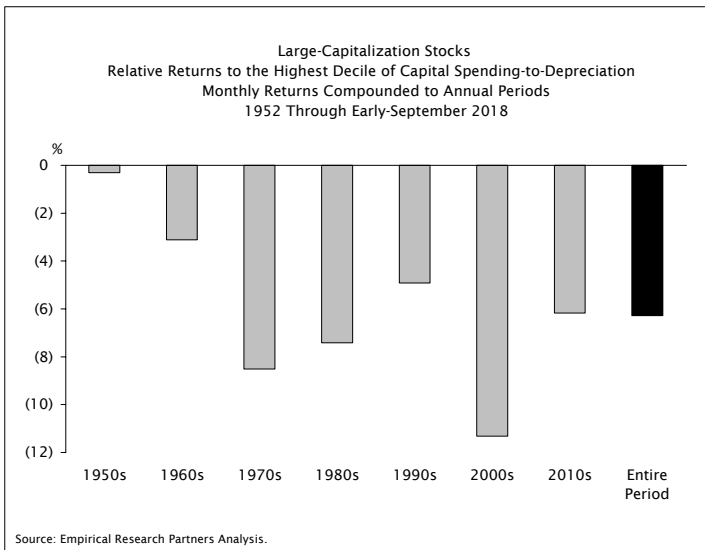
- Sentiment drawn from media sources helps us distinguish among failure candidates...



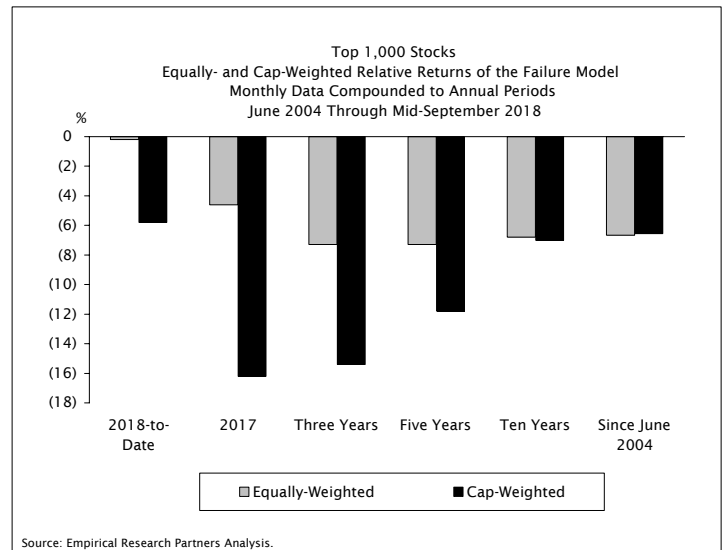
- ...And we're incorporating our Media Sentiment Indicator into our failure model:



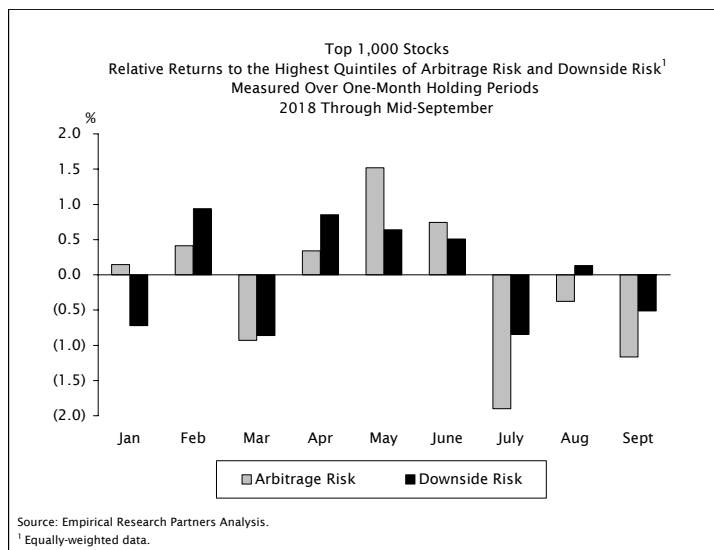
- We're also penalizing very capital-intensive businesses:



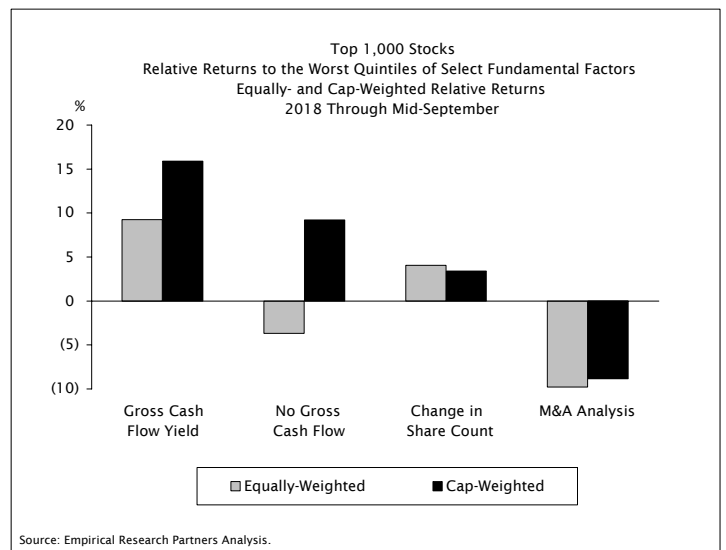
- The failure model has a good record:



- This year the environment has been challenging...



- ...As stocks with little gross cash flow have led:



## The Failure Model: Adding More Big Data Into the Mix

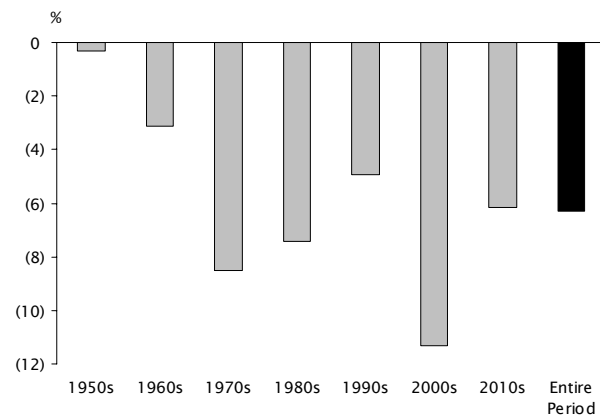
### Improving Our Read of the Mood of the Crowd

We've been investigating the world of Big Data for some time now, looking for datasets that have broad applicability for equity managers. So far we've found a couple that fit the bill. The first captures the activity of short sellers, drawing upon daily data provided by stock lending agents. It measures the supply/demand balance for stock borrows as well as the cost to borrow. Stocks in high demand tend to underperform, over both the next quarter and the next year.

The second type of Big Data that's promising involves monitoring the media - both traditional outlets, like Dow Jones, and social media, like Twitter and the blogs - trying to get a handle on sentiment. We found that when used in tandem, signals from RavenPack and MarketPsych, two leading vendors, can improve our decisionmaking.<sup>1</sup> The Media Sentiment Indicator we created, that draws upon story-level information, tells us something we didn't already know from other factors that have a momentum character. It's most helpful over a month or two and thereafter the signal comes to resemble that gleaned from stock price trends. Eventually the news is out.

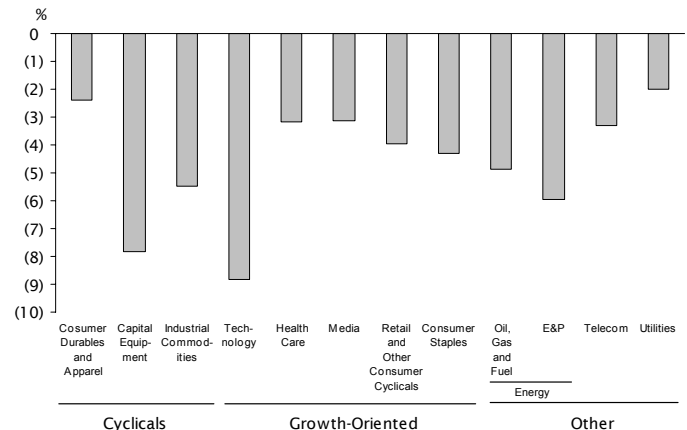
We added a short pressure indicator to our failure models earlier this year and in this research we examine whether media sentiment makes the cut. We're also revisiting a longstanding issue in failure modeling, exploiting capital-intensive business models. In early versions of the model we penalized companies with high ratios of capital spending-to-depreciation, figuring their fixed cost burdens would weigh upon the stocks when fundamentals took a turn for the worse. We think there's good reason to bring that idea back into the fold as in a capital-lite world companies that need to invest at a high rate have found themselves behind the eight ball and have chronically trailed the market. That's been true in the Bretton Woods II era of the 2000s too, and the penalty has been greatest in the sectors most exposed to globalization, such as technology and industrial capital goods (see Exhibits 1 and 2). Protectionism aside, we think that that's still the reality, and in the failure model we're replacing the price-to-book ratio with one that compares capital spending to depreciation.

**Exhibit 1: Large-Capitalization Stocks**  
**Relative Returns to the Highest Decile of**  
**Capital Spending-to-Depreciation**  
**Monthly Returns Compounded to Annual Periods**  
**1952 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

**Exhibit 2: Large-Capitalization Stocks**  
**Relative Returns to the Highest Decile of**  
**Capital Spending-to-Depreciation by Sector**  
**Monthly Returns Compounded to Annual Periods**  
**1952 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

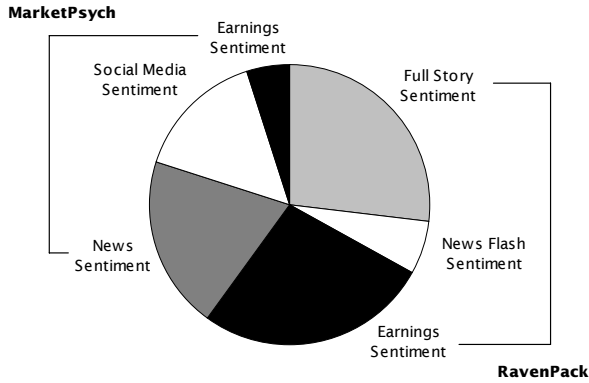
### Incorporating Media Sentiment into the Failure Model

Turning to media sentiment, we developed an indicator that draws upon data provided by RavenPack and MarketPsych that's designed to provide a picture of the mindset surrounding each stock (see Exhibit 3). We found that it was worthwhile getting into the weeds here and details about the type of news reporting did matter. The indicator produces some alpha on its own, but given its turnover it's not a world-beater (see Exhibit 4). One virtue it does possess is that it tells us something about a stock's near-term outlook that the price action does not, and when looking for failure candidates that's valuable (see Exhibit 5). When we sort our hundred failure candidates by our sen-

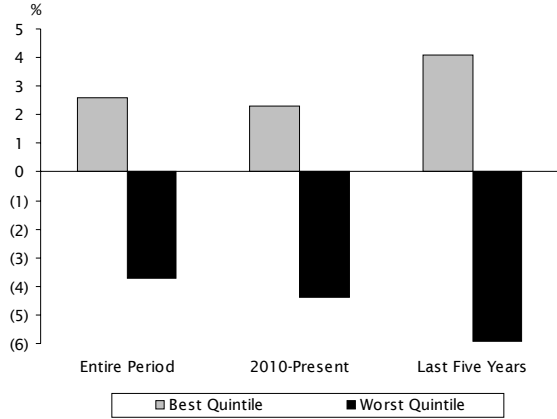
<sup>1</sup>Stock Selection: Research and Results August 2018. "Big Data: Harnessing News and Social Media to Improve Our Timing."

timent indicator we find that those with the most-favorable media coverage, that rank in the top decile, 8% of the universe, outperformed, while those in the bottom one lagged by more than (20) percentage points (see Exhibit 6). In the other eight buckets the inclusion of sentiment didn't change our view of things very much.

**Exhibit 3: Media Sentiment Indicator Target Factor Weights As of September 2018**



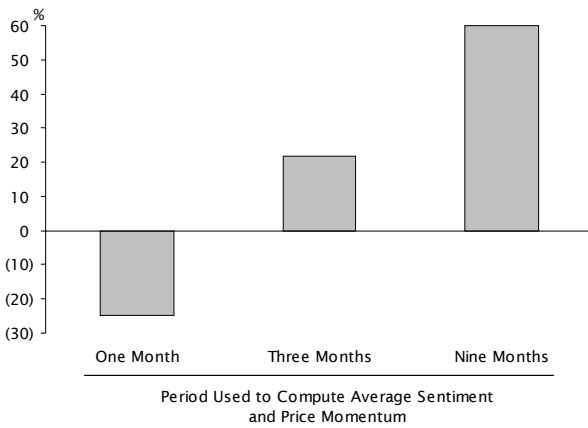
**Exhibit 4: Top 1,000 Stocks Relative Returns to the Best and Worst Quintiles of Media Sentiment Monthly Data Compounded to Annual Periods 2002 Through Early-September 2018**



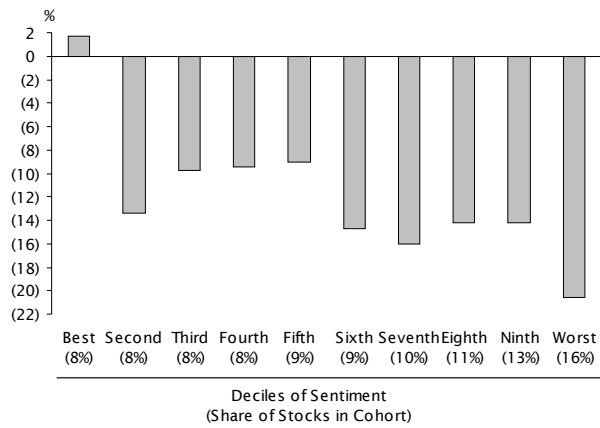
Source: RavenPack, MarketPsych, Empirical Research Partners Analysis.

Source: Empirical Research Partners Analysis.

**Exhibit 5: Top 1,000 Stocks Correlation of Relative Returns Between the Best Quintiles of Media Sentiment and the Equivalent Price Momentum Measure 2002 Through August 2018**



**Exhibit 6: Failure Candidates<sup>1</sup> Relative Returns by Deciles of Media Sentiment Monthly Data Compounded to Annual Periods 2002 Through August 2018**



Source: Empirical Research Partners Analysis.

Source: Empirical Research Partners Analysis.

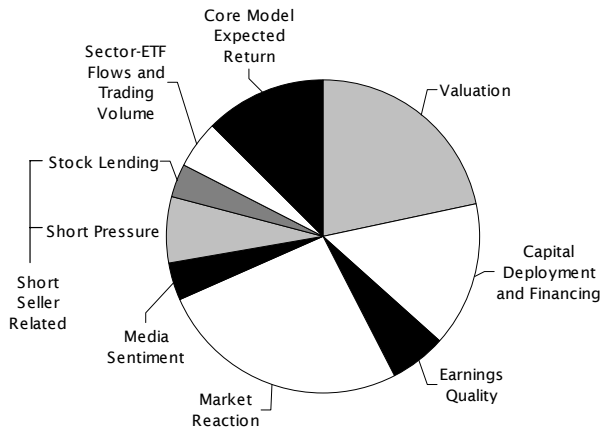
<sup>1</sup>100 failure candidates drawn from the largest 1,000 stocks.

The signal from our media sentiment indicator will on average comprise 4% to 5% of the expected return of the failure model, compared to 25% for the other components that capture market reaction (see Exhibit 7). That framework combines eight inputs that assess not only stock price movements but importantly, the context in which they're occurring. The weight put on media sentiment is comparable to that accorded to analyses of the money flows and trading volume of sector-focused ETFs, that we employ in a contrarian fashion. The emphasis put on each of the model's 29 factors varies by market regime, with more focus accorded to media sentiment in growth-oriented ones, the current state of affairs.

We estimate that the addition of media sentiment to the failure model should add about +60 basis points to its annual expected return (see Exhibit 8). The share of failure candidates that underperform the universe should improve by about half a point. The inclusion of the capital spending-to-depreciation ratio at an average 3% weight should add a like amount to expected returns.

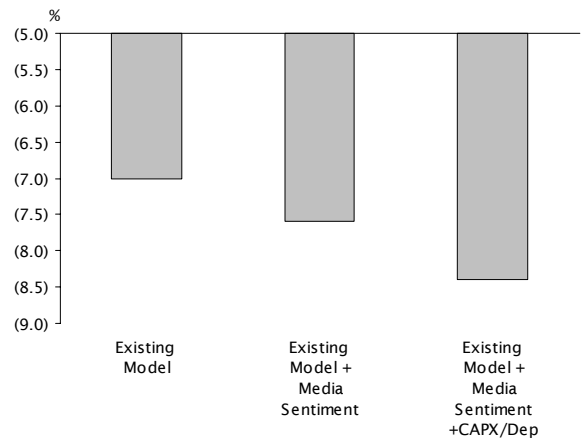
The turnover of the updated model isn't materially different from its predecessor with an annual number of 67%.

**Exhibit 7: Failure Model  
Base Factor Weights  
As of Mid-September 2018**



Source: Empirical Research Partners Analysis.

**Exhibit 8: Top 1,000 Stocks  
Relative Returns of Failure Candidates  
Before and After Model Updates  
Monthly Data Compounded to Annual Periods  
2002 Through August 2018**

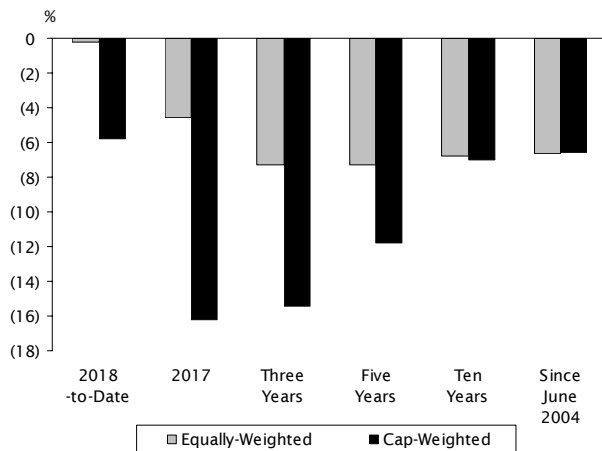


Source: Empirical Research Partners Analysis.

### Failure Model Performance Dynamics

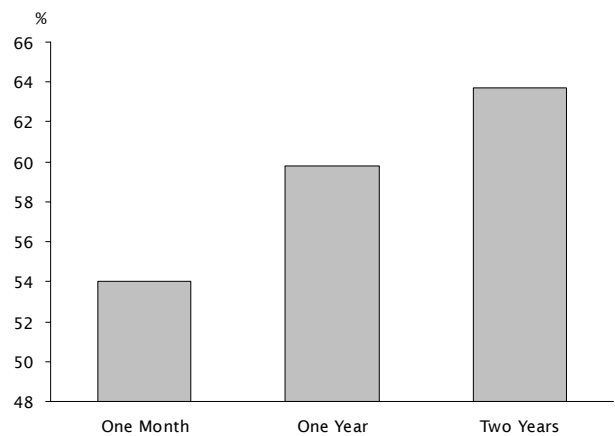
Our large-cap failure model, that identifies 100 candidates drawn from among the top 1,000 issues, has generated (7) percentage points of alpha per annum in the last 14+ years of day-to-use (see Exhibit 9). The equally- and cap-weighted numbers have been virtually identical, although in recent years the cap-weighted ones have been considerably better. What's made the model work is its win rate, and over the entire span about 58% of failure candidates have underperformed the market over a one-year holding period (see Exhibit 10). One desirable characteristic of the model is that the odds of underperformance improve as the holding period is extended out to at least 2 years. That's why it's a useful tool for investors.

**Exhibit 9: Top 1,000 Stocks  
Equally- and Cap-Weighted Relative Returns  
of the Failure Model  
Monthly Data Compounded to Annual Periods  
June 2004 Through Mid-September 2018**



Source: Empirical Research Partners Analysis.

**Exhibit 10: Top 1,000 Stocks  
Share of Failure Candidates Underperforming  
Measured Over Various Holding Periods  
June 2004 Through Mid-September 2018**



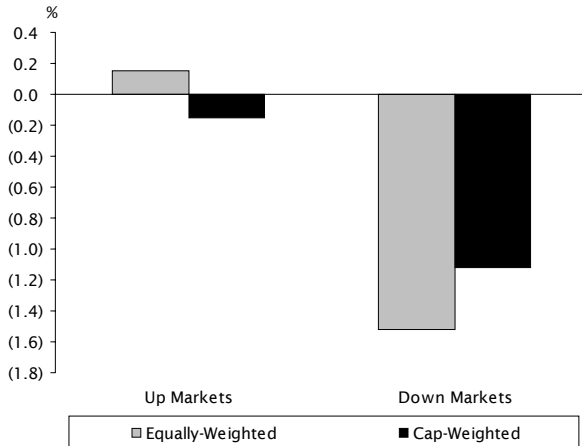
Source: Empirical Research Partners Analysis.

The model was designed to protect capital in down markets and that's the way it's worked out. In up markets it's produced benchmark-like returns while generating substantial alpha in down ones (see Exhibit 11). It has a small-cap bias and it performs better when those issues are lagging (see Exhibit 12).

Two concepts that are important in its design are arbitrage and downside risk. The first gauges controversy, measuring a stock's non-systematic risk after accounting for its beta over three months. If its not acting like itself that's a sign that something is going on, and if the expectations are high enough, that something is more likely to turn out to be bad than good. Downside risk measures the stock's volatility on days when it underperformed and it represents a different take on dispute. The failure model works best when investors are fleeing from arguments (see Exhibit

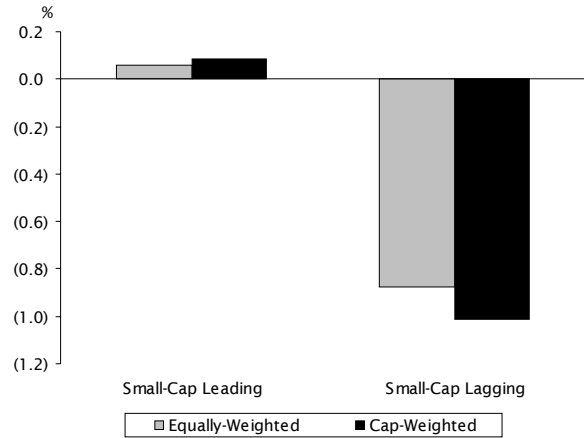
13). This year from April through June they did the opposite and embraced them as a hawkish Fed and the harsh rhetoric on trade pushed them toward stories thought to be able to power through any economic hiccups (see Exhibit 14). What we've seen is consistent with the precedents of earlier tightening episodes (see Exhibit 15).

**Exhibit 11: Top 1,000 Stocks**  
**Relative Returns of the Failure Model**  
**in Up and Down Markets**  
**Measured Over One-Month Holding Periods**  
**June 2004 Through Early-September 2018**



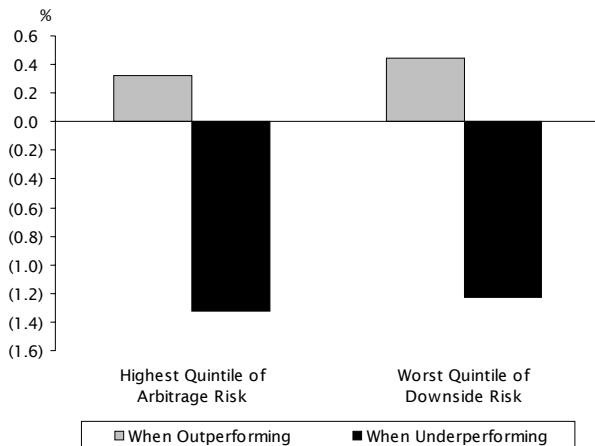
Source: Empirical Research Partners Analysis.

**Exhibit 12: Top 1,000 Stocks**  
**Relative Returns of the Failure Model Depending**  
**on the Performance of Small-Cap Stocks**  
**Measured Over One-Month Holding Periods**  
**June 2004 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

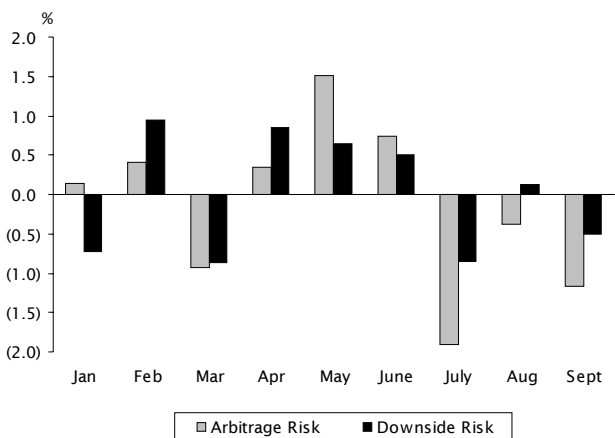
**Exhibit 13: Top 1,000 Stocks**  
**Relative Returns of the Failure Model<sup>1</sup>**  
**When High Arbitrage Risk and Downside Risk Stocks**  
**are Out- or Under-Performing**  
**Measured Over One-Month Holding Periods**  
**June 2004 Through Mid-September 2018**



Source: Empirical Research Partners Analysis.

<sup>1</sup>Equally-weighted data.

**Exhibit 14: Top 1,000 Stocks**  
**Relative Returns to the Highest Quintiles of**  
**Arbitrage Risk and Downside Risk<sup>1</sup>**  
**Measured Over One-Month Holding Periods**  
**2018 Through Mid-September**



Source: Empirical Research Partners Analysis.

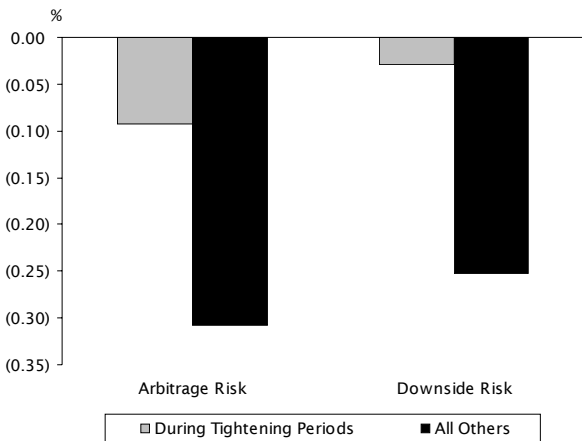
<sup>1</sup>Equally-weighted data.

The failure model generally performs best in value regimes and it faces the stiffest headwinds in growth-tilted ones (see Exhibit 16). We've experienced the latter setting for much of the last couple of years. That's because stocks with high expectations often fare poorly during recoveries, while they lead when the desire for top-line growth, from any source, has heated up.

We investigated the seasonality of the model's returns and found that it's performed best when the optimistic assumptions that usually underpin estimates were being rethought, most often in August, and it's done worst in December, when attention turns to the next year and hope springs eternal (see Exhibit 17).

In the past 14 years the failure model has added value in every sector, save telecom services, with the greatest alpha in the financial sectors and the least in utilities (see Exhibit 18). We see those results as a function of this era, that included a financial debacle and a bull market in bonds.

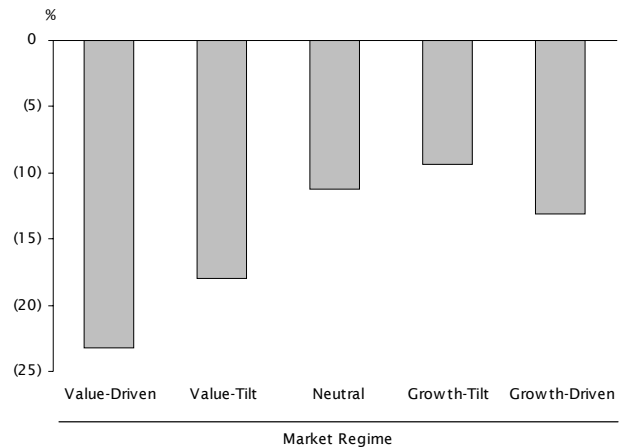
**Exhibit 15: Top 1,000 Stocks**  
**Relative Returns to the Highest Quintiles of Arbitrage Risk and Downside Risk<sup>1</sup> During Tightening Periods and All Others Measured Over One-Month Holding Periods 1954 Through Mid-September 2018**



Source: Federal Reserve Board, Empirical Research Partners Analysis.

<sup>1</sup>Equally-weighted data.

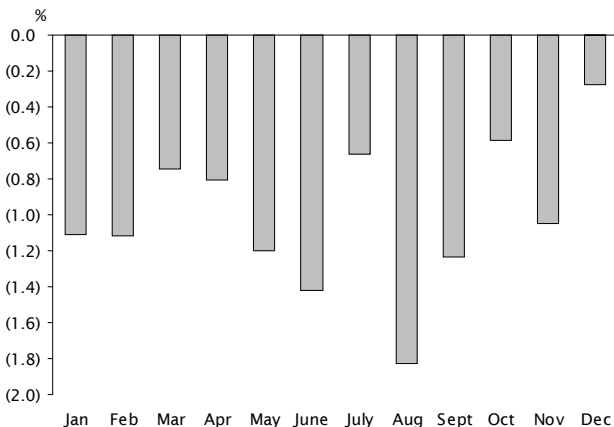
**Exhibit 16: Top 1,000 Stocks**  
**Relative Returns of the Failure Model by Regime<sup>1</sup> Monthly Data Compounded to Annual Periods 1954 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

<sup>1</sup>Equally-weighted data.

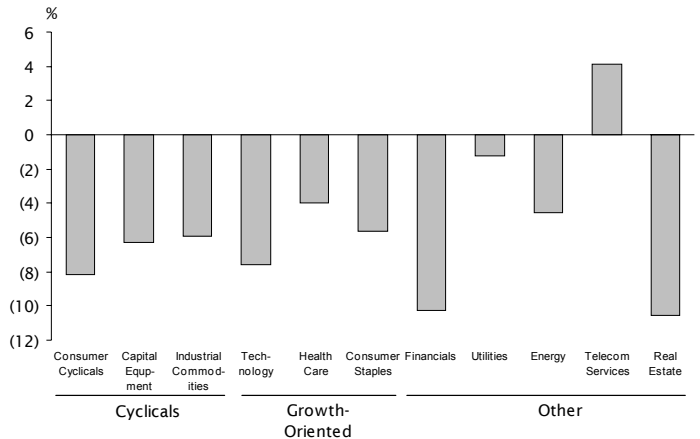
**Exhibit 17: Top 1,000 Stocks**  
**Relative Returns of the Failure Model by Month<sup>1</sup> Measured Over One-Month Holding Periods 1952 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

<sup>1</sup>Equally-weighted data.

**Exhibit 18: Top 1,000 Stocks**  
**Relative Returns of the Failure Model by Sector Monthly Returns Compounded to Annual Periods June 2004 Through Mid-September 2018**



Source: Empirical Research Partners Analysis.

### What's Happened So Far in 2018

The failure model has faced headwinds this year as the market's focus has been singularly on growth as the tightening campaign by the Fed has made investors fear that a stumble is inevitable. Exhibit 19 presents its monthly relative returns on an equally- and cap-weighted basis. The environment was most hostile in April through June, the period during which the trade war with China heated up. As shown in Exhibit 14, during that span controversy was a virtue, a fairly rare state-of-affairs.

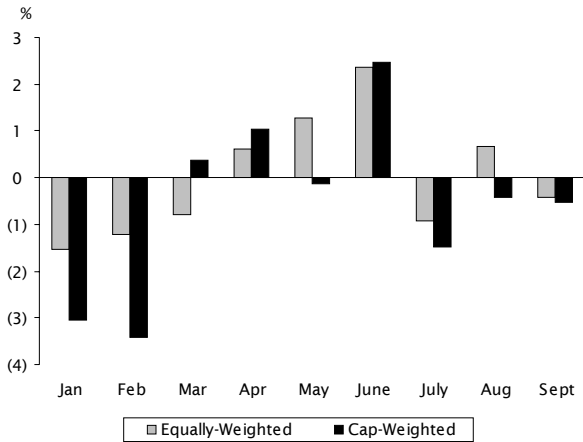
Over the long run the best valuation measure when looking for shorts has been gross cash flow yield, and stocks without any gross cash flow have proved particularly vulnerable. This year though companies with low yields have been bid up, while those with no gross cash flow have once again lagged (see Exhibit 20). That too is consistent with the pattern seen during other tightening episodes (see Exhibit 21). Dilution hasn't been a burden, although acquirers doing destructive deals have lagged by the normal amount.

The more technical components of the model have added to returns, but by somewhat less than usual (see Exhibit 22).

**Conclusion: Marching Forward**

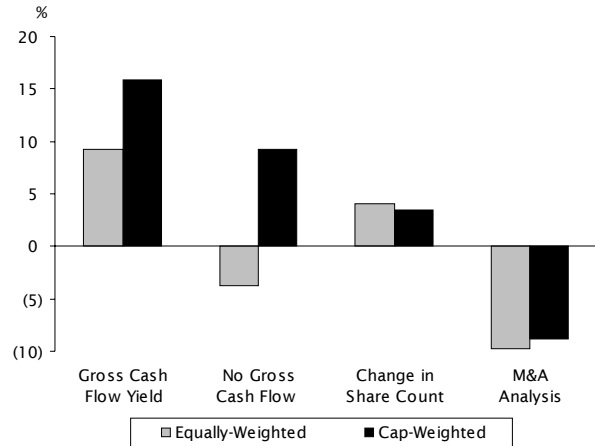
We see modeling as a long trek, not a sprint. A year ago we comprehensively revised to the failure model by adding a regime feature and one exploiting supernovas (i.e., stocks with pops likely to reverse), incorporating an M&A-penalty module and tweaking a number of our fundamentally-focused frameworks. In the intervening year the revised version has outperformed its predecessor by almost +600 basis points on an equally-weighted basis and +500 basis points on a cap-weighted one. Most of the changes we made have proved to be helpful, with the addition of the M&A module the best of the lot.

**Exhibit 19: Top 1,000 Stocks Monthly Relative Returns of the Failure Model<sup>1</sup> 2018 Through Mid-September**



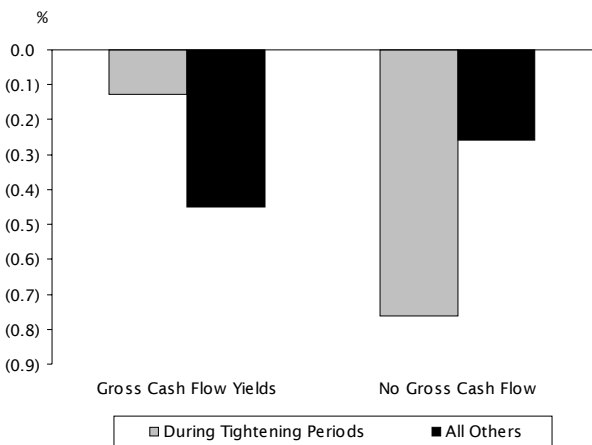
Source: Empirical Research Partners Analysis.

**Exhibit 20: Top 1,000 Stocks Relative Returns to the Worst Quintiles of Select Fundamental Factors Equally- and Cap-Weighted Relative Returns 2018 Through Mid-September**



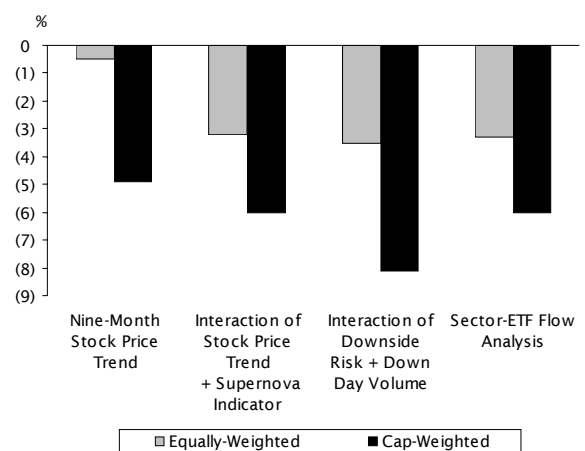
Source: Empirical Research Partners Analysis.

**Exhibit 21: Top 1,000 Stocks Relative Returns to the Worst Quintile of Gross Cash Flow Yields and Those with No Gross Cash Flow<sup>1</sup> During Tightening Periods and All Others Measured Over One-Month Holding Periods 1954 Through Mid-September 2018**



Source: Federal Reserve Board, Empirical Research Partners Analysis.

**Exhibit 22: Top 1,000 Stocks Relative Returns to the Worst Quintiles of Select Market Reaction and Market Structure Factors Equally- and Cap-Weighted Relative Returns 2018 Through Mid-September**



Source: Empirical Research Partners Analysis.

<sup>1</sup>Equally-weighted data.

We're hoping that the more modest changes we're making now will add to returns by bringing us a different perspective on short-term sentiment. On a pro-forma basis the inclusion of media sentiment would have generated an additional +150 basis points of alpha this year, as the setting has been ripe for its use. Appendix 1 beginning on page 10 presents a summary report listing the 100 failure candidates identified by the revised model, with a dozen of them new to the list. The new additions, that are identified by two asterisks, don't change the sector exposures much. The number of stocks drawn from industrial commodities, energy and health care are down a bit, while the counts in consumer cyclicals, staples and financials are up.

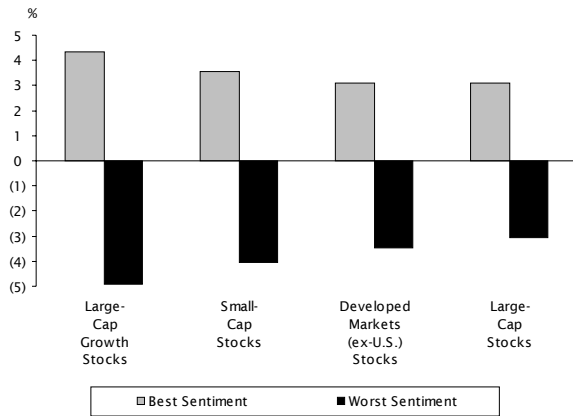


## Media Sentiment: More Helpful in Growth and Small-Cap

### Greater Stakes, Less Info

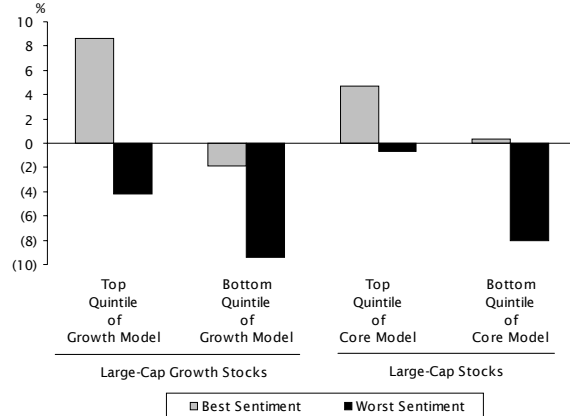
Clients have asked if our Media Sentiment Indicator is more or less powerful in the growth and small-cap arenas than in the large-cap market as a whole. The answer is yes, because in the first case the stakes are greater while in the second one information is scarcer. Even so, the differentials in performance are modest. Exhibit 23 presents the relative returns of stocks in the top and bottom quintiles of media sentiment drawn from the large-cap growth universe, the small-cap one, the non-U.S. developed markets and the entire large-cap market beginning in 2010. The numbers are best in growth, where there's more news coverage. It looks to be worthwhile to integrate the signal into that model in a more aggressive way than elsewhere (see Exhibit 24).

**Exhibit 23: Developed Markets Stocks**  
**Relative Returns to the Best and Worst Quintiles**  
**of Media Sentiment**  
**Monthly Data Compounded to Annual Periods**  
**2010 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

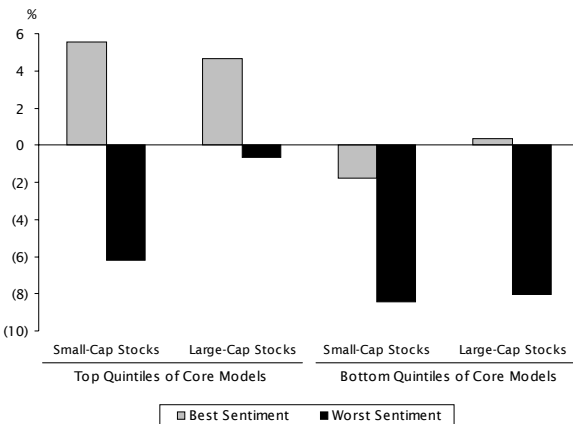
**Exhibit 24: Large-Capitalization Stocks**  
**Relative Returns to the Top and Bottom Quintiles**  
**of Growth and Core Models**  
**Contingent on Media Sentiment Quintiles**  
**2010 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

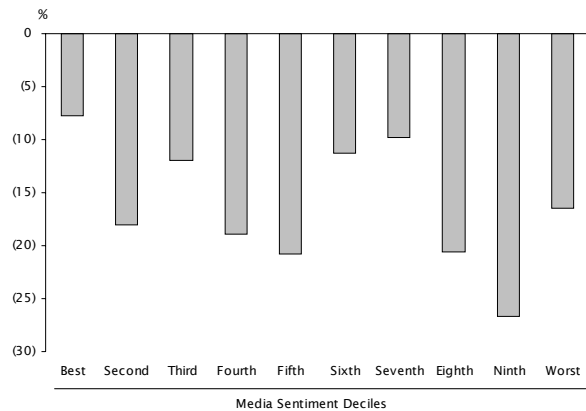
In the small-cap world media sentiment is somewhat additive to both our general model and the failure one (see Exhibits 25 and 26). Failure modeling results are less clear cut in the small-cap world than in the large-cap one.

**Exhibit 25: Large- and Small-Capitalization Stocks**  
**Relative Returns to the Top and Bottom Quintiles**  
**of the Core Models**  
**Contingent on Media Sentiment Quintiles**  
**Monthly Data Compounded to Annual Periods**  
**2010 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

**Exhibit 26: Small-Cap Failure Candidates**  
**Relative Returns by Deciles of Media Sentiment**  
**Monthly Data Compounded to Annual Periods**  
**2002 Through Early-September 2018**



Source: Empirical Research Partners Analysis.

### Conclusion: When the Stakes are High Everything Matters

When expectations are high, as they are when investing in growth stocks, everything matters. In that space positive sentiment is the rule, and it makes sense that the best use for our Media Sentiment Indicator is there. We are in the process of integrating it into that model as well as the small-cap and international ones.





**Appendix 1 (cont.): Top 1,000 Stocks Failure Candidates Sorted By Market Capitalization Within Sector As of Mid-September 2018**

Symbol	Company	Valuation										Capital Deployment and Earnings Quality										Market Reaction									
		Negative Cash Flow					Free Cash Flow					Capital Deployment and Financing					Earnings Quality					Interactions of:					Market Structure				
		Gross Cash Flow	Cash Flow	Yield	Price	Value	Normalized: Free Cash Flow Yield	Capital Spending Growth	Capital Spending to-Depreciation	Inventory Growth	Out-standing	Shares Out-	Common	Free Cash Flow Margin	Non-Current Assets	Arbitrage Risk (1=Lowest 10=Highest)	Downside Risk	Nine-Month Price Trend	Media Sentiment	Supernovas & Nine-Month Price Trend	Downside Risk & Day Volume	Short Pressure	Sector Equivalent Volume	Flows and Equivalent Volume	Core Model Rank	Failure Model Rank	Market Capitalization (\$ Billion)				
<b>Energy:</b>																															
<b>Integrators, Oil Service, Refiners and Other</b>																															
BHGE	BAKER HUGHES A GE CO																														
WMB	WILLIAMS COMPANIES INC																														
FTI	TECHNIPFMC PLC																														
HP	HELMERICH & PAYNE																														
CLB	CORE LABORATORIES NV																														
<b>Exploration and Production</b>																															
CXO	CONCHO RESOURCES INC																														
CDEV	CENTENNIAL RES DEVELOPMENT INC																														
VET	VERMILION ENERGY INC																														
RRC	RANGE RESOURCES CORP**																														
<b>Utilities</b>																															
D	DOMINION ENERGY INC																														
SRE	SEMPRA ENERGY																														
LNT	ALLIANT ENERGY CORP																														
NI	NISOURCE INC																														

Source: Empirical Research Partners Analysis.

\*\* Denotes new addition.