

## Event Driven Investing Series

# Lenders Lead, Owners Follow:

## The Relationship between Credit Indicators and Equity Returns

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Investors are continuously searching for profitable new investment opportunities. S&P Capital IQ Quantamental Research has been focused on exploring a class of strategies that originates from company specific events often overlooked by many investors. Because event driven strategies tend to be idiosyncratic, they are often complementary to common strategies employed by investors. We empirically examine the equity price response to two classes of fixed income events: changes in the opinions of Standard & Poor's Ratings Services<sup>1</sup> credit analysts and changes in Credit Default Swap [CDS] spreads.

This paper demonstrates a strong link exists between credit events and equity returns, suggesting a potential investment strategy. Whereas previous academic work focused on ratings changes within the U.S., this analysis takes a global perspective and includes the post-financial crisis period. Shareholders should note that even in a benign credit environment Standard & Poor's Ratings Services ("S&P Ratings Services") downgraded 68 U.S. speculative grade companies in the second quarter of 2014, and forecasts the rate of speculative grade defaults to increase next year to 2.2% from 1.6% in 2014. Year to date, there have been 303 instances where credit default swap spreads have widened by more than 50 basis points.

We analyzed these events in the Russell 3000®, and within the developed S&P Europe BMI, and S&P Asia Pacific BMI indices<sup>[1]</sup> and found:

- Negative changes to S&P Ratings Services' opinion have historically led stock price underperformance. Stocks of downgraded companies underperformed in the U.S., Europe, and Asia with excess backtested returns of -1.75%, -1.08%, and -2.95% respectively, over the 20 trading days following the downgrade.
- S&P Ratings Services Long-Term Rating changes were most impactful in three scenarios: multiple notch movements, high yield companies, and highly leveraged companies.
- A large one day widening (50 bps) in the 5-year CDS spread preceded 20-day stock price underperformance in the U.S., Europe, and Asia by -1.07%, -1.46%, and -4.91%, respectively.
- Companies that experienced multiple 50 bps CDS spread widenings within 20 trading days of each other, underperformed dramatically. In the U.S., Europe, and Asia those companies' stock price underperformed by -1.29%, -1.96%, and -6.65% respectively.

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<sup>1</sup> S&P Capital IQ is an affiliate of S&P Ratings Services which is analytically and editorially independent from any other group at McGraw Hill Financial

<sup>2</sup> Source: S&P Capital IQ Quantamental Research. Indexes are unmanaged, statistical composites. It is not possible to invest directly in an index. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Index and backtested returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

## 1 S&P Ratings Services Events

S&P Ratings Services is a Nationally Recognized Statistical Ratings Organization (credit rating agency) that publishes opinions about credit risk regarding an issuer's ability to meet its financial obligations. S&P Ratings Services analysts' views are significant as they have extensive contact with top management. The likelihood of default is the single most important factor in the assessment of creditworthiness. *Changes* in these opinions may contain incremental information relevant to equity holders. This is significant to equity holders as they are lowest in the capital structure and last in line to get paid in bankruptcy.

### 1.1 Long-Term Rating Changes

**S&P Ratings Services Long-Term Ratings** reflect the credit analyst's opinion of the issuer's ability to meet long-term financial commitments (5 year horizon). S&P Ratings Services express opinions about the ability and willingness of an issuer, such as a corporation, state or city government, to meet its financial obligations in accordance with the terms of those obligations. While a key component of credit rating analysis is the evaluation of historical data, ratings opinions are designed to be forward looking. In other words, ratings take into account not only the present situation but also the potential impact of future events on credit risk. Further details on the scale that S&P Ratings Services utilizes in expressing its opinion of creditworthiness are provided in the appendix.

#### Do Long-Term Rating Changes Predict Stock Prices? – Event Study

In order to explore how Long-Term Ratings changes might impact equity prices, we conducted an event study analyzing backtested equity returns in the time period surrounding changes to a firm's Long-Term Rating between 2000 and 2013. The event date ( $t_0$ ) signifies the publication date of a Long-Term Rating change. Throughout the paper, backtested returns for these firms are adjusted for the Fama-French three factors.<sup>2</sup> This adjusts backtested returns for three common risk factors: The Market, Market Capitalization, and Valuation. In this way, adjusted backtested returns are more reflective of returns attributable to the events.

Cumulative backtested average abnormal returns (CAAR) are presented over four post-event windows:  $[t_0, t+1]$ ,  $[t_0, t+5]$ ,  $[t_0, t+10]$ ,  $[t_0, t+20]$ . These post-event windows range from the event date, through 1, 5, 10, and 20 trading days after the event date.

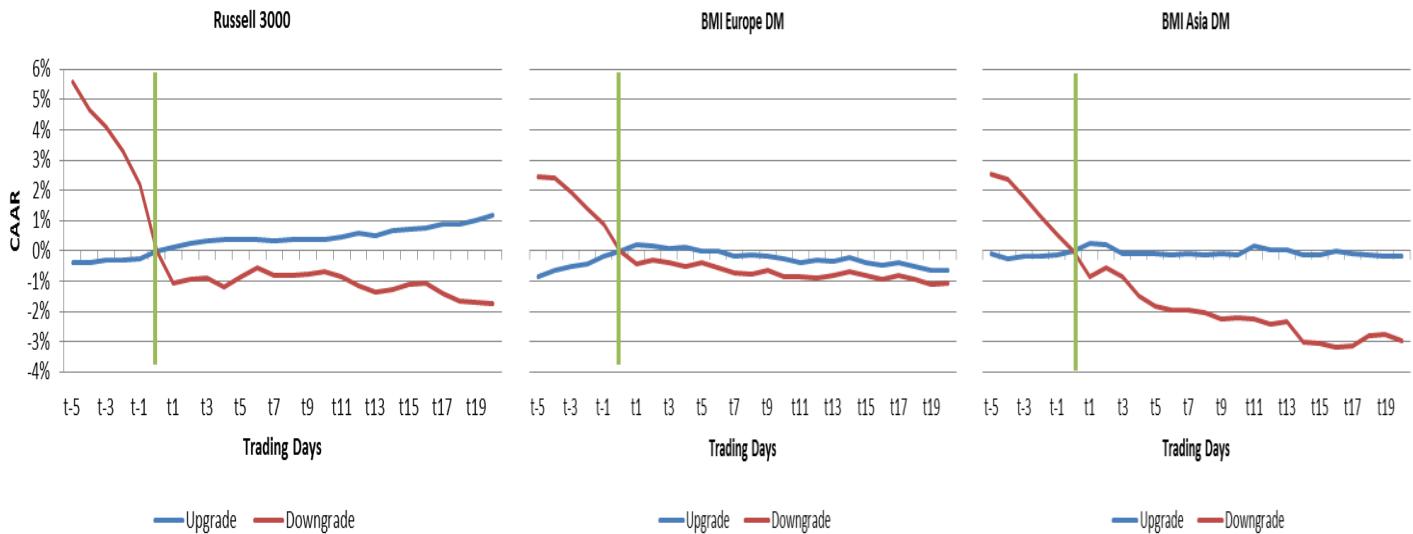
The following analysis shows significant equity price response surrounding changes in firms' S&P Ratings Services Long-Term Rating in the U.S. There is strong negative response to ratings downgrades that saturates quickly after the event. In the U.S., downgraded firms experience a CAAR of -242 bps on the day (i.e.  $[t-1, t_0]$ ) of the ratings change. The weakness continued on the subsequent day with underperformance of -108 bps. The hit rate of 42% in Table 1 indicates that these firms underperformed 58% of the time on the day following a long-term ratings change. The response to upgrades is less immediate, though upgraded firms significantly outperformed by 120 bps through the post event window,  $[t_0, t+20]$ .

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<sup>3</sup> Fama-French three factors are the market, size and value factors that Fama and French have shown to be important drivers of future stock returns. See "Common Risk Factors in the Returns on Bonds and Stocks" by Fama and French 1993.

Figure 1 shows similar efficacy for changes in S&P Ratings Services Long-Term Ratings within Europe and Asia with downgrades underperforming by -108 and -295 bps respectively, within the post-event window [t0, t+20]. The performance following upgrades is mixed. They seem to be non-events for companies in Asia. However, we see mean reversion over short horizons in Europe following the largest run up in the days leading to the event.

**Figure 1: Event Study: Long-Term Rating Changes**  
12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns



Source: S&P Capital IQ Quantamental Research.

Table 1 demonstrates that the equity response to rating downgrades has been similar across developed Europe and Asia regions, while the impact of upgrades is mixed. The performance of downgrades in Europe is faster moving as 78% of the CAAR is experienced in the first 10 days. This suggests that downgrades may exhibit decay in their excess returns in a longer horizon portfolio process.

**Table 1: Event Study - Long-Term Rating Changes by Region**  
12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

Event [Count]	Russell 3000				S&P BMI Europe Developed				S&P BMI Asia Developed			
	Upgrade [1775]		Downgrade [2716]		Upgrade [453]		Downgrade [1001]		Upgrade [439]		Downgrade [327]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
1 Day	0.13% *	50%	-1.08% ***	42% ***	0.21% **	53%	-0.44% ***	44% ***	0.25% **	54% *	-0.85% ***	40% ***
5 Day	0.38% ***	52%	-0.85% *	42% ***	-0.01%	48%	-0.40%	44% ***	-0.07%	49%	-1.84% ***	39% ***
10 Day	0.40% **	50%	-0.70% ***	45% ***	-0.28%	46%	-0.84% **	44% ***	-0.12%	47%	-2.19% ***	40% ***
20 Day	1.20% ***	52%	-1.75% ***	44% ***	-0.63% *	45% **	-1.08% **	43% ***	-0.19%	46% *	-2.95% ***	37% ***

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. For all the above charts, backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

## Which Ratings Changes Matter?

In order to better understand the drivers of equity response to ratings changes, we examine three characteristics focusing on the U.S. given the breadth:

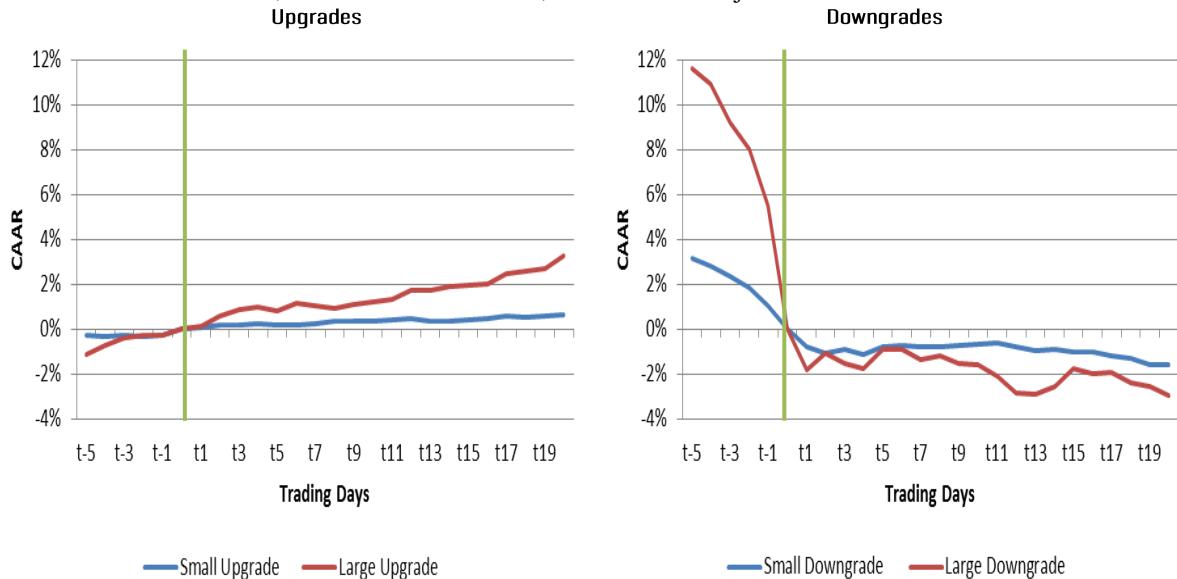
- The magnitude of change in Long-Term Rating [Large/Small]
- Level of credit quality [Investment Grade / Speculative]
- Level of financial leverage [High/Low Leverage]

### Magnitude of Rating Change

Since 2000, the majority of Long-Term Rating changes have been 1-notch moves. For example, a downgrade from 'BBB+' to 'BBB' would be considered a 1-notch change. We examine whether large Long-Term Rating changes, defined as changes greater than 1-notch, lead to a stronger equity market reaction to the change. These large moves represent a more pronounced change in the credit analyst's opinion of the underlying business and financial risk.

**Figure 2: Magnitude of Long-Term Ratings Change – Event Study**

Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns



Source: S&P Capital IQ Quantamental Research.

**Table 2: Small [Single Notch Moves] and Large [Multiple Notch Moves]**

Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

	20Day CAAR	Hit Rate	Count
<b>Small Downgrade</b>	-1.58%***	45%***	1804
<b>Large Downgrade</b>	-2.94%**	41%***	731
<b>Small Upgrade</b>	0.66%**	51%	1442
<b>Large Upgrade</b>	3.25%***	57%**	217

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

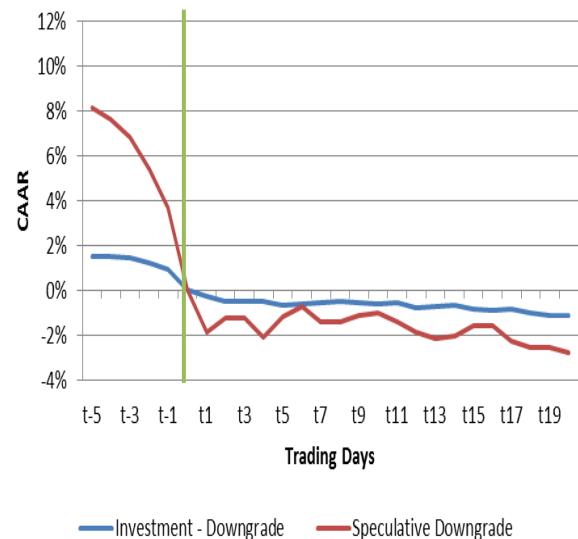
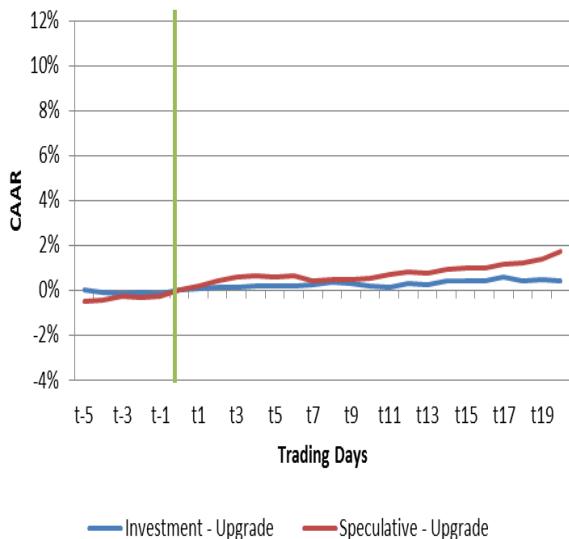
Source: S&P Capital IQ Quantamental Research. For all the above charts, backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Indeed, the equity price response to large rating changes, in both directions, is significant [Table 2]. The associated performance [20 day CAAR] is particularly pronounced for large upgrades. The average small upgrade generated abnormal backtested returns of 66bps the 20 days following a Long-Term Ratings change while a large upgrade yielded 325bps over the same horizon. Additionally, the outperformance of large upgrades occurs with a greater consistency as demonstrated by a hit rate of 57%, compared to 51% for small upgrades. Large downgrades are more noteworthy as well. Small downgrades generated abnormal backtested returns of -158 bps the 20 days following a Long-Term Ratings change while a large downgrade yielded -294 bps. The performance is again slightly more consistent, with large downgrades underperforming 4% [hit rate: 41% vs. 45%] more frequently.

### Credit Quality

S&P Ratings Services Long-Term Ratings are split into two broad categories of credit quality: investment grade and speculative grade. Investment grade ['BBB-' and higher] is used to describe issuers with higher levels of credit quality while speculative grade ['BB+' and lower] is used to describe issuers that face business and financial uncertainties, raising their likelihood of default. Given the additional inherent risk, equity market participants should have a stronger reaction to changes for speculative grade issuers.

**Figure 3: Change in Long-Term Ratings by Credit Quality – Event Study**  
 Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns  
**Upgrades**



Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

**Table 3: Change in Long-Term Ratings by Credit Quality**

Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

	20Day CAAR	Hit Rate	Count
<b>Investment Grade Downgrade</b>	-1.12%**	47%*	850
<b>Speculative Downgrade</b>	-2.75%**	41%***	1422
<b>Investment Grade Upgrade</b>	0.45%	52%	495
<b>Speculative Upgrade</b>	1.71%***	53%*	1007

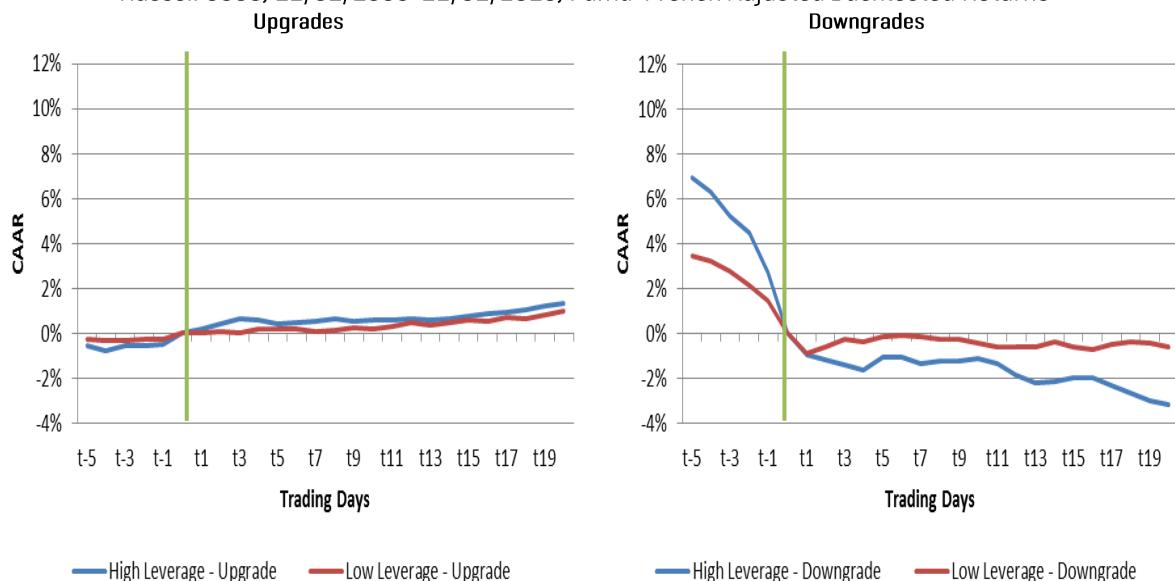
\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Figure 3 and Table 3 demonstrate a marked difference in the performance of Long-Term Ratings changes between speculative and investment grade rated companies. Upgrades for speculative grade issuers experienced an abnormal return of 171 bps the 20 trading days following the change compared to only 45 bps for upgrades to investment grade issuers. Downgrades to speculative grade issuers generated -275 bps and underperformed 59% [100% - 41%] of the time compared to investment grade issuers which generated -112 bps and underperformed 53% of the time.

### Financial Leverage

Equity market participants are sensitive to the strength and stability of earnings. Firm's that are dependent on additional debt financing face roll-over risks and may carry a higher debt service burden. A change in the Long-Term Rating of a leveraged firm should have a material impact on earnings as cost of capital is directly influenced by the rating. Secondarily, it effectively extends the queue in terms of repayment in cases of liquidation. We classify companies with Debt to Equity Ratios greater than 1 as highly leveraged. Figure and Table 4 explore whether the equity price response is stronger for highly leveraged firms.

**Figure 4: Long-Term Ratings Changes by Financial Leverage – Event Study**  
Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns



Source: S&P Capital IQ Quantamental Research. For all the above charts, backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

**Table 4: Long-Term Ratings Changes by Financial Leverage**  
 Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

	20Day CAAR	Hit Rate	Count
Low Leverage Downgrades	-0.59%	45%***	1099
High Leverage Downgrades	-3.18%***	42%***	1367
Low Leverage Upgrades	0.97%***	51%	899
High Leverage Upgrades	1.34%***	54%**	674

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Figure 4 and Table 4 demonstrate that leveraged firms have been most impacted by ratings changes. Downgrades to leveraged firms generated a CAAR of -318 bps and underperformed 58% of the time compared to underperformance -59 bps and 55% for less leveraged firms. Highly leveraged firms are also more sensitive to upgrades outperforming 134 bps in the month following an upgrade.

### Portfolio Simulation – Long-Term Rating Changes

We simulate strategies built around Long-Term Ratings Changes by forming backtest portfolios and periodically rebalancing according to predefined rules. This measures a more representative excess return, in line with following a simple strategy. The simulation is performed using a predefined lookback window to identify the ratings change events to include in the backtest portfolio. For example, a backtest portfolio built with a lookback window of 1 Month would consist of all companies which experienced a ratings change in the past 1 Month. The backtested returns are adjusted for the Fama-French risk factors. This approach most often provides a more conservative set of results than the event study, as it incorporates the changing number of securities in a backtest portfolio, and raises the bar for statistical significance.

Table 5 presents summary results of portfolio strategies over a number of look back windows [formation period]. This helps to illustrate the tradeoff between capturing backtested returns attributable to the event and backtest portfolio size for various look back windows, as well as, alpha decay. This becomes important when dealing with relatively infrequent events where shorter lookback windows lead to highly concentrated and often volatile backtest portfolios. Table 5 illustrates that the majority of underperformance following a downgrade occurs within 1 month with prominent decay at longer horizons. Upgrades lead to positive excess backtested returns for most regions and formation periods.

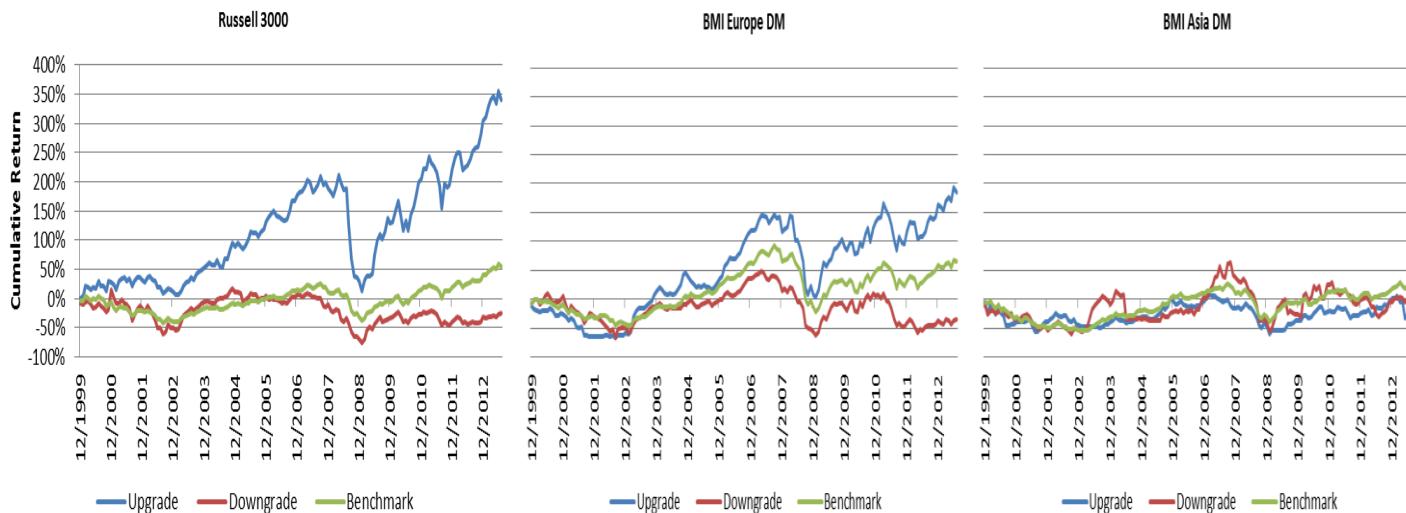
**Table 5: Backtest Portfolio Formation Return Analysis Long-Term Ratings Changes**  
 12/31/1999-8/31/2013, Fama-French Adjusted Return, Monthly Rebalance

	Russell 3000			S&P BMI Europe Developed			S&P BMI Asia Developed					
Event	Upgrade		Downgrade		Upgrade		Downgrade		Upgrade		Downgrade	
Formation Period	Backtest Excess Return	Backtest Portfolio Average Count	Backtest Excess Return	Backtest Portfolio Average Count	Backtest Excess Return	Backtest Portfolio Average Count	Backtest Excess Return	Backtest Portfolio Average Count	Backtest Excess Return	Backtest Portfolio Average Count	Backtest Excess Return	Backtest Portfolio Average Count
1 Month	0.81% **	11	-1.60% ***	16	0.67%	3	-1.25% **	7	-0.52%	3	-0.63%	2
3 Month	0.68% **	31	-0.72% **	43	0.58%	9	-0.31%	18	-0.01%	8	-0.67%	5
6 Month	0.55% **	62	-0.14%	77	0.54% *	17	0.01%	33	0.18%	16	-0.20%	10
12 Month	0.47% **	119	0.16%	131	0.64% ***	31	0.09%	57	0.02%	30	-0.52%	18

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Figure 5 illustrates portfolio formation strategies incorporating ratings changes with a lookback of three months. We focus on the three month look back as it represents a reasonable tradeoff between backtest portfolio size and backtested performance. The red line illustrates the cumulative return from a strategy forming backtest portfolios of stocks that experienced a downgrade in the last three months. This backtest portfolio is rebalanced monthly. The blue line illustrates a similar approach, except backtest portfolios are formed based on all upgraded companies in the last three months. The green line is the cumulative return to the benchmark [Russell 3000, BMI Europe, and BMI Asia] as a point of reference.

**Figure 5: Backtest Portfolio Formation Return – Long-Term Ratings Backtest**  
 12/31/1999-8/31/2013, Monthly Rebalance, 3 Month Lookback



Source: S&P Capital IQ Quantamental Research. For all above charts, indexes are unmanaged, statistical composites. It is not possible to invest directly in an index. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Index and backtested returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Table 6 shows that the market adjusted performance [Portfolio Return – Market Return] of these backtest portfolios is largely consistent with our intuition of upgraded [downgraded] firms outperforming [underperforming] the market. The magnitude of the mean market adjusted performance of downgrades is muted. The backtest portfolio formation approach exhibited significant positive skew in the monthly performance, impacting the average performance. These positive outlier months were related to turning points in broader market performance. For example, downgraded firms greatly outperformed the market as part of the junk rally in March 2009 following the low point of the crash [38% and 23% market adjusted backtested returns that month for U.S. and Europe respectively]. We present both mean and median monthly market adjusted return to reflect this skew.

**Table 6: Summary Long-Term Ratings by Region – Backtest Portfolio Formation**  
12/31/1999-12/31/2013, Monthly Rebalance, 3 Month Lookback

	Russell 3000		S&P BMI Europe BMI Developed		S&P BMI Asia Developed	
Event	Upgrade	Downgrade	Upgrade	Downgrade	Upgrade	Downgrade
Mean Market Adjusted Portfolio Returns	0.75% ***	-0.06%	0.57%	-0.22%	0.11%	0.33%
Median Market Adjusted Portfolio Returns	0.39%	-0.87%	0.38%	-0.86%*	-0.05%	-0.24%
Hit Rate %	55%	44%	54%	43% *	49%	49%
Information Ratio	0.71	-0.03	0.36	-0.13	0.06	0.13
Average Number of Stocks in Portfolio	31	43	9	18	8	5

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

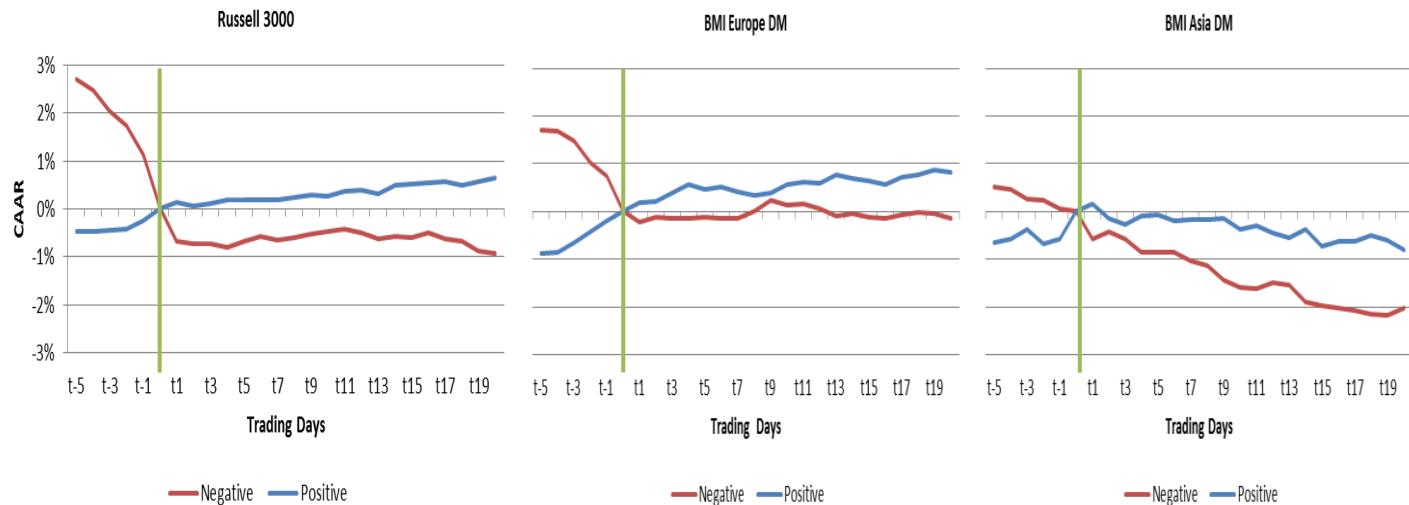
## 1.2 Rating Outlook Changes

Credit analysts may express their opinion of the possible future direction of the Long-Term Rating with an **Outlook**. A positive/negative Outlook indicates that the Long-Term Rating may be raised/lowered over the medium term [6 months to 2 years].

### Do Changes In The Ratings Outlook Impact Equity Prices? – Event Study

The following event study analyzes the equity backtested returns following a change to the outlook for a firm's long-term credit rating over the period 2000 through 2013. The results were largely in line with the findings for Long-Term Ratings (Section 1.1). However, the magnitude of the equity price response is considerably muted. There is an immediate response to negative outlooks while the market responds more gradually to positive outlooks (Figure 6).

**Figure 6: Ratings Outlook Changes – Event Study**  
12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns



In the U.S., firms experienced an average excess backtested return of -67 bps the day following the negative outlook which grows to -93 bps within 20 trading days. Firms with positive outlooks in the U.S. experienced gradual outperformance, 65 bps after 20 days. We extend the analysis for European and Asian developed markets. In both regions the response is most dramatic around negative outlooks. The negative equity price response is largely experienced in the day following the outlook change in Europe, but persists for up to 20-days in Asia.

**Table 7: Ratings Outlook – Event Study by Region**  
12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

Event [Count]	Russell 3000				S&P BMI Europe BMI Dev				S&P BMI Asia BMI Dev			
	Positive [1315]		Negative [2682]		Positive [327]		Negative [1076]		Positive [255]		Negative [474]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
1 Day	0.13%	50%	-0.67% **	43% ***	0.17%	53%	-0.22% *	46% **	0.16%	53%	-0.58% **	41% ***
5 Day	0.19%	51%	-0.66% **	45% ***	0.47% *	51%	-0.12%	47% *	-0.07%	46%	-0.85% *	42%***
10 Day	0.28%	51%	-0.48%	46% ***	0.56% *	51%	0.12%	50%	-0.38%	45%	-1.59% **	41% ***
20 Day	0.65% *	51%	-0.93% **	46% ***	0.81%	52%	-0.14%	48%	-0.81%	41%	-2.01% **	45% **

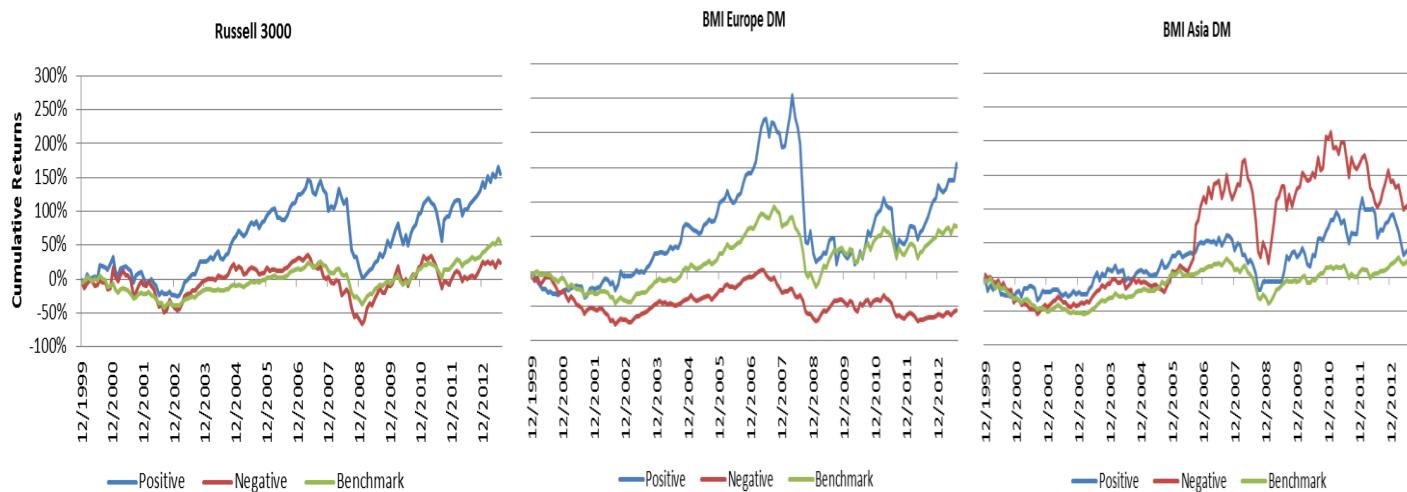
Source: S&P Capital IQ Quantamental Research. For all the above charts, backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

### Portfolio Simulation – Outlook Changes

We repeated the portfolio simulation analysis in the previous section, driven by announcements of outlooks. We maintain the same lookback window from our Long-Term Ratings simulation to form backtest portfolios of firms with an outlook announcement. The backtest portfolio includes any

stock for which an outlook change occurred over the past three months. This backtest portfolio is then rebalanced monthly. The performance illustrated in Figure 7 is consistent with the Long-Term Ratings and the Outlook event studies.

**Figure 7: Backtest Portfolio Formation Return Analysis - Outlook**  
12/31/1999-8/31/2013



Source: S&P Capital IQ Quantamental Research.

Table 8 indicates that the persistence of the performance beyond the initial market response is limited as none of the returns are significant, economically or statistically. A possible explanation to the muted response is that outlooks lack the impact to firm borrowing costs that may come with a long-term rating change.

**Table 8: Backtest Portfolio Formation Return Analysis Ratings Outlook by Region**  
12/31/1999-8/31/2013 Monthly Rebalance, 3 Month Lookback

	Russell 3000		S&P BMI Europe BMI		S&P BMI Asia BMI	
Event	Positive	Negative	Positive	Negative	Positive	Negative
Mean Market Adjusted Backtest Portfolio Returns	0.41%	0.20%	0.48%	-0.56%	0.25%	0.41%
Median Market Adjusted Backtest Portfolio Returns	0.36%	-0.26%	0.66%*	-0.88%*	0.14%	-0.06%
Hit Rate %	55%*	47%	57%*	41%*	51%	49%
Information Ratio	0.40	0.11	0.33	-0.41	0.14	0.20
Average Number of Stocks in Backtest Portfolio	24	47	6	20	5	9

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research.

For all above charts, backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

### 1.3 CreditWatch Changes

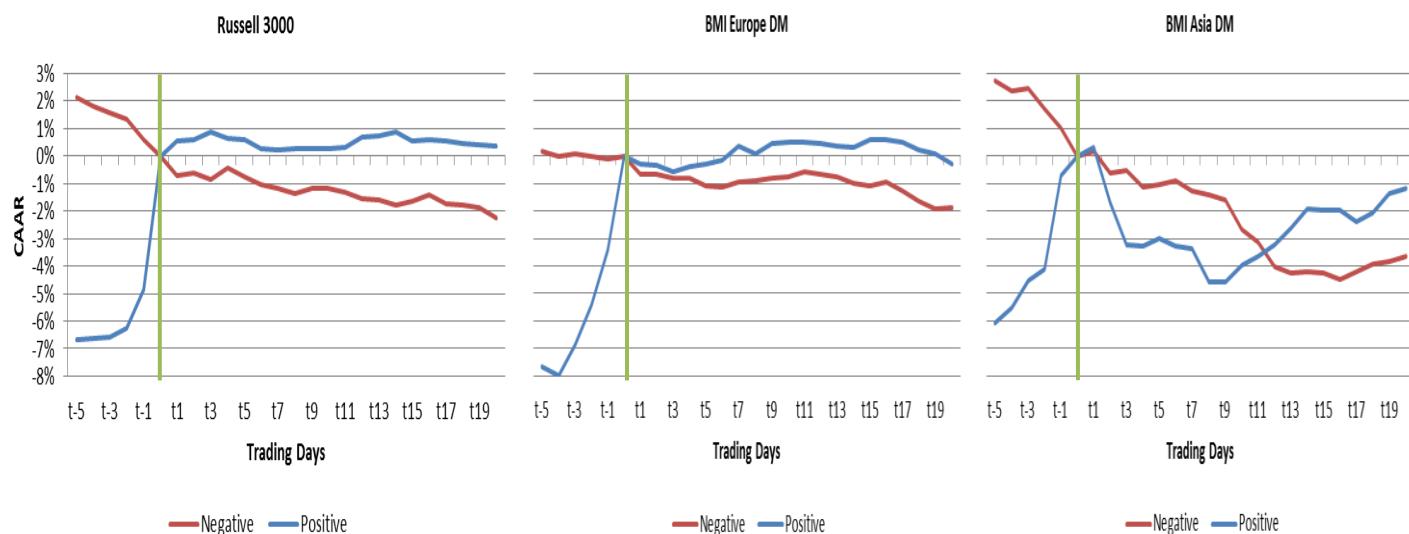
Credit analysts can respond quickly to unforeseen catalysts that are likely to have an impact in the near term by issuing a **CreditWatch**. As part of its surveillance process, S&P Ratings Services may communicate the potential for a credit ratings change by placing the rating on CreditWatch. Ratings for an issuer or issue appear on CreditWatch when, based on S&P Ratings Services analysis, an event or deviation from an expected trend has occurred, or may occur, that is likely to cause a ratings change in the near term, usually within 90 days.

#### Do Changes In CreditWatch Impact Equity Prices? - Event Study

In this section the event study is repeated to analyze equity backtested returns around CreditWatch announcements from 2000 to 2013. The analysis shows significant movement preceding a CreditWatch. One possible reason is that some positive events that can trigger a positive CreditWatch may already be on the radar of equity investors. Conversely, negative CreditWatch events have typically played out more slowly and over time representing an opportunity for equity investors [Figure 8].

**Figure 8: CreditWatch – Event Study**

Russell 3000, 12/31/1999-12/31/2013, Fama-French Adjusted



Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Table 9 shows that the market reactions to CreditWatch announcements are similar across the U.S., European and Asian developed markets. The equity markets respond to the positive events that drive a CreditWatch rapidly, with a more gradual reaction to negative CreditWatch announcements. Negative credit watches have been associated with underperformance of -226 bps, -188 bps, and -365 bps within the post-event window [ $t_0, t+20$ ] in the U.S., Europe and Asia, respectively. The issuance of a CreditWatch tends to be a relatively rare event compared to other S&P Ratings Services announcements.

**Table 9: CreditWatch by Region – Event Study**  
 12/31/1999-12/31/2013, Fama-French Adjusted Backtested Returns

	Russell 3000				S&P BMI Europe BMI Dev				S&P BMI Asia BMI Dev			
Event [Count]	Positive [90]		Negative [485]		Positive [74]		Negative [390]		Positive [25]		Negative [100]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
1 Day	0.55%	41%	-0.73% *	43% ***	-0.31%	35%	-0.67% ***	41% ***	0.29%	45%	0.14%	46%
5 Day	0.59%	39%	-0.76% **	45% **	-0.31%	39%	-1.09% ***	42% ***	-3.01%	27%	-1.02%	44%
10 Day	0.29%	44%	-1.18% *	47% *	0.50%	37%	-0.78% **	41% ***	-3.99%	22%	-2.65% * **	41%
20 Day	0.34%	42%	-2.26% **	44% ***	-0.29%	32%	-1.88% ***	42% ***	-1.20%	45%	-3.65% * *	42%

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

## 1.4 S&P Ratings Services Action – Summary

Changes to Long-Term Ratings are the most impactful to the equity market. Changes to Long-Term Ratings often lead further excess performance in equity markets. Downgrades tend to have more extreme backtested returns surrounding the event date and out to one month following the change. Upgrades experience a gradual response leading to outperformance over longer horizons. S&P Ratings Services Long Term Ratings changes are most impactful in for multiple notch movements, companies within the high yield universe, and for companies that are highly leveraged. Finally, simple backtest portfolios built entirely around Long-Term Ratings Changes provide intuitive simulated portfolio results.

## 2 CDS Movements

A Credit Default Swap [CDS] is a form of insurance on credit default that was initially created as a way for banks to transfer credit risk in order to free capital. As the market evolved, CDS became a vehicle for hedgers and speculators who looked to bet directionally on credit risk. The instrument is attractive as participants do not incur an initial cash outlay. The CDS market is relatively opaque, and the players tend to be sophisticated. Large institutions that trade CDS may also have client relationships with the reference entities of the CDS. Due to the lack of transparency in the market and the sophistication of the players, we explore whether *large movements in CDS spreads might provide a meaningful signal to equity investors*.

In 2009, new CDS market standardization rules [the Big Bang] took effect, significantly changing how CDS trades are executed, moving from bespoke to standardized contracts. Most CDS

contracts are now cleared centrally with greater price transparency. Due to this structural change in the market, we explore the relationship between large movements in CDS 5-year mid-spreads and equity prices after June 2009. This time period omits the financial crisis, an abnormal market environment. We follow the same analytical framework from our S&P Ratings Services analysis in section 1, CDS spread is lagged one day. In this way, we attempt to simulate results that equity participants might be more likely to experience. As in section 1, all backtested returns are controlled for the three Fama-French risk factors: Market, Capitalization and Valuation.

As of September 2, 2014 there were 1406 active CDS issuers within the U.S., Developed Europe and Developed Asia. The average number of constituents in each universe with CDS spreads was 345, 221, and 135 for Russell 3000 [R3K], S&P BMI Europe Developed Markets [BMI Europe], and S&P BMI Asia Developed Markets [BMI Asia] indices, respectively. These counts represent approximately 11.5%, 13.6, and 5.1% of the R3K, BMI Europe and BMI Asia respectively and this relatively limited scope of coverage will become relevant in our discussion of the backtest portfolio formation results.

## 2.1 Absolute Movements of CDS Spreads

In this section we examine the reaction of a firm's equity price to extreme CDS spread changes by studying the equity response to a 50 bps widening or tightening. Specifically, we focus on changes in the 5-year constant maturity, associated with the senior debt.

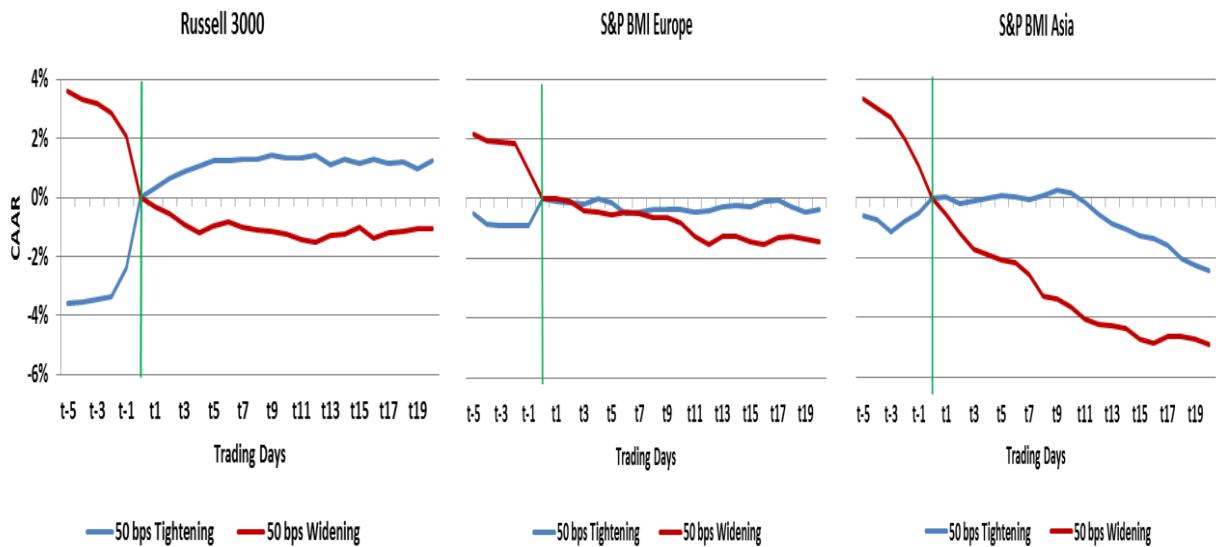
### Absolute CDS Spread Movement – Event Study

Figure 9 shows that equity prices in all three regions react differently depending on whether CDS spreads are widening or tightening. We observe that equity prices declined and experienced trend continuation after 50 bps widening [credit deterioration] events. However equity prices tended to mean revert after tightening [credit improvement] events, with the exception of CDS tightening events in the Russell 3000.

Contracts that experienced large CDS changes tended to already have been trading at wide levels. The median CDS spread in the Russell 3000, S&P BMI Europe, and S&P BMI Asia on the day of the event was 1468, 1028, 1473 bps respectively, for widening events. The median CDS spread was 1300, 939, and 1674 bps, respectively for tightening events.

We observe statistically significant backtested returns over a 20-day time horizon following both large tightenings and widenings with the exception of CDS tightenings in Europe. In all three markets we have observed equity prices moving both before and after the CDS event. Table 10 shows the CAAR and hit rates within the various event windows. The equity response to widening events is directionally in line with our intuition. Equity responses to tightenings do not show a uniform trend across regions.

**Figure 9: 50 Bps Change in CDS Spread by Region – Event Study**  
6/1/2009–11/31/2013, Fama-French Adjusted Backtested Returns



Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

**Table 10: 50 Bps Change in CDS Spread by Region – Event Study**  
June 2009 – November 2013, Fama-French Adjusted Backtested Returns

	Russell 3000				S&P BMI Europe BMI Developed				S&P BMI Asia BMI Developed			
Event [Count]	50 Bps Tightening [1986]		50 Bps Widening [2008]		50 Bps Tightening [714]		50 Bps Widening [697]		50 Bps Tightening [482]		50 Bps Widening [476]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
1 Day	0.32%*	49%	-0.29%*	46%***	0.10%	44%***	-0.03%	49%	0.06%	46%***	-0.56%**	42%***
5 Day	1.25%***	48%	-0.95%***	45%***	-0.14%	47%*	-0.55%	46%**	0.10%	45%***	-2.05%**	39%***
10 Day	1.34%**	47%***	-1.25%***	45%***	-0.36%	42%***	-0.82%	44%***	0.20%	43%***	-3.67%***	40%***
20 Day	1.25%**	48%*	-1.07%*	44%***	-0.35%	43%***	-1.46%**	41%***	-2.44%**	40%***	-4.91%***	36%***

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

All widening events are associated with negative CAARs and are statistically significant at the 10% level or better, over the 20-day event window [Table 10]. Within the Russell 3000 and the S&P BMI Asia universes, equity backtested returns are statistically significant beginning immediately after

the widening event takes place. Hit rates [the percentage of stocks beating the benchmark] are lowest within the S&P BMI Asia, where 64% of companies experiencing spread widenings experienced negative excess backtested returns 20 days after the event. The negative equity response to Asia tightenings is due to a high volatility within a concentrated sample.

### Credit Quality and Sector - Conditioned Event Study

By defining the universes for observation more granularly based on credit quality [High Yield, Investment Grade] and sector [Financials, and Non-Financials], we can better observe where performance is concentrated. We used S&P Ratings Services ratings on the event date to delineate investment grade and high yield categories. If a company did not have a rating at the time of the event we excluded it from this analysis, this includes companies that are in default or selective default. As 50 bps movements are very large, most of the widening names come from the high yield universe. The analysis in Table 11 shows that widening events in Europe and Asia, Financials and High Yield produce the largest negative equity backtested returns. In the U.S., Financials and High Yield perform the best when there is tightening in CDS spreads [credit improvement]. The differences in results between the U.S. vs Asia and Europe can be attributed to breadth of the high yield market. Asia and Europe events are more concentrated as a result of fewer liquid names.

**Table 11: 50 Bps Change in CDS Spread by Region - Conditioned Event Study**  
June 2009 – November 2013, Fama-French Adjusted Backtested Returns

	Russell 3000		S&P BMI Europe BMI Developed				S&P BMI Asia BMI Developed					
Event (Count)	50 Bps Tightening [1986]		50 Bps Widening [2008]		50 Bps Tightening [714]		50 Bps Widening [697]		50 Bps Tightening [482]		50 Bps Widening [476]	
Sub Segment	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
Non Financials	0.50%	46% **	-1.00%	47% ***	2.68% ***	49%	0.85%	42% ***	2.63%	49%	-0.14%	50%
Financials	2.81% ** [641]	51%	-1.23%	42% ***	-3.78% ***	38% ***	-2.14% *	40% ***	-6.38% ***	33% ***	-8.58% *** [269]	25% ***
High Yield	2.08% *** [1791]	48% *	0.08%	46% ***	0.74%	46% *	-2.04% ***	38% ***	-3.38% **	35% ***	-6.56% *** [314]	28% ***
Investment Grade	0.44%	52%	-0.80%	38% **	-3.53% ***	36% ***	-0.31%	47%	0.37%	51%	-2.74%	49%

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Investigating widening events more closely, we observe that events overlapped. In other words, there could be multiple occurrences of a widening greater than 50 bps for the same issuer over a

20 day time horizon. For example, if a company experiences a 50 bps widening on March 1<sup>st</sup> with no events preceding it, it is considered a first event. If another event happens on March 10<sup>th</sup> then that is considered an overlapping subsequent event. Any event for an individual company thereafter that is within 20 days of the closest event is considered a subsequent event. Table 12 displays the average return of the first 50 bps widening over a 20-day time horizon vs. the average return of subsequent events that happen over that same time frame. We notice that subsequent large CDS widening events result in larger negative equity backtested returns compared with when a 50 bps widening happens in isolation. The volatility and momentum to credit deterioration prove to have strong negative results in the relating equity. In this way equity investors are given an early warning signal with the first widening that should subsequent a widening occur, it will lead to underperformance.

**Table 12: Multiple 50 Bps Widening by Region – Event Study**  
June 2009 – November 2013, Fama-French Adjusted Backtested Returns

	Russell 3000		S&P BMI Europe BMI Dev		S&P BMI Asia BMI Dev	
Event	First Event in 20 Days	Subsequent Events	First Event in 20 Days	Subsequent Events	First Event in 20 Days	Subsequent Events
Count	566	1442	225	472	141	335
CAAR	-0.58%	-1.29%	-0.42%	-1.96%**	-0.78%	-6.65%***
Hit Rate	44%***	45%***	44%*	40%***	50%	30%***

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

### Portfolio Simulation – 50 Bps Widening

Next we look at this event study in a portfolio formation approach, where we utilize this signal to construct backtest portfolios. Due to the fact that CDS and equity price movements are highly concentrated around the event date, we rebalanced our backtest portfolio daily with a 5, 10, and 20 trading day holding period. Trading costs are not taken into account. Inclusion into the backtest portfolio occurs one day after a large CDS movement in order to be conservative and to measure the performance investors might reasonably expect to attain. The analysis focuses only on CDS widening events to determine whether there is strong associated equity underperformance. All backtest portfolios have very few constituents, explaining the lack of statistical significance for most of the results. The nature of overlapping and clustering of events through time further complicates achieving a level of statistical significance. In Europe and Asia we observe negative backtested returns for all holding periods, while in the Russell 3000 we only see the negative excess backtested returns on a 5 day holding period [Table 13]. We only see statistically significant backtested returns within Asia.

**Table 13: Backtest Portfolio Formation Return Analysis 50 Bps Widening**  
 June 2009 – November 2013, Market Adjusted Backtested Returns

	Russell 3000				S&P BMI Europe Developed				S&P BMI Asia Developed			
Event	50 Bps Widening				50 Bps Widening				50 Bps Widening			
Holding Period	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count
5 Day	-0.54%	48%	-0.11	6	-2.40%	46%**	-0.58	3	-4.6%**	44%***	-1.25	2
10 Day	0.00%	49%	-0.001	8	-2.40%	47%*	-0.57	4	-4.8%**	44%***	-1.44	2
20 Day	0.44%	50%	0.13	11	-2.80%	47%**	-0.73	5	-3.00%	46%**	-0.91	3

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Indexes are unmanaged, statistical composites. It is not possible to invest directly in an index. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Index and backtested returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

## 2.2 Percentage Movements of CDS Spreads

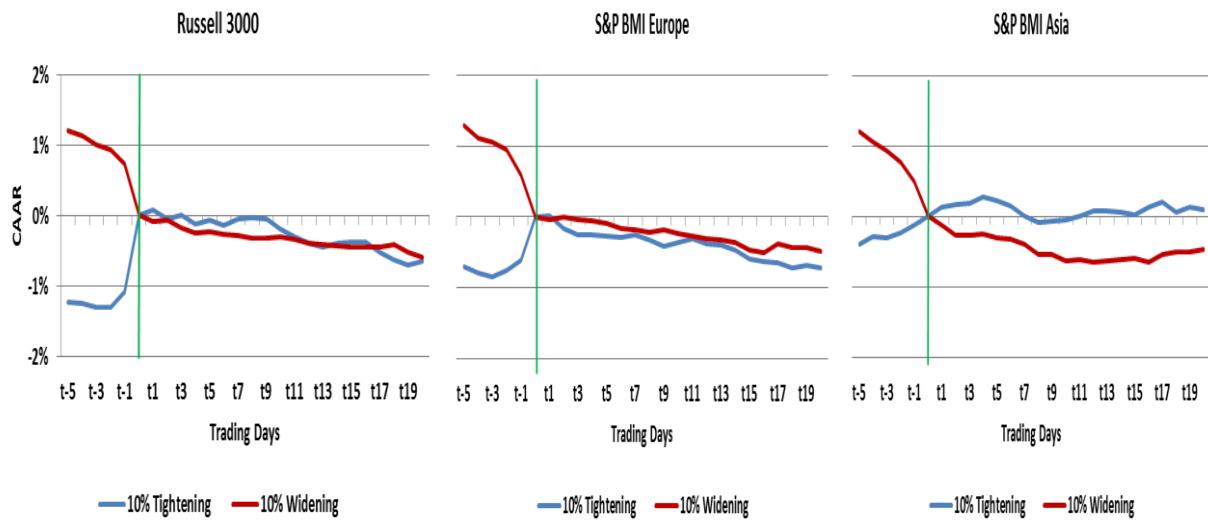
We also examined extreme CDS moves by studying the equity response to 10% CDS movements for both widening and tightening spreads.

### Event Study

Similar to the 50 bps movements analyzed in section 2.1, we see a trend continuation from widening events that is statistically significant in all regions 20 days after the event. We observe that backtested stock returns mean revert after 10 % CDS tightening events. The median CDS spread on the day of the event for Russell 3000, S&P BMI Europe, and S&P BMI Asia was 108 bps, 145 bps, 102 bps respectively for widening events and 88 bps, 142 bps, and 83 bps respectively for tightening events, significantly tighter spreads than in the previous analysis in 2.1. This will impact our results as the denominator used to calculate changes is often small.

We observe that Fama-French market backtested returns for the Russell 3000 are the most negative, followed by S&P BMI Europe, and S&P BMI Asia respectively on day 20 for 10% tightening events. Tightenings revert quickly in both U.S. and Europe. By day 20, the equity backtested returns associated with 10% tightenings underperform widening events [Figure 10, Table 14].

**Figure 10: 10% Change in CDS Spread by Region - Event Study**  
6/1/2009-11/31/2013, Fama-French Adjusted Backtested Returns



Source: S&P Capital IQ Quantamental Research.

Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

**Table 14: 10% Change in CDS Spread by Region - Event Study**  
June 2009 – November 2013, Fama-French Adjusted Backtested Returns

Event (Count)	Russell 3000				S&P BMI Europe Developed				S&P BMI Asia Developed			
	10% Tightening [2385]		10% Widening [4022]		10% Tightening [1535]		10% Widening [2699]		10% Tightening [1711]		10% Widening [2390]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
1 Day	0.09%	47% **	-0.09%	49%	0.02%	48%	-0.04%	48% **	0.12% *	48% *	-0.11% **	47% ***
5 Day	-.07% ***	47% **	-0.24% **	48% ***	-0.27%	47% **	-0.10%	48% **	0.23% *	49%	-0.30% **	48%
10 Day	-0.19% **	45% ***	-0.30% ***	47% ***	-0.35% **	46% ***	-0.24% **	47% ***	-0.05%	47% ***	-0.63% ***	46% ***
20 Day	-0.65% ***	45% ***	-0.59% ***	45%	-0.72% ***	46% ***	-0.48% ***	48%	0.09%	47% **	-0.47% ***	48% **

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively.

Source: S&P Capital IQ Quantamental Research.

Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Examining the tightening events within the U.S. and Europe may appear to display results that are counter to intuition as they are negative. The accelerating underperformance through 20-days is the mean reversion of the outperformance that occurs prior to, and on the day of the 10% CDS tightening (Figure 10, Table14).

### Conditioned Event Study

For 10% CDS movement events, we notice many more occurrences in the investment grade space rather than in high yield. Regionally, we observe that Investment Grade and Non-Financials achieve statistical significance in the U.S. and Europe for widening events. For tightening events we note that investment grade tightening has statistical significance and mean reverts across all regions.

**Table 15: Conditioned Event Study – 10% Change in CDS Spread by Region**  
June 2009 – November 2013, Fama-French Adjusted Backtested Returns

Russell 3000				S&P BMI Europe Developed				S&P BMI Asia Developed				
Event [Count]	10% Tightening [2385]		10% Widening [4022]		10% Tightening [1535]		10% Widening [2699]		10% Tightening [1711]		10% Widening [2390]	
Event Window	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate	CAAR	Hit Rate
Non Financials	-0.72%	46% ***	-0.66% ***	45% ***	-0.32%	46% *	-0.69% ***	46% ***	.23%	48%	-0.12%	49%
	[2007]	[3417]		[944]		[1708]		[1453]		[1919]		
Financials	-0.26%	44% ***	-0.16%	45% **	-1.33% ***	44% ***	-0.11%	48% **	-0.70%	42% **	-1.87% **	43% ***
	[378]	[605]		[591]		[991]		[258]		[471]		
High Yield	-0.14%	46% *	-0.19%	44% ***	-2.49%	40% ***	-1.55% *	41% ***	3.39%	47%	-3.26% *	38% ***
	[562]	[890]		[183]		[244]		[145]		[171]		
Investment Grade	-0.34% **	46% ***	-0.48% ***	46% ***	-0.47% **	46% ***	-0.36% **	47% ***	-0.45% *	47%	-0.36%	49%
	[1748]	[3028]		[1220]		[2343]		[976]		[1464]		

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively

Source: S&P Capital IQ Quantamental Research. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

### Portfolio Simulation – 10% CDS Widening

Forming backtest portfolios for 10% CDS movements did not produce statistically significant backtested returns in any of the universes. Similar to 50 basis points CDS movement, we rebalanced portfolios daily with a 5, 10, and 20 day holding period. Trading costs are not taken into account. Inclusion into the backtest portfolio occurs one day after large CDS widening in order to be conservative.

**Table 16: Backtest Portfolio Formation Return Analysis 10% Widening**  
 June 2009 – November 2013

Russell 3000				S&P BMI Europe Developed				S&P BMI Asia Developed				
Event	10% Widening			10% Widening			10% Widening					
Holding Period	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count	Monthly Backtest Excess Return	Hit Rate	IR (Information Ratio)	Average Backtest Portfolio Count
5 Day	-0.04%	49%	-0.01	17	-1.22%	48%	-0.43	11	-1.65%	49%	-0.66	10
10 Day	-0.18%	50%	-0.07	28	-0.58%	49%	-0.21	18	-0.92%	48%	-0.40	17
20 Day	0.22%	50%	0.10	47	-0.11%	48%	-0.04	29	-0.22%	50%	-0.10	27

\*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels respectively  
 Source: S&P Capital IQ Quantamental Research.

Indexes are unmanaged, statistical composites. It is not possible to invest directly in an index. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Index and backtested returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

### 2.3 CDS Change Summary

For the most part both 50 basis point changes and 10% CDS moves show consistent results over the three regions. The event study showed that large tightenings experienced outperformance leading up to and on the day of the tightening followed by a mean reversion whereas large CDS widenings tended to lead to further underperformance. Also subsequent widenings were the most significant leading to underperformance across all regions.

Neither widening measure proved significant using the portfolio simulation approach due to both the clustering and overlap of events.

Large CDS widenings have value in equity investment process as an alert for further due diligence when multiple widenings occur.

## 3 S&P Capital IQ Credit Analytics

We examined the following three quantitatively driven models of credit quality and measured the subsequent equity response, *Probability of Default Model Market Signals – Corporates [non-financials only]*, *Probability of Default Based – Market Derived Signal*, and *CreditModel®*.<sup>3</sup> Whereas S&P Ratings Services may contain qualitative insights, and have the benefit of credit analysts' fundamental experience, there are limitations in terms of total coverage and speed of response. Quantitative measures address these specific concerns by including various inputs, resulting in timely indicators of credit quality over a large breadth of companies.

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<sup>3</sup> See sections 3.1 – 3.3 as well as the technical guides listed in the reference section at the end of the paper for additional details on the construction of the three model outputs

We use an event study framework to analyze how well the model outputs explain stock returns globally. The event triggers are improvements and declines in scores. Scores are expressed in the form of lowercase credit rating nomenclature [e.g. aa, bbb]. [Lower-case nomenclature is used to differentiate PD market signals or scores from the credit ratings issued by S&P Rating Services.] An example of score improvement [decline] is going from aa to aa+ [from bbb+ to bbb].

The event date is the date where an event trigger occurs and is denoted by  $t_0$ . We examined backtested returns in both short- and long-horizon post-event windows where the lengths of the two event windows are  $[t+2, t+23]$  and  $[t+2, t+250]$ , respectively, where  $t+2$ ,  $t+23$ , and  $t+250$  are 2, 23, and 250 trading days after the event trigger date,  $t_0$ . Abnormal backtested returns are in excess of the Fama-French three factors. Universes examined are Russell 3000, S&P BMI Europe Developed Markets, and S&P BMI Asia Developed Markets indices.

### 3.1 Probability of Default Model Market Signal - Corporates

*Probability of Default Model Market Signal - Corporates* is a quantitative model that generates daily one-year forward looking probability of defaults for public companies globally. It combines equity and debt market information, with country and industry risk factors. The PD model provides a short-term assessment of an organization's creditworthiness through an enhanced Merton framework. The model outputs probability of defaults [PDs] where the values are between zero and one, inclusive. See *PD Model Market Signals - Corporates Release 1.0*, the technical reference guide for additional details on the construction of the model.

#### 3.1.1 Event Study

For our event study analysis, we mapped the PD values to their respective lowercase credit rating nomenclature [e.g. aa, bbb] based upon historical one-year observed default rates of S&P Rated entities. We used improvements and declines of the PD scores as our event triggers. See Table 17 below for the mapping.

In general, we are unable to establish that improvements [declines] of PD scores led to future equity outperformance [underperformance] in our sample data set in both short- and long-horizon event windows. In fact, we see perverse forecasting behavior. For example, stocks in S&P BMI Europe Developed Markets index that experienced PD score improvement underperformed subsequently by -205 bps in the post event window  $[t+2, t+250]$  in our sample data set. See Exhibit A.1 in the appendix.

**Table 17: Mapping between PD and PD Score**  
**Based upon Historical Default Rates from S&P Ratings Globally**

PD	PD Score	PD	PD Score	PD	PD Score
< 0.007%	<del>aaa</del>	[0.126%, 0.204%]	<del>bbb+</del>	[3.675%, 5.951%]	b
[0.007%, 0.011%]	<del>aa+</del>	[0.204%, 0.330%]	<del>bbb</del>	[5.951%, 9.637%]	b-
[0.011%, 0.018%]	<del>aa</del>	[0.330%, 0.534%]	<del>bbb-</del>	[9.637%, 15.606%]	<del>ccc+</del>
[0.018%, 0.030%]	<del>aa-</del>	[0.534%, 0.865%]	<del>bb+</del>	[15.606%, 25.272%]	<del>ccc</del>
[0.030%, 0.048%]	a+	[0.865%, 1.401%]	bb	[25.272%, 40.925%]	<del>ccc-</del>
[0.048%, 0.078%]	a	[1.401%, 2.269%]	bb-	[40.925%, 66.274%]	cc
[0.078%, 0.126%]	a-	[2.269%, 3.675%]	b+	>=66.274%	c

Source: S&P Capital IQ Quantamental Research & S&P Ratings Services

### 3.2 Probability of Default Based – Market Derived Signal

Unlike the model outputs of *Probability of Default Model Market Signal – Corporates*, the *Probability of Default Based - Market Derived Signal (PD-MDS)* outputs are probability of default letter grade nomenclature [e.g. aa, bbb]. The model takes eight financial, economic, and market measures as inputs. The scope of the model is global with daily data frequency. The model starts coverage in August 2008.

#### 3.2.1 Event Study

Based on our empirical results, we are unable to infer that upgrades [downgrades] of PD-MDS scores led to future equity outperformance [underperformance] in both short- and long-horizon windows. We, however, did see some correlation between PD-MDS and equity prices on the downgrade side. Specifically, stocks in the Russell 3000 and the S&P BMI Europe Developed Markets index that had PD score downgrades underperformed by -482 and -280 bps subsequently in the post event window [t+2, t+250]. See Exhibit A.2 in the appendix.

### 3.3 CreditModel

*CreditModel* is a quantitative model that generates credit scores [e.g. aa, bbb] for non-financial corporates globally, and is calibrated to S&P Ratings Services credit ratings. It combines financial ratios, systemic and economic factors, to provide an evaluation of an organization's long-term credit strength, with an easy, efficient and automated model. Similar to the PD-MDS, *CreditModel* outputs lower case scores in line with the ratings taxonomy [e.g. aa, bbb]. [Lower-case nomenclature is used to differentiate CreditModel scores from the credit ratings issued by S&P Rating Services.]

The inputs to the model are financial items and ratios from company financial filings and the S&P proprietary Country Risk Score. See *S&P Capital IQ CreditModel Release 2.6*, the technical reference guide for additional details on the construction of the model.

### 3.3.1 CreditModel - Event Study

Generally, based on our empirical results, we are unable to establish that improvements [declines] of S&P Capital IQ CreditModel scores led to future equity outperformance [underperformance] in both short- and long-horizon windows. However, we do see some evidence that stocks in S&P BMI Asia Developed Markets index with declines in credit scores underperformed by -564 bps [statistically significant at the 1% level] subsequently in the post event window [ $t+2, t+250$ ] in our sample data set. See Exhibit A.3 in the appendix.

## 4 Data and Methodology

We explored a number of different data sources traditionally utilized by fixed income investors to identify those metrics that may lead equity prices. We examined historical entity level Long-Term Credit Ratings, Outlooks, and CreditWatches issued by S&P Ratings Services. S&P Capital IQ provides independent CDS prices based on data collected from CDS buy-side firms. Finally, S&P Capital IQ provides a number of quantitatively driven credit indicators designed to estimate a firm's probability of default and credit grade: *Probability of Default Model Market Signals – Corporates, Probability of Default Based – Market Derived Signal, and CreditModel*. This data is available via the S&P Capital IQ Platform, the S&P Capital IQ API, as a part of the S&P Capital IQ Credit Indicator data package on XpressFeed and finally on a real-time basis via the Event Driven Alerts low-latency feed.

## 5 Conclusions

Our analysis established the correlation of S&P Rating Services credit ratings and S&P Capital IQ credit quality indicators with stock movements globally after controlling for market, size, and value factors. The results demonstrated that changes in S&P Ratings Services Long-Term Ratings tended to precede an economically and statistically meaningful movement in equity prices. Our work also shows that ratings changes most often preceded equity price movements for companies whose ratings fall into one of three categories: multiple notch moves, high yield, highly leveraged.

Large CDS spread widening also provided additional complementary information to an equity investment process. Our results demonstrated that stocks experiencing large CDS widening underperformed in the subsequent month. Multiple occurrences of large CDS widening within a short span of time are particularly significant, as those losses are most pronounced across all regions.

Consistent with existing literature, our results demonstrated that Probability of Default and CreditModel scores were not correlated with stock price movements.

## Appendix

**Exhibit A.1: Short- and Long-Horizon Backtested Returns Analyses  
Probability of Default Model Market Signal – Corporates  
July 2003 – July 2013**

Index	Metrics	[t+2, t+23]		[t+2, t+250]	
		Model Score Upgrade	Model Score Downgrade	Model Score Upgrade	Model Score Downgrade
Russell 3000	avg backtested excess return	-0.08%	0.05%	-0.41%	0.05%
	hit rate	47.5% ***	48.4% ***	43.0% ***	43.6% ***
	count of events	19062	18786	7099	7105
BMI Europe Dev	avg backtested excess return	-0.34% ***	-0.01%	-2.05% ***	-0.56%
	hit rate	47.4% **	48.5%	43.2% ***	45.8% **
	count of events	2193	2178	768	793
BMI Asia Dev	avg backtested excess return	0.19%	0.07%	-1.67% ***	0.26%
	hit rate	48.2% ***	47.0% ***	41.3% ***	42.8% ***
	count of events	9037	8931	3083	3109

**Exhibit A.2: Short- and Long-Horizon Backtested Returns Analyses  
Probability of Default Model – Market Derived Signal  
August 2008 – July 2013**

Index	Metrics	[t+2, t+23]		[t+2, t+250]	
		Model Score Upgrade	Model Score Downgrade	Model Score Upgrade	Model Score Downgrade
Russell 3000	avg backtested excess return	0.23%	-0.11%	-3.92% ***	-4.82% ***
	hit rate	49.0%	48.6% *	40.3% ***	38.8% ***
	count of events	4046	4056	1781	1800
BMI Europe Dev	avg backtested excess return	0.32%	0.12%	-1.57%	-2.80% *
	hit rate	49.3%	49.9%	45.9%	40.6% ***
	count of events	684	690	266	266
BMI Asia Dev	avg backtested excess return	-0.46%	-0.24%	-1.29%	-1.75%
	hit rate	46.5% *	48.5%	42.3% **	38.5% ***
	count of events	591	598	213	213

**Exhibit A.3: Short- and Long-Horizon Backtested Returns Analyses  
S&P Capital IQ CreditModel**

**Russell 3000 Apr. 1998 – Jun. 2013; BMI Europe Dev Jul. 1998 – Jun. 2013; BMI Asia Dev Dec. 2000 – Jun. 2013**

Index	Metrics	[t+2, t+23]		[t+2, t+250]	
		Model Score Upgrade	Model Score Downgrade	Model Score Upgrade	Model Score Downgrade
Russell 3000	avg backtested excess return	0.30%	-0.53%	-0.47%	0.64%
	hit rate	49.1%	45.8% ***	45.2% ***	43.4% ***
	count of events	1716	1516	1270	1177
BMI Europe Dev	avg backtested excess return	0.36%	-1.22% ***	-1.60%	0.31%
	hit rate	50.0%	44.8% **	45.3% **	45.0% **
	count of events	620	591	428	358
BMI Asia Dev	avg backtested excess return	0.45%	-0.56%	1.99%	-5.64% ***
	hit rate	47.9%	42.6% ***	44.4% *	37.9% ***
	count of events	643	498	487	309

For all charts: Source: S&P Capital IQ Quantamental Research. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively. Indexes are unmanaged, statistical composites. It is not possible to invest directly in an index. Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Index and backtested returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results.

Exhibit A.4: S&P Ratings Scale

**Opinions Reflected By S&P's Ratings**

 <b>Investment Grade</b>	<b>'AAA'</b> Extremely strong capacity to meet financial commitments. Highest rating
 <b>Speculative Grade</b>	<b>'AA'</b> Very strong capacity to meet financial commitments
 <b>Speculative Grade</b>	<b>'A'</b> Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances
 <b>Speculative Grade</b>	<b>'BBB'</b> Adequate capacity to meet financial commitments, but more subject to adverse economic conditions
 <b>Speculative Grade</b>	<b>'BBB-'</b> <i>Considered lowest investment grade by market participants</i>
 <b>Speculative Grade</b>	<b>'BB+'</b> <i>Considered highest speculative grade by market participants</i>
 <b>Speculative Grade</b>	<b>'BB'</b> Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions
 <b>Speculative Grade</b>	<b>'B'</b> More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments
 <b>Speculative Grade</b>	<b>'CCC'</b> Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments
 <b>Speculative Grade</b>	<b>'CC'</b> Currently highly vulnerable
 <b>Speculative Grade</b>	<b>'C'</b> A bankruptcy petition has been filed or similar action taken, but payments of financial commitments are continued
 <b>Speculative Grade</b>	<b>'D'</b> Payment default on financial commitments

Ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories.

Source: [http://www.standardandpoors.com/aboutcreditratings/RatingsManual\\_PrintGuide.html](http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html)

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## S&P Capital IQ Recent Event Driven Signal Research

### April 2014: Riding the Coattails of Activist Investors Yields Short and Long Term Outperformance

On August 13, 2013, Apple's stock price rose 4.75% on high volume after Carl Icahn, a renowned activist investor, tweeted that his firm had accumulated a large position in the company. In the ensuing 6 months, the stock rose an additional 9.33% as Icahn demanded that the company add another \$50 billion to its existing stock buyback plan. Icahn backed off from this demand on February 10, 2014, but not before Apple's stock price had risen to \$528.99 from \$461.88 where it was before he embarked on the campaign. By then, the company had already aggressively repurchased its stock, including \$14 billion in a two-week stretch. As high-profiled campaigns have occurred with greater frequency and resulted in more successes, the AUM for investor activist funds has tripled to \$95 billion in 2013, 3 times the amount in 2008.

### January 2014: Buying Outperformance: Do share repurchase announcements lead to higher returns?

We examine the returns surrounding buyback announcements to test whether, and when, buyback programs signal subsequent outperformance and shareholder value. We find\*:

- Buyback announcements precede excess returns in the U.S.. Stocks on average outperformed the equally weighted Russell 3000 by 0.60% over one month, and by 1.38% over one year periods following buyback announcements.
- Outperformance is greatest among small caps or larger magnitude buybacks as a % of shares outstanding.
- Reported insider trading and buyback announcement signals are complementary.
- In Europe, some post-buyback outperformance over 12 months, but no significant excess return after one month.

### October 2013: Informative Insider Trading – The Hidden Profits in Corporate Insider Filings

In this report, we investigate the impact of the public disclosure of insider trading on equity prices, using both an event study framework and a portfolio formation approach. Leveraging S&P Capital IQ's Ownership database, we explore several practical methods of identifying "informative" insider trades, and how to construct a backtest portfolio of stocks using recent "informed" insider transactions. We document the following results\*:

- Consistent with existing literature, insider trades are correlated with future stock returns.
- Outside investors have been able to earn economically significant excess returns by trading on "informative" insider trading signals.
- Mimicking the net purchase actions of CEOs yielded an excess return of 1.27% over the next one week.
- A trading strategy based on the three characteristics: opportunistic, intensive and directional change, yielded 0.36% weekly excess backtested returns after assumed transaction costs.

\*Backtested returns do not represent the results of actual trading and were constructed with the benefit of hindsight. Returns do not include payment of any sales charges or fees. Inclusion of fees and expenses would lower performance. Past performance is not a guarantee of future results

December 2012: [Do CEO and CFO Departures Matter? - The Signal Content of CEO and CFO Turnover](#)

April 2011: [Can Dividend Policy Changes Yield Alpha?](#)

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