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Equity Research
6 February 2020

Investment Sciences

When Managements Tell You What They'll Do, Believe It the First Time

INDUSTRY UPDATE

Investment Sciences

Investment Sciences
Ryan Preclaw
+1 212 412 2249
ryan.preclaw@barclays.com
BCI, US

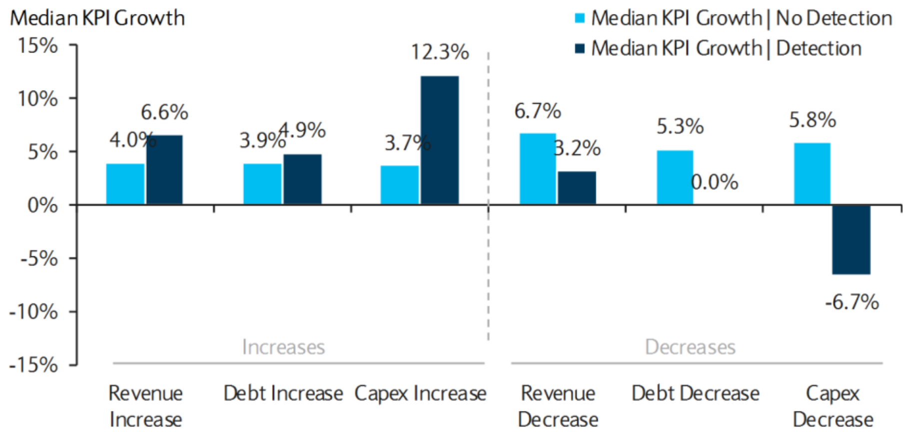
Using natural language processing (NLP) event detection rules, we look at earnings call comments about the future direction of revenue, debt, and capital spending (KPIs) and find they match up with the reality of what companies actually do. The signals are not perfectly predictive of future actions, but they are statistically significant for each KPI and direction pair. In general, when transcripts feature talk about a change to one of our targeted quantities, the companies are more likely to do it.

The rules were developed within our grammar-based event detection framework: We believe that grammar rule event detection is an efficient way to integrate NLP into both systematic and discretionary investment processes.

Baskets of companies with these particular detections did not systematically generate alpha: Although there were some performance differences for companies in the detection vs. non-detection groups, these signals appear to be predictive of operating performance, but not predictive of abnormal returns.

But when combined with some fundamental context, the detections can be powerful predictive tools: Case studies on capital spending in the energy industry and sales declines among specialty retailers demonstrate that baskets of stocks assigned based on the signals most relevant to the sector context can have starkly different return performance.

FIGURE 1
Companies Have Higher (Lower) Average Growth in Sales/Debt/Capital Spending After Talking About Increasing (Decreasing) Those KPIs on a Call



Source: Barclays Research

PLEASE SEE ANALYST CERTIFICATION(S) AND IMPORTANT DISCLOSURES BEGINNING ON PAGE 10.

Event Detections Can Predict a Variety of Business Indicators

In our report *Grammar Rules for Event Detection in Corporate Transcripts*, published October 2, 2018, we presented grammar rules as an efficient and cost-effective way for investors to start working with natural language processing (NLP). Our first project looked at using discussion about capex as a near-term predictor of changes in aggregate investment, and was additive to other capital spending signals used by our equity strategy team (*U.S. Equity Strategy: Management Sentiment NLP Model 3Q Update: Capex Headwind Persist*s, November 22, 2019).

We believe that natural language event detection is a very flexible technology that can provide insights about a wide variety of corporate performance indicators (KPIs).

To explore that potential, we look at rules detecting discussions of three corporate KPIs: sales, debt balances, and capital spending. Each of these represents a different aspect of corporate reporting regime, over which management holds different degrees of control. Capital spending is effectively entirely under the control of management, debt balances are substantially but not entirely under their control, and revenues are the least subject to direct management control.

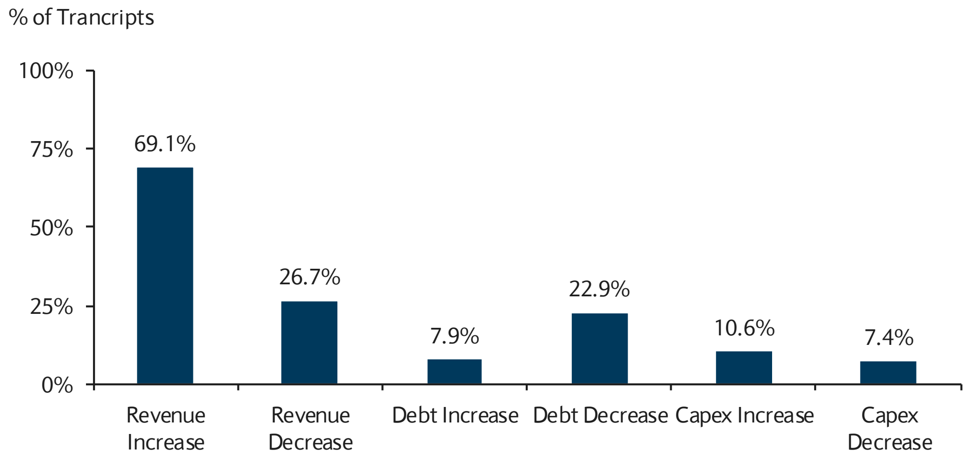
We built rules for when earnings call participants (both management and analysts) talk about increases and decreases in the KPI features. The summary of the rules is as follows:

- Revenue rules were designed to **detect** discussions of revenue increases or declines, but **exclude** discussions of fees or revenue mix. For details of our method see our report, *Data Science Methods: Grammar Rules for Conversation About Changes in Revenue Expectations*, 2/6/20
- Debt rules were designed to detect discussions of debt raises or paydowns, but exclude discussions of debt rates, bad debts, debt funds, "issue" as a noun, or debt ratios. For details of our method see our report, *Data Science Methods: Grammar Rules for Conversation About Changes in Debt*, 2/6/20.
- Capital expenditure rules were designed to **detect** discussion of increasing or decreasing capital spending and investment, but **exclude** discussion of working capital or of clients changing their capex decisions. For details of our method see our report *Data Science Methods: Natural Language Processing: Grammar Rules for Event Detection in Corporate Transcripts,* 10/2/19.

We applied the rules to a set of approximately 90k transcripts, which started in 2001 and continue to the present. There was substantial variation in the density of the detections from each rule. The revenue rules had detections for a vast majority of transcripts – around 72% had some sort of revenue signal. Companies could have multiple different detections in the same transcript; >90% of "Revenue Decrease" signals also had a detection for revenue increase. An examination of a selection of these transcripts suggests this happens because companies that are facing revenue declines generally want to spin the positive that they will someday return to growth.

FIGURE 2

Of The Nearly 90,000 Earnings Call Transcripts in Our Dataset Since 2001, A Large Share Contain Discussions About Revenue; Many Fewer Touch on Debt or Capital Spending

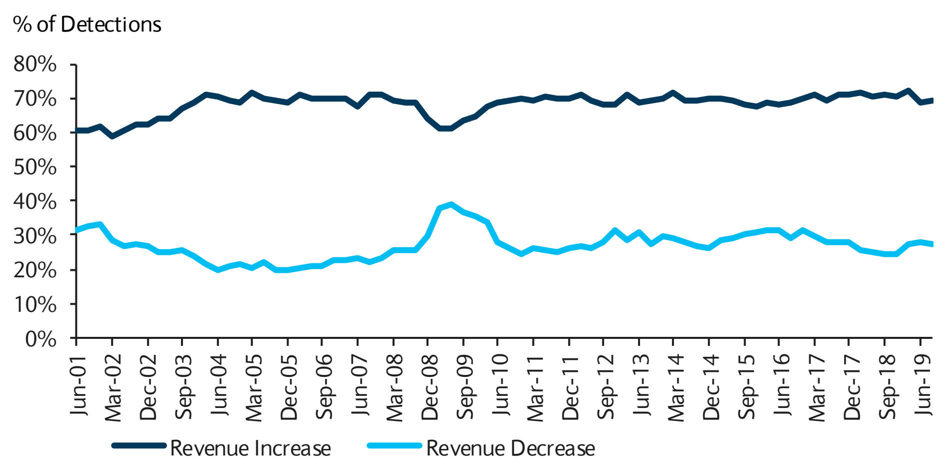


Source: Refinitiv, Barclays Research

All of the rules had at least some variation in their frequency of detection across time, and the degree of volatility in detections was also different between rules. Revenue detections in particular were steady, with a routinely large majority of companies discussing revenue increases. In fact, the only notable dip was in the peak and aftermath of the 2008 financial crisis (and which quickly reversed itself). Revenue decrease detections have been somewhat more volatile, but it is interesting to note that their low point is consistently higher than the low points for other detections – it appears there are always some companies talking about their revenues falling.

FIGURE 3

A Consistently Large Number of Companies Talked About Revenue Increases, While The Number Discussing Revenue Decreases Was Lower and More Volatile

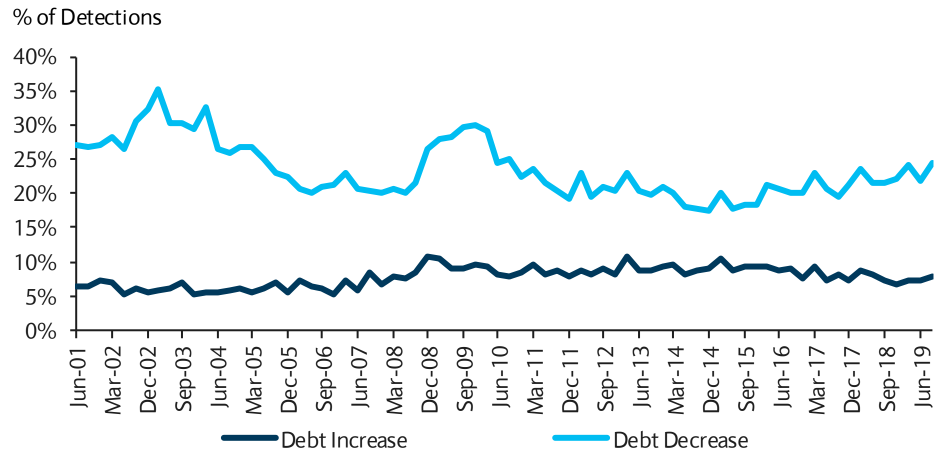


Source: Refinitiv, Barclays Research

On the other hand, the peak detection rate for debt increases was below the low point for any of the revenue detections. They also featured a long increasing trend from the mid 2000s to the mid 2010s, and then a slow decline since. Debt decreases were a more popular topic of conversation, peaking in popularity in the early 2000s, experiencing a big spike around the 2008 crisis, and then a gradual increase in the past 5 years.

FIGURE 4

The Popularity of Debt Decreases Has Varied Substantially, and Has Experienced a Steady Rise Since Mid-2014; Debt Increase Detections Rose Slowly But Consistently in the 2010s

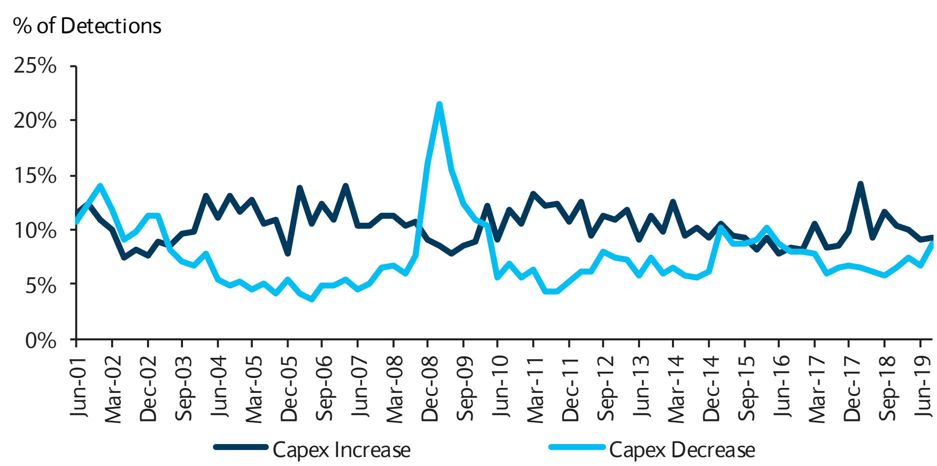


Source: Refinitiv, Barclays Research

As a group, capex detections had the lowest detection rate, and were the only one where the rate of decrease detections occasionally crossed over to be higher than the increase detections. It is likely that part of the difference in level is that capital investment is not a relevant concept for all businesses the way revenue or debt are. Attention on capital spending also has concentrations in some industries and times; for example, capital decreases spiked among energy companies in 2014 and 2015 (see the note below). One notable trend was capex increase detections drifting downward from the early 2010s to the middle, before bouncing back in 2017.

FIGURE 5

Capital Expenditure Detections Occur At A Lower Rate Than For Revenue and Debt



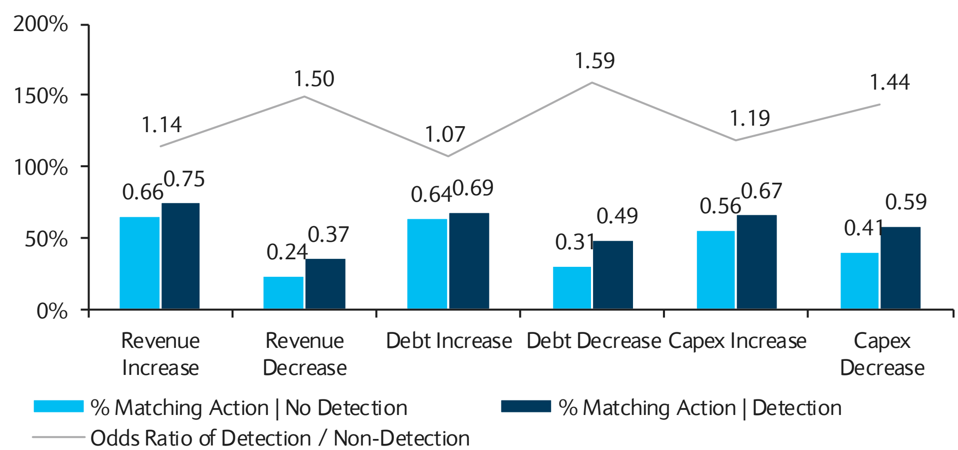
Source: Refinitiv, Barclays Research

To evaluate the predictiveness of our event detections we joined them with fundamental data that matched each category. We attached the last annual value prior to the detection date, and compared it to the first annual value after the detection. As Figure 5 shows, companies have a higher probability of undertaking each detection-implied action after the detection occurs. In this case, we use odds ratios (probability of event given detection / probability of event given no detection) to determine whether the gain in predictive power from the signal was statistically significant, or could just have been random. Where the odds ratios are greater than 1, we have gained apparent predictive power. If the lower bound of the 95% confidence for the odds ratio is also greater than 1, then that gain is statistically significant. Figure 6 shows that the odds ratios are above 1 for each event category and direction. Further, each of those odds ratios is statistically significant, suggesting that across the board a detected discussion of an event coincides with that event being more likely to occur.

The most interesting pattern that appears is that "decrease" detections provide a greater uplift over base rates than "increase" detections for each corporate action. Part of that is mechanical – because the increase detections are more frequent on average for each category, there is less room for absolute increase in odds ratio. But given the general upward drift in nominal amounts (which arise at least from broad GPD growth and inflation), having more predictive power for the rarer events is an attractive component of the approach. After all, there is probably more value knowing with higher precision that sales are going to shrink, than grow.

FIGURE 6

Detections Raise the Probability of an Actual Subsequent Event Across All Categories

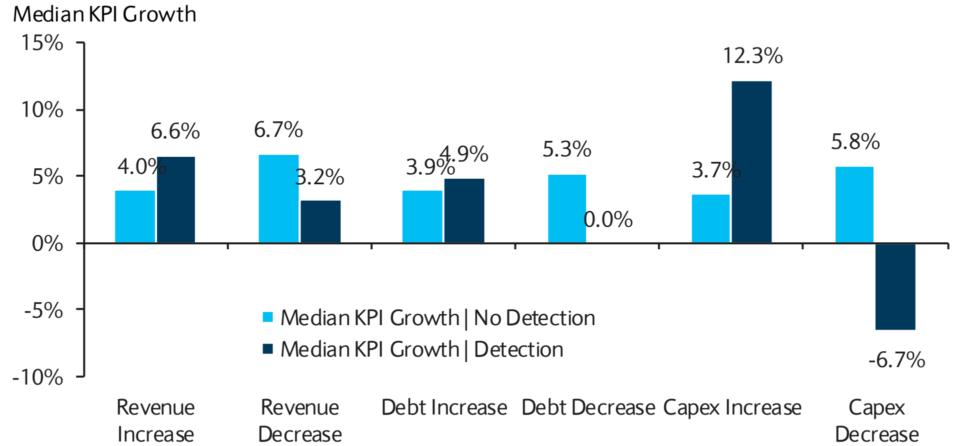


Source: Compustat, Refinitiv, Barclays Research

Figure 6 shows the median growth rate of the companies in the year after a detection. As with the odds ratios, the average for firms with the "increase" detections is higher than the non-detection base rate. Similarly, the average for firms with the "decrease" detections are lower than the base rate.

FIGURE 7

The Growth Rates of the Detected Category Are Consistently Higher (Lower) After an Increase (Decrease) Detection



Source: Compustat, Refinitiv, Barclays Research

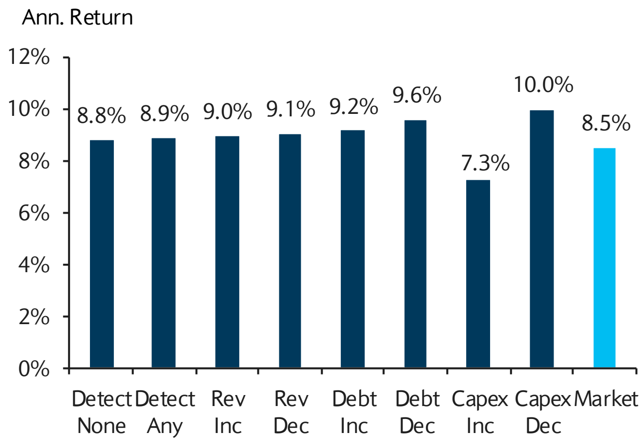
Our conclusion is that event detections are effective in predicting corporate actions. Their effectiveness is highest where companies have the most control over their actions – capital spending, with less relative predictiveness for debt balances, and the least for revenue growth. Nevertheless, even for revenue, there is a meaningful difference between companies with growth detections and those with decrease detections.

These Detections Don't Say Much Systematic About Returns

Given that company commentaries do predict corporate actions and the evolutions of key financial metrics, the next obvious question is whether the detections systematically tell you something about returns. For these signals, the short answer is no, they do not. Although 5 of the 6 events we consider here result in higher average performance than the index (Figure 8), none generates alpha after loading on Fama French factors. The closest to significance is capex increases, which appear to predict negative performance.

FIGURE 8

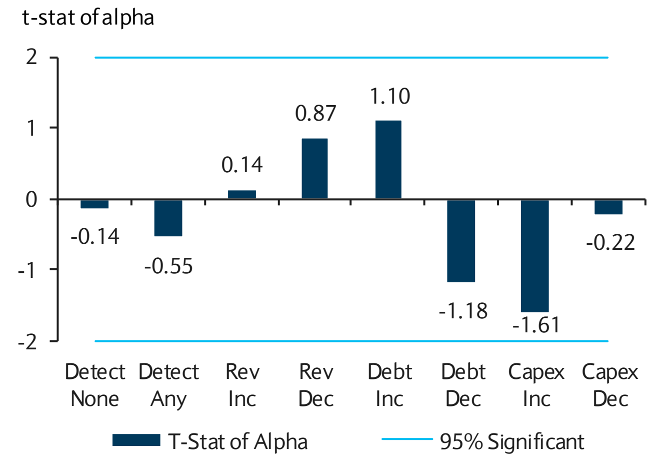
Market-Value Weighted Portfolios Based on Most Event Detections Have Outperformed the Market…



Source: Barclays Research

FIGURE 9

…But None Have Statistically Significant Alpha After Accounting for Basic Factor Loadings



Source: Barclays Research

But They Are Useful for Deeper Fundamental Understanding

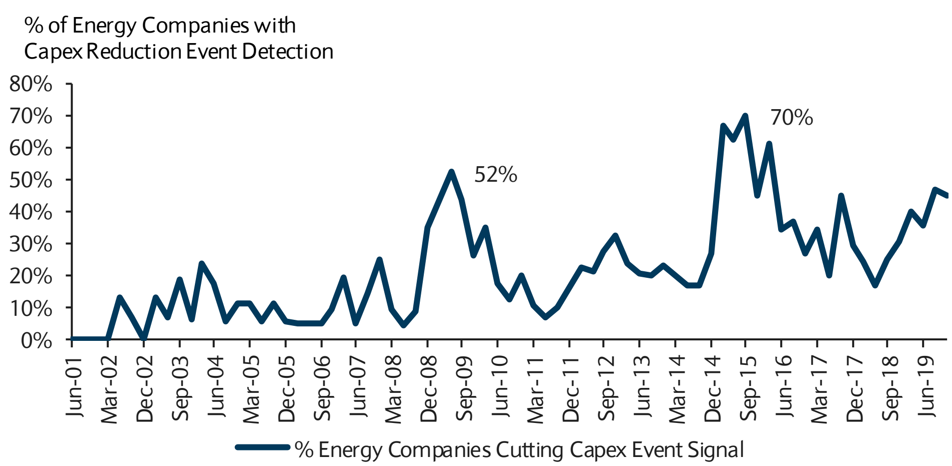
Even if these KPI-oriented event detections do not systematically predict abnormal returns, when they are combined with some fundamental analyses of companies and sectors they can add predictive power. We present a pair of case studies of how the event detections could be used to in specific sector analyses.

E&P Capital Spending Cycles

Energy companies have seen multiple cycles where they reduced capex (Figure 10), including major industry-wide cutting cycles in 2008/09 and 2015/16.

FIGURE 10

Energy Companies Have Seen Significant Cycles in Cutting Capex

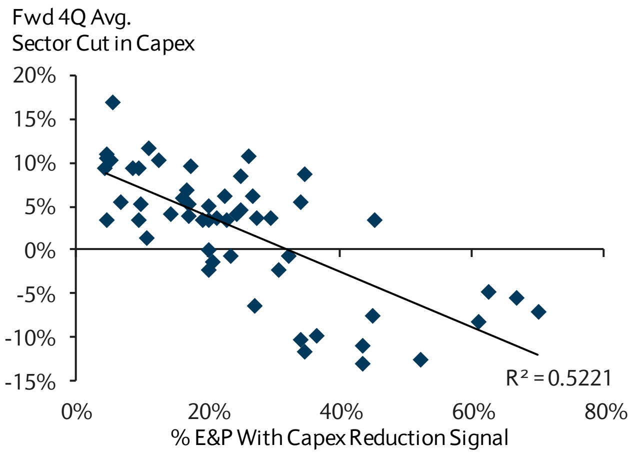


Source: Refinitiv, Barclays Research

The share of independent E&P companies with detections for capital spending decreases has been a reliable signal of capital cutting across the sector (Figure 11). It's also interesting to note that companies start talking about cutting after they've had a run of bad stock performance (Figure 12).

FIGURE 11

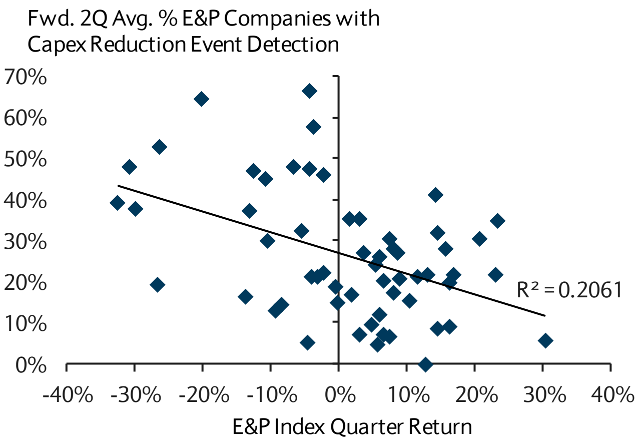
When Companies Say They're Going to Cut Capex, It Falls In the Following 4 Quarters



Source: Compustat, Refinitiv, Barclays Research

FIGURE 12

Companies Plan to Cut Capex After Bad Runs of Equity Performance

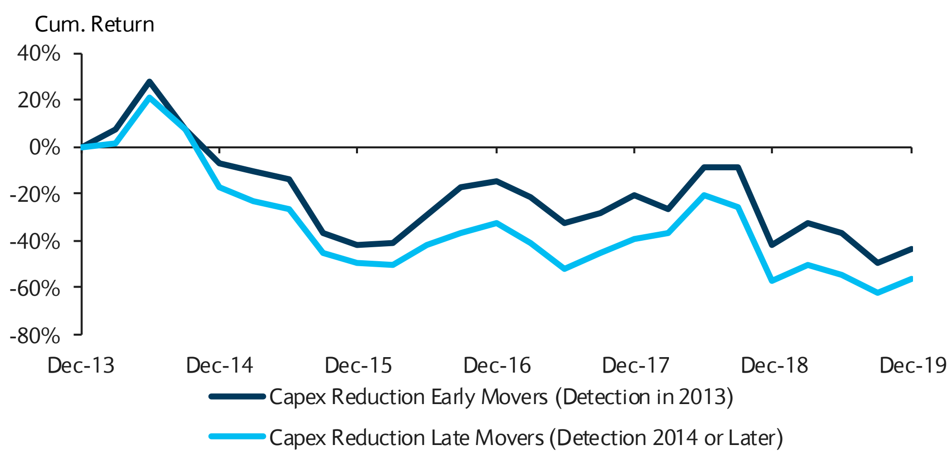


Source: Compustat, Refinitiv, Barclays Research

Even though prior poor equity performance predicts broader cutback in energy investment, within these cycles event detections have also offered a degree of predictiveness for who will outperform. In the 2015 cycle, for example, the first companies to be detected discussing capital reductions were equity outperformers over the entire investment-reduction cycle (Figure 13).

FIGURE 13

The Early Movers in Cutting Back on Capital Investment in the 2014 Cycle Outperformed



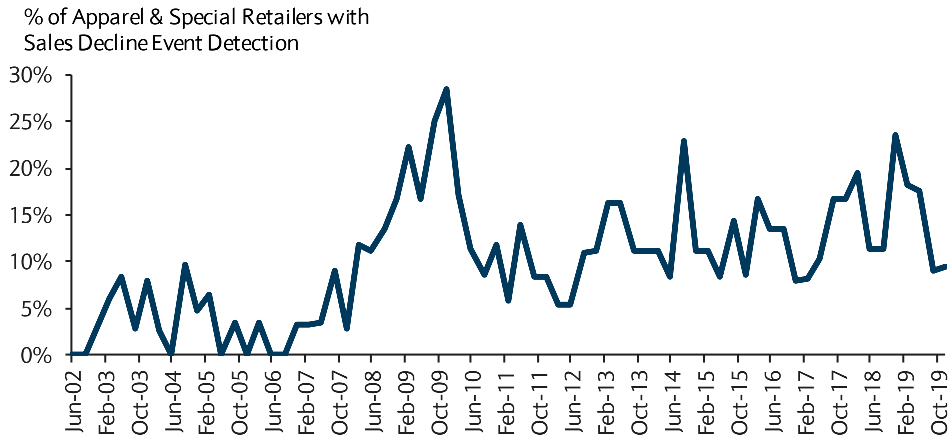
Source: Compustat, Refinitiv, Barclays Research

Apparel and Special Retailing

Revenue detections suggest a long-term shift in the risks to apparel and specialty retail businesses. Those companies have been >3x more likely to talk about revenue declines since the 2008 crisis than they were before it (Figure 14).

FIGURE 14

Apparel and Specialty Retailing Has Seen a Structural Shift in The Number of Firms Talking About Sales Declines From Prior to 2008

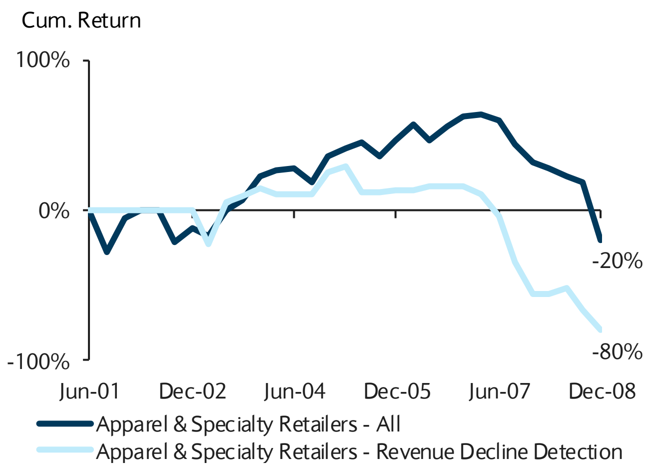


Source: Refinitiv, Barclays Research

And within the sector, companies discussing revenue declines have consistently underperformed during the entire period for which we have data (Figures 15 & 16). In specialty retailing at least, when management announces that a decline is coming, it pays to listen to them.

FIGURE 15

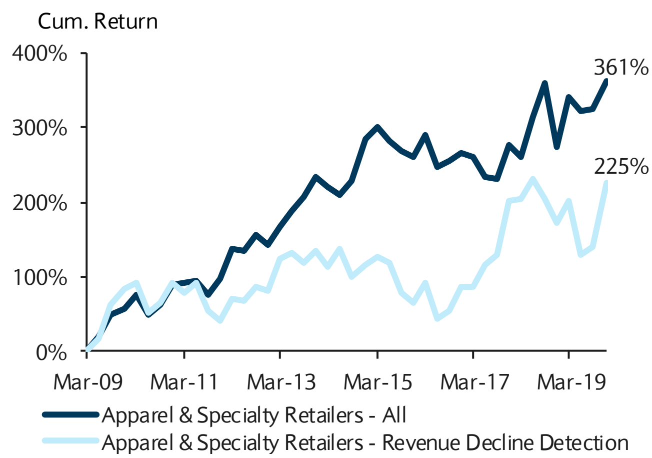
Retailers That Talked About Sales Declines Were Best Avoided Before 2008…



Source: Compustat, Refinitiv, Barclays Research

FIGURE 16

…And Have Continued To Lag the Sector Since



Source: Compustat, Refinitiv, Barclays Research

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