MODEL OVERVIEW

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EDF-X Scenario-Conditioned Probability of Default (PD) At a Glance

Early warning of material risk is one of the fundamental challenges of credit analysis. Identifying what factors are most important and how various metrics should be incorporated into a decision making process are key for detecting vulnerable firms before significant deterioration. The EDF-X Early Warning System (EWS) was designed with these concerns in mind and is a powerful tool for identifying at-risk exposures well in advance of a negative credit event.

With the introduction of firm-level Scenario-Conditioned probability of default (PD) forecasts, the EDF-X EWS can be used to classify and quantify credit risk across a number of alternative economic scenarios, allowing users to answer questions such as “how would my exposures evolve during a recession?” and “which firms would outperform their peers if economic growth exceeds expectations?”.

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1. Introduction

Early warning of material risk is one of the fundamental challenges of credit analysis. Identifying what factors are most important and how various metrics should be incorporated into a decision making process are key for detecting vulnerable firms before significant deterioration. The EDF-X Early Warning System (EWS) was designed with these concerns in mind and is a powerful tool for identifying at-risk exposures well in advance of a negative credit event.

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The EDF-X Scenario-Conditioned PD Model uses company information and macroeconomic scenarios to forecast firm-level PD over time. By projecting PD under various scenarios, the model quantifies a company's sensitivity to fluctuating economic conditions. This method is commonly known as stress testing, or scenario conditioning when positive outcomes are also considered.

Shocking a PD presents a number of challenges. For example, users are typically interested in determining losses at the peak of the cycle, so shocking a "Through-the-Cycle PD" is insufficient. Further, anticipating the qualitative factors under an adverse scenario is difficult, due to the rarity of robust qualitative factor data sets collected consistently over a complete economic cycle. Anticipating how a firm's financial statement will change is also challenging. Different firms have different strategies for adapting to both recessions and expansions, and, consequently, how financial statements respond to the cycle is likely to be firm-specific.

Financial institutions, corporations, asset managers, insurance firms, and regulators can leverage the Scenario-Conditioned Model to shock obligor-level default risk in a consistent manner for all the counterparties in their portfolio. The model is universally applicable:

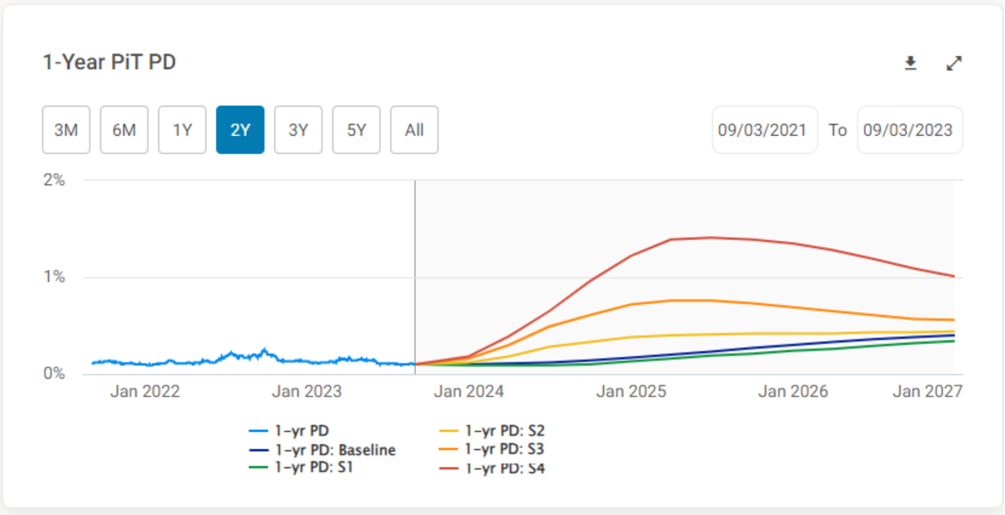
- It covers both public and private companies.
- It includes financial and non-financial institutions in all industries, including energy.
- It spans across every country in the world.

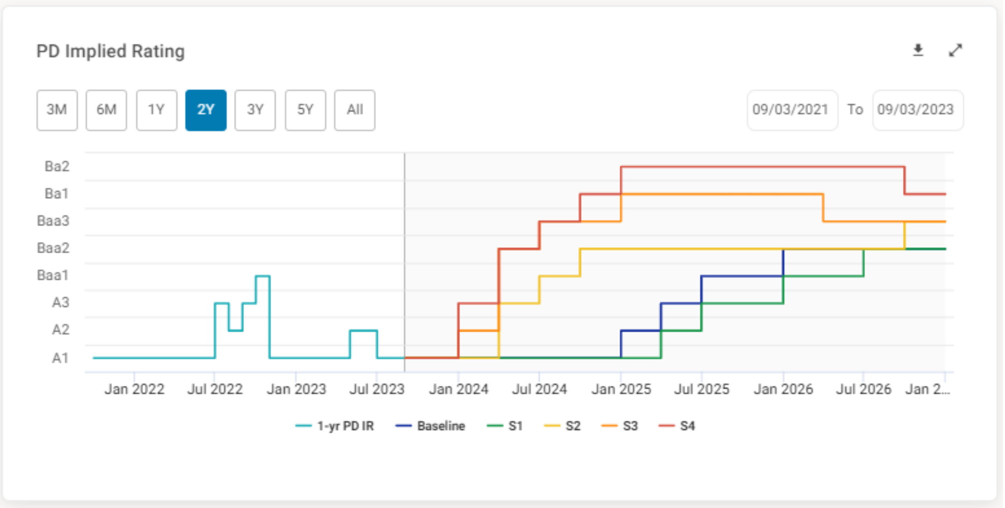
Applying the scenario conditioning on a company's PD enables a powerful analysis to identify counterparties that would struggle to cope with a recession even if their current status is not markedly alarming.

2. Model Results

Scenario-Conditioned PDs are company-level, annualized one-year point-in-time PDs. They are projected over a maximum of five years at a quarterly frequency for each supported scenario. Further, the projected PD values are mapped to an implied rating which varies over time and across scenarios.

Figure 1. Scenario-Conditioned 1-Year PD and Implied Rating in EDF-X





Scenario-Conditioned PDs can be accessed via the EDF-X web-based platform and EDF-X API. They can be used for many purposes including sensitivity analysis, early warning, monitoring and internal risk rating systems.

2.1 Using Scenario-Conditioned PDs to Navigate Uncertainty

Examining the potential effects of economic forecasts on a company's credit risk equips you with the knowledge to make informed decisions today. This process not only provides clarity but also helps manage uncertainty in the ever-changing economic landscape.

To help prioritize and manage your workload effectively, each firm's projected credit risk is mapped to the EDF-X Early Warning Signal (EWS). In the context of the EDF-X EWS framework, scenario conditioning is applied to a given firm as well as all the firms in its peer group. This ensures that the shock is not isolated to the firm and that the PD trigger – which is drawn from the peer group – is also scenario conditioned.

With these elements at hand, we can leverage the EDF-X EWS framework and extract scenario-conditioned signals. The x-axis distance to trigger can be measured with the Scenario-Conditioned PD and Scenario-Conditioned trigger. Similarly, the change in implied rating can be computed using the implied rating corresponding to the Scenario-Conditioned PD. Figure 2 illustrates this with an example.

Figure 2. Scenario-Conditioned EWS quadrant view

You can decide whether a more in-depth analysis is needed based on the severity of the warning, the likelihood of the scenario occurring and your own workload. If a more thorough examination is required, you can use EDF-X's what-if feature to delve deeper.

3. Model Methodology Summary

The EDF-X Scenario-Conditioned PD Model was developed using historical company and default data from EDF-X and macroeconomic variables sourced from Moody's Analytics Data Buffet. The macroeconomic variables were selected based on their global availability and treated to ensure stationarity. These variables are classified into three categories: prices, economic performance, and financials.

Table 1. List of selected macroeconomic variables

Type	Variable
Prices	Consumer Price Index (CPI)
	Stock Price Index
	House Price Index (HPI)
	Oil Price Index
Economic Performance	Gross Domestic Product (GDP)
	Employment Total
	Unemployment Rate
Financial Variables	Monetary Policy Rate
	10-year Treasury Yield
	Money Market Rate
	S&P 500 Volatility Index
	BBB U.S. Corporate Yield

The methodology provides forecasts that change according to fluctuations in economic conditions while also capturing the underlying risk profile of various geographies and industries. The methodology consists of two steps:

» Macroeconomic variables are selected using an Optimal Variable Search (OVS) with an automated process to test numerous combinations. Different subsets and transformations of variables are relevant for different countries.

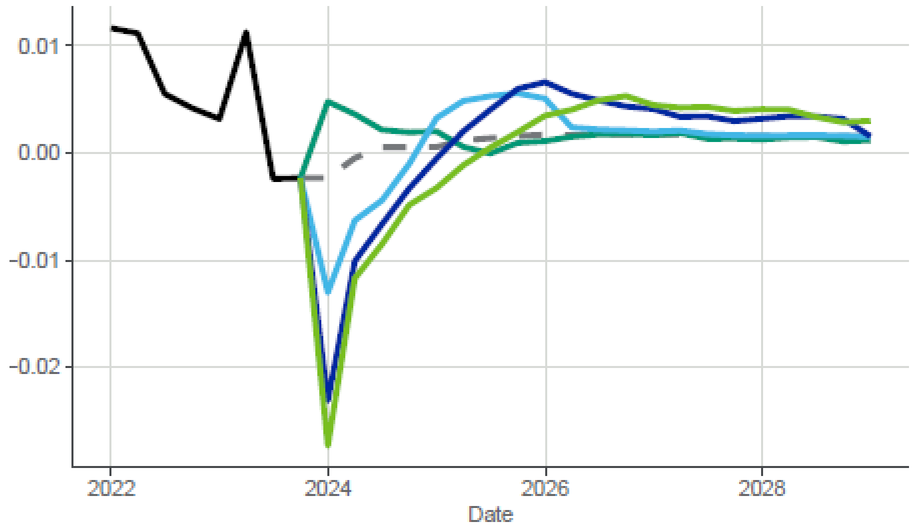
» The chosen variable coefficients are then estimated using the Generalized Method of Moments (GMM) approach. Coefficients vary for listed and unlisted firms and depend on firm location and industry combinations.

The model's final inputs include:

» Company information such as current point-in-time PD, point-in-time PD from 3 months ago, country and industry of operation.

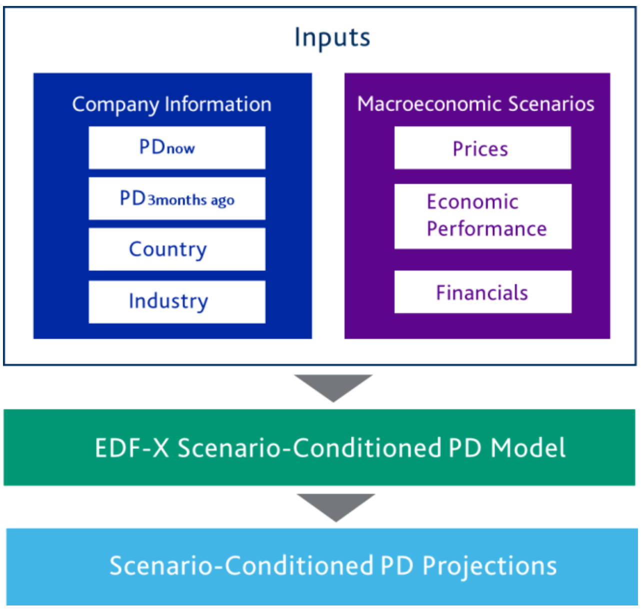
» Macroeconomic data (including historic time series and forecast) quantifying the alternative scenarios.

Figure 3. Example: History and forecast for employment growth in the U.S.



Scenario-Conditioned PDs are calculated by applying the estimated model parameters – which measure the average sensitivity of credit risk to country-specific macroeconomic risk factors and firm-specific PD momentum – to forward-looking macroeconomic scenario data and recent PD data.

Figure 4. Scenario-Conditioned PD Model summary



The model was validated on four dimensions:

- Back-tested to assess accuracy by comparing historical forecasts with actualized values.
- Compared PD projections with historical data during various periods of stress to ensure the movement of PDs is comparable to that observed.
- Compared changes in the rank ordering of companies across time with historical values.
- Compared 12-month change in the implied rating.

The current implementation supports off-the-shelf scenarios selected from the *Moody's Analytics Standard Global Scenarios* set[1]:

- Baseline scenario: The probability that the economy will perform better than this projection is equal to 50%, the same as the probability that it will perform worse.
- One upside scenario (S1): 10% probability that the economy will perform better than in this scenario, and 90% probability that it will perform worse.
- Three downside scenarios, with increasing severity (S2, S3, S4): 75%, 90% and 96% probability that the economy will perform better than under these scenarios, respectively.

Moody's Analytics Standard Global Scenarios are updated monthly by Moody's Analytics Economics team and published in Moody's Analytics Data Buffet. EDF-X follows the same update frequency to ensure the PDs are always conditioned using the latest macroeconomic forecasts. Future developments of the Scenario-Conditioned PD feature will include the addition of regulatory-driven scenarios as well as custom scenarios defined by EDF-X users.

[1] For further details about the scenarios, see the "Global Macro Narratives" file, available on the EDF-X help page.

For More Information

To learn more about EDF-X and other Moody's solutions, contact our experts at clientservices@moodys.com.