S&P Global
Market Intelligence

# Optimizing Credit Portfolio Surveillance: A Case Study

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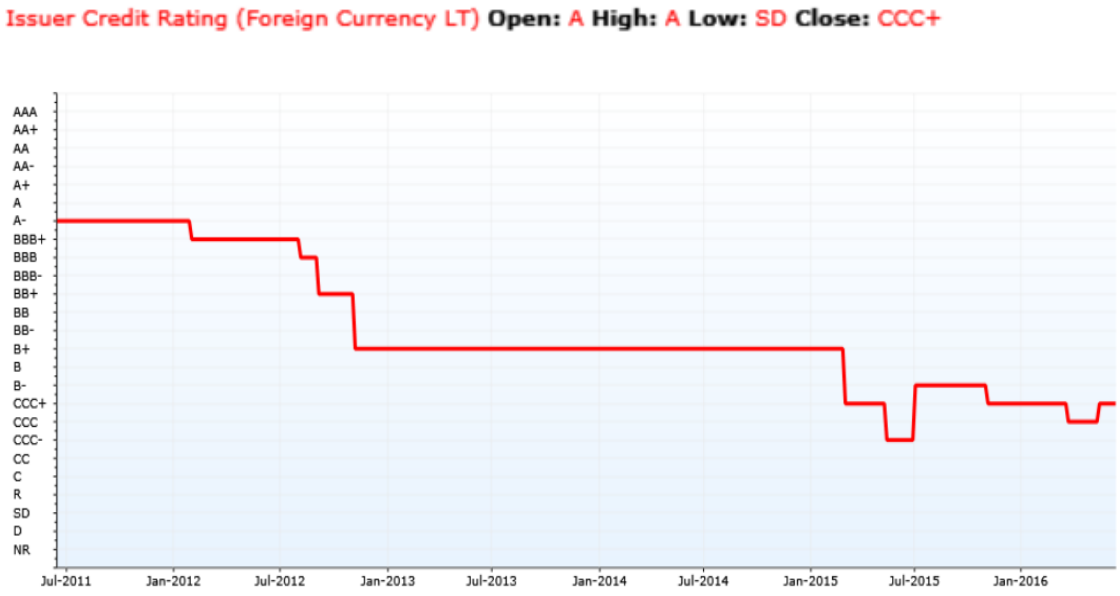
## Introduction

Over the last five years, S&P Global Ratings Long-Term Foreign Currency Issuer Credit Rating of a leading consumer electronics company deteriorated substantially, going from "A" (strong capacity to meet its financial commitments) in 2010 to "CCC+" (vulnerable) in 2015 (see Chart 1). Such dramatic changes in credit quality over a five-year period are more an exception than the norm.[1] That said, factors such as technological innovation, changes in commodity prices, geopolitical risks and sovereign debt defaults can lead to rapid and unanticipated changes in a company's ability to service its debt payments.

**Chart 1: S&P Global Ratings Long-Term Foreign Currency Ratings For A Leading Consumer Electronics Company, July 2011 to June 2016**




Source: RatingsDirect® on the S&P Capital IQ platform as of June, 2016. For illustrative purposes only.

[1]The Transitions Matrices Report from S&P Global Market Intelligence's CreditPro database (as of June 2016) shows that the historical average probability of an "A-" rated entity becoming a "CCC-" and below over five years was only 0.75% for static pools created between 1981 to 2011

If large, well reputed companies are not immune to financial distress, how can we detect potential favorable or adverse changes in credit quality early on? Focusing on a leading consumer electronics company, the case study that follows shows how to take steps to monitor and potentially prepare for unwanted surprises.

## Leveraging Early-Warning Signals of Default[2]

Movements in equity prices and in the credit default swap (CDS) markets provide important early-warning signals of both potential improvements and deteriorations in credit quality. S&P Global Market Intelligence provides models to capture each of these:

- **Probability of Default (PD) Market Signals** translate stock price volatility into credit risk measures using a sophisticated extension of Merton models, which treat the firm's equity as a call option on its assets and assumes that the firm defaults on its debt when the market value of assets falls below the market value of debt[3]. These are well established types of credit risk models.
- **CDS Market Derived Signals** incorporate daily pricing information from the CDS marketplace to assess different views of the risk profile of an industry or entity.

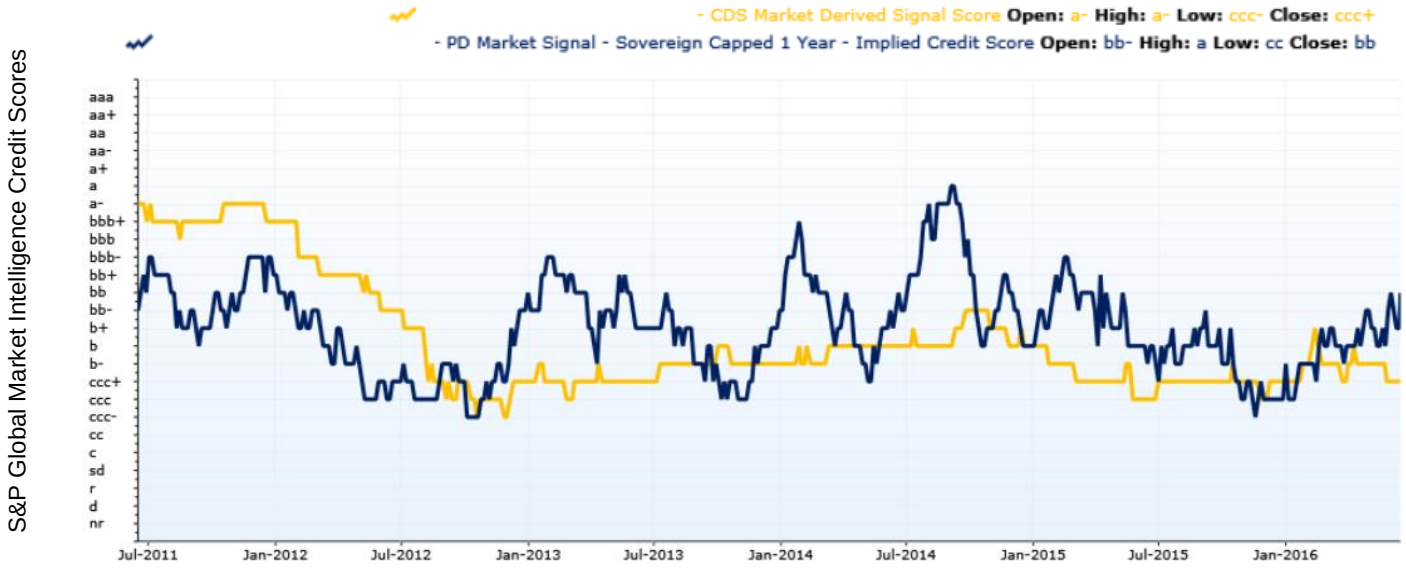
S&P Global Ratings credit ratings provide longer-term, stable assessments of risk that involve extensive qualitative and quantitative analysis, and range from "AAA" (extremely strong capacity to meet its financial commitments) to "SD" (selective default) and "D" (in default on one or more of its financial obligations[4]).[5]

Chart 2 below shows that the consumer electronics company's PD Market Signal Implied Credit Score and CDS Market Derived Signals[6] began to reflect below investment grade ("bb+" and below) credit risk in early 2012. These indicators deteriorated further to "ccc+" and below at various points in time after August 2012.

[2]Note: Many of the approaches discussed in this case study are applicable to other rated and unrated entities, entities with positive and negative changes in credit fundamentals as well as investment grade and high yield entities.
[3]Merton, R. 1974. "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." Journal of Finance, 29, 449-470.
[4]Including rated and unrated financial obligations but excluding hybrid instruments classified as regulatory capital or in non-payment according to terms.

[6] S&P Global Ratings does not contribute to or participate in the creation of credit scores generated by S&P Global Market Intelligence. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence PD credit model scores from the credit ratings issued by S&P Global Ratings.

**Chart 2: PD Market Signal Implied Credit Score and CDS Market Derived Signals for a Leading Consumer Electronics Company, July 2011 to June 2016**




Source: S&P Capital IQ platform as of June, 2016. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence credit scores from the credit ratings issued by S&P Global Ratings. For illustrative purposes only.

Comparing PD Market Signal credit scores to fundamental indicators such as S&P Global Ratings credit ratings (and CreditModel scores for entities not rated by S&P Global Ratings[7]), we find that when the two deviate significantly, fundamental indicators such as credit ratings or CreditModel scores, on average, are highly likely to move in the same direction as the market signals. (See the Appendix for additional details.)

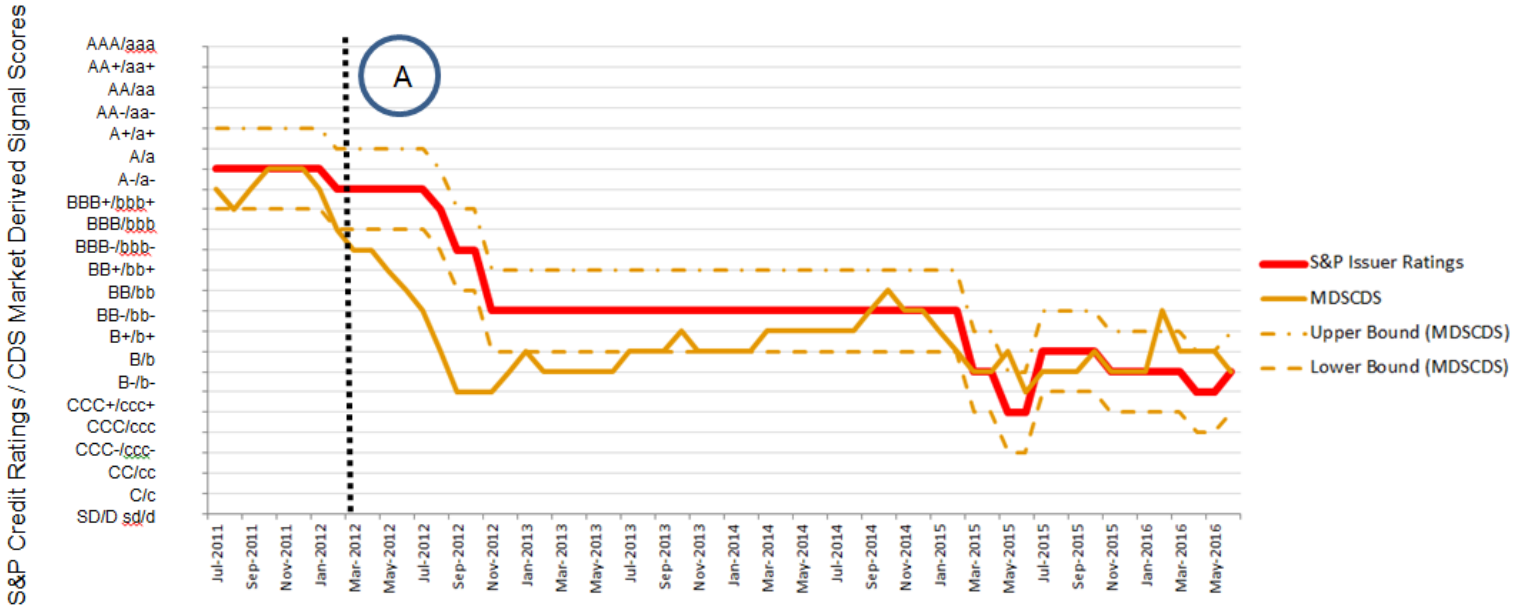
To make the differences between these indicators easier to interpret, we applied upper and lower bounds (+/-1.96 standard deviations over the 2005-2015 sample period) on the market indicators to adjust for volatility, so that a signal is flagged whenever the market indicators exceed these bounds. In doing so, we found that if the CDS Market Derived Signal was below the lower bound, the likelihood of an S&P Global Ratings downgrade within the next 12 months increased by 16.5%. Similarly, if the PD Market Signal was below the lower bound, the likelihood of an S&P Global Ratings downgrade within the next 12 months increased by 11.4%.

Looking at our consumer electronics company, its CDS Market Derived Signals were below the lower bound from February 2012 to February 2014. The company's PD Market Signal

[7]This includes S&P Global Ratings credit ratings and model derived scores for non-rated entities.

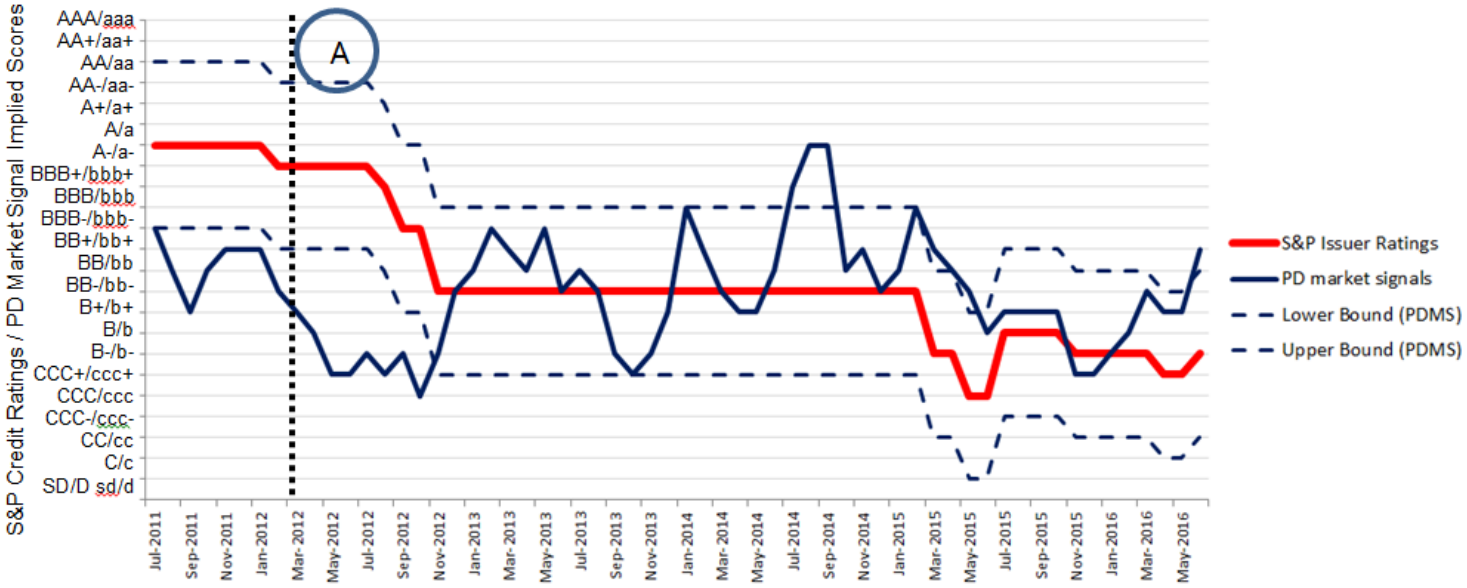
Implied Credit Score were significantly more bearish than the credit rating for most of the period, except from July 2012 to July 2013, and July 2014 to May 2015 (see Chart 3 and Chart 4). Point A circled in the charts below (see Chart 3 and 4) denotes a period where both indicators were at or below their lower bounds.

**Chart 3: CDS Market Derived Signal Scores, Upper and Lower Bounds for a Leading Consumer Electronics Company, July 2011 to June 2016**




Source: S&P Capital IQ platform as of June, 2016. Credit ratings are prepared by S&P Global Ratings, which is analytically and editorially independent from any other analytical group at S&P Global. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence credit scores from the credit ratings issued by S&P Global Ratings. For illustrative purposes only.

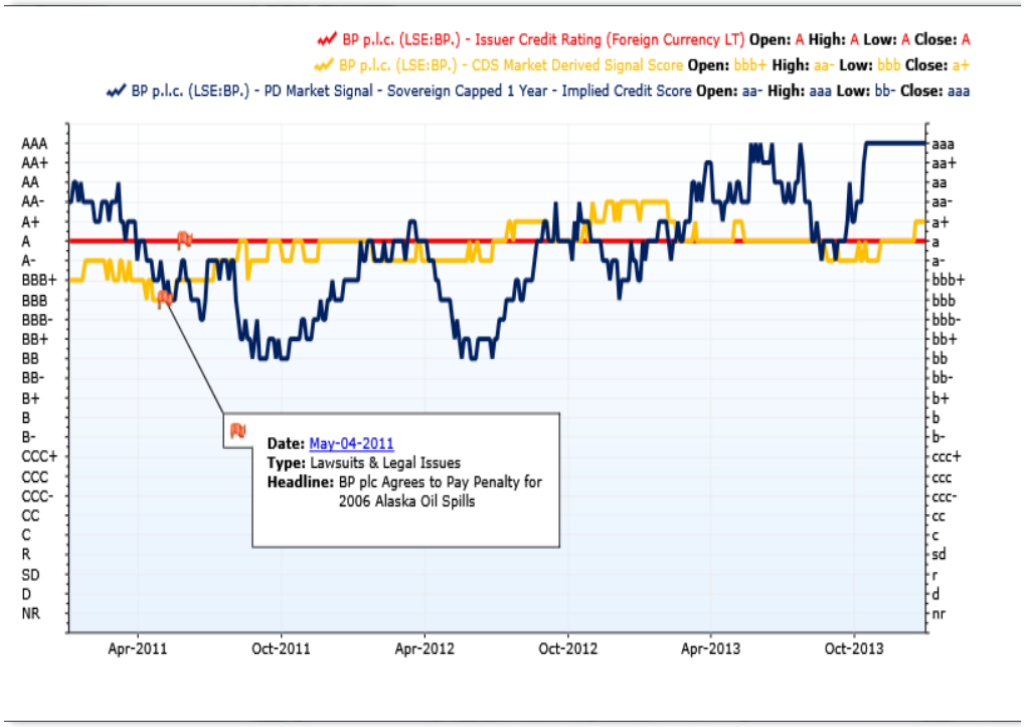
**Chart 4: PD Market Signal Implied Scores, Upper and Lower Bounds for a Leading Consumer Electronics Company, July 2011 to June 2016**




Source: S&P Capital IQ platform as of June, 2016. Credit ratings are prepared by S&P Global Ratings, which is analytically and editorially independent from any other analytical group at S&P Global. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence credit scores from the credit ratings issued by S&P Global Ratings. For illustrative purposes only.

Large deviations between market signals and fundamental signals do not always lead to adjustments in credit ratings. For example, in the case of BP Plc. (LSE:BP), S&P Global Ratings had downgraded its long-term credit rating from “AA-“ to “A” on June 17, 2010, after the Alaska oil spill. In May 2011, both equity and CDS indicators continued to deteriorate after the company announced that it agreed to pay penalties on the Alaska oil spills. However, S&P Global Ratings revised its outlook to Stable in July 2011 (see “BP PLC Outlook Revised to Stable on Supportive Market Conditions; A/A-1 Ratings Affirmed”) because “operating performance remains satisfactory overall, supported by market conditions. Asset sales and underlying operating cash generation support BP’s near-term financial flexibility.” Eventually, both CDS and equity-based market indicators recovered and converged towards the credit rating of “A” (see Chart 5). This indicates that market prices could have been overly bearish on BP Plc.’s fundamental credit quality.

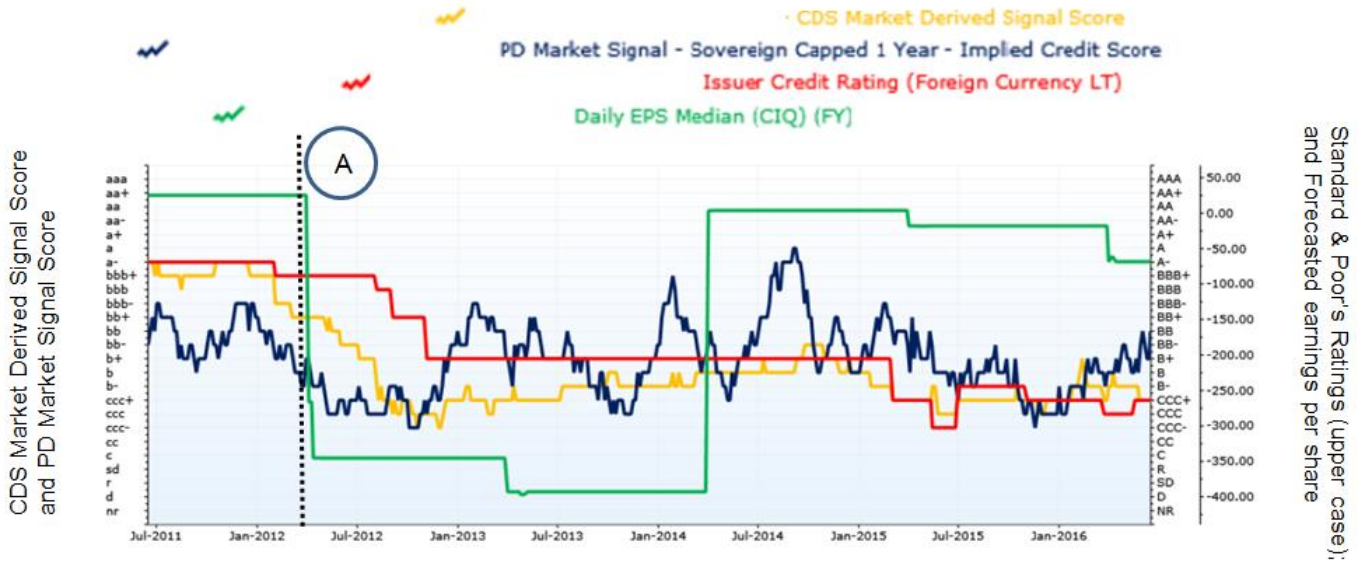
**Chart 5: PD Market Signal Scores, CDS Market Derived Signal Scores and S&P Global Ratings Issuer Credit Ratings for British Petroleum (LSE:BP), January 2011 to December 2013**




Source: S&P Capital IQ platform as of June, 2016. Credit ratings are prepared by S&P Global Ratings, which is analytically and editorially independent from any other analytical group at S&P Global. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence credit scores from the credit ratings issued by S&P Global Ratings. For illustrative purposes only.

From the cases above, we can see that sometimes market signals forewarn future changes in fundamental credit quality, but in other times they over-react to news or they are noisy. Given this, can we find a better way of making sense of differences between market and fundamental indicators?

**Chart 6: PD Market Signal Scores, CDS Market Derived Signal Scores, S&P Global Ratings Issuer Ratings and FY1 Consensus Earnings Estimates for a Leading Consumer Electronics Company, July 2010 to June 2016**



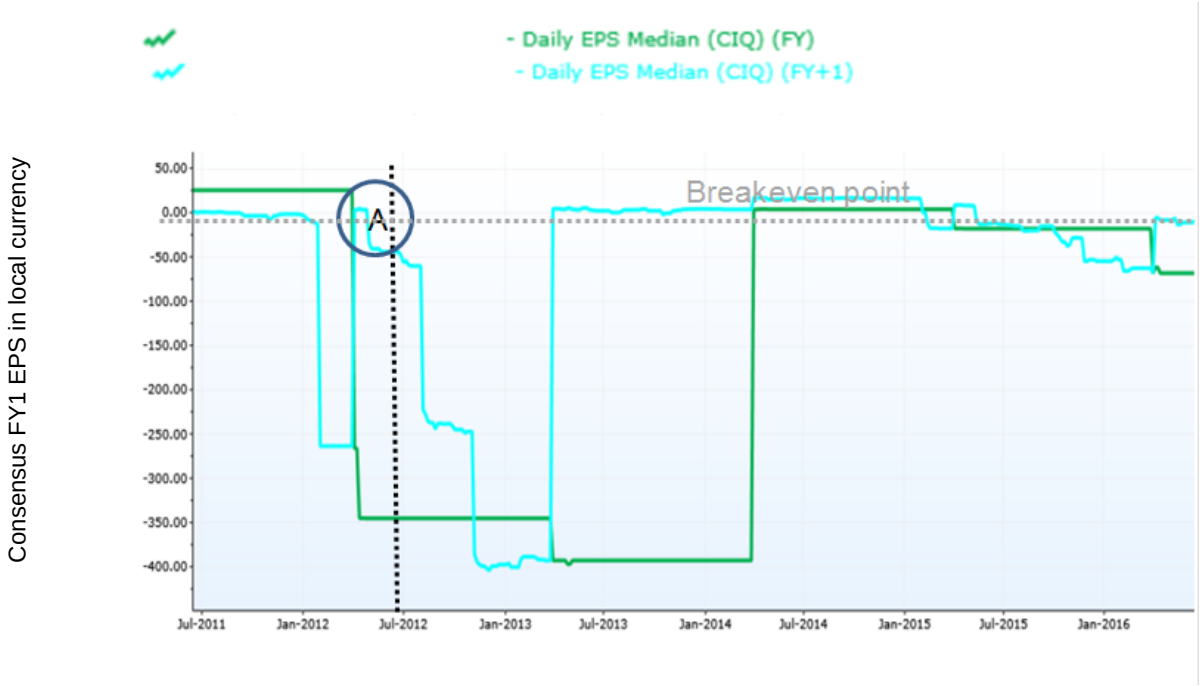

Source: S&P Capital IQ platform as of June, 2016. Credit ratings are prepared by S&P Global Ratings, which is analytically and editorially independent from any other analytical group at S&P Global. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence credit scores from the credit ratings issued by S&P Global Ratings. For illustrative purposes only.

Equity prices and CDS spreads often react to investor expectations of a company's ability to service its debt and interest payments via future earnings. In April 2012, equity- and CDS-based signals were significantly below the company's credit rating. At the same time, the consensus FY1 Earnings per Share estimate made by equity analysts was revised from a profit of 25.14 to a loss of 345.35 in local currency. That provides insight into the deterioration of market indicators.

What is the potential impact on credit ratings? According to an S&P Global Ratings research report on the consumer electronics company published in April 24, 2012, the ratings analyst *"will consider lowering the ratings on the consumer electronics company if we expect a further delay in improvement of the company's earnings, reducing the likelihood that debt to EBITDA will fall below 3x in the next two years. The ratings may also come under pressure if the company incurs further heavy losses in fiscal 2012, or if we see a growing likelihood of its free cash flow turning negative*".

Chart 7 below shows that, from 2012 to April 2013, equity analysts were not expecting the company's earnings to recover quickly. In fact, losses were expected in that current and next fiscal year.

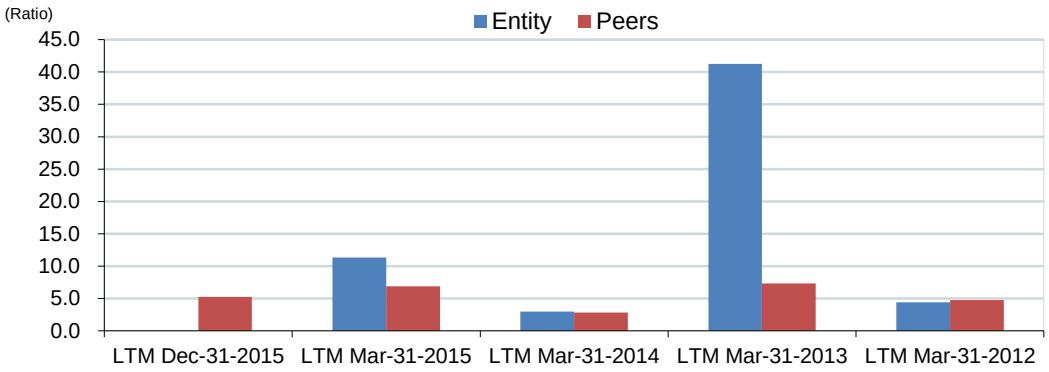
**Chart 7: Current Fiscal Year (dark green) and FY1 (bright blue) Consensus Earnings Estimates For a Leading Consumer Electronics Company, July 2011 to June 2016**




Source: S&P Capital IQ platform as of June, 2016. For illustrative purposes only.

Chart 8 below shows that the consumer electronics company's net debt to EBITDA was well above 3x, which was also above its peers, underscoring the company's inability to finance its debt obligations with cash earnings when compared to its peers.

**Chart 8: Net Debt to EBITDA for a Consumer Electronics Company versus its Peer Group, FY 2011 to FY 2015**




Source: Credit Health Panel on the S&P Capital IQ platform as of December 2015. For illustrative purposes only.

Shortly after the Q1 earnings release in July 2012, S&P Global Ratings lowered its rating to "BBB" and placed the company on CreditWatch Negative.

**Chart 9: Bond and Equity Prices of a Leading Consumer Electronics Company, July 2011 to June 2016**


Source: S&P Capital IQ platform as of June, 2016. For illustrative purposes only.

What are the implications of these changes in credit quality to investment profits? In April 2012 (circled "A" in Chart 9), the market indicators hit the lower bounds. Subsequent to that, equity prices began to deteriorate (purple line). Equity prices are more sensitive to forecasted declines in earnings than fixed income instruments, because dividends get affected first before issuers default or delay debt payments. Also, CDS prices reflect the market price of default risk and are more responsive to changes in credit risk than bond yields. In this case, bond prices only began to react after the S&P Global Ratings downgrade in July 2012 (light brown line represents the price of a bond maturing in September 2016, and the dark brown line represents the price of a bond maturing in year 2019).

Although both equity and bond prices rebounded in early 2013, equity prices have not recovered to their levels in April 2012. The shorter-duration prices of the bond maturing in September 2016 had recovered more than those of the bond maturing in year 2019. However, neither of these three securities have recovered to the April 2012 levels.

## In Summary

In a May 2014 paper titled "Seeing the Light: Improving Credit Surveillance Using a Spectrum of Approaches"[8], we looked at how market and fundamental indicators can be used jointly to accurately identify high default risk entities. In this paper, we have extended the analysis to monitor potential improvements and deteriorations in credit risk by using a simple three-step process. When market indicators flag significantly higher (lower) credit quality than fundamental indicators, it is an early warning flag that credit quality of the company is improving (deteriorating). We provide a case where the PD Market Signal Implied Credit Score can signal changes in bond prices. To operationalize this finding, we:

1. Provide a dashboard to flag companies whose market indicators have exceeded the upper and lower bounds of credit risk relative to fundamental indicators (Charts 3 and 4).
2. Reference upside and downside scenarios from S&P Global Ratings' reports to identify potential sources of credit ratings revisions in the future.
3. Use fundamental data, quantitatively-derived credit scores, earnings estimates and key company developments to gauge if fundamentals of the company are likely to change, and how they fare relative to their peer group.

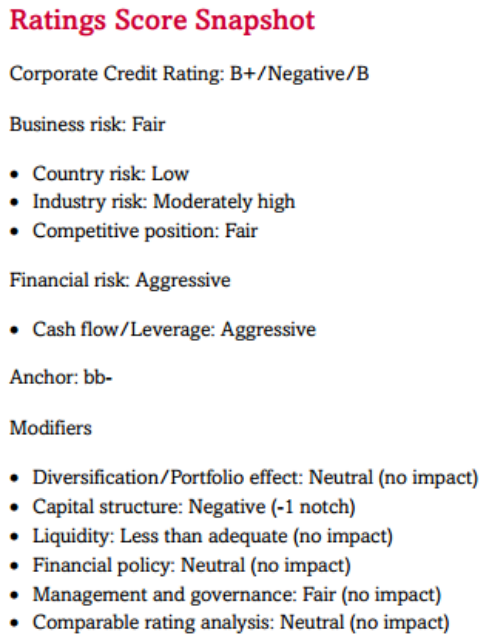
[8] Michelle Cheong, Giorgio Baldassarri and Marcel Heinrichs, "Seeing the Light: Improving Credit Surveillance Using a Spectrum of Approaches," S&P Capital IQ, May 2014.

You can also combine your perspective on these rating factors with our ratings methodology to produce illustrative corporate credit ratings by building your own credit scenario in the Credit Scenario Builder (see Charts 10 and 11).

## Sample: Corporate Credit Scenario Builder

S&P Global Ratings provides Ratings Score Snapshots, which detail the framework and rationale of its entity ratings, together with scenarios for potential ratings upgrades and downgrades.

**Chart 10: Sample Ratings Score Snapshot From a Full Analyses Report on Entities**



Ratings Score Snapshot

Corporate Credit Rating: B+/Negative/B

Business risk: Fair

- Country risk: Low
- Industry risk: Moderately high
- Competitive position: Fair

Financial risk: Aggressive

- Cash flow/Leverage: Aggressive

Anchor: bb-

Modifiers

- Diversification/Portfolio effect: Neutral (no impact)
- Capital structure: Negative (-1 notch)
- Liquidity: Less than adequate (no impact)
- Financial policy: Neutral (no impact)
- Management and governance: Fair (no impact)
- Comparable rating analysis: Neutral (no impact)

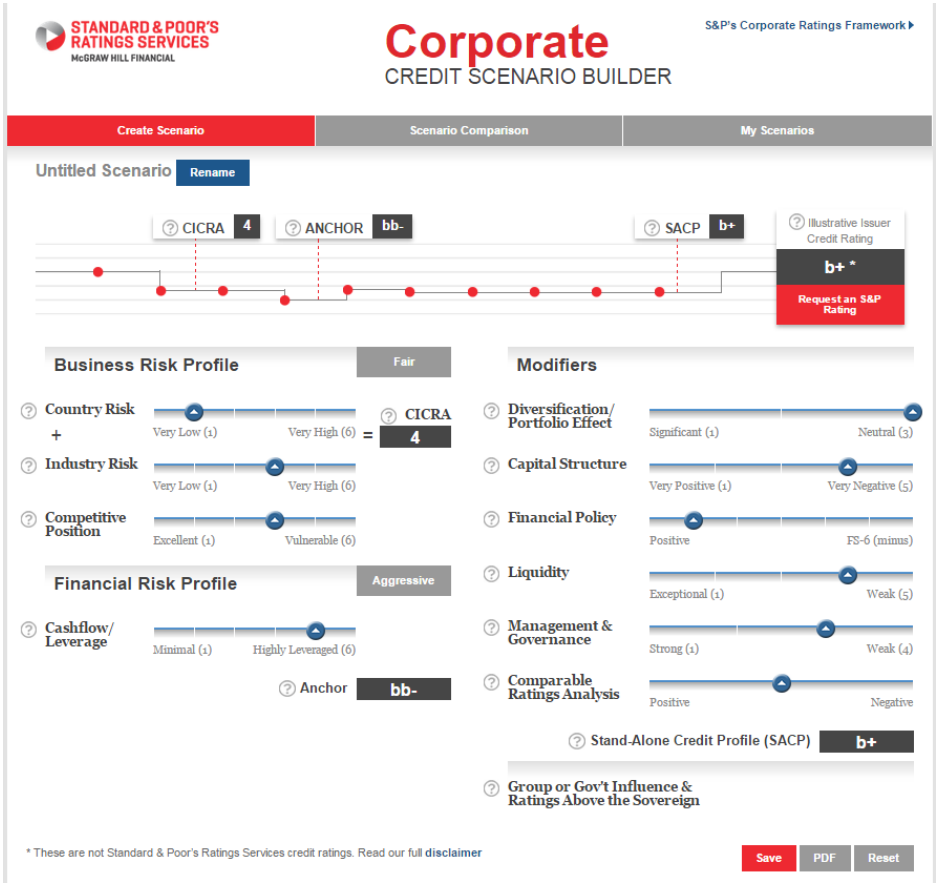
Source: RatingsDirect. As of June 2016. For illustrative purposes only.

With the Corporate Credit Scenario Builder, when market indicators hit the upper and lower bounds, you can:

- Reference the scenarios in S&P Global Ratings' services criteria and research.
- Use credit fundamentals via research, fundamental information and analyst estimates on the S&P Capital IQ platform to form your views on changes in credit fundamentals.

- Combine your perspective on these rating factors with S&P Global Ratings transparent ratings methodology to produce illustrative corporate credit ratings.

**Chart 11: Corporate Credit Scenario Builder**




Source: S&P Global Ratings_For illustrative purposes only.

## Additional Information Services Supporting this Analysis

This case study has drawn on an extensive range of credit market information, tools and products available from S&P Global Market Intelligence that can be used to help improve surveillance of a credit portfolio to stay ahead of the markets. The products used in the analysis include:

- S&P Global Ratings and Research on RatingsDirect on the S&P Capital IQ platform, a dynamic web-based platform that combines one of the most extensive sources of

credit ratings and research with powerful workflow tools to quickly retrieve and analyze credit market information.

- Credit Scenario Builder on RatingsDirect, to create scenarios based on user inputs and S&P Global Ratings' corporate credit ratings framework.
- Market indicators from equity prices, such as PD Market Signal Implied Credit Score found on the S&P Capital IQ platform, as well as CDS Market Derived Signals available on Ratings Direct.
- Key developments and distress indicators on the S&P Capital IQ platform, offered by S&P Global Market Intelligence.
- CreditStats Direct, providing adjusted financial statement information used by S&P Global Ratings' analysts.
- S&P Global Market Intelligence's own fundamental data.
- Credit Health Panel, providing an comparative analysis of peer groups, suppliers and other counterparties using key financial metrics linked to credit risk for corporates
- Equity analyst estimates and research from S&P Global Market Intelligence.
- Macroeconomic indicators/research on RatingsDirect.

**For more information on this article or on any of these services, please contact** Michelle P. Cheong, Director, Market Development (Asia Pacific), S&P Global Market Intelligence, at (65) 6239-6359 or **michelle.cheong@spglobal.com.**

# APPENDIX

The hypothesis that was tested looked at whether there is (i) a higher likelihood of ratings upgrades if the market indicators hit the upper bound relative to credit ratings, and (ii) a higher likelihood of ratings downgrades if the market indicators hit the lower bound relative to credit ratings. In this case, credit ratings are measured by S&P Global Ratings Long-Term Foreign Currency Issuer Credit Ratings and market indicators are derived from the credit default swap market via the CDS Market Derived Signal and from the equity markets via the Probability of Default Market Signals model.

To test this hypothesis, we constructed upper and lower bounds on market indicators around ratings, which are 1.96 times the standard deviations between these market indicators derived scores and ratings (i.e. the market signals Z-score = +/- 1.96) for all companies with ratings and market signal indicators in the S&P Global Ratings' database from 2005 to 2015. If the market indicator is above the upper bound, the market has a significantly more bullish view on the company's credit quality than what is indicated by long-term, through-the-cycle credit ratings. Similarly, if the market indicator is below the lower bound, the market has a significantly more bearish view on the company's credit quality than credit ratings.

Our results indicate that there is a significantly higher chance of a ratings upgrade in the next 12 months if the market indicators are significantly above credit ratings, or in other words, above the upper bound; and there is a significantly higher chance of a ratings downgrade in the next 12 months if the market indicators are significantly below credit ratings, or in other words, below the lower bound. Similar results apply when PD Market Signal Implied Credit Score (PDMS) deviate significantly from CreditModel scores.

**Chart 12: Incremental Probability of S&P Global Ratings Upgrade if CDS Market Derived Signal (CDS MDS) is Above Upper Bound versus Current S&P Global Rating***

| τ (months) | (1) Probability of S&P Global Ratings upgrade after τ months, when CDS MDS within upper bound | (2) Probability of S&P Global Ratings upgrade after τ months, when CDS MDS exceed upper bound | Incremental probability of S&P Global Ratings upgrade after τ months (1) – (2) | T-value of (1) – (2) |
|---|---|---|---|---|
| 1 | 0.9% | **2.3%** | 1.4% | 2.47 |
| 3 | 3.0% | **6.3%** | 3.3% | 4.80 |
| 6 | 6.2% | **11.7%** | 5.4% | 6.53 |
| 12 | 12.2% | **20.0%** | 7.8% | 8.25 |

* For illustrative purposes only. Source: Research by S&P Global Market Intelligence. Data is sourced from Credit Analytics offered by S&P Global Market Intelligence and RatingsDirect® as of May 2016.

**Incremental Probability of Ratings Downgrade if CDS Market Derived Signal (CDS MDS) is Below Lower Bound versus Current Rating**

| τ (months) | (1) Probability of S&P Global Ratings downgrade after τ months, when CDS MDS within lower bound | (2) Probability of S&P Global Ratings downgrade after τ months, when CDS MDS below lower bound | Incremental probability of S&P Global Ratings downgrade after τ months (2) – (1) | T-value of (2) – (1) |
|---|---|---|---|---|
| 1 | 0.6% | **3.4%** | 2.8% | 4.20 |
| 3 | 1.8% | **9.1%** | 7.3% | 6.01 |
| 6 | 3.4% | **14.5%** | 11.1% | 10.24 |
| 12 | 5.9% | **22.4%** | 16.5% | 11.64 |

* For illustrative purposes only. Source: Research by S&P Global Market Intelligence. Data is sourced from Credit Analytics offered by S&P Global Market Intelligence and RatingsDirect® as of May 2016.

**Incremental Probability of S&P Global Ratings Upgrade if equity volatility based PD Market Signal Implied Credit Score implied credit score (PDMS) is Above Upper Bound versus Current S&P Global Rating**

| τ (months) | (1) Probability of S&P Global Ratings upgrade after τ months, when PDMS within upper bound | (2) Probability of S&P Global Ratings upgrade after τ months, when PDMS exceeds upper bound | Incremental probability of S&P Global Ratings upgrade after τ months (1) – (2) | T-value of (1) – (2) |
|---|---|---|---|---|
| 1 | 0.9% | **2.0%** | 1.1% | 5.11 |
| 3 | 2.8% | **5.9%** | 3.1% | 8.34 |
| 6 | 5.7% | **11.2%** | 5.5% | 9.77 |
| 12 | 10.9% | **20.6%** | 9.7% | 12.49 |
| 24 | 19.8% | **35.0%** | 15.3% | 21.84 |

* For illustrative purposes only. Source: Research by S&P Global Market Intelligence. Data is sourced from Credit Analytics offered by S&P Global Market Intelligence and RatingsDirect® as of May 2016.

**Incremental Probability of S&P Global Ratings Downgrade if equity volatility based PD Market Signal Implied Credit Score implied credit score (PDMS) is Below Lower Bound versus Current S&P Global Rating***

| τ (months) | (1) Probability of S&P Global Ratings downgrade after τ months, when PDMS within lower bound | (2) Probability of S&P Global Ratings downgrade after τ months, when PDMS below lower bound | Incremental probability of S&P Global Ratings downgrade after τ months (2) – (1) | T-value of (2) – (1) |
|---|---|---|---|---|
| 1 | 0.9% | **2.5%** | 1.5% | 5.64 |
| 3 | 2.6% | **7.0%** | 4.3% | 8.95 |
| 6 | 4.7% | **12.1%** | 7.4% | 11.21 |
| 12 | 8.2% | **19.6%** | 11.4% | 10.68 |
| 24 | 13.9% | **28.4%** | 14.5% | 13.11 |

* For illustrative purposes only. Source: Research by S&P Global Market Intelligence. Data is sourced from Credit Analytics offered by S&P Global Market Intelligence and RatingsDirect® as of May 2016.

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