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Assessing Financial Resilience with Scenario-Conditioned Early Warning Signals

Early warning systems have long been essential tools for credit risk managers, enabling proactive risk identification and supporting regulatory compliance by flagging accounts that require closer scrutiny. However, their utility extends well beyond these traditional applications. By leveraging scenario-conditioned analysis, early warning signals can offer deeper insights into financial resilience, uncovering hidden risks and opportunities. This paper explores how unconditional and scenario-conditioned quantitative early warning signals can be used to assess financial resilience, illustrated with an example analyzing the reaction of several portfolios—the S&P 500, Russell 1000 and Russell 2000—to trade tariff announcements. This approach equips organizations with richer analytics, empowering them to refine strategies and enhance decision-making.

Introduction

Early warning systems are integral to credit risk management, flagging credit-negative news and identifying risks that exceed predefined thresholds. They enable proactive credit risk identification, regulatory compliance, and operational efficiency by focusing on entities requiring scrutiny. Beyond traditional uses, quantitative early warning signals (EWS) can reveal overlooked risks —which can, in turn, be opportunities—offering insights for portfolio construction, prospecting, and supplier assessments.

Stress-testing EWS against macroeconomic scenarios uncovers financial resilience by exposing vulnerabilities that conventional approaches might miss. With EDF-X's pre-scoring capabilities, organizations can even extend this analysis to firms outside their current portfolios, unlocking new avenues for strategic planning and prospecting.

Moreover, the findings derived from scenario-conditioned early warning signals can serve diverse stakeholders across the financial ecosystem. Asset managers, for example, can refine investment strategies by identifying undervalued assets with robust financial resilience, even when conventional risk metrics suggest otherwise. Corporates can leverage these analyses for trade credit management, supply chain optimization, and industry-level benchmarking, pinpointing strengths and vulnerabilities within their own operations or broader networks. By enriching existing systems with scenario-based approaches, organizations can pursue a deeper, more strategic analysis that goes beyond traditional metrics, enabling more informed and impactful decision-making.

In this paper, we describe the EDF-X early warning signal framework, and explain how combining current, unconditional signals with projected, scenario-conditional ones can provide ways to measure financial resilience. We illustrate this approach with an example analyzing the reaction of several portfolios—including the S&P 500, Russell 1000 and Russell 2000—to trade tariff announcements.

EDF-X Early Warning Framework

To understand the value of scenario-conditioned early warning signals, it is useful to first understand the EDF-X Early Warning Signal (EWS) operational framework, which hinges on three pillars: good data, good models, and good rules (Figure 1).[1]

[1] EDF-X, Moody's flagship solution for accelerated financial risk insights and early warning signals, pre-calculates credit measures for 500+ million companies globally— public and private, rated and unrated—using the best data available and provides customized views for a range of business and credit decisions.

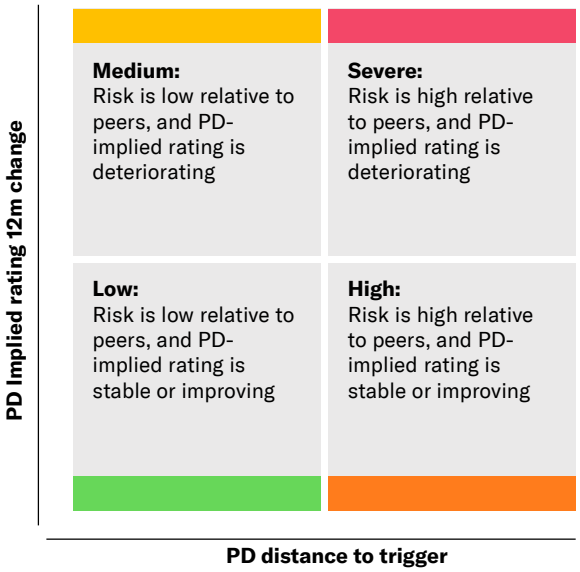
Figure 1. The Three Pillars for an Effective Early Warning System

Moody's vast data assets, encompassing market data, financial statements for both private and public entities, ownership networks, payment behavior, news, and other relevant information for specific companies, serve as the foundation. These are meticulously leveraged as inputs into our sophisticated model suite. The value of these models is contingent upon the quality of data used for their development and the reliability of the data processed during their application. This interdependence underscores the critical synergy between good data and models, enabling the extraction of accurate metrics such as probabilities of default and implied ratings. Yet, these metrics alone are insufficient for early warning purposes. It is the application of well-defined rules that contextualizes these metrics, pinpointing areas of elevated risk and thereby realizing the early warning capability.

The EDF-X EWS quadrant combines two rules to identify four signal categories: Low, Medium, High and Severe. The rules are based on probability of default (PD) and PD-implied ratings. The first rule, represented on the x-axis, assesses a firm's probability of default (PD) in relation to its peers, establishing a peer-based threshold. Companies exceeding this trigger are classified as having an elevated risk compared to others in their group. By evaluating all companies within a peer group monthly, we can determine the critical cutoff point that signifies substantial risk at that point in time. Meanwhile, the second rule, plotted on the y-axis, uses static PD-implied ratings to measure the absolute risk and how it changes over time, capturing its risk trajectory (Figure 2).[2]

[2] For more details and performance statistics, please see the EDF-X Early Warning System Methodology.

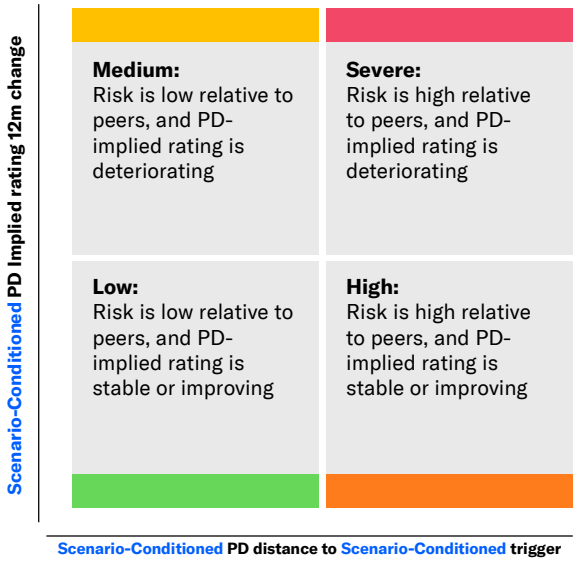
Figure 2. The EDF-X Early Warning System Quadrant Facilitates Actionable Risk Assessment



Taking the EDF-X EWS to the next level

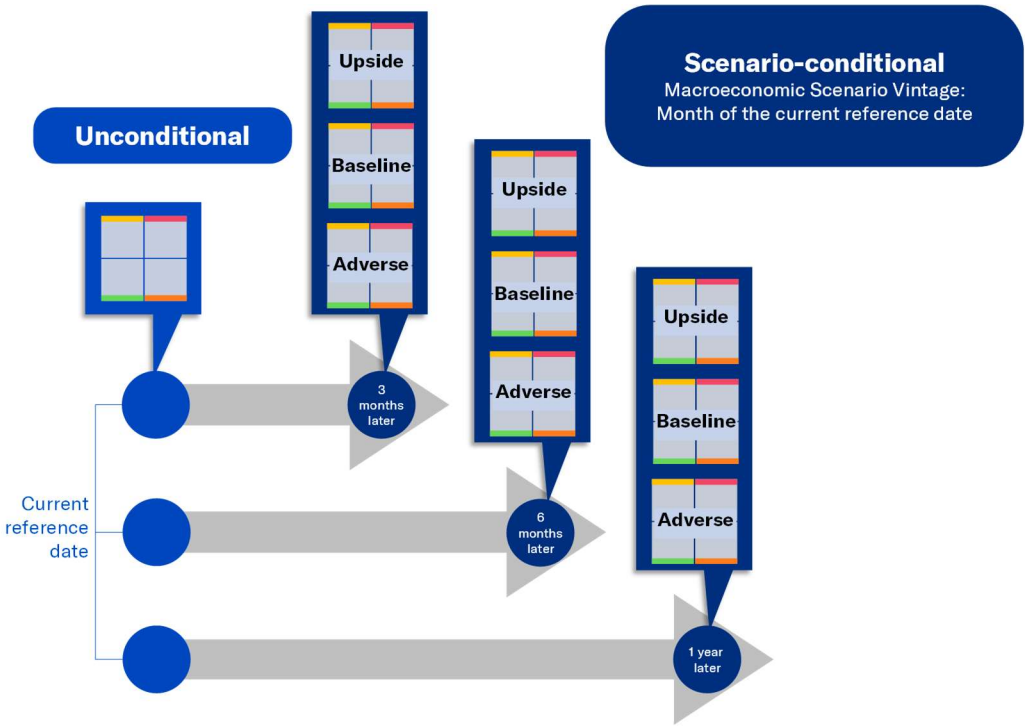
Building on the foundational elements of quality data, robust models, and precise rules, the EDF-X EWS offers a forward-looking assessment of risk that is both comprehensive and nuanced. At its core, the system processes unconditional probabilities of default alongside their corresponding implied ratings, delivering an initial layer of insight. However, the framework's versatility extends further, accommodating scenario-conditioned probabilities and their respective scenario-conditioned PD-implied ratings to provide scenario-conditioned early warning signals (Figure 3). This capability to analyze how early warning signals evolve under various macroeconomic conditions elevates the insights provided, offering a deeper, more contextual understanding of overlooked vulnerabilities.

Figure 3. Introducing Scenario-Conditioned Metrics into the EDF-X EWS Quadrant



Thus, we can project the early warning signal into the future, at multiple horizons, making use of macroeconomic scenarios, as shown on Figure 4.

Figure 4. Projecting EWS into the Future Using Macroeconomic Scenarios



Evaluating financial resiliency from early warning signals

We can uncover meaningful insights by examining how early warning signals evolve from their current unconditional state to scenario-conditional projections. This analysis allows us to pinpoint specific concentrations of financial resilience and risk, revealing the nuanced dynamics of risk exposure and robustness within a particular portfolio.

We leverage our unconditional and conditional early signals to define financial resiliency by the ability—or inability—of an entity to remain below trigger (in either Low or Medium), even under adverse conditions. We build a transition matrix to capture possible changes from today's early warning signal, and the projected signal one year later, under three alternative scenarios.

Figure 5 describes the detailed categories defined by transitions between the observed early warning signal at a given date and the scenario-conditioned signal projected one year ahead. Additionally, it assigns a score to each category, enabling the computation of financial resiliency at the portfolio level. It is important to highlight that this framework does not hinge on specific adverse or upside scenarios but rather illustrates the broader methodology for risk categorization.

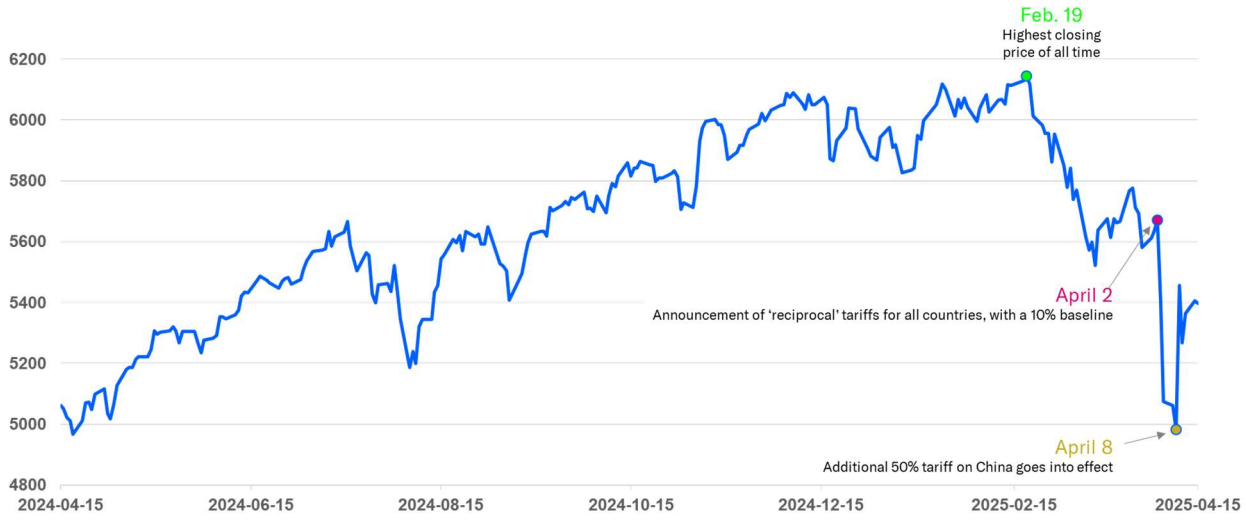
Figure 5. Financial Resiliency from EDF-X Early Warning Signal Transitions

Grade	Current Uncondi-tional	Conditional Signals			Firms in this category are	Score
		Upside	Baseline	Adverse		
Resilient					**Ultra resilient**: Maintain a Low EWS even under stress	8
					Very resilient: Stay Low under baseline conditions but shift to Medium under adverse scenarios.	7
					Moderately resilient: Remain in Low/Medium even under stress, but do not qualify for ultra, very or mildly resilient.	6
					Mildly resilient: Remain in Medium even under stress	5
Vulnerable					**Sensitive**: Stay in Low or Medium in benign and baseline scenarios but breach trigger under adverse conditions, exposing vulnerability to economic stress.	4
					Emerging risk: Start as Low or Medium EWS but escalate to High or Severe under baseline or adverse scenarios, signaling overlooked risks.	3
Precarious					**Resurgent**: Currently distressed but show recovery potential if macroeconomic conditions exceed baseline expectations.	2
					Distressed: Consistently above the risk threshold across all scenarios, indicating persistently high risk.	1

Financial resilience in practice – a case study with well-known portfolios

We analyze the financial resilience of companies listed on prominent indices, including the S&P 500, Russell 1000, and Russell 2000. The S&P 500 includes 500 of the largest publicly traded companies in the U.S., representing a broad cross-section of major industries and serving as a key benchmark for the overall stock market. The Russell 1000 tracks the 1,000 largest U.S. companies by market capitalization, while the Russell 2000 focuses on the next 2,000 smaller companies, collectively providing insight into large-cap, mid-cap, and small-cap market performance. We focus on two key dates: February 19, 2025, and April 8, 2025, to compare financial resilience and explore the underlying dynamics shaped by the geopolitical environment and economic policies in effect at the time. As illustrated in Figure 6, February 19 marks the index's highest closing price in history, making it a valuable reference point for assessing financial resilience. In contrast, April 8 represents a period of heightened market uncertainty, coinciding with the escalation of the tariff war just before the announcement of a 90-day pause for all countries except China on the following day. While significant developments have occurred since then, examining financial resilience on these two dates offers a useful stress-testing framework.

Figure 6. From all-time highs to market whiplash: S&P500's reaction to tariff announcements



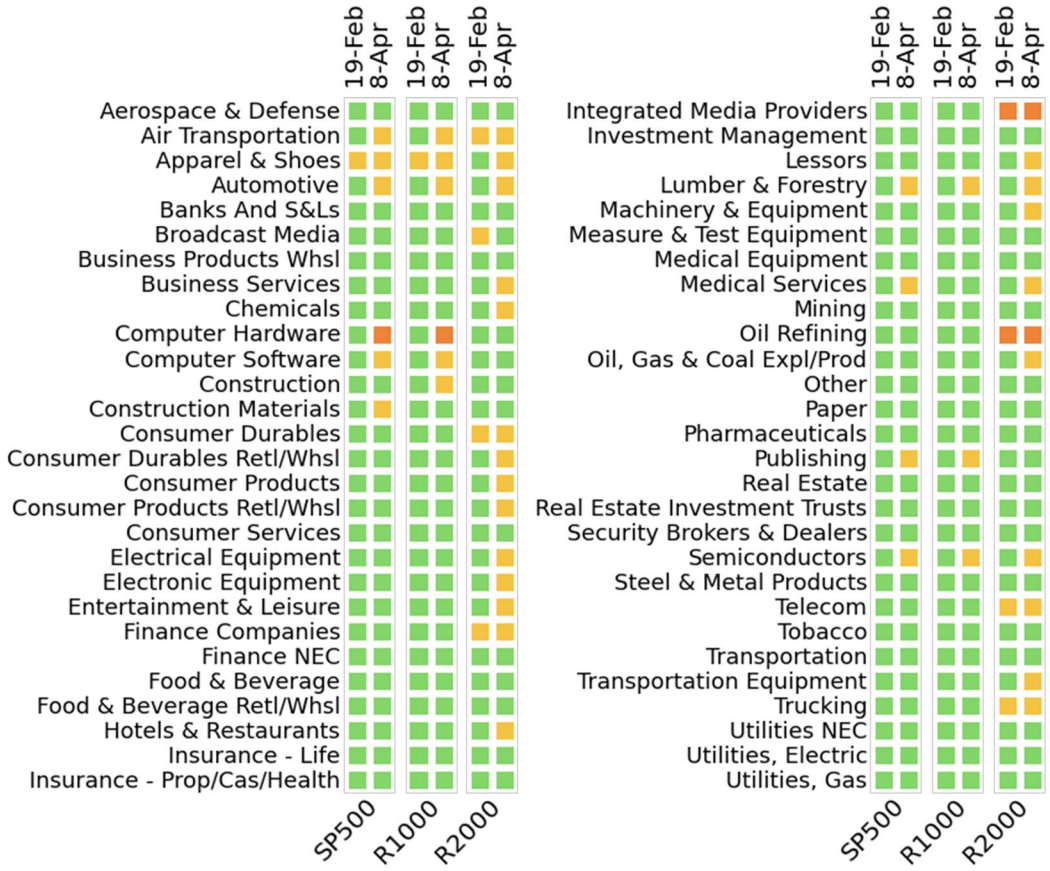
Source: Federal Reserve Bank of St. Louis, Moody's

We begin our analysis by looking at the EDF-X EWS for the three portfolios at each reference date (Figure 7).[3] To capture sector-level trends, we compute the market-cap weighted average of the signals. Although we cannot attribute the observed changes solely to the tariff news, the data reveals that the average EWS weakens for several sectors, with the magnitude of the shift varying by sector and firm size. For instance, large- and mid-cap companies in the Computer Hardware sector experienced a noticeable decline in their signals, while smaller companies in the same sector generally remained in

[3] 'R1000' and 'R2000' denote Russell 1000 and 2000, respectively.

the Low category. In contrast, sectors such as Lumber & Forestry and Semiconductors show consistent signal degradation across all firm sizes.

Figure 7. EDF-X EWS Sector-Level Signal, Market-Cap Weighted Average



To construct the financial resilience metric for each reference date, we start with the unconditional EWS for each company at that date (shown above) and project it one year forward. For February 19, we use the February macroeconomic scenario vintage to compute the one-year-ahead EWS, while for April 8, we use the April scenario vintage for the same purpose. For both reference dates, the EWS projections are evaluated under three alternative scenarios: Baseline, Upside (S1), and Downside (S2)4. Figure 8 and illustrate the financial resilience categories—Resilient, Vulnerable, Precarious—across different sectors, for S&P500 and Russell 2000 companies, respectively, comparing results between the two reference dates.

Figure 8 highlights the strong financial resilience of large-cap companies, as most sectors within the S&P 500 remain predominantly categorized as Resilient, even following the tariff announcements. However, there are notable exceptions: in the Computer Hardware sector, some companies shift from Resilient to Precarious, while in the Entertainment & Leisure sector, they transition to Vulnerable. These changes reflect the impact of the tariff announcements and the evolving macroeconomic outlook.

[4] A description of the economic scenarios produced by Moody's Analytics can be found here: https://www.economy.com/products/alternative-scenarios/standard-scenarios

Figure 8. Impressive financial resilience among large-caps, with a few exceptions (% counts)

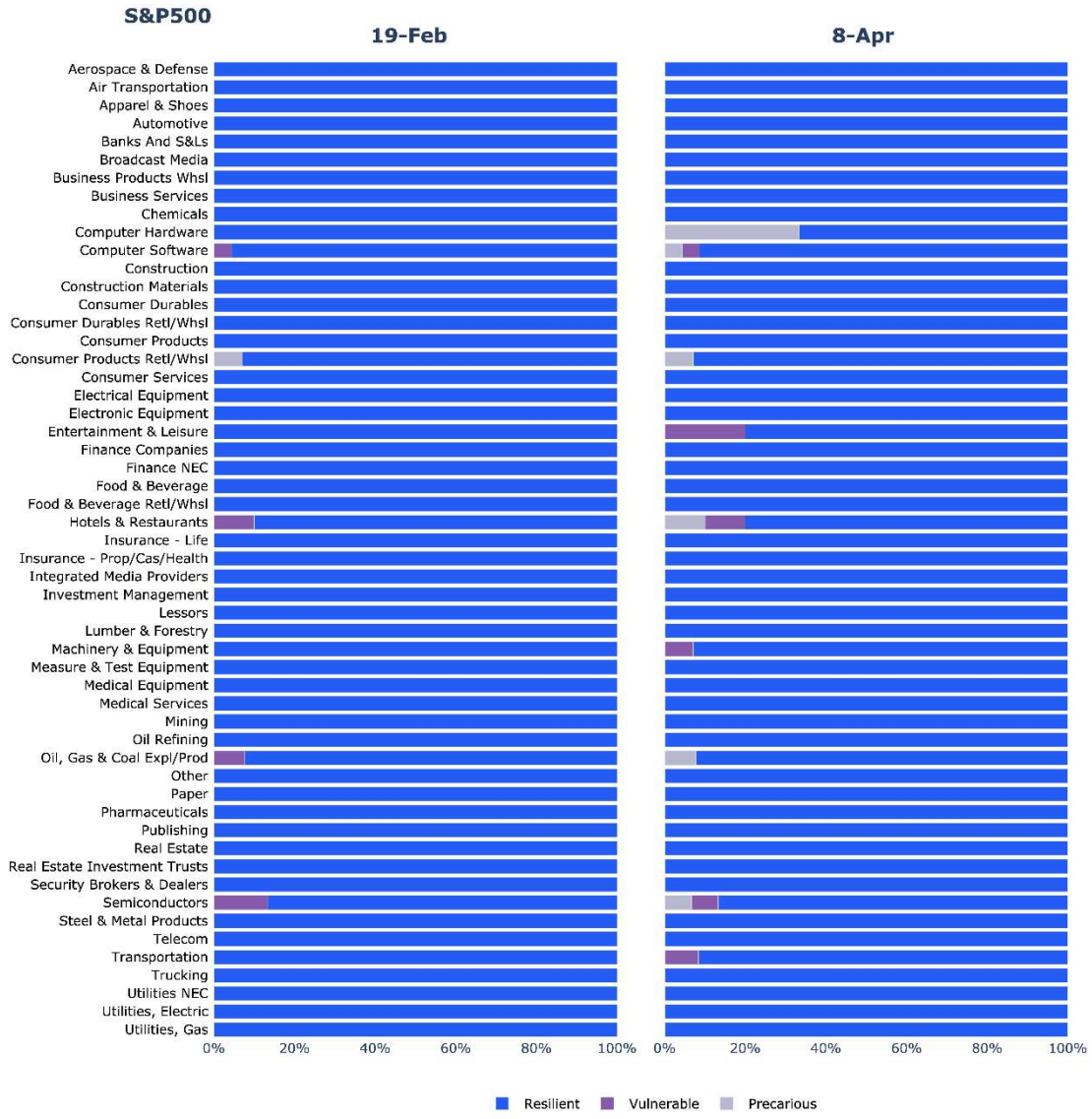


Figure 9 shows that in Computer Hardware, companies like Zebra demonstrate stable financial resilience. It turns out this is due to strong margins, prior investments in operational efficiencies, and a diversified supplier base, positioning it well to navigate the trade war. In contrast, HP faces greater challenges, with disappointing Q1 results driven by inflationary pressures on margins and manufacturing risks. HP's heavy reliance on Southeast Asian production for U.S. sales leaves it particularly vulnerable to tariffs and trade disruptions.

In the Entertainment and Leisure sector, Warner Bros. Discovery demonstrates interesting dynamics in its financial resilience. In February, the company exhibited a Resilient – Very Resilient level (score=6), despite rising living costs that have long threatened subscriptions and revenue. By April, its unconditional EWS remains Low (green), indicating stability in the short term (Figure 10). However, the projected EWS one year ahead signals distress due to the deteriorating macroeconomic outlook,

causing its resilience to decline to Vulnerable – Emerging Risk (score = 3). This shift aligns with concerns about changing audience sentiment, as geopolitical tensions reshape preferences and create volatility in key international markets. Additionally, the possibility of a film ban in China, as tensions in the trade war escalate, added significant uncertainty and worsened the outlook. Crucially, this risk is only revealed through scenario-conditioned metrics, highlighting the importance of these tools for uncovering hidden vulnerabilities that standard assessments might overlook.

Figure 9. Financial resilience of S&P500 companies in two key sectors

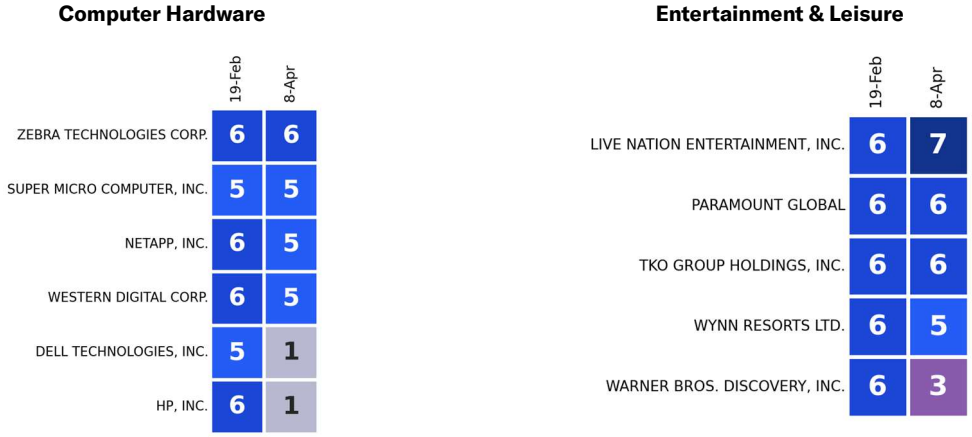
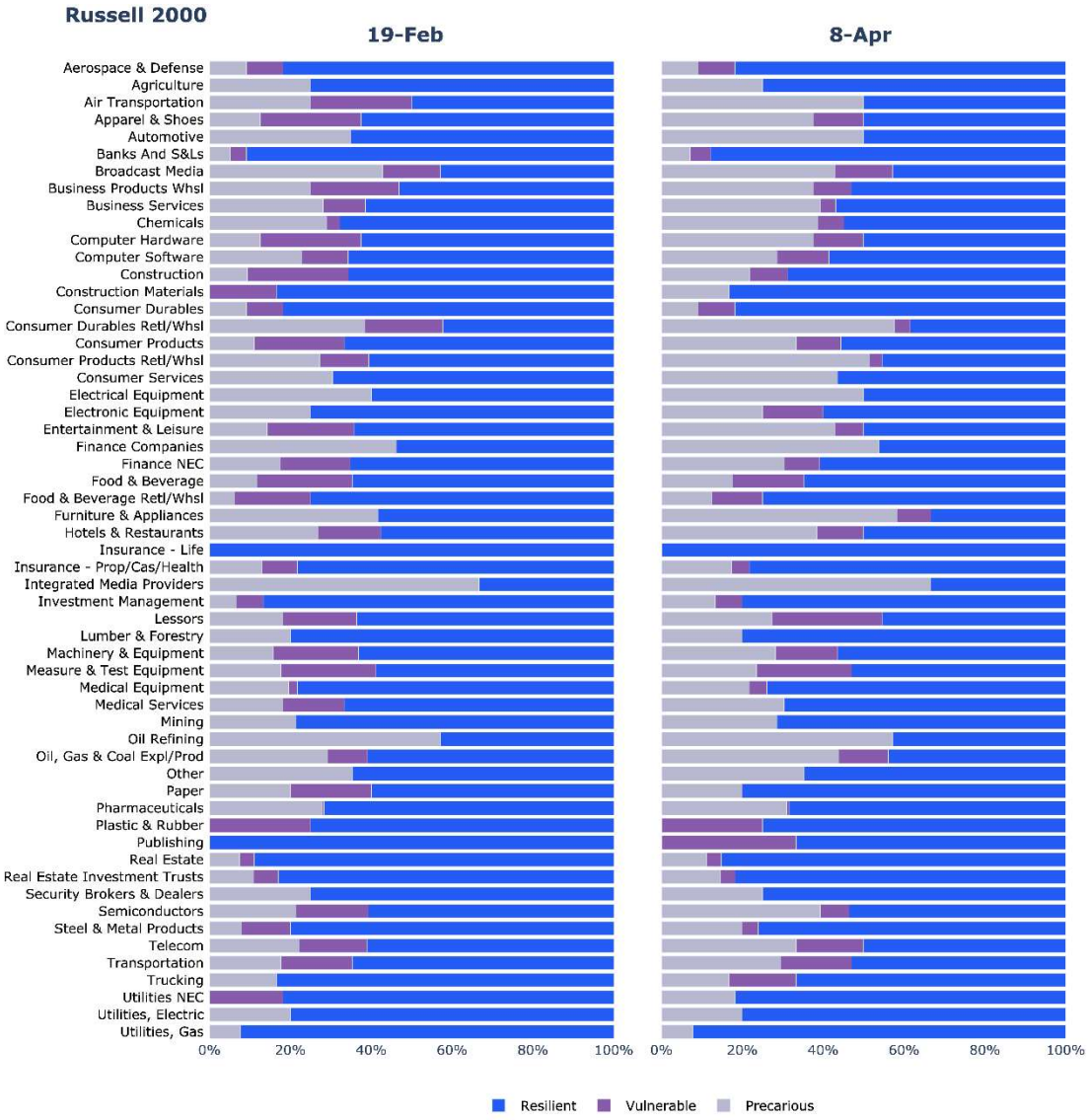


Figure 10. A deeper look into the financial health of Warner Bros. Discovery, Inc.

Date	Market Cap ($ Billions)	EDF-X PD	EDF-X EWS	Financial Resiliency Grade
19-Feb	26.71	1.71%		Resilient
8-Apr	18.88	3.45%		Vulnerable

Figure 11 reveals a different dynamic for small-cap companies, as they start with weaker financial resilience and seem more sensitive to the tariff news and changes in the outlook compared to larger caps. While they also exhibit large differences in overall financial resilience across sectors, many small-cap companies within individual sectors experience a decline in financial resilience by April.

Figure 11. But smaller businesses are exhibiting weaker financial resilience



This analysis underscores the value of scenario-conditioned early warning signals and financial resiliency assessments in uncovering hidden risks and evaluating a company's capacity to navigate macroeconomic challenges. Notably, the recent tariffs have had uneven effects across sectors, with industries such as Computer Hardware—defined by intricate supply chains and regional dependencies—proving especially susceptible. Within each sector, factors like firm size and supply chain diversification play a critical role, as larger companies or those with more flexible, diversified supply chains tend to fare better under tariff pressures.

Powerful insights beyond an existing portfolio

It is worth reiterating that the analysis described here does not only apply to an existing portfolio. With our pre-scoring capabilities, EDF-X users can build this analysis for firms that are not in their portfolios. Moreover, the insights described above should offer valuable perspectives for multiple use cases. Asset managers might see an opportunity to refine investment strategies, pinpointing undervalued assets that possess a robust potential for financial resilience despite conventional risk indicators. Corporates, on the other hand, can leverage these insights for supply-chain management, trade credit management, strategic planning, etc., identifying strengths and vulnerabilities within their own operations or across their industry. Bottomline, this scenario-based approach encourages a deeper, more strategic analysis that goes beyond traditional metrics, facilitating more informed decision-making across the financial ecosystem.

References

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