Scoring
Credit Risk

WHITE PAPER

FICO® Score 10 Suite Performance Results

From Five Lenders Across Seven Consumer Credit Portfolios

FICO® SCORE

Introduction

In 2020, FICO released two new versions of its FICO® Score in the United States — the FICO® Score 10 suite — to help lenders predict and manage credit risk:

- FICO® Score 10 leverages the latest data and modeling methodologies, while preserving backward compatibility with previous versions of the FICO® Score, enabling more seamless implementation by clients
- FICO® Score 10 T builds on the FICO® Score 10 framework and incorporates powerful new characteristics (including trended data that captures consumer behavior dynamics over time)

The FICO® Score 10 suite reflects FICO's practice of continual innovation to address market and data evolutions. It provides lenders with market-leading risk management capabilities for a wide variety of business applications, with more flexibility than ever before.

Upon development of the FICO® Score 10 suite, FICO partnered with five lenders to perform retrospective validation analyses on seven of their consumer portfolios, with compelling results. In all cases, our analysis showed the FICO Score 10 suite outperformed the current version of FICO® Score in use.

Performance Results

Our survey of seven consumer credit loan portfolios showcases the versatility of the FICO® Score 10 suite by highlighting key findings across a breadth of participating lenders of varying size and type, and across different lending products and credit decisions:

- Lender sizes ranged from <$200 million in assets to >$200 billion
- Lender types included regional and international banks, as well as state-chartered and federally chartered credit unions
- Products included revolving lines of credit, as well as secured and unsecured installment loans
- Credit decisions spanned the credit lifecycle, including underwriting, initial line/loan assignment, pricing, and credit line management

We analyzed the impact on each portfolio of migrating from the FICO® Score currently in use by the lender to one of the FICO® Score 10 suite scores, primarily along two dimensions:

- **Predictive Power** — improved differentiation between borrowers who paid as agreed and delinquent borrowers
- **Stability** — similarity in distribution of borrower scores and consistent odds-to-score relationship between versions (where score ranges overlap)

Predictive Power

We evaluated the ability of FICO® Score 10 and FICO® Score 10 T to differentiate between borrowers who paid as agreed and those who became delinquent, based on both statistical measures — Kolmogorov-Smirnov statistic (K-S) and Gini index — and "swap set" analyses across the full range of FICO® Scores.

K-S performance

The K-S for all of these portfolios shows that the relevant FICO® Score 10 version outperforms the FICO® Score currently in use. The improvement varies across portfolios, with one portfolio seeing an improvement in K-S of 18%, as shown in Figure 1a.

Portfolio	Relevant FICO® Score 10 suite version	K-S for FICO® Score currently in use (%)	K-S for relevant FICO® Score 10 suite version (%)	Absolute improvement (%)	Relative improvement (% of K-S for FICO® Score currently in use)
Portfolio 1	FICO® Score 10 T	58.8	59.2	0.4	0.7%
Portfolio 2	FICO® Score 10 T	71.0	73.3	2.3	3.2%
Portfolio 3	FICO® Score 10 T	70.1	71.9	1.8	2.6%
Portfolio 4	FICO® Score 10 T	26.8	31.8	5.0	18.4%
Portfolio 5	FICO® Score 10	63.9	65.8	1.9	3.0%
Portfolio 6	FICO® Score 10	65.1	67.7	2.5	3.9%
Portfolio 7	FICO® Score 10	68.1	71.4	3.3	4.9%

Figure 1a: Comparison of K-S results. All results show improvement, usually by at least 2.5% in relative terms. Note that metrics for all portfolios other than Portfolio 4 are based on an Account Management view. While overall K-S values tend to be lower for Account Origination, relative gains observed migrating to newer FICO® Score versions tend to be greater.

Gini performance

Similarly, the Gini also demonstrates that the FICO® Score 10 suite models provide stronger rank ordering of future individuals who will pay as agreed for all portfolios, as shown in Figure 1b.

Portfolio	Relevant FICO® Score 10 suite version	Gini for FICO® Score currently in use (%)	Gini for relevant FICO® Score 10 suite version (%)	Absolute improvement (%)	Relative improvement (% of Gini for FICO® Score currently in use)
Portfolio 1	FICO® Score 10 T	74.1	74.8	0.7	1.0%
Portfolio 2	FICO® Score 10 T	85.8	87.8	2.0	2.3%
Portfolio 3	FICO® Score 10 T	84.5	86.2	1.7	2.0%
Portfolio 4	FICO® Score 10 T	34.0	41.1	7.1	20.9%
Portfolio 5	FICO® Score 10	78.0	79.1	1.1	1.4%
Portfolio 6	FICO® Score 10	80.6	82.7	2.1	2.7%
Portfolio 7	FICO® Score 10	82.8	84.5	1.7	2.0%

Figure 1b: Comparison of Gini results. All results improved by at least 1% in relative terms. Note that metrics for all portfolios other than Portfolio 4 are based on an Account Management view. While overall Gini values tend to be lower for Account Origination, relative gains observed migrating to newer FICO® Scores tend to be greater.

The examples in Figures 1c, 1d, and 1e illustrate the impact of improvements in Gini between versions of FICO® Score.

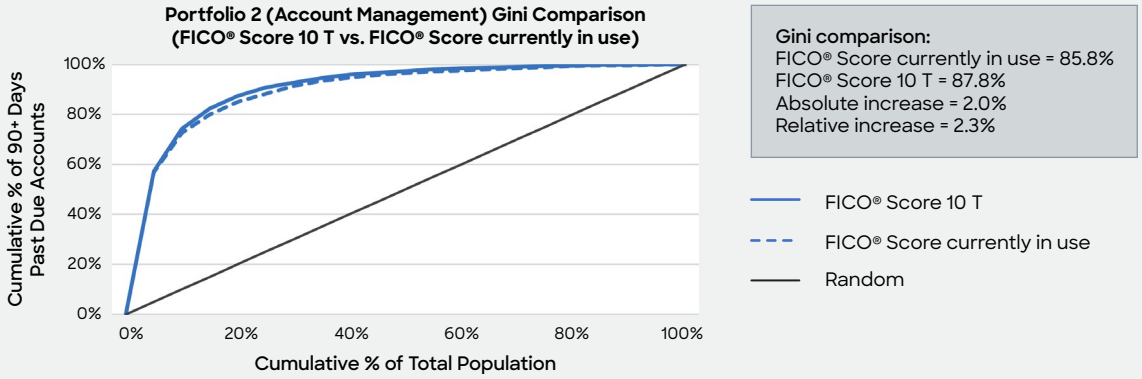

Figure 1c: Comparing the cumulative percentage of 90+ days past due accounts and cumulative percentage of all accounts for Portfolio 2 (Account Management view) reveals a 2.3% relative increase in Gini between the FICO® Score currently in use and FICO® Score 10 T.

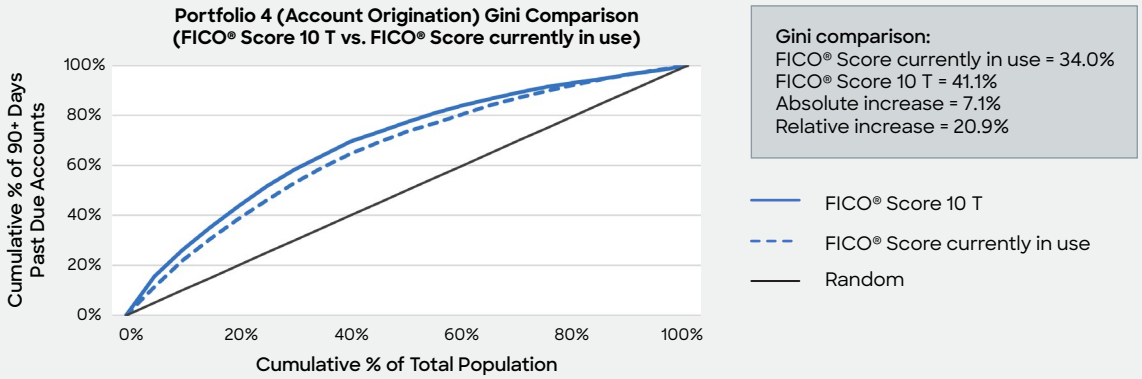

Figure 1d: Comparing the cumulative percentage of 90+ days past due accounts and cumulative percentage of all accounts for Portfolio 4 (Account Origination view) reveals a 20.9% relative increase in Gini between the FICO® Score currently in use and FICO® Score 10 T.

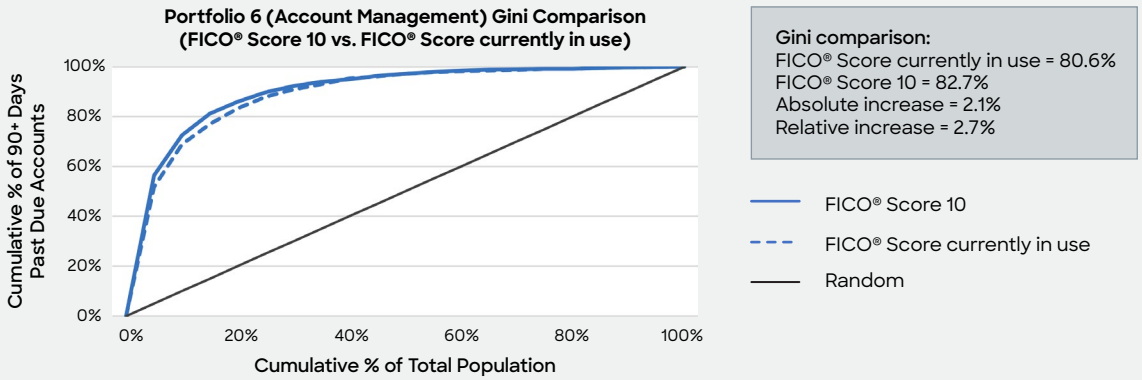

Figure 1e: Comparing the cumulative percentage of 90+ days past due accounts and cumulative percentage of all accounts for Portfolio 6 (Account Management view) reveals a 2.7% relative increase in Gini between the FICO® Score currently in use and FICO® Score 10.

Swap set performance

FICO® Scores are considered more effective when riskier borrowers have lower scores and less risky borrowers have higher scores. We typically measure risk in terms of "repayment odds," which in Figures 2a and 2b equals the ratio between the number of borrowers who did not become 30 or more days past due during the performance window and the number of borrowers who became 90 or more days past due during the performance window. We can identify opportunities for improved decision making when riskier borrowers with lower repayment odds get swapped below key FICO Score cutoffs by a model, while less risky borrowers with higher repayment odds get swapped above the same cutoffs.

We say borrowers have "swapped above" a certain threshold between versions of FICO® Score when their current FICO Score in use is below that threshold and their new FICO Score is at or above that threshold. The repayment odds of borrowers who swap above a certain threshold is described as the "swapped above odds." Similarly, borrowers have "swapped below" a certain threshold between versions of FICO Score when their current FICO Score in use is at or above that threshold and their new FICO Score is below that threshold. The repayment odds of borrowers who swap below a certain threshold is described as the "swapped below odds."

At common FICO® Score cutoffs of 680 and 740, we observe consistent improvements in score effectiveness in all of the portfolios we analyzed based on a comparison of swapped above odds and swapped below odds. Wherever the swapped above odds exceed the swapped below odds, the relevant FICO® Score 10 suite version is showing improved risk insight and supporting more accurate decisions, because borrowers with higher odds are moving to higher FICO Scores while borrowers with lower odds are moving to lower FICO Scores.

Figures 2a and 2b confirm consistent improvement with respect to these FICO® Score cutoffs wherever we observed statistically significant numbers of delinquent borrowers.

At FICO® Score cutoff of 680

Portfolio	Relevant FICO® Score 10 suite version	Swapped above percent	Swapped below percent	Swapped above odds	Swapped below odds
Portfolio 1	FICO® Score 10 T	3.8	4.0	34.3	25.1
Portfolio 2	FICO® Score 10 T	7.0	3.8	82.9	41.0
Portfolio 3	FICO® Score 10 T	5.3	2.8	38.9	22.0
Portfolio 4	FICO® Score 10 T	5.8	9.2	10.4	6.2
Portfolio 5	FICO® Score 10	2.1	1.8	25.1	13.0
Portfolio 6	FICO® Score 10	2.1	1.7	70.2	24.8
Portfolio 7	FICO® Score 10	7.8	3.3	34.9	14.1

Figure 2a: Comparison of swap set results at FICO® Score cutoff of 680. Across all portfolios shown here, accounts swapping above 680 FICO Score had higher odds than those swapping below.

At FICO® Score cutoff of 740

Portfolio	Relevant FICO® Score 10 suite version	Swapped above percent	Swapped below percent	Swapped above odds	Swapped below odds
Portfolio 1	FICO® Score 10 T	4.5	4.5	111	77
Portfolio 2	FICO® Score 10 T	12.8	2.7	686	134
Portfolio 3	FICO® Score 10 T	12.1	3.9	227	88
Portfolio 4	FICO® Score 10 T	6.0	8.7	28	14
Portfolio 5	FICO® Score 10	4.7	3.7	120	61
Portfolio 6	FICO® Score 10	4.7	3.9	221	111
Portfolio 7	FICO® Score 10	7.3	4.1	NM	NM

Figure 2b: Comparison of swap set results at FICO® Score cutoff of 740. Accounts swapping above 740 FICO Score had higher odds than those swapping below for a given portfolio, with the exception of Portfolio 7, which had a statistically insignificant number of delinquent accounts around this cutoff (marked "NM" for "Not Meaningful").

Stability

While improving predictive power is the primary reason to migrate to FICO® Score 10 or FICO® Score 10 T, it is also important to understand how moving to a new FICO® Score version may impact a lender's current strategies. The need to adjust strategies is reduced when the odds-to-score relationship is stable/consistent between versions.

Consumer score changes

We measured the percentage of borrowers in each portfolio whose scores were either less than 10 points different or at least 30 points different between the FICO® Score currently in use and the relevant FICO® Score 10 suite version. As shown in Figure 3, 19% to 44% of borrowers experienced a (positive or negative) change in FICO Score of at least 30 points, while 19% to 38% of borrowers experienced score changes of less than 10 points.

Portfolio	Relevant FICO® Score 10 suite version	% <10 points	% 30+ points
Portfolio 1	FICO® Score 10 T	32%	25%
Portfolio 2	FICO® Score 10 T	19%	40%
Portfolio 3	FICO® Score 10 T	19%	41%
Portfolio 4	FICO® Score 10 T	25%	34%
Portfolio 5	FICO® Score 10	37%	19%
Portfolio 6	FICO® Score 10	38%	19%
Portfolio 7	FICO® Score 10	20%	44%

Figure 3: Comparison of score migration results.

Odds-to-score relationship comparisons

Migrating to a new version of FICO® Score is less operationally disruptive when the odds-to-score relationship is consistent within a lender's operating range where FICO Score-driven cutoffs are used.

We can visualize the similarity in odds-to-score relationships by comparing the repayment odds lines for two versions of FICO® Score for the same portfolio. For example, in Figure 4 we observe a very similar odds-to-score relationship between the FICO Score currently in use and FICO® Score 10 for Portfolio 5 (Account Management view). The odds-to-score relationship remained stable between FICO Score versions for the other portfolios we analyzed as well.

Conclusion

The FICO® Score 10 suite supports more predictive consumer credit risk management. All portfolios we analyzed observed performance lift from use of the relevant FICO Score 10 suite version over their FICO® Scores currently in use. Our results suggest that lenders may also anticipate operational stability as they upgrade. By adopting FICO® Score 10 or FICO® Score 10 T, which both leverage FICO's latest techniques and technology, lenders have better opportunities than ever to optimize credit risk decisions across their consumer lending portfolios.

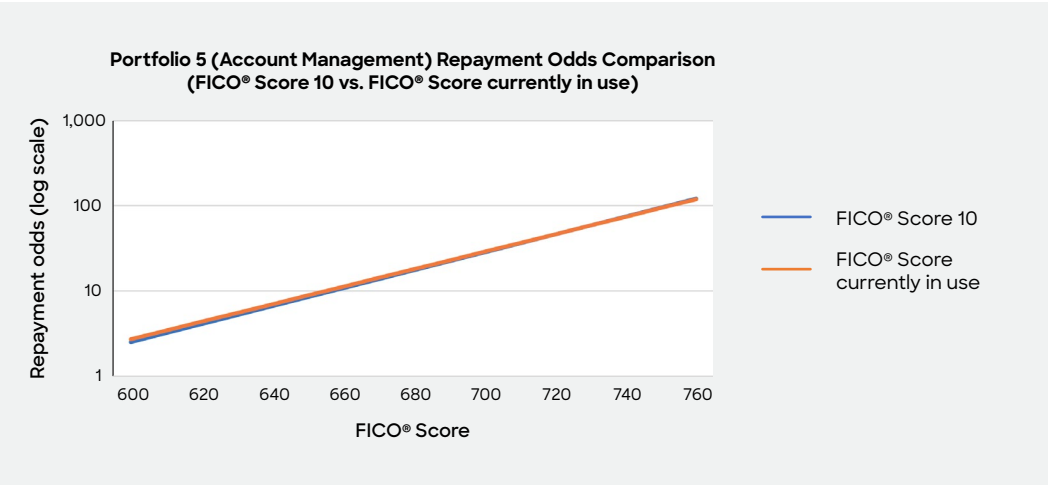

Figure 4: Comparison of repayment odds lines for Portfolio 5 (Account Management view). Repayment odds remained stable across the entire operating range.

Appendix

Key statistical measures

K-S and Gini are two key statistical measures of the predictive power of FICO® Score 10 or FICO® Score 10 T vs. a previous FICO® Score version.

K-S statistic

K-S measures the maximum difference between the cumulative percentage of two contrasting groups of accounts, ordered by a ranked model.

As shown in Figure 5a, when evaluating FICO® Score 10 and FICO® Score 10 T models, results are ordered by the relevant FICO® Score from low to high, and the comparison is between the cumulative percentage of accounts that became at least 90 days past due (or worse, derogatory) within the performance window and the cumulative percentage of accounts that paid as agreed throughout the performance window.

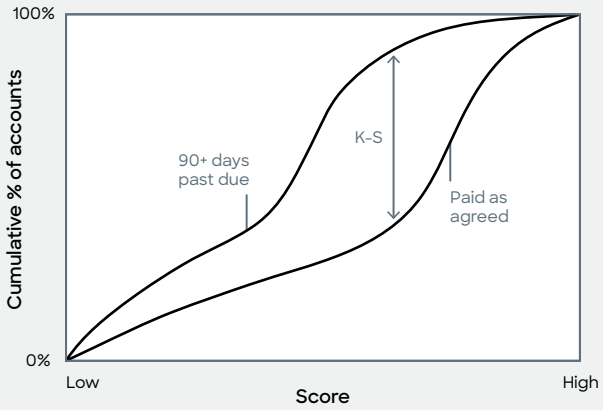

Figure 5a: Illustration of K-S comparing the cumulative percentage of accounts that paid as agreed over a given performance window and the cumulative percentage of accounts that became at least 90 days past due (or worse, derogatory) during the same performance window, ordered by FICO® Score from low to high. K-S equals the maximum distance between these two curves, expressed as a percentage value between 0 and 100.

Gini

Gini equals twice the area between two curves: one that compares the cumulative percentage of a subpopulation of accounts to the cumulative % of the total population, ordered by a ranked model, and a straight line representing a random distribution where the cumulative percentage of a subpopulation of accounts always equals the cumulative percentage of the total population.

As shown in Figure 5b, when evaluating FICO® Score 10 and FICO® Score 10 T models, results are ordered by the relevant FICO® Score from low to high and the comparison is between the cumulative percentage of accounts that became 90+ days past due within the performance window and the random distribution curve.

K-S and Gini values range from 0% to 100%. The larger the K-S or Gini, the more predictive the model.

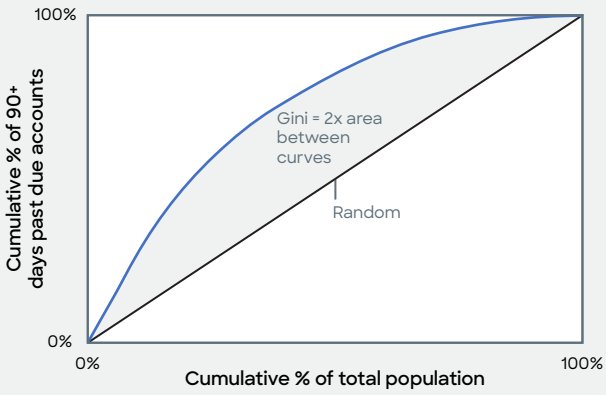

Figure 5b: Illustration of Gini comparing the cumulative percentage of accounts that became at least 90 days past due (or worse, derogatory) over a given performance window and the random distribution curve, ordered by FICO® Score from low to high. Gini is equal to twice the area between these curves, expressed as a percentage value between 0 and 100.

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