Scoring
Credit Risk

WHITE PAPER

A Tale of Two Portfolios:

How resilience profiles can benefit the auto ABS market

FICO® SCORE

Introduction

Nearly all public asset-backed securities (ABS) prospectuses disclose FICO® Score information, providing a consistent measure of underlying portfolio credit risk that allows stakeholders to compare the quality of similar portfolios or vintages over time.

With the introduction of the FICO® Resilience Index, ABS issuers and investors can gain additional insight about portfolio risk under stress. The FICO Resilience Index is a new analytic designed to rank-order consumer resilience to economic stress. It differentiates and rank-orders "latent" credit risk that may manifest during economic downturns, offering a powerful complement to the FICO® Score for deeper credit risk insights and more refined consumer decisions.

Using a series of simulations based on a hypothetical auto loan ABS, this white paper demonstrates how two portfolios with identical FICO® Score distributions but different resilience profiles (as measured by FICO® Resilience Index) exhibit a wide range of performance outcomes through a period of economic stress. Such ABS resilience profiles add a new dimension of identifying credit risk not captured by FICO Scores or historical performance alone, and should be of interest to investors, issuers, credit rating agencies, or other stakeholders interested in the potential impact of stressed economic conditions on ABS performance.

After a brief overview of the FICO® Resilience Index, we will walk through a performance simulation for a hypothetical ABS based on data about its FICO® Score distribution, but assuming varying levels of portfolio resilience. Although this simulation is based on an auto loan ABS, the methodology translates well to all consumer ABS credit analysis.

We will close by considering a range of potential applications for ABS resilience profiles, powered by FICO® Resilience Index in conjunction with FICO® Scores.

How can ABS resilience profiles help?

Knowing how different consumers may perform under stress based on their resilience to economic stress has the potential to influence credit loss forecasts, pricing, and credit ratings of ABS offerings across all asset classes.

A brief overview of the FICO® Resilience Index

To understand the purpose of the FICO® Resilience Index, it is useful to first review the main objective of the FICO® Score.

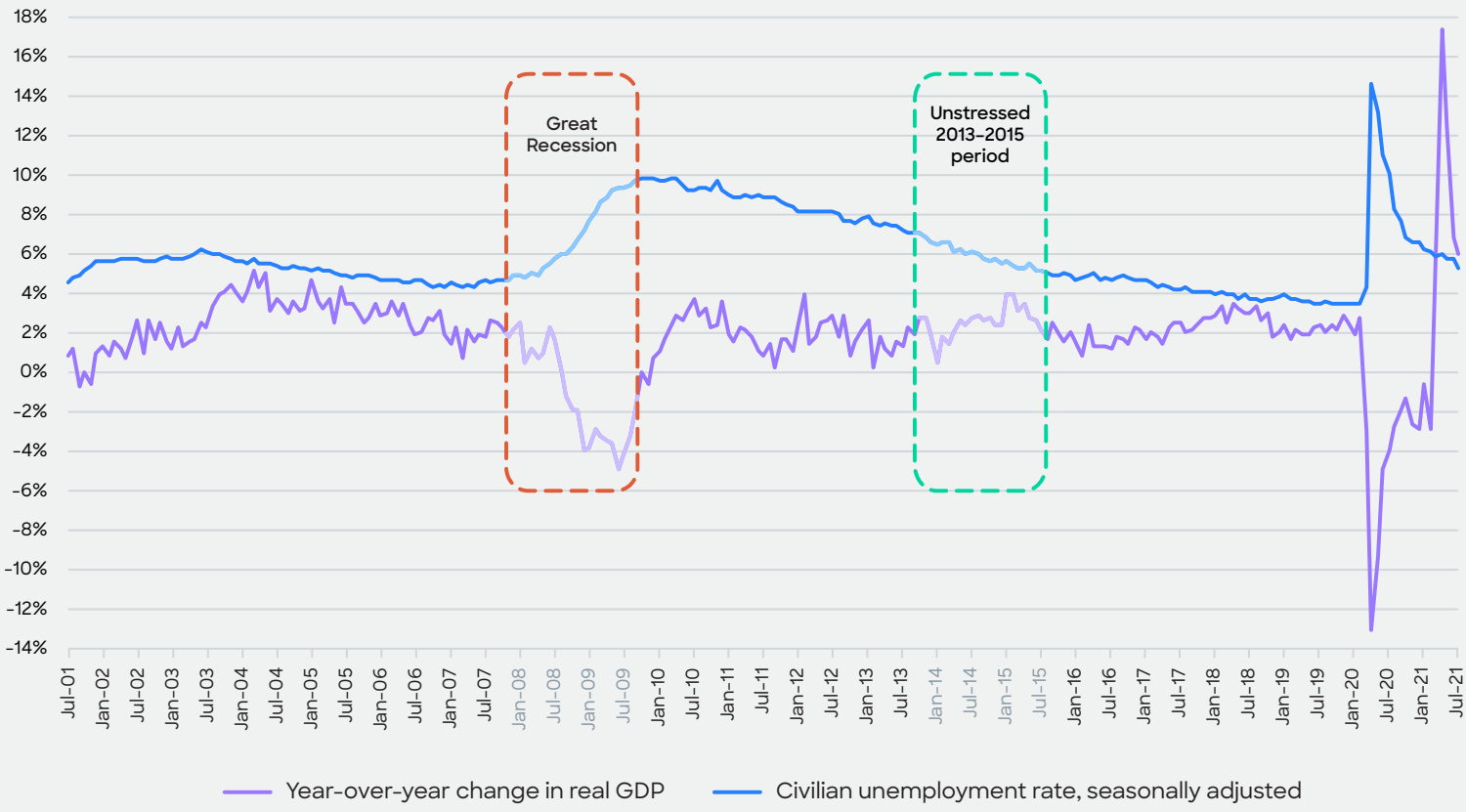
The FICO® Score is designed to rank-order consumer credit risk at all stages of the economy, not to directly forecast repayment odds at a point in time. A specific FICO Score will therefore correspond to differing repayment odds across different portfolios and lenders and through different economic environments over time.

FICO analysis has confirmed that the repayment odds associated with a given FICO® Score tend to worsen on average during a stressed economy as compared to an unstressed economy. The FICO Scores team sought to understand whether modeling insights drawn from credit bureau data alone could help identify consumers who were more or less resilient than average for their FICO Score band during a highly stressed economy.

What does a "stressed" economy look like?

FICO® Resilience Index was developed based on the comparative performance of similar consumers through two different phases of the economy, one "stressed" and the other "unstressed" or "benign." The stressed economy was based on the Great Recession of 2007–2009, which was marked by a significant reduction in gross domestic product (GDP) and a rapid increase in the unemployment rate. In contrast, the unstressed/benign economy was based on 2013–2015, where GDP showed steady improvement and unemployment consistently decreased. The impact of COVID-19 on the US economy was even sharper and more sudden, although governmental and lender interventions mitigated the effects on serious borrower delinquency.

Year-Over-Year GDP Growth Rate Versus US Unemployment Rate, 2001-2021



Sources (data as of 9/10/2021)
Year-over-year change in real GDP: https://ihsmarkit.com/products/us-monthly-gdp-index.html
Civilian unemployment rate, seasonally adjusted: https://www.bls.gov/charts/employment-situation/civilian-unemployment-rate.htm

Our research led to the development of the FICO® Resilience Index, which rank-orders consumer credit risk within narrow FICO® Score bands during periods of economic stress. Note that FICO Resilience Index is not designed to provide additional rank-ordering during benign periods of the economy, nor when viewed as a standalone metric.

FICO® Scores and FICO® Resilience Index together provide greater insight about consumer credit risk under stressed economic conditions than FICO Scores alone. We observe in Figure 1a how FICO® Auto Score 8 (the version most widely used for auto finance underwriting) and FICO Resilience Index 2 (the latest version, released in 2021) rank-ordered credit risk during the Great Recession across the auto finance industry. We scored consumers with auto finance tradelines using both FICO Auto Score 8 and FICO Resilience Index as of October 2007 and tracked the rate at which they became 90 or more days past due (or experienced other derogatory credit events such as bankruptcy) on at least one auto finance trade by October 2009. While FICO Auto Score 8 overall rank-ordered credit risk, within each narrow FICO Auto Score 8 band we also see that the most resilient consumers consistently had much lower serious delinquency rates than the least resilient consumers.

90+ DPD Rate by FICO® Auto Score 8 Band and FICO® Resilience Index 2 Quintile (2007-2009)
Auto Finance, Account Origination

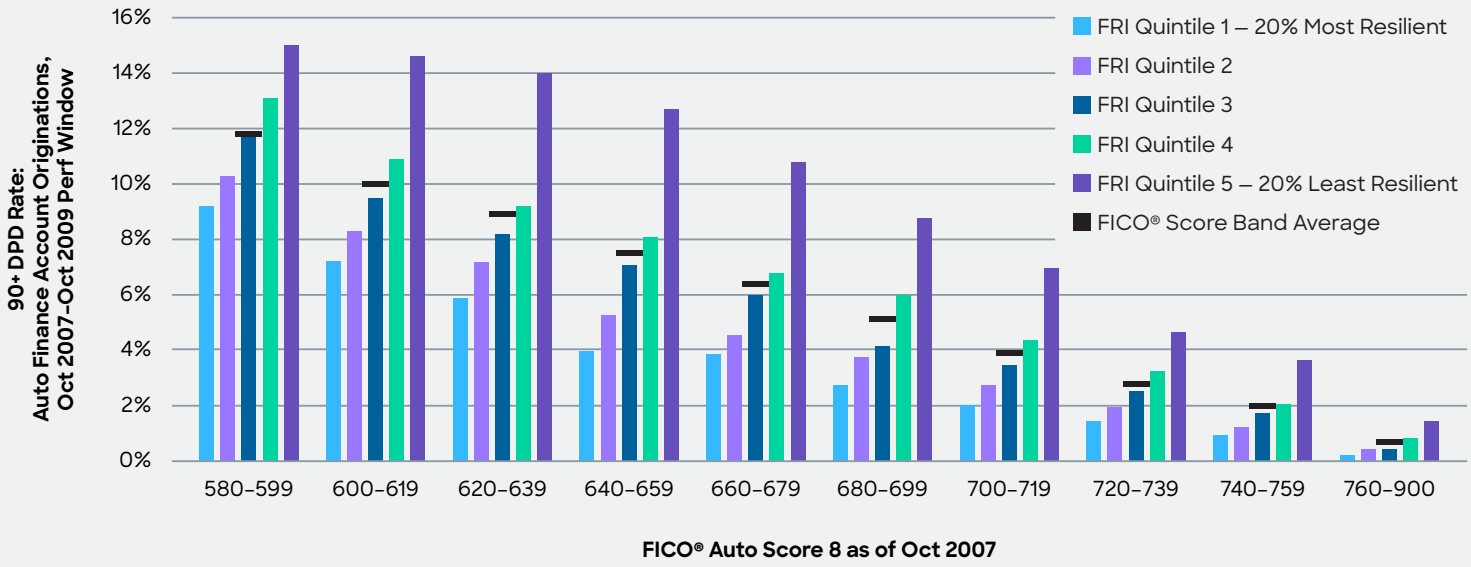


Figure 1a: FICO® Resilience Index rank-ordered payment performance within narrow FICO® Score bands during the Great Recession (October 2007–October 2009). In each FICO Score band, more resilient consumers experienced substantially lower rates of serious delinquency.

Conversely, Figure 1b confirms that FICO® Resilience Index provided no additional rank-ordering of credit risk within narrow FICO® Auto Score 8 bands during the benign period from October 2013 to October 2015, as expected.

90+ DPD Rate by FICO® Auto Score 8 Band and FICO® Resilience Index 2 Quintile (2013-2015)
Auto Finance, Account Origination

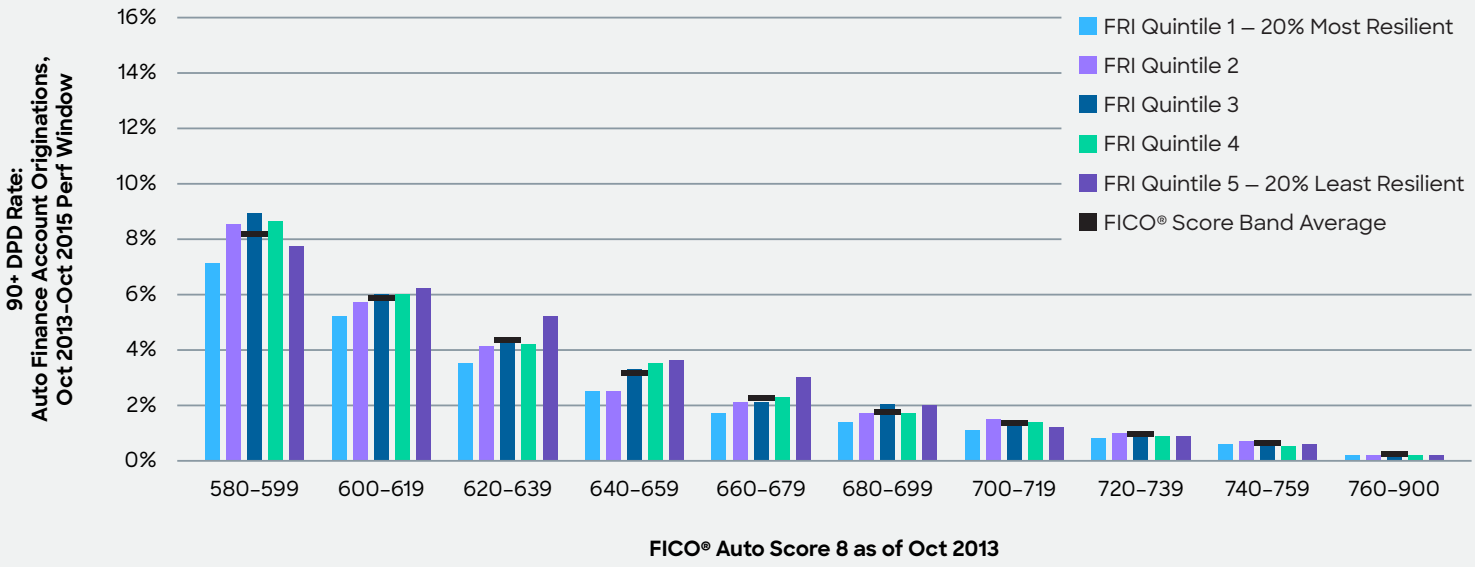


Figure 1b: As expected, FICO® Resilience Index did not rank-order payment performance within narrow FICO® Score bands in the absence of economic stress (October 2013–October 2015).

During previous periods of economic stress, lenders and investors have responded to the uncertainty of outcomes by restricting access to credit or implementing pricing premiums more than they would have preferred, cutting off much-needed liquidity for consumers and financial markets. By providing additional insight into borrower resilience and latent credit risks that may manifest during an economic downturn, FICO® Resilience Index (paired with the FICO® Score) can reduce uncertainty and volatility throughout the economic cycle. This enables lenders to offer more precise and competitive pricing, and investors to predict pool performance more accurately.

Hypothetical ABS resilience case study: Prime Motors Auto Receivables Trust 2020-A

To quantify the potential impact of resilience on ABS performance, we performed a simulation exercise based on the FICO® Score distribution of a hypothetical ABS, Prime Motors Auto Receivables Trust 2020-A (PMART 2020-A), that issued $1 billion of notes backed by receivables secured by vehicles from a popular brand in the United States. PMART 2020-A's hypothetical portfolio composition, FICO Score distribution, and expected cumulative default performance align with those of similar securitizations issued in 2020.

Underlying FICO® Score distribution of trust receivables

Assume that PMART 2020-A disclosed the FICO® Auto Score 8 distribution shown in Figure 2, with more than 60% of the portfolio coming from borrowers with FICO Auto Score 8 of at least 720.

Twin portfolio simulations: Same FICO® Score distribution, different resilience profiles

Assume that information about borrower resilience is not shared in the PMART 2020-A prospectus. We want to understand whether the underlying loans' expected performance under stress would vary substantially under a range of borrower resilience scenarios.

Based on industry-wide analysis of actual observed auto finance portfolio performance between 2007 and 2009, within any given FICO® Auto Score 8 band, "stressed" default rates ranged considerably between the most resilient and most sensitive consumers, as measured by FICO® Resilience Index.

The simulations that follow consider the impact on base case proxy loss forecasts depending on the assumed level of economic stress. When economic stress is more likely, the difference in latent credit risk between these "twin" portfolios becomes increasingly clear.

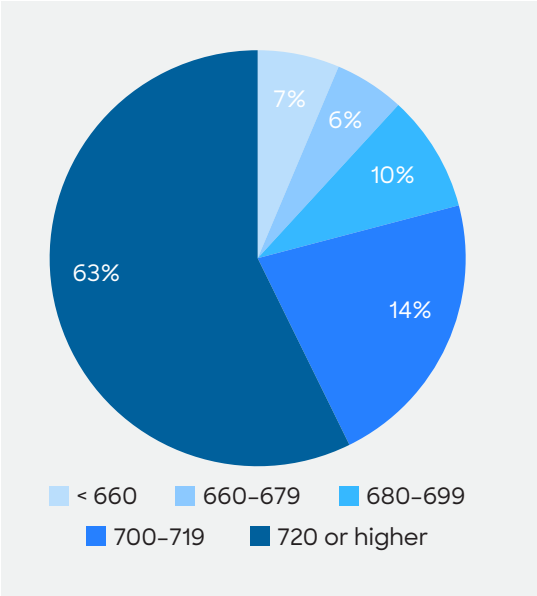


Figure 2: Distribution of hypothetical ABS PMART 2020-A's portfolio by FICO® Auto Score 8.

Step 1: Derive resilience multipliers for resilient versus sensitive portfolios

We estimated default rates for a portfolio with PMART 2020-A's FICO® Auto Score 8 distribution through a 24-month performance window during the Great Recession, using three different ABS resilience profiles:

1. A **Resilient** portfolio with FICO® Resilience Index values aligned to the lowest 20% of industry values within each FICO® Auto Score 8 band, based on PMART 2020-A's hypothetical distribution (~50 or lower).
2. A **Moderate** portfolio with FICO® Resilience Index values aligned to the overall distribution of industry values within each reported FICO® Auto Score 8 band.
3. A **Sensitive** portfolio with FICO® Resilience Index values aligned to the highest 20% of industry values within each FICO® Auto Score 8 band, based on PMART 2020-A's hypothetical distribution (~65 or higher).

As shown in Figure 3, the resulting range of 24-month cumulative default (90+ days past due) rates was substantial — 1.8% for the Resilient portfolio, 3.1% for the Moderate portfolio, and 5.1% for the Sensitive portfolio. Refer to the Appendix for information about the methodology supporting these simulations, and for more information about the FICO® Resilience Index model design and development.

Based on this range of stressed default rates, we calculated "resilience multipliers" for each hypothetical portfolio, comparing the projected stressed default rates of the Resilient and Sensitive portfolios to those of the Moderate portfolio, as shown in Figure 4. The resilience multipliers for the Resilient and Sensitive portfolios highlight the range in performance these seemingly identical twin portfolios could display under severe economic stress. The large variance in resilience multipliers directly reflects the observed divergence in actual stressed economy performance between and most and least resilient consumers in each FICO® Score Auto 8 band, together with the assumed distribution of assets by FICO Score Auto 8 band.

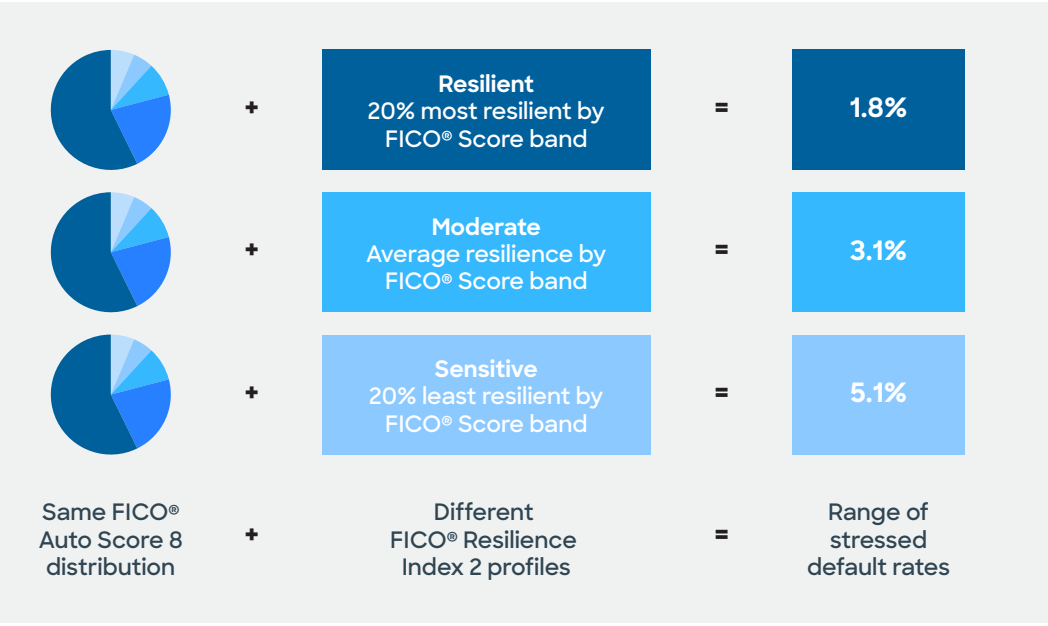


Figure 3: Range of stressed default rates assuming the PMART 2020-A FICO® Auto Score 8 distribution and a range of FICO® Resilience Index profiles.

	Resilient	Moderate	Sensitive
Stressed default rate	1.8	3.1%	5.1%
Resilience multiplier (calculation)	**0.59** (1.8% / 3.1%)	**1.00**	**1.65** (5.1% / 3.1%)

Figure 4: "Resilience multiplier" calculations reflecting the relative projected default performance of the PMART 2020-A portfolio assuming a range of FICO® Resilience Index profiles.

Step 2: Calculate resilience-adjusted base case proxy loss estimates

Assume a base case proxy loss estimate of 2.0% has been derived from the probability-weighted average cumulative net losses (CNL) from a stressed period (20% likelihood of 4.0% CNL) and a benign period (80% likelihood of 1.5% CNL), as shown in Figure 5. These historical and forecast loss estimates are in line with those of similar securitizations backed by auto loans in 2020, as the pandemic began to increase economic uncertainty.

To estimate each portfolio's revised base case proxy CNL estimates, the resilience multipliers of 0.59 for the Resilient portfolio and 1.65 for the Sensitive portfolio were applied to the stressed CNL rate of 4.0% that contributed to the overall base case proxy estimate.[1] Resilience multipliers were not applied to the unstressed CNL rate of 1.5%, because FICO® Resilience Index is not expected to differentiate performance during an unstressed economy.

Assuming the same 20% stress scenario weight and applying the relevant resilience multiplier yields a range of revised base case proxy CNL estimates from 1.7% to 2.5%, as shown in Figure 6.

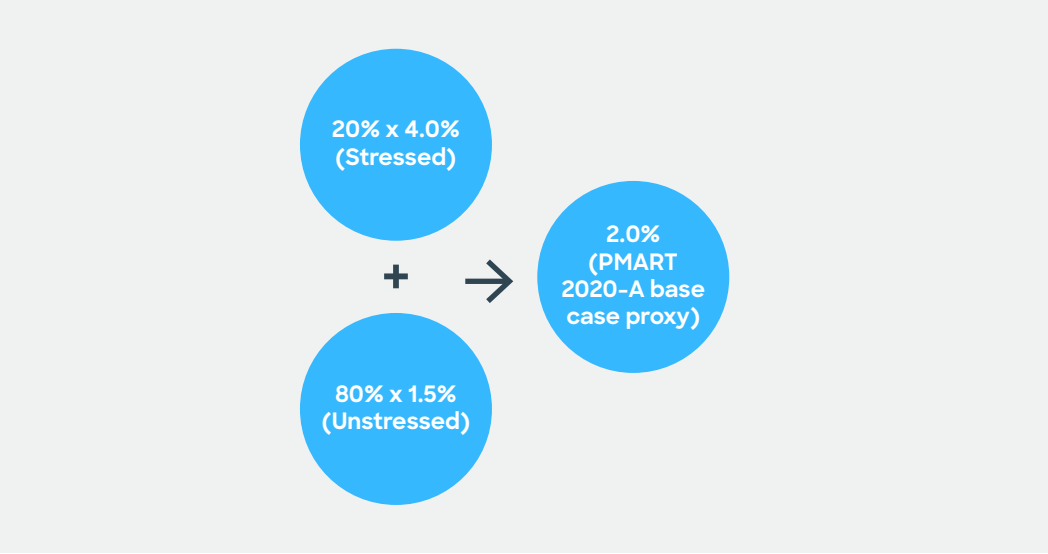


Figure 5: A base case proxy CNL estimate of 2.0% is based on 20% weight on stressed performance from the Great Recession and 80% weight on unstressed performance from a benign period.

Figure 6: Revised base case proxy CNL estimates of 1.7% for the Resilient portfolio and 2.5% for the Sensitive portfolio, each assuming 20% weight on stressed performance from the Great Recession and 80% weight on unstressed performance from a benign period.

[1] Although resilience multipliers are derived based on relative default performance over 24 months, they have been applied to CNL estimates on the assumption that the relationship between 24-month performance and lifetime loss performance and the loss severity rate remain constant across each hypothetical portfolio.

Step 3: Calculate resilience-adjusted stressed case loss estimates

The impact of borrower resilience is amplified in scenarios where economic stress is assumed to be likely or certain. For example, increasing the implied stress scenario weight from 20% to 50% expands the range of revised base case proxy CNL estimates to 1.9% to 4.1%, as shown in Figure 7.

Case study results and insights: Not-so-identical twins under stress

As the above simulations demonstrate, two portfolios with similar FICO® Score distributions may have strikingly different resilience profiles and loss performance under stress. During "the best of times," these portfolio twins may still seem identical; during "the worst of times," though, their distinctive traits will become apparent.

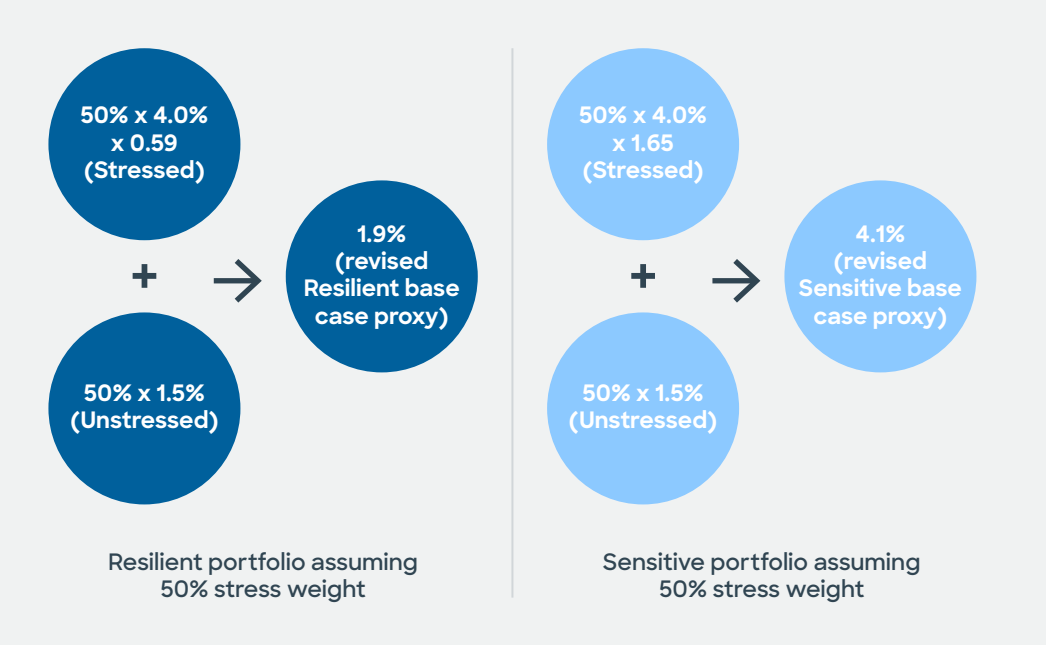


Figure 7: Revised base case proxy CNL estimates of 1.9% for the Resilient portfolio and 4.1% for the Sensitive portfolio, each assuming 50% weight on stressed performance from the Great Recession and 50% weight on unstressed performance from a benign period.

Without ABS resilience profiles to differentiate such twin portfolios, stakeholders may miss key drivers of borrower performance under stress and make inaccurate risk assessments, leading to sub-optimal decisions regarding the portfolio.

Potential applications for ABS resilience profiles

As the previous case study shows, disclosing more information about portfolio resilience enables all stakeholders interested in ABS performance under different scenarios to make more informed decisions. We envision several opportunities for ABS resilience profiles to enhance ABS prospectuses and credit rating agency pre-sale documents:

1. Include FICO® Resilience Index as an explicit ABS eligibility criterion, again ideally in combination with FICO® Score. For example, assets with certain combinations of FICO Score and FICO Resilience Index could be excluded from offerings to ensure a minimum level of combined credit quality and resilience.
2. Disclose statistics about portfolio resilience, ideally in the context of FICO® Score information. For example, rather than providing a distribution of assets by FICO Score band and average FICO Score alone, the prospectus could include a matrix showing the distribution of assets by both FICO Score and FICO® Resilience Index, as well as the average FICO Resilience Index by FICO Score band. Such additional details would allow cross-investment comparisons between otherwise similar portfolios or FICO Score bands to differentiate expected credit loss performance based on a range of economic stress assumptions.
3. Incorporate FICO® Resilience Index into credit rating assessments as described earlier, reflecting the impact of portfolio resilience on both base case proxy and stressed scenario loss forecasts.

Conclusion

The FICO® Resilience Index is an innovative new metric designed to drive additional insight into consumer resilience to economic stress beyond what FICO® Scores and other standard credit risk scores can offer. ABS resilience profiles based on the FICO Resilience Index can provide issuers, investors, and credit rating agencies valuable information about the range of potential cumulative net loss estimates under a range of economic scenarios, allowing all ABS stakeholders to make more informed decisions regarding pricing, investment value, and risk.

Appendix

Derivation of resilience multipliers

The "resilience multipliers" used in the simulation were based on a comparison of observed auto finance industry 24-month default (90+ days past due) performance of new accounts originated between November 2007 and April 2008, based on their FICO® Auto Score 8 and FICO® Resilience Index 2 values as of October 2007, as shown in Figure 1a. The scoring date is prior to the range account origination dates to remove the impact of originating the new account on either score.

The resilience multiplier for the Resilient portfolio was based on the relative performance of the most resilient FICO® Resilience Index quintile within each FICO® Score band (the left-most columns in Figure 1a labeled "FRI Quintile 1 – 20% Most Resilient"). Similarly, the resilience multiplier for the Sensitive portfolio was based on the relative performance of the least resilient FICO Resilience Index quintile within each FICO Score band (the right-most columns in Figure 1a labeled "FRI Quintile 5 – 20% Least Resilient").

To calculate the resilience multiplier for an individual FICO® Score band, divide the default rate of the simulated Resilient or Sensitive portfolio in that band by the default rate of the simulated Moderate portfolio, as indicated by the markers in Figure 1a labeled "FICO® Score Band Average." For example, in the 660–679 FICO Auto Score 8 range, the default rate for the Sensitive portfolio was 10.8%, while the Moderate portfolio default rate reflecting the FICO Score band average was 6.3%, yielding a resilience multiplier of 10.8% / 6.3% = 1.71 for the Sensitive portfolio in that FICO Score band.

To derive a portfolio-level resilience multiplier, first calculate the overall default rates for each portfolio reflecting the assumed asset distribution weighting shown in Figure 2, then repeat the resilience multiplier calculation. For example, the Sensitive portfolio default rate of 5.1% was derived by weighting each FICO® Score band's Sensitive portfolio default rate by the assumed percentage of assets within that FICO Score band and totaling the result, as follows:

7% x 17.3% + 6% x 10.8% + 10% x 8.8% + 14% x 6.9% + 63% x 2.2% = 5.1%

Dividing 5.1% by the overall Moderate portfolio default rate of 3.1% yields the Sensitive portfolio resilience multiplier of 1.65 used throughout the analysis. Similarly, dividing the 1.8% Resilient portfolio default rate by 3.1% yields the Resilient portfolio resilience multiplier of 0.59 used throughout the analysis.

FICO® Auto Score 8	Assumed % of assets	24-month 90+ days past due rate			Resilience multiplier	
		Resilient portfolio (A)	Sensitive portfolio (B)	Moderate portfolio (C)	Resilient portfolio (A ÷ C)	Sensitive portfolio (B ÷ C)
Less than 660	7%	10.5%	17.3%	13.7%	0.76	1.26
660–679	6%	3.8%	10.8%	6.3%	0.61	1.71
680–699	10%	2.7%	8.8%	5.0%	0.53	1.74
700–719	14%	2.0%	6.9%	3.9%	0.52	1.80
720 or higher	63%	0.5%	2.2%	1.1%	0.45	1.96
Weighted	**100%**	**1.8%**	**5.1%**	**3.1%**	**0.59**	**1.65**

Figure 8: Derivation of resilience multipliers for the hypothetical Resilient and Sensitive portfolios, based on the assumed asset distribution of PMART 2020-A.

FICO® Resilience Index model overview

We designed the FICO® Resilience Index model to measure consumers' resilience to an economic disruption, which we defined as the difference in their payment odds under "stressed" versus "normal" economic conditions.

In our model framework, normal and stressed conditions appear as two arms of a thought experiment (see Figure 9). Naturally, consumers can only travel along one arm of the experiment for which their performance can be observed.

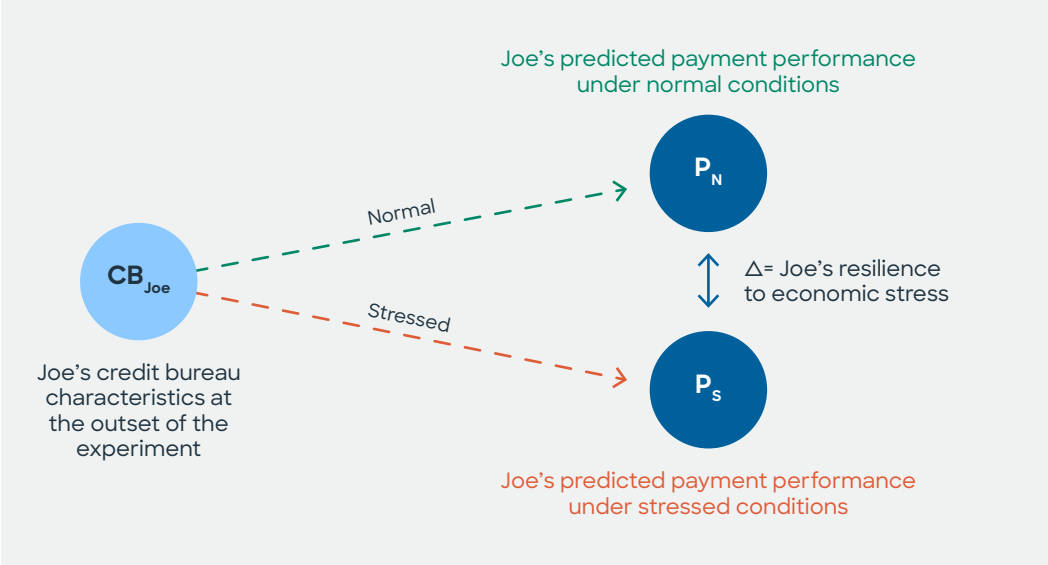


Figure 9: Definition of resilience as the difference in predicted outcomes under contrasting economic conditions.

We developed the FICO® Resilience Index model based on US credit bureau data collected during two starkly contrasting phases of the economy. First, we measured payment performance for a set of consumers who experienced the stable, benign economy between October 2013 and October 2015 (the "normal condition" in Figure 9). Through established modeling methods, we then composed an identically sized set of "twin" consumers who shared very similar attributes at the outset, but instead experienced the Great Recession between October 2007 and October 2009 (the "stressed condition").

We began each FICO® Resilience Index model development by randomly sampling very large (> 10 million) representative sets of consumers who experienced the two economic conditions. However, using these full samples may introduce selection bias, because the typical behavior of consumers at the outset of the stressed economy differs from that of consumers at the outset of the normal economy. The twinning process is designed to eliminate this selection bias, by only retaining those consumers in a twinned sample for whom a similar consumer can be found who experiences the opposite economic condition.

Twinning reduces the original sample size but still yields a large (typically > 1 million) unbiased sample of consumer credit records from both economic conditions. Each FICO® Resilience Index model is developed based on the twinned sample, by essentially using the difference in payment performance for these sets of twin consumers under normal versus stressed conditions to quantify their resilience to stress.

Investors interested in learning more can visit the FICO ABS portal or contact us at ficoscoreinfo@fico.com. To keep tabs on the latest FICO research on scoring best practices and credit risk trends, visit the FICO Blog.

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