

Seeing the Light: Improving Credit Surveillance Using a Spectrum of Approaches

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Introduction

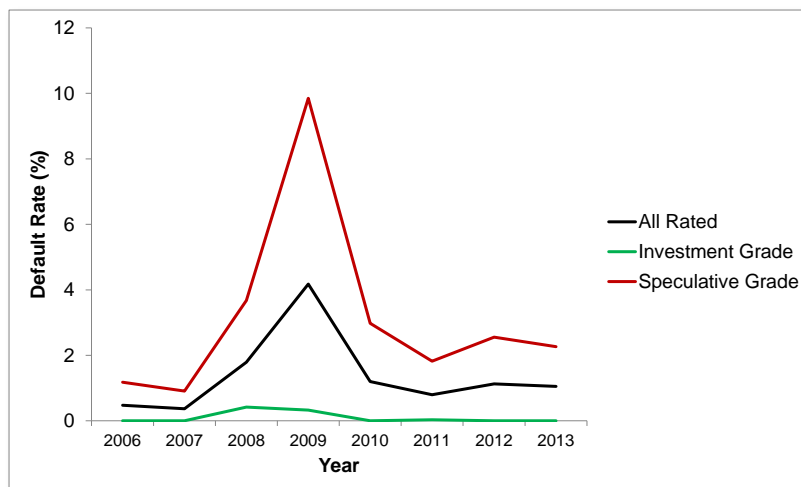
Rising credit volatility over the last two decades has heightened the need for improved credit surveillance by both corporations and investment firms [Figure 1]. Firms are increasingly aware that another wave of default might be triggered by various “sleeping volcanoes of credit risk”, including the potential impact of sovereign defaults, geopolitical events such as the Ukraine crisis and instability in the Middle East, the withdrawal of quantitative easing, and slow-downs in developing economies.

As credit surveillance becomes more critical, it is also becoming more complex. Corporations are monitoring ever larger numbers of global customers and longer supply chains; and investment firms need to manage a wider range of risk exposures more rigorously in the tough, post-crisis market and regulatory environment.

Finding a way to conduct fast, accurate and scalable credit analysis is thus a priority for all firms with credit exposures. The ability to scale up any credit assessment approach is important because, outside the banking sector, credit teams are often small compared to the number of counterparties that must be monitored. Coping with this by introducing rigid rules [e.g., that the firm must deal only with investment-grade suppliers and customers, or only invest in investment-grade bonds] tends to rule out many attractive opportunities.

In theory, the situation should have been eased by the many new approaches to credit risk measurement that have evolved over the last ten or twenty years. However, firms have found it difficult to apply these measures in a systematic way that recognizes the strengths and weaknesses of each approach.

In this report, we show how to understand the pros and cons of the two principal families of credit measures – those based on market signals and those based on more fundamental credit factors such as financial ratios and industry and country risk data – so they can be built into a systematic “multi-horizon” credit surveillance approach. This generates more accurate results, more rapidly, with fewer resources, and is especially suitable when a small number of credit analysts must keep an eye on a very large number of counterparties.

Figure 1: Yearly observed default rates of Standard & Poor's rated entities [2006-2013]

Source: Default rates are from S&P CreditPro database for all S&P rated entities

The Spectrum of Credit Measures

The many different approaches to credit measurement now available include 'traditional' analyst-driven public ratings, quantitative credit scoring models of various kinds, and models that use information from the credit and equity markets [Table 1].

Table 1: The spectrum of credit measures

	Expert Judgment		Quantitative Fundamentals-Based Models			Quantitative Market-Signals Models	
	Public Ratings	Scoring Excel-Fundamentals	Scoring Model-Fundamental	Probability of Default - Fundamental	Peer Analysis Model	Market Signals CDS Spreads	Market Signals Stock Price Volatility
Measure	<ul style="list-style-type: none"> Standard & Poor's <i>Ratings</i> Services credit ratings* 	<ul style="list-style-type: none"> Scorecards Credit Score Lower-case nomenclature 	<ul style="list-style-type: none"> CreditModel Credit Score Lower-case nomenclature 	<ul style="list-style-type: none"> Fundamental Probability of default (PD) Lower-case nomenclature 	<ul style="list-style-type: none"> Credit Health Panel Relative score Custom score 	<ul style="list-style-type: none"> Market Derived Signals (MDS)* Lower-case nomenclature 	<ul style="list-style-type: none"> Market Signals PD Lower-case nomenclature
Capabilities	<ul style="list-style-type: none"> Analyst, committee driven & credit methodology driven Medium to long term metric Transparent processes, objective view, rigorous analysis Global coverage 	<ul style="list-style-type: none"> Segment-focus modeling approach Expert judgment driven Medium to long term metric Qualitative inputs and quantitative inputs Global coverage 	<ul style="list-style-type: none"> Segment-focus modeling approach Fundamentals and ratings driven model Medium to long term metric Financial statements inputs Global coverage 	<ul style="list-style-type: none"> Segment-focus modeling approach Point-in-time risk assessment Fundamental and observed defaults models Financial statements inputs Global coverage 	<ul style="list-style-type: none"> Fundamental-based scores and ratios – Operational – Solvency – Liquidity Fundamentally driven (financial statements) Custom peer groups Listed co coverage 	<ul style="list-style-type: none"> Proprietary daily risk indicators Market-derived signals based on credit default swaps Pre-calculated PD Companies with CDS coverage 	<ul style="list-style-type: none"> Proprietary daily risk indicators Based on: Equity, Country Risk, Industry Risk, Sovereign rating & sovereign CDS MDS Pre-calculated PD Listed Co coverage
Fundamentals (Financials)					Market Factors		
Long Run					Point-In-Time		

*From Standard & Poor's Ratings Services, which is analytically and editorially separate and independent from other analytical areas at McGraw Hill, including S&P Capital IQ. S&P Capital IQ includes ratings in its product platform and uses credit ratings in some of its models, and so the sentence should be turned around.

As **Table 1** shows, this potentially confusing array of approaches can be organized into a spectrum in terms of the credit assessment time horizon, and divided into two main classes:

- **Fundamentals-based approaches**, such as public ratings, credit scores and fundamentals-based probabilities of default, depend on the analysis of fundamental factors underlying the performance of the obligor, e.g., financial ratios
- **Market-driven approaches** are based primarily on market price signals such as credit default swap [CDS] spreads and equity prices

Understanding the complementary strengths and weaknesses of these two main classes of approach offers a foundation for building more systematic approaches to credit surveillance.

Fundamentals-Based Approaches – Pros and Cons

Fundamentals-based approaches measure credit risk by examining the key underlying drivers of creditworthiness, most obviously financial ratios but also sometimes other drivers such as country risk, industry sector risk, and a firm's competitiveness.

Examples include public ratings and credit scores derived from the expert judgment of credit analysts and credit committees, and purely quantitative models that use information from financial statements and other scorable inputs to generate either credit scores or probability of default percentages. Other 'peer analysis' approaches compare financial statement ratios and fundamentals-based scores of corporations within a given peer group to create rankings of credit health.

Fundamentals-based approaches vary in terms of how much they depend on expert judgment versus mathematical algorithms, the number and type of fundamental factors taken into account, the frequency of the inputs [e.g., based on quarterly or annual reports], and the style of the desired output [e.g., public ratings, credit scores, relative rankings, or probabilities of default]. In particular, approaches based on expert judgment, e.g., public ratings and expert judgment risk scores; tend to require substantial time and resources in comparison to quantitative models, though they can evaluate qualitative inputs [e.g. management quality] in greater depth.

However, the similarities between the various fundamental measures are more profound than their differences.

Fundamentals-based measures can cover a wide range of firms because they can be used wherever the analyst has access to fundamental information about a company¹. Furthermore, when designed in a transparent manner, they make an intuitive connection between credit risk assessments and factors known to be important to the credit health of firms, e.g., profitability and leverage.

Importantly, fundamental measures are typically designed to offer a stable, mid- to long-term view² of an entity's creditworthiness. For example, through-the-cycle fundamentals-based credit

¹ Though the number of public ratings is inevitably limited, Standard & Poor's publishes ratings for over 7000 firms around the world.

² S&P Capital IQ's CreditModel reflects a three- to five-year view of default risk for investment grade entities and a two- to three-year view of default risk for non-investment grade entities.

scores appeal to decision makers who need to assess an entity's creditworthiness across an economic cycle, and who may not want the measured credit quality of an entity to jump around unnecessarily, e.g., because their investment policy is limited to entities of a given credit rating. Provided a firm's fundamentals remain unchanged, then the firm's credit assessment will, largely speaking, stay the same, and will be unaffected by market sentiment.

On the other hand, fundamental measures based on expert judgment can be expensive in terms of time and resources – many key fundamentals and qualitative measures need to be included to perform in-depth analyses – and most fundamental measures are not designed to take account of all the latest news and information about an obligor the instant it becomes available. Indeed, because fundamentals-based approaches depend on periodic reviews and updating of inputs (e.g., based on annual or quarterly reporting), they won't capture changes in fundamental factors and their effect on creditworthiness between reporting periods.

As such, they are most suited to tasks that require a medium- to long-term view, for example:

- Longer term strategic decisions such as setting credit limits
- Whether to originate a loan, e.g., a loan with a tenor of, say, three to five years
- Assessing the credit risk of longer-term counterparties
- Pricing debt such as fixed-income instruments, syndicated loans and so on

Market-Driven Approaches – Pros and Cons

Market-driven approaches use price signals in the financial markets to measure credit quality:

- Some approaches apply the industry-standard structural 'Merton model' to estimate the probability of default of a firm from its stock price and stock price volatility, which can then be mapped to a credit score
- Other models are based primarily on CDS spreads and translate these signals into a credit score, which in turn can be mapped to a probability of default
- A third set of models apply changes in the prices of corporate or sovereign bonds to gauge changes in the credit risk posed by a counterparty via a score that can then be mapped to a probability of default (or vice versa)

Market-driven approaches each have a slightly different set of strengths and weaknesses. For example, S&P Capital IQ's equity-driven models offer relatively wide coverage because they can be applied to the world's publicly listed companies, around 35,000 companies and more. However, from a credit perspective, equity-driven models have at times over-reacted to the latest news. In many equity-driven models, sudden movements in stock prices can lead to excessively volatile probabilities of default and to counter-intuitive results. These models may also struggle to capture each important risk dimension, e.g., the effect of industry sector and country risk.

Bond and CDS market-based models have a stronger intuitive link to credit risk because the risk of default is a key determinant of bond and CDS market prices, but they cover a much smaller set of companies, e.g., S&P Capital IQ's market-based CDS signals cover around 1000 entities. Furthermore, particular bonds and CDS may not be liquid enough for their prices to produce informative market signals and both CDS and bond market price signals can be affected by macroeconomic factors such as movements in interest rates. Nevertheless, CDS prices have a particularly good track record as a predictor of default, e.g., for sovereign bonds.

The similarities between the various market-driven measures are more profound, however, than any of the various differences. Their most important common strength is that they all provide short-term or 'point in time' views of creditworthiness that capture the latest market information about an obligor or counterparty.

Their common weakness is that they generate a lot of 'false positives', i.e., they flag up market worries about entities that do not turn into long-term deteriorations in creditworthiness.

This is particularly true for equity-based market signals. While there have been attempts to defuse this problem, e.g., by applying rolling averages or by filtering out high frequency changes, these solutions tend to also reduce the unique strength of market-based approaches – timeliness in alerting users to the very latest market signal.

Market-driven approaches are therefore best applied:

- As part of an 'early warning system' to alert users to credit deterioration
- As leading indicators of possible longer term shifts in credit quality
- To monitor short-term shifts in the credit risk of counterparties, e.g., downward trends
- To inform tactical credit and investment management decisions, i.e., where short-term market credit perceptions are more important than long-term credit fundamentals

The Case for Using both Market-Based and Fundamentals-Based Signals

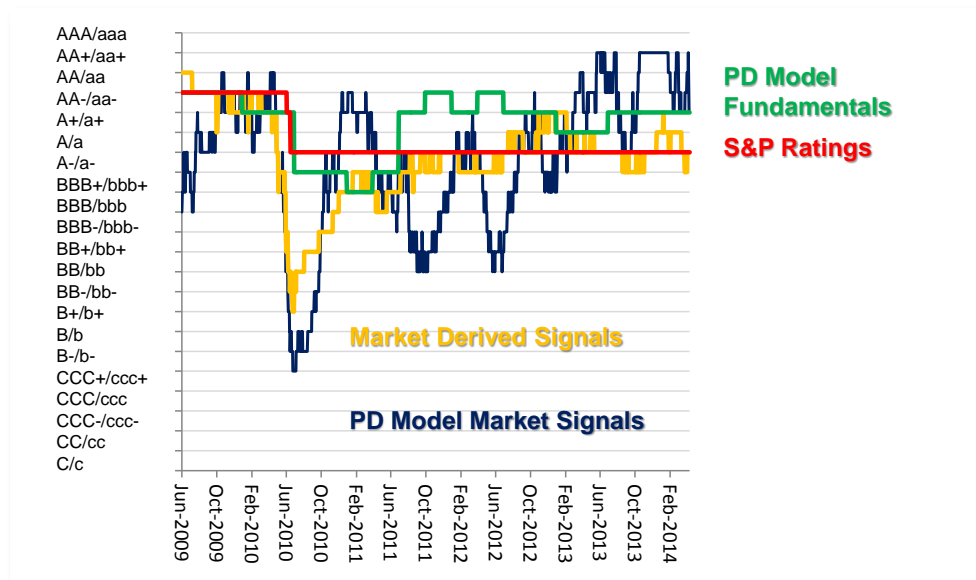
As we've seen, approaches based on fundamentals and approaches based on market signals have very different strengths and weaknesses³. Yet debate about using credit measures has often been dominated by the question of which approach gives the 'best' credit signal:

- Fundamentals-based credit measures are often criticized for not reacting quickly enough to current events or for playing 'follow my leader' to early warning signals given out by market-based measures
- Market-based approaches, meanwhile, are said to be 'noisy' and to give too many false positives that conflict with the results of more fundamental analysis

³ Equity prices and fundamentals-based measures of credit risks are connected in various ways. For example, rating agencies often put firms on watch before a credit downgrade, which prompts markets to react before any downgrade takes place.

The case of the energy giant BP Plc. [LSE:BP.], following the Deepwater Horizon oil rig explosion in the Gulf of Mexico in April 2010, offers a dramatic example of this kind of signal conflict (**Figure 2**). In the aftermath of the disaster, BP Plc.'s share price fell. Over the next three years or so, CDS-market-based credit measures and, especially, equity market-based measures emitted a series of volatile signals that would have pushed the firm on and off an analyst's red-flag list. However, fundamentals-based measures such as the firm's Standard & Poor's credit rating continued to suggest that the energy giant would survive – rightly, as things turned out. BP had strong enough fundamentals like capital, earnings and cash flow generation to withstand such a shock and the losses it had to absorb. Had the company been weak to start with who knows if they had recovered that easily?

Figure 2: Credit Risk of BP Plc. [LSE:BP.] as indicated by fundamentals-based and market-based credit risk signals



Source: S&P Ratings, S&P CreditModel Scores, and PD Market Signals from S&P Capital IQ RatingsDirect, October 2008 – April 2014. Key Developments news is from S&P Capital IQ's news sources.

Our solution is to use both kinds of credit measure within a more systematic process that applies the most suitable measure to each task; and that helps to reconcile any conflicting signals.

In particular, firms should be using a systematic combination of market- and fundamentals-based approaches within a triage process:

- Market signals have lower Type I errors, i.e., they are less likely to present obligors as healthy when they are not, particularly over shorter time horizons of less than one year, so we can use them to spot and shortlist potential defaulters
- Fundamentals-based measures have lower Type II errors, i.e., they are less likely to say an obligor is unhealthy when they are not, so we can use fundamentals-based measures to winnow out the market signal 'false alarms'

Using both approaches also discriminates between defaulters and non-defaulters more powerfully than any single approach.

In **Tables 2a & 2b**, entities have been first grouped into buckets using one of two fundamentals-based approaches and a market signals-based approach⁴. We then calculated the realized one-year default rate for each bucket. As we can see from the tables, the realized defaults are concentrated in the buckets where credit risks, as indicated by both fundamentals-based and market signals approaches, are high.

Table 2a: Observed default rates within each CreditModel Score / PD Model Market Signals bucket

	PD Model Market Signals [%]						
CreditModel Score	0.00 to 0.01	0.01 to 0.03	0.04 to 0.13	0.13 to 0.53	0.53 to 2.27	2.27 to 9.64	>9.64
aaa	0.00	0.00	0.00	0.00	0.00	N/A	N/A
aa+ to aa-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
a+ to a-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
bbb+ to bbb-	0.00	0.00	0.03	0.15	0.18	0.75	1.19
bb+ to bb-	0.00	0.00	0.15	0.22	0.62	1.44	4.78
b+ to b-	0.00	0.28	0.46	1.15	3.35	6.07	10.89
ccc+ and below	N/A	0.00	0.00	6.19	11.43	20.00	28.53

Source: Table 2a is based on default data for 2137 public corporations rated by Standard & Poor's, drawn from S&P Capital IQ's global database of PD Model Fundamentals, PD Market Signals and CreditModel Scores, for the period of January 2004 to December 2013. Non-bank financial institutions were excluded from the all models, and Banks were excluded from CreditModel calculations.

Table 2b: Observed default rates within each PD Model Fundamentals / PD Model Market Signals bucket

	PD Model Market Signals [%]						
PD Model Fundamentals	0.00 to 0.01	0.01 to 0.03	0.04 to 0.13	0.13 to 0.53	0.53 to 2.27	2.27 to 9.64	>9.64
0 to 0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01 to 0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.03 to 0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.13 to 0.53	0.00	0.00	0.04	0.09	0.21	0.64	1.76
0.53 to 2.27	0.00	0.02	0.12	0.33	0.55	1.08	3.68
2.27 to 9.64	0.00	0.00	0.16	0.62	1.76	3.61	7.29
Above 9.64	0.00	0.00	0.67	1.75	6.47	12.47	21.30

Source: Table 2b is based on default data for 2137 public corporations rated by Standard & Poor's, drawn from S&P Capital IQ's global database of PD Model Fundamentals, PD Market Signals and CreditModel Scores, for the period of January 2004 to December 2013. Non-bank financial institutions were excluded from the all models, and Banks were excluded from CreditModel calculations.

⁴ Table 2a applies S&P Capital IQ's fundamentals-based CreditModel vs. S&P Capital IQ's PD Model Market Signals - Corporates; Table 2b applies S&P Capital IQ's PD Model Fundamentals - Public Corporates, vs. S&P Capital IQ's PD Model Market Signals - Corporates.

Applying a Spectrum of Approaches

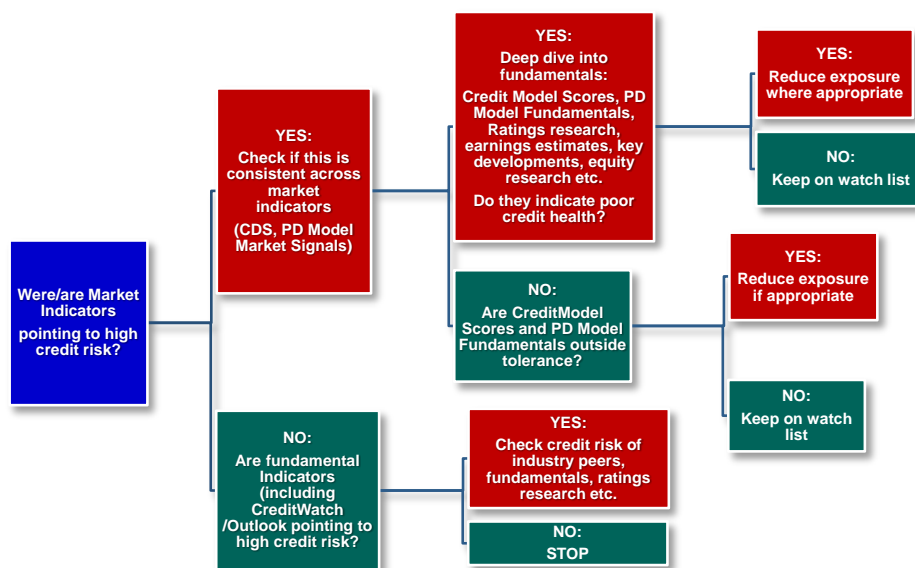
To speed up and improve credit surveillance, it is important to apply the various credit measures systematically and in the right order.

The decision tree shown in **Figure 3** offers an example of how to do this. Here we can see that the firm's first line of defense is to track credits using automated market-based credit signals, e.g., equity-based signals. If one of the signals crosses a predetermined threshold, such as a given default probability, then the analyst checks if the alert is consistent with other market-based indicators, e.g., CDS-based signals.

If these other signals are quiet, the analyst should quickly check the obligor's fundamentals-based score. However, if the signals are flashing red or amber, then a deeper dive should be made. For example, the analyst can look at a range of fundamentals-based credit scores and probabilities of default as well as looking at specific intelligence in the form of public ratings research, earnings estimates, and other key qualitative developments, e.g., change of auditor.

If this research unearths further reasons for concern, the analyst may argue for a reduction in exposure or other credit mitigation. Where the research offers reassurance, the obligor should remain on the watch list until the market signal clears.

Figure 3: An illustration of a structured credit surveillance process that utilizes both fundamentals- and market-based signals

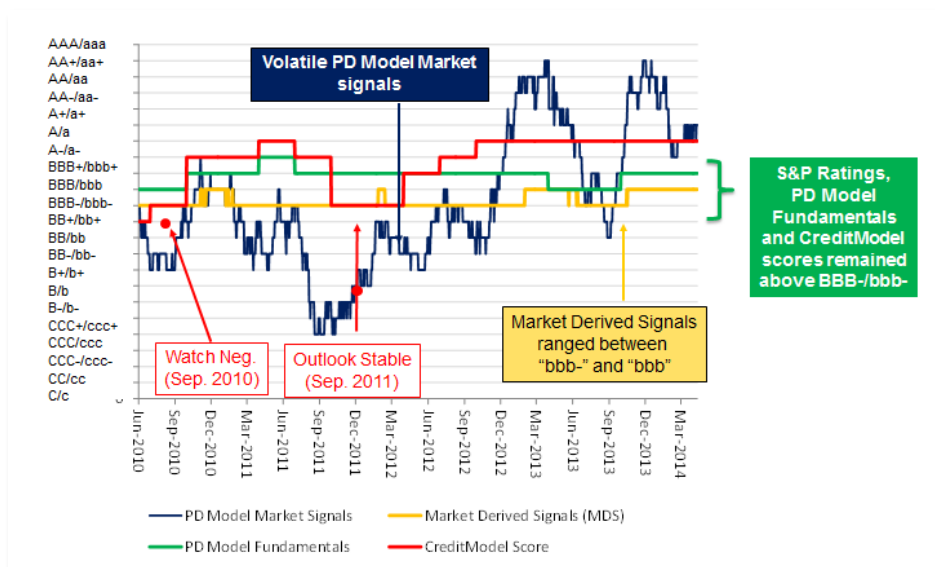


Source: For illustrative purposes only.

The bumpy ride of Southwest Airlines Co. [NYSE:LUV] during 2011 helps to show how this approach might be applied in practice. Airline stocks were volatile during 2011, causing the market-derived probabilities of default for Southwest Airlines Co. to rise and fall sharply during the year [Figure 4].

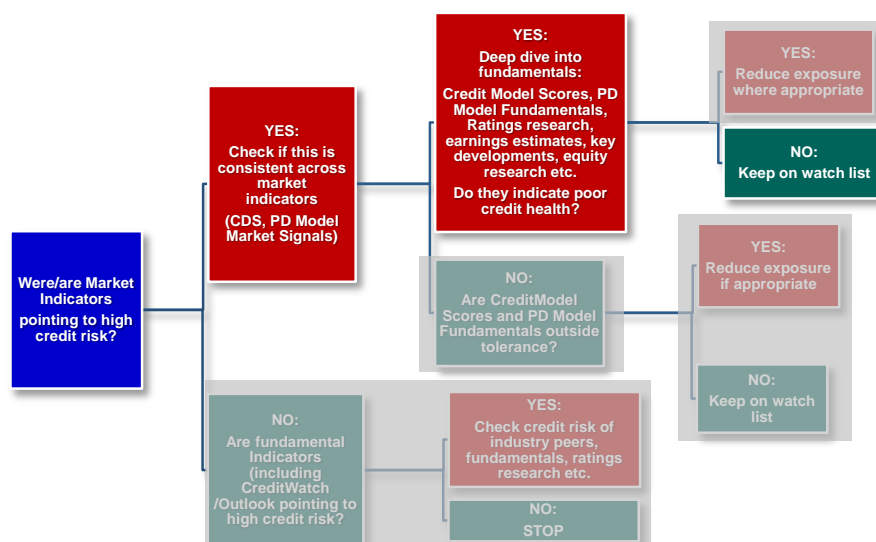
However, the fundamentals-based indicators – here Standard & Poor's rating for the firm and S&P Capital IQ's fundamentals-based CreditModel – remained robust and the airline did not default. In terms of our decision tree, the analyst would have followed the route marked in **Figure 5**.

Figure 4: Market-based and fundamentals-based indicators for Southwest Airlines [NYSE:LUV], which did not default on its debt



Source: S&P Ratings, S&P CreditModel Scores, and PD Market Signals from S&P Capital IQ RatingsDirect, June 2010– April 2014. Key Developments news is from S&P Capital IQ's news sources.

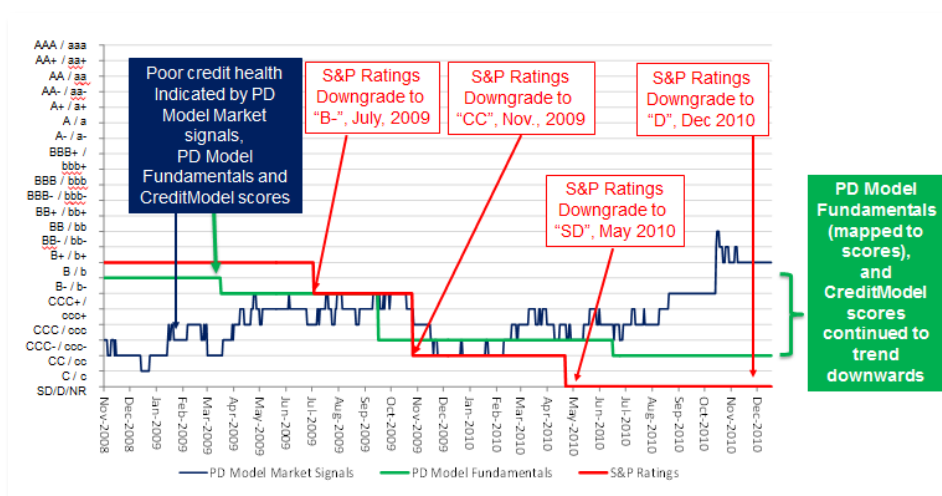
Figure 5: Illustrative decision tree for Southwest Airlines Co. [NYSE:LUV]



Source: For illustrative purposes only.

There was a less happy ending in the case of PT Arpeni Pratama Ocean Line Tbk. [JKSE:APOL], a major Indonesian shipping company that defaulted on its debt in 2010. We can see in **Figure 6** that market-based probability of default modeling, here mapped into credit scores for ease of comparison, flagged the firm's poor condition well in advance. Analysts alerted by market-based indicators would have been in a position to give the firm their full attention, e.g., by conducting an analysis of its fundamentals relative to a peer group of firms. This would have revealed that by late 2008 the firm was ranked bottom among selected peers in terms of fundamental metrics such as liquidity and solvency.

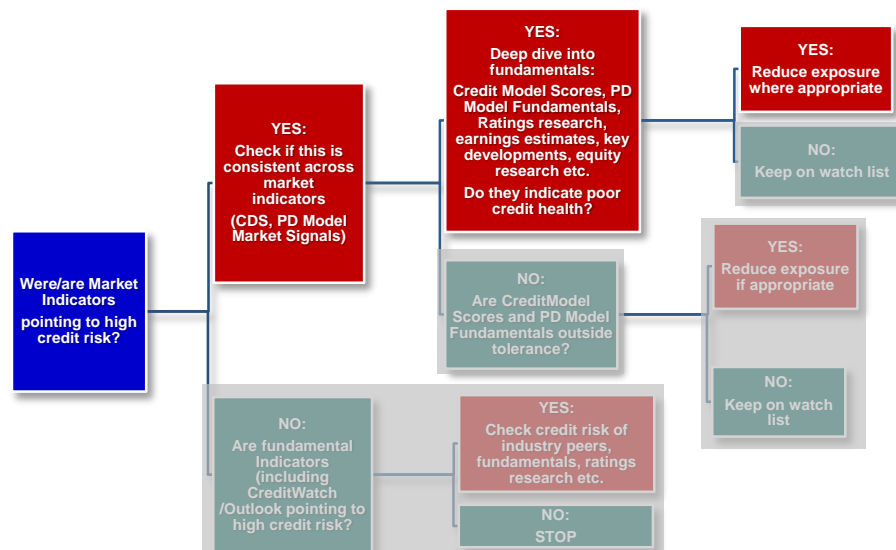
Figure 6: Market signals and fundamentals-based indicators for PT Arpeni Pratama Ocean Line Tbk. [JKSE:APOL] indicated poor credit health prior to default



Source: S&P Ratings, S&P CreditModel Scores, and PD Market Signals from S&P Capital IQ RatingsDirect, November 2008 – December 2010. Key Developments news is from S&P Capital IQ's news sources.

In terms of our decision tree, the analyst would have followed the red route marked in **Figure 7**, and would have been able to recommend defensive actions well before the firm's public ratings began a series of downgrades through 2009 and 2010.

Figure 7: Illustrative decision tree for PT Arpeni Pratama Ocean Line Tbk. [JKSE:APOL]



Source: For illustrative purposes only.

Conclusion

Building efficient, accurate and scalable credit surveillance is an urgent priority for many corporations and investment firms.

In this article, we've shown that the best way to build a surveillance system is to apply multiple credit indicators in a systematic way that plays on the particular strengths of each approach.

In particular, market-based signals offer an effective early warning system but also generate many false alarms. They should be used as a surveillance screening tool to attract the analyst's attention to risks that can then be analyzed using fundamentals-based indicators and tracked in terms of the latest news and events.

This kind of systematic approach both speeds up and improves the accuracy of the surveillance process: firms red-flagged by market-based signals are more likely to default when those red flags are confirmed by fundamentals-based analysis.

The approach is ideal when small teams need to monitor large portfolios, and may prove invaluable as developed nations begin to unwind support for their economies, interest rates climb to more normal levels, and the value of robust credit surveillance rises even further.

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