EDF-X At a Glance

Accelerated Credit Risk Insights for Any Company in the World

In an uncertain economy with rising credit risk, early warning signals are critical

Heightened vigilance and closer monitoring of credit portfolios is essential as we witness the end of the relatively calm credit conditions that have existed since the Global Financial Crisis. The accumulated corporate debt from the past decade now presents potential risks for repayment and refinancing. Moody's Investors Service predicts that the global default rate will increase from 2.6% in 2022 to 4.7% in the first quarter of 2024.

In favorable credit conditions, it is relatively easy to spot potential problem credits – those likely to underperform or, worst case, experience a credit event – as firm-specific business models prove unsuccessful or sector specific shocks impact a portion of a portfolio. Early detection becomes challenging as credit quality worsens and credit markets tighten. Existing methods of early detection also make the effort more difficult. Many established monitoring processes tend to be backward-looking, time consuming, and labor intensive: going loan by loan, looking at annual financial statements, checking internal ratings, and even sending questionnaires to borrowers.

Early detection is ultimately about efficiency and accuracy. The task is to identify which exposures require immediate attention so that scarce human resources can be used to investigate them further and take appropriate mitigating actions. A robust early detection system should help answer urgent questions such as: *Which potential borrowers should I lend to? Which exposures in my portfolios should I worry about? When should I take action?*

Moody's designed EDF-X specifically with early detection in mind. Covering over 450 million companies and financial institutions globally, EDF-X combines Moody's time-tested credit risk models with the world's largest company database to help you reliably assess the credit risk across your portfolios with greater speed and accuracy.

Table of Contents

Authors

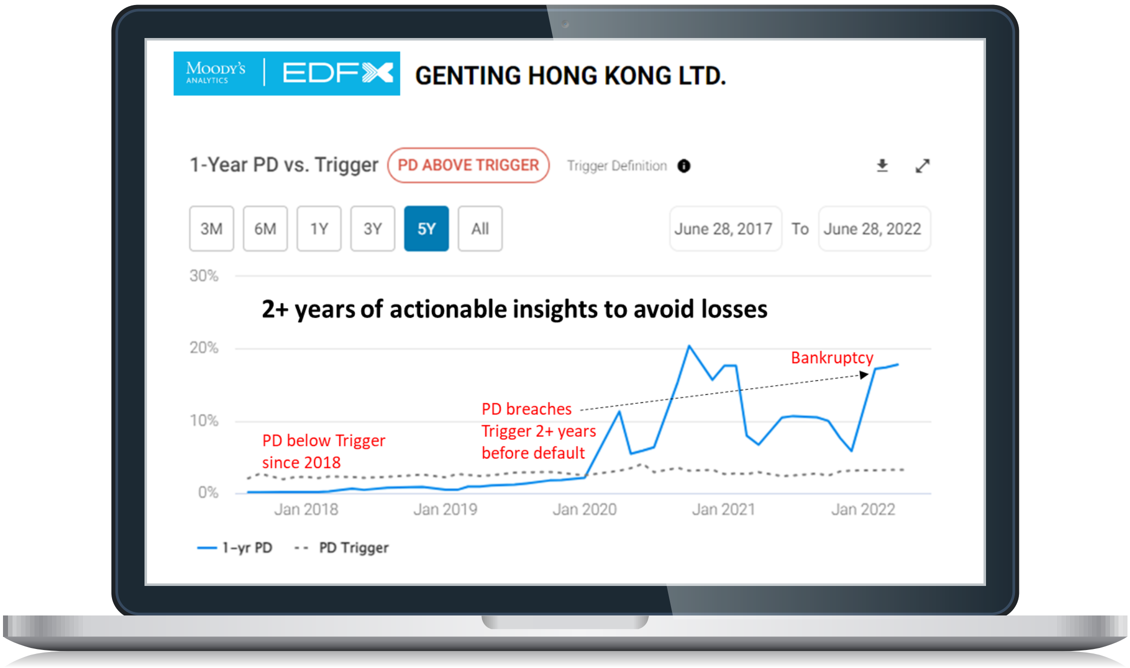
Ryan Donahue
Associate Director-Customer Insights
Ryan.Donahue@moodys.com

David Hamilton, PhD
Managing Director-Credit Insights
David.Hamilton@moodys.com

Kyle Hillman
Associate Director-Research
Kyle.Hillman@moodys.com

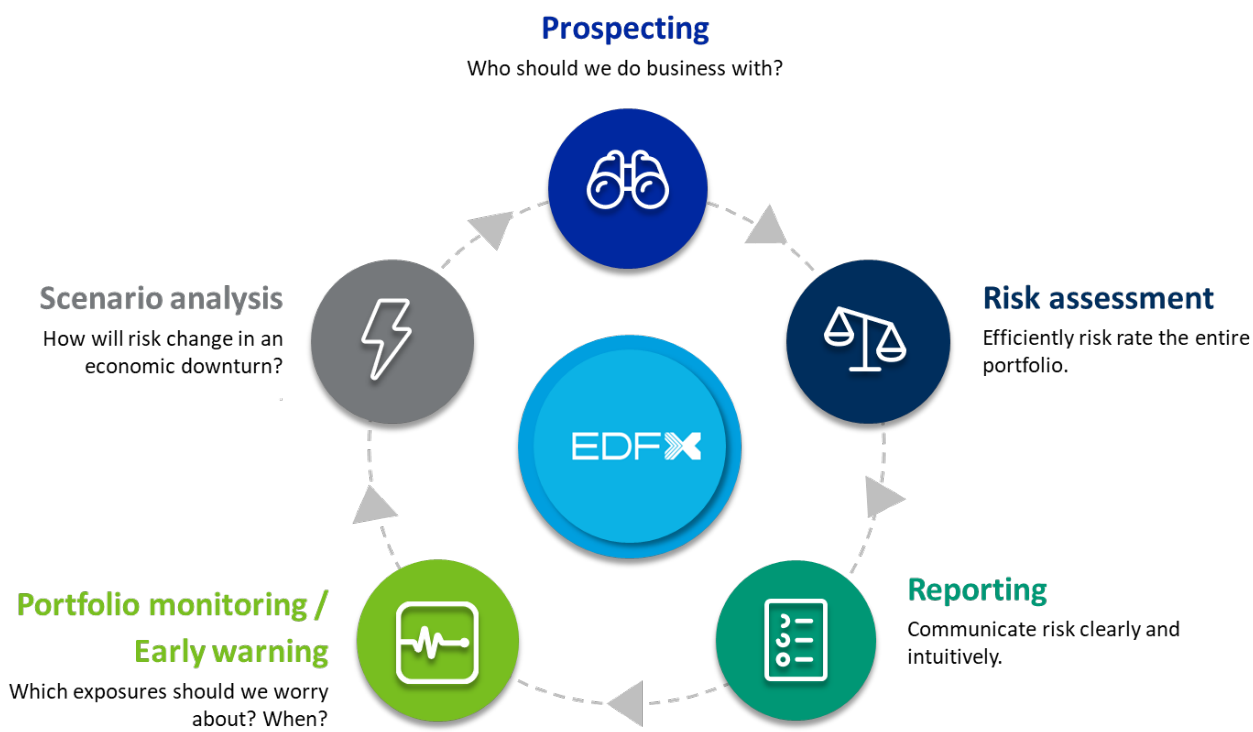
Anamaria Pieschacon, PhD
Managing Director-Research
Anamaria.Pieschacon@moodys.com

To learn more about the capabilities of EDF-X, please contact us at edfx@moodys.com

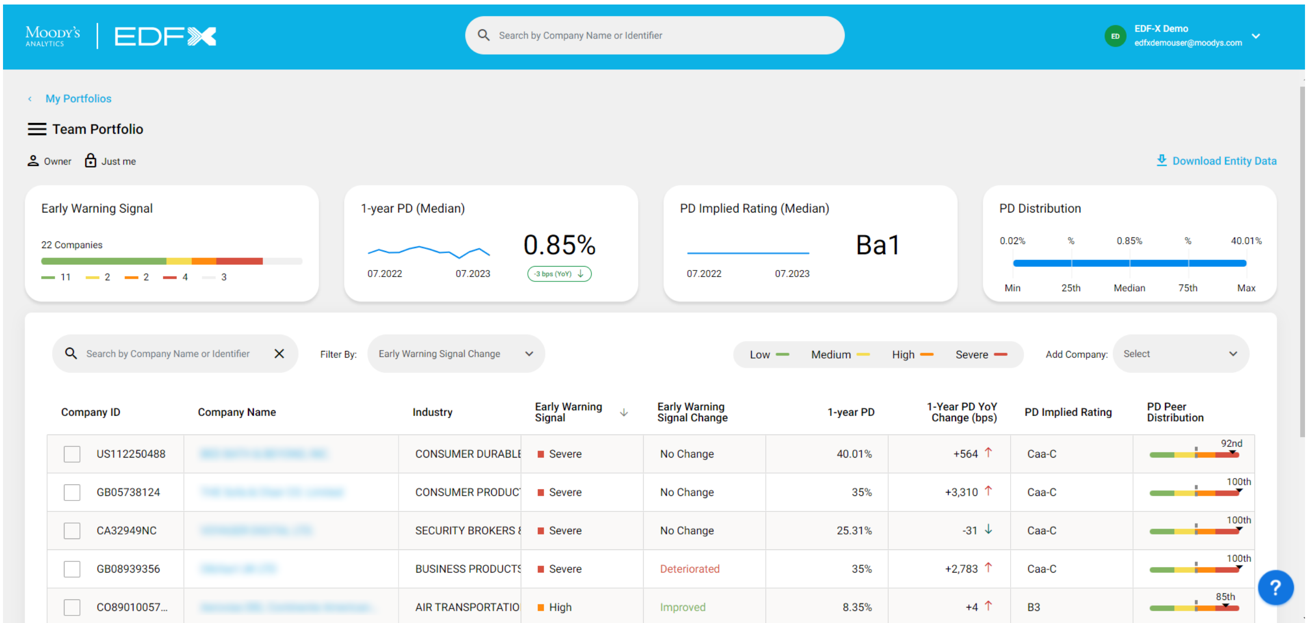


EDF-X puts decision analytics at the helm

EDF-X offers actionable insights across the entire credit lifecycle including market analysis, new business prospecting, origination and risk rating, reporting, portfolio monitoring, and regulatory applications. The EDF-X web platform supports a range of business and credit decisions for financial institutions and corporations by providing Moody's recommended views, with the option for users to create custom dashboards and alerts and incorporate their own data. Anyone looking to automate and streamline their credit assessment process will find the EDF-X solution a major enhancement to their workflow.



In order to monitor a portfolio and capture early signals of credit risks, credit professionals may use a multitude of signals including financial ratios, credit ratings, securities prices, probability of default (PD), macroeconomic data, news, credit spreads, and more. EDF-X helps solve this fundamental problem of integrating multiple views of credit risks and opportunities into one web platform and API.



EDF-X brings game-changing automation and efficiencies to your credit risk monitoring and early warning process

Moody's scores the world's largest credit database

Combined capabilities of Moody's extensive company database and award-winning risk models provide accelerated credit risk insights for 450+ million pre-scored companies, ranging from small family-owned businesses to large global enterprises. Even in the absence of timely financial statement information, EDF-X still produces reliable risk measures leveraging Moody's curated trove of alternative data, powered by sophisticated machine learning techniques. This proprietary corpus includes, but is not limited to, contributory data on trade payment behavior, firmographic and ownership information, and economic forecasts under stressed scenarios.

EDF-X turns data into action

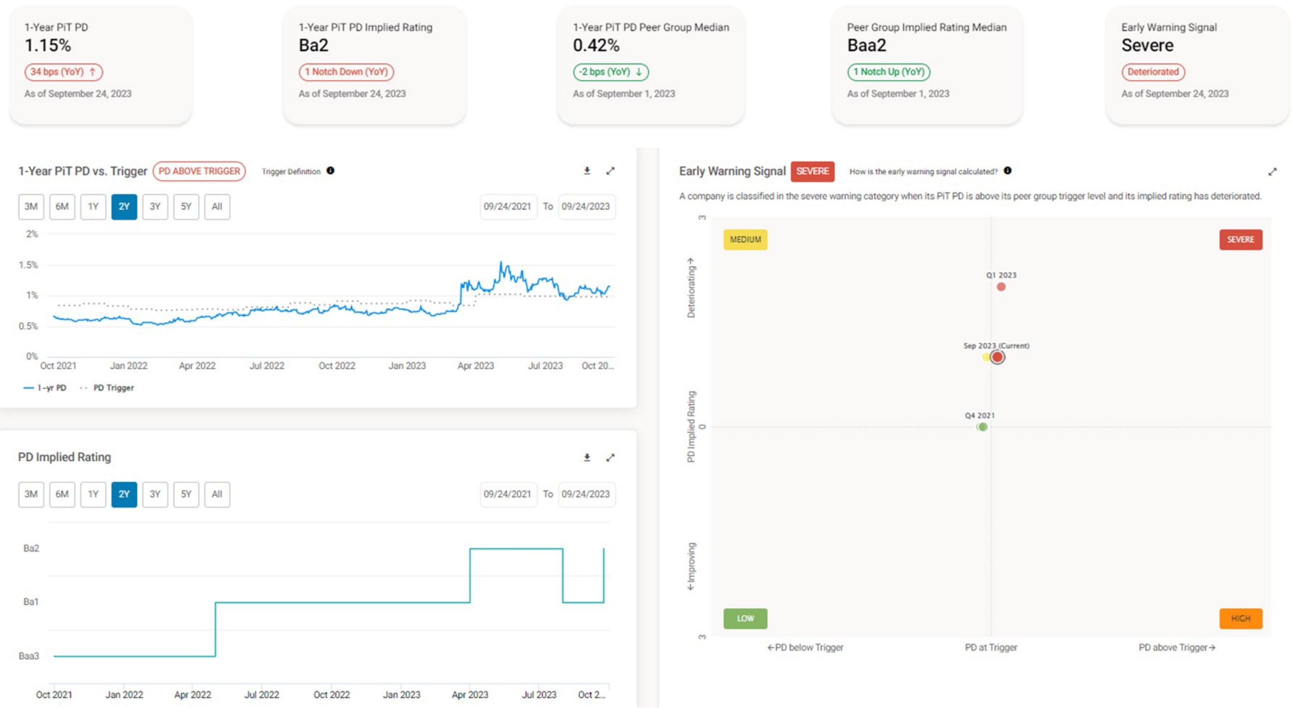
Easily score entire portfolios without having to make modeling decisions. EDF-X selects the best PD model based on the best data available including company data, trade payment data, or user provided financials, market condition inputs, credit cycle and/or scenario adjustments.

Early detection of risk

Forward-looking measures for every company including PD, implied ratings, PD sector risk triggers and Early Warning Signal help you spot emerging risks and opportunities across your portfolio faster and with better accuracy – increasingly important in uncertain economic environments.

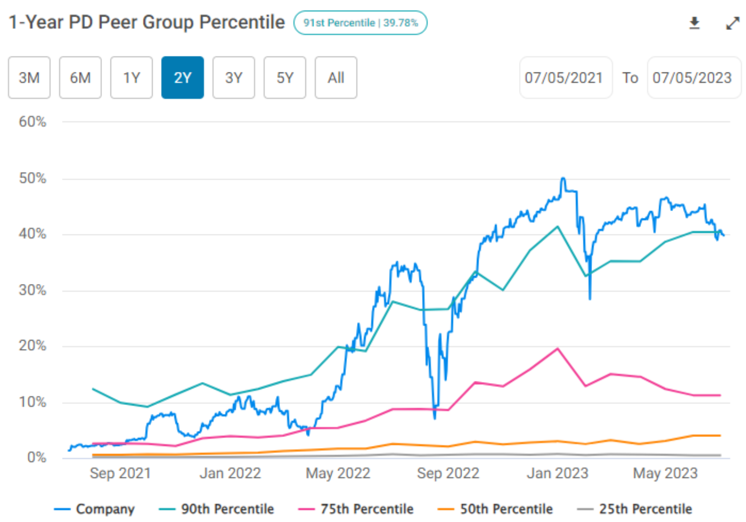
EDF-X Concept: PD Trigger Level

The early warning trigger methodology offers an intuitive framework for the early detection of firm credit risk relative to aggregate peer credit risk. This comparative credit risk measure is captured by measuring firm level PD against the trigger level PD, where the trigger is derived from a PD percentile based on country and industry peer groups and accounting for the current credit cycle. Calibration of the PD trigger level is critical to its success as an early warning signal and an effective PD trigger level will balance the tradeoff between accuracy and forecast errors. Risk assessment with this is straightforward; when a firm PD is below the trigger, it is a relatively safe credit risk relative to its peers and when firm PD is above, it is relatively risky.



Varied views of risk

Multiple risk assessments paint a fuller picture of exposure risk for you to make informed business and credit decisions: 300,000+ peer group comparisons, drivers of risks and sensitivities, financial and business risk insights, macroeconomic data, climate risk impact, news-based credit sentiment, firmographic/ownership details, trade payment trends, and more.



EDF-X Concept: Peer Groups

EDF-X aggregates firms into groups of economically similar firms. These peer groups provide analytics for a given firm relative to a population of similar firms. EDF-X includes more than 300,000 peer groups based on country; region, or aggregation of countries; industry; and if the firm is public or private. A firm's location within its peer group, measured as its percentile location, are provided for a number of metrics including PD and financial statement ratios. Finally, peer group definitions are used to calculate the peer-based PD trigger level, a key signal for early warning of relative credit risk.

Simple execution to efficiently monitor portfolios

Choose from over 100 company identifiers to get the best credit assessment for any name given the financial data available. You can also use your own data in a simplified global template to make adjustments. The EDF-X web platform and API help streamline public and private portfolio processes and create automated workflows.

> "What would have taken my team an hour to get risk insights for a private firm is now taking us less than a minute with the new EDF-X workflow. It has superseded my expectations. It is saving my team valuable time and shaping the way in which we review our portfolio. The optimization search tool is quick and efficient, the site is easy to navigate and the enhancements which identify early warning triggers are a game changer."
>
> *- Risk Manager from a global technology and electronics conglomerate*

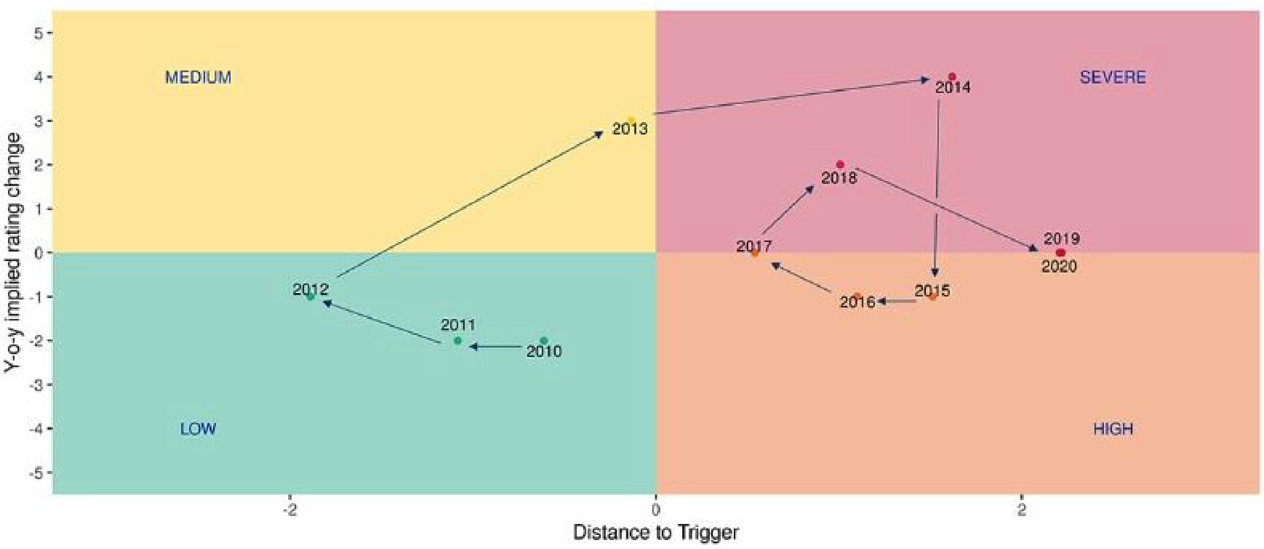
An effective early warning system can give you the edge you need in a challenging macroeconomic environment

The Early Warning Signal (EWS) in EDF-X combines two automated decision rules into an actionable early warning framework. The first decision rule is *distance to trigger* which helps you spot which firms stand out as relatively risky compared to their country/region/industry peer group. The second decision rule is the *PD-implied rating change* which measures the significance of recent change in their credit risk. The quadrant design of the EWS yields actionable early warning risk assessments: Severe, high, medium and low.

Early Warning Signal	PiT PD vs. EDF-X Trigger	Implied Rating 12-Month Change
Severe	PD above Trigger	Deteriorating
High	PD above Trigger	Improving or Unchanged
Medium	PD at or below Trigger	Deteriorating
Low	PD at or below Trigger	Improving or Unchanged

Overall, the EWS is capable of effectively flagging defaulting firms at various points ahead of default in all regions. Our system tends to identify around 51% of eventual defaulters 36 months before a credit event, with the hit rate increasing to 80%-90% by the time default is on the doorstep, or one month ahead. Similarly for private firms, across regions roughly one-third of eventual defaulters are identified as severe or high 36 months in advance, with the percentage increasing to 35%-50% one month before default.

Below is a visualization of J.C. Penney's risk migration in the design of the EWS in EDF-X. For illustration purposes, we plot the company's EWS metrics for each January between 2010 and 2020. J.C. Penney was in the green bucket before 2012, because its PD level is lower than the trigger and its PD-implied rating experienced an improvement in the prior 12 months. From 2015 to 2017, the firm's PD level was higher than its peer group PD trigger, while the implied rating was either improved or stable, placing the firm in the high-risk early warning category during that period. In 2018, the firm was flagged as a severe risk, given its two-notch deterioration in its PD-implied rating, as its PD moved further above its early warning trigger level. In 2019 and 2020, the firm remained in the severe-warning bucket but became riskier compared to 2018, as evidenced by a higher distance to trigger. Finally, J.C. Penney filed for bankruptcy in May 2020.



J.C. Penney is a telling example of the power of the EWS. Not only did the EWS signal flag J.C. Penney in the severe bucket at least three years before its default, the EWS quadrant design also provided an informative visualization of its migration between different warning buckets over time. Read the full methodology.

Major Insurer Put Early Warning System to Work

The client confirmed having a strong forward position on a few trending public and private company names. Early warning alerts from EDF-X triggered some of these entities in the portfolio showing signs of financial deterioration and moving to high risk category. The client's credit team connected with Moody's experts to better understand the severity of these early warning alerts as part of the platform training and confirmed to avoid more than $50 million in losses using our solutions.

Seamless integration of models, data sources and analytics allows for comparable results across firms

Although Moody's PD models are derived using different data inputs and different modeling methods, the models all yield forward-looking, point-in-time PDs. They are updated monthly or daily and serve as a solid foundation for early warning of credit risk.

PD MODEL FEATURES	PUBLICLY LISTED FIRMS	PRIVATE FIRMS WITH SUFFICIENT FINANCIALS	PRIVATE FIRMS WITH PAYMENT DATA LACKING SUFFICIENT FINANCIALS	PRIVATE FIRMS LACKING SUFFICIENT FINANCIALS OR PAYMENT DATA
Primary Model Inputs	Firm asset values and volatility derived from equity valuations, liability information from the balance sheet	Financial data from balance sheet, income statement	Firm years in business trade behavior	Firm country, industry sector
Point-In-Time Adjustment	Market-based (equity) input	Credit cycle adjustment factor	Credit cycle adjustment factor	Credit cycle adjustment factor
PD Output Frequency	PDs updated daily	PDs updated monthly	PDs updated monthly	PDs updated monthly
Model Framework	Merton-style framework	Regression models	Regression models	Regression models
Coverage	Publicly listed firms globally	Any firm with sufficient financial statements	Private U.S. firms with less than $500M in net sales	Any firm globally

OUTPUTS

450+M PRE-SCORED COMPANIES GLOBALLY

- Early Warning Signal
- Point-in-time PD
- Implied Rating
- 10-yr Term Structure
- Model Drivers
- Peer Analysis
- What-if (scenarios, pro-forma, climate)
- Qualitative Inputs
- Loss Given Default

Payment Model

We expanded pre-scored coverage using the following logic: If a private firm has financial information, we use the appropriate PD model. Otherwise, we use the Payment Model, if there is trade information available and the firm's net sales are under $500 million. It provides improved credit risk assessment of small U.S. firms that do not have financial statements or that have statements of poor quality.

Trade Credit Limit Model

The Trade Credit Limit Model provides a quantitative approach for obtaining a maximum credit limit, which can be extended to a buyer under a given set of assumptions. The model uses our proprietary framework to calculate a credit limit based on the net value added in a transaction.

Loss Given Default (LGD) Model

The LGD Model determines loss given default credit measures and expected losses (EL) for public and private companies, loans and bonds. This framework enables users to efficiently calculate LGD and EL by passing entity specific PD values as LGD inputs. It has extensive internal mapping, a term structure up to 10 years, and tenor matched LGD and EL.

PD Implied Ratings

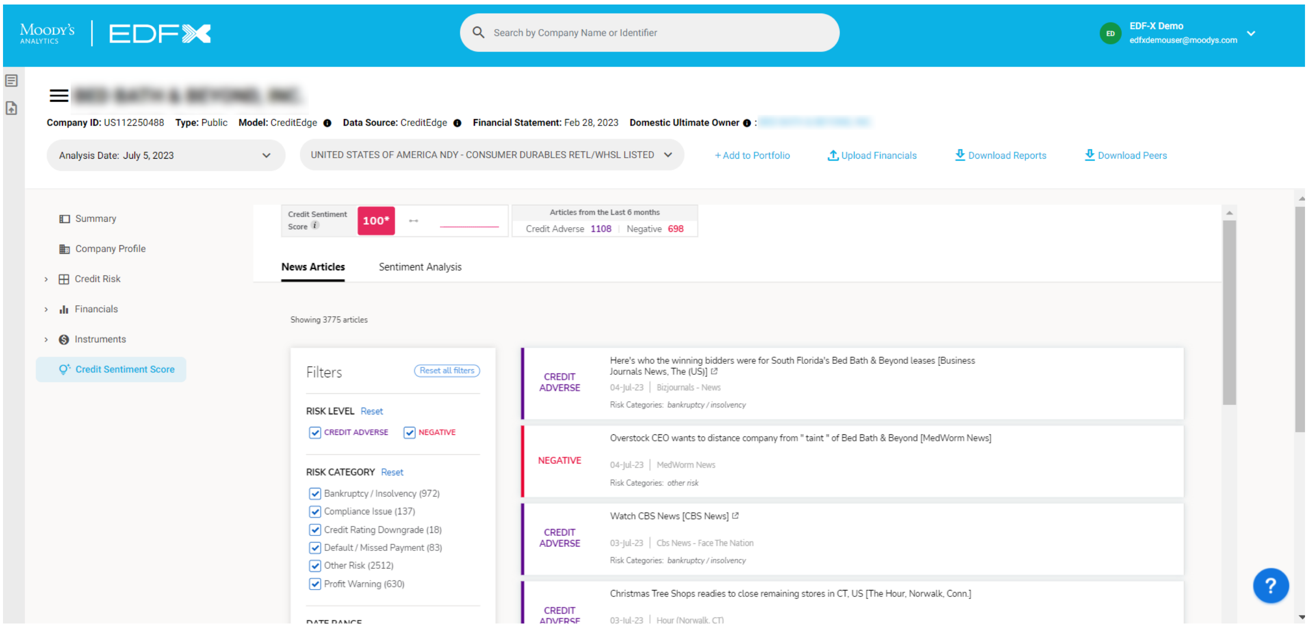
To help interpret quantitative probability measures, EDF-X incorporates a mapping of PDs to implied credit ratings. This mapping is stable regardless of changes in time or the characteristic of firms. Sometimes the terminology of credit ratings may be preferred, as they are widely recognized and understood by investors, lenders, and other credit stakeholders. In addition, mapping of internal ratings to rating grades with sufficient risk differentiation is a regulatory requirement. Changes in PD-implied ratings can be used to provide a consistent measure of credit risk across different years, industries and geographies, which are used in many applications such as IFRS9, early warning and monitoring. Finally, PD-implied ratings can be used to compare instruments based on their credit risk.

Climate Risk Impact

The Climate-Adjusted PD framework provides a consistent, transparent and customizable means for analyzing the impact of physical and transition climate risk on public companies' credit risk. The Physical Risk-Adjusted PD model forecasts both direct and indirect effects of weather and climate events on a firm's infrastructure, operations and market. The resulting credit analytics account for acute physical events (e.g. hurricanes, wildfires) as well as chronic physical risks (e.g. sea level rise, heat stress) while taking into account different time horizons, the firm's physical location and its financial profile. In contrast, the Transition Risk-Adjusted PD model forecasts the risk and rewards associated with the transition to a lower carbon economy. The model incorporates an Integrated Assessment Model to quantify how a given transition path affects firm prices, sales and costs while also projecting how transition risk impacts firm level earnings, value and ultimately, credit risk.

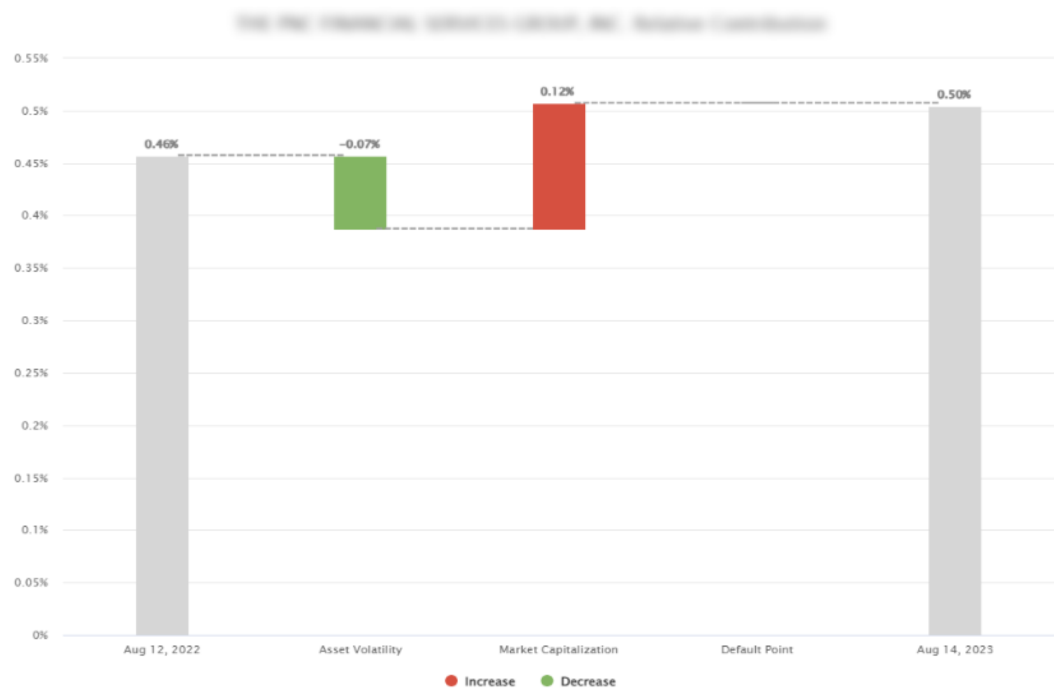
Credit Sentiment Analysis

Credit analysts have always used news to help understand and monitor their borrowers, but the volume of information has increased exponentially in recent years, making it difficult to identify valuable data points through the deluge of coverage. Fortunately, artificial intelligence (AI) methods can help identify which articles are worth reading and why, freeing up time for deeper investigations of specific names. The award-winning Credit Sentiment Score uses Moody's Analytics NewsEdge real-time newsfeeds with state-of-the-art AI techniques to derive credit-relevant sentiment from news articles.

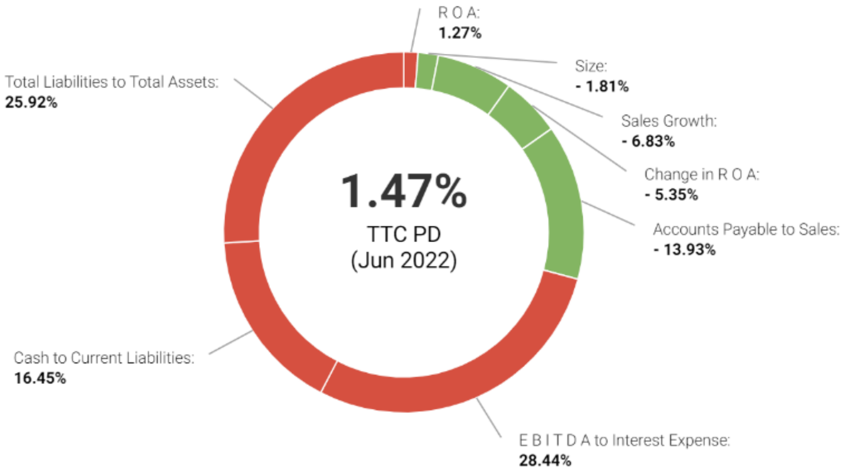


PD Risk Drivers

EDF-X not only identifies changes in firm-level credit risk – it also provides analytics for why a firm's position has changed. These analytics are specific to the model a given firm is scored with, and crucially, the relative contribution of each factor is visually and numerically displayed within the interface, allowing for a quick understanding of why the PD has changed. In the case of a publicly listed firm, PD drivers will include asset volatility, market capitalization and changes in the default point.



For firms scored with financial statements only, the impact of each ratio is presented:

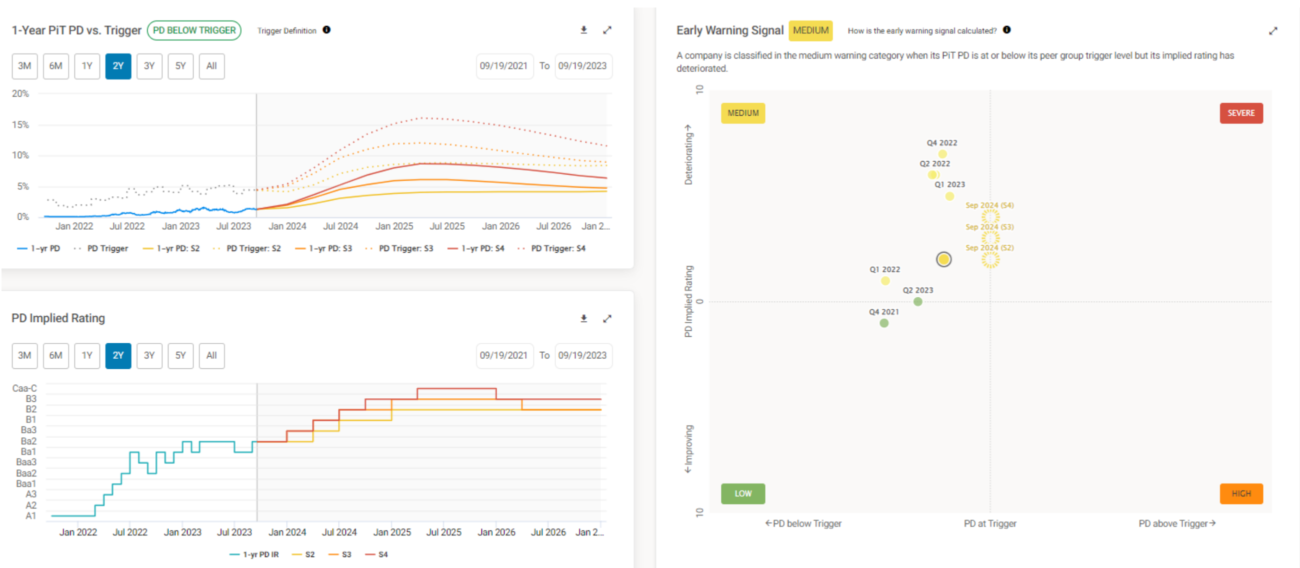


Similar metrics are provided for firms scored via other models within EDF-X.

Scenario-Conditioned PD and Early Warning

Prudent risk management and opportunistic portfolio management strategies require considering firm performance across a number of economic outcomes, both to the upside and downside. EDF-X includes a robust framework for projecting scenario-conditioned PDs based on econometric models relating macro variables to firm PD changes. The three main factors in these models are country, sector, and credit risk, so that different countries, sectors, and ratings have different exposures and sensitivities to macro variable shocks. A mixture of economic intuition and variable selection techniques are used to select macroeconomic variables. The final set of macroeconomic variables selected ensures the model is robust and works well across different stress scenarios.

These forecasts can be used to project future PD values under specific scenarios and can be applied to any internal rating framework that has been calibrated to produce PD values. Managers who use fundamental analysis to determine ratings, or whom have a portfolio for which financial statements are not readily available (or both), can apply this approach to their portfolios.



The sky's the limit when it comes to unleashing the full potential of EDF-X

Moody's existing solutions are validated over credit cycles and informed by the world's leading financial institutions who use them. It's reliable and robust, but we aren't stopping there. We own some of the world's most relevant, unique and comprehensive data sets to assess a wide range of risks. Our decades-long expertise coupled with more and better data, machine learning and expert teams positions us well to extract the best systemic and idiosyncratic risk signals. We recognize that clients want to run their own scenarios and consume the output in different formats and frequencies. Through EDF-X we continue to collaborate with clients and partners on our journey to keep enhancing our early warning signals and maintain our #1 position.

RiskTech 100 2023
#1

RiskTech 100 2023
Moody's
Innovation – Credit Risk

waters
Rankings Winner 2023
Best credit risk solution provider
Moody's Analytics