SEPTEMBER 2018

VantageScore 4.0 2015-2017 Validation Study:

Inaugural VantageScore 4.0 Trended Credit Data Model Validation

Contents

VantageScore Solutions, as part of its mission of education and transparency, annually validates the VantageScore credit score models. To promote transparency and aid in model governance, VantageScore Solutions publishes the results of these validation studies every year. Over the past 12 years, we have been the only model developer to do so, and we look forward to the day when our competitors follow our lead in publishing their validation results as well.

The 2018 Validation study from VantageScore represents the inaugural validation of VantageScore 4.0, the first and only tri-bureau credit scoring model to incorporate trended credit data to predict consumer credit risk. Trended credit data provides additional insights to consumer credit risk because it monitors credit usage patterns over an extended period while other credit score models only use information from the most recent credit usage. For example, trended credit data attributes reveal patterns in credit behaviors, such as the number of balance decreases over time or an increase in the rate of a borrower's utilization.

The inaugural validation study analyzes performance on mainstream consumers using trended credit data from the CRCs by comparing VantageScore 4.0 with the most recently developed static-only credit scoring model, VantageScore 3.0. Performance is measured by using the Gini Coefficient or "Gini Value," a standard measure of a score's predictive power.[1]

1 *The Gini coefficient of a credit score compares the distribution of defaulting consumers with the distribution of non-defaulting consumers across the credit score range. The coefficient has a value of 0 to 100. A value of 0 indicates that defaulting consumers are equally distributed across the entire credit score range. In other words, the credit score fails to assign more defaulting consumers to lower credit scores and is thus not predictive. A coefficient value of 100 indicates that the credit score has successfully assigned all defaulting consumers to the lowest score possible. A gini coefficient above 45 is a good result.*

VantageScore

a higher level of confidence

The validation study shows VantageScore 4.0 outperformed across all major lending industries, in both existing account management results as well as new account originations, when it was compared with all pre-existing versions of VantageScore and CRC scoring models.

VantageScore 4.0 scores approximately 30 million consumers who cannot obtain credit scores when conventional scoring models are used. To further enhance the accuracy of scores assigned to this previously unscoreable population, VantageScore 4.0 scientists leveraged machine learning techniques in their development of scorecards for those with thin file (less than two tradelines/credit accounts) or dormant credit histories (i.e., those with scoreable trades but with no update to their credit file in six months). This "Universe Expansion" population is validated by comparing the latest VantageScore 4.0 machine learning-based model with earlier VantageScore models.

Finally, score consistency is compared against VantageScore 3.0 results. By using levelled trended attributes across the three national CRCs, VantageScore 4.0 is able to provide the most consistent model for VantageScore yet.

VantageScore 4.0 was validated using 15 million anonymized and randomly selected U.S. consumer credit files from the databases at each CRC. The performance timeframe was from 2015 to 2017.

2017 Highlights

- On a U.S. population representative of Mainstream consumers (consumers conventionally scored by other generic scoring models):
  - VantageScore 4.0 outperforms all previous models of VantageScore, as well as all CRC models, in all product areas for both originations and account management.
  - VantageScore 4.0 greatly improves upon the performance of VantageScore 3.0 in the Bankcard and Mortgage Originations areas.
  - VantageScore 4.0's use of trended attributes has brought significant improvements in Prime and Super-Prime settings, where half of the attributes being used to score those consumers are based on trended information. VantageScore 4.0 was most effective in Prime and Super-Prime originations.
- On a U.S. population representative of Universe Expansion consumers (consumers not conventionally scored by generic scoring models), VantageScore 4.0 maintains its predictive power, which is provided by the machine learning techniques used in its development.
- Emerging from the VantageScore attribute leveling process (extended in VantageScore 4.0 to include computed attributes based on available CRC trended data), score consistency results between CRCs are maintained and are superior to VantageScore 3.0.

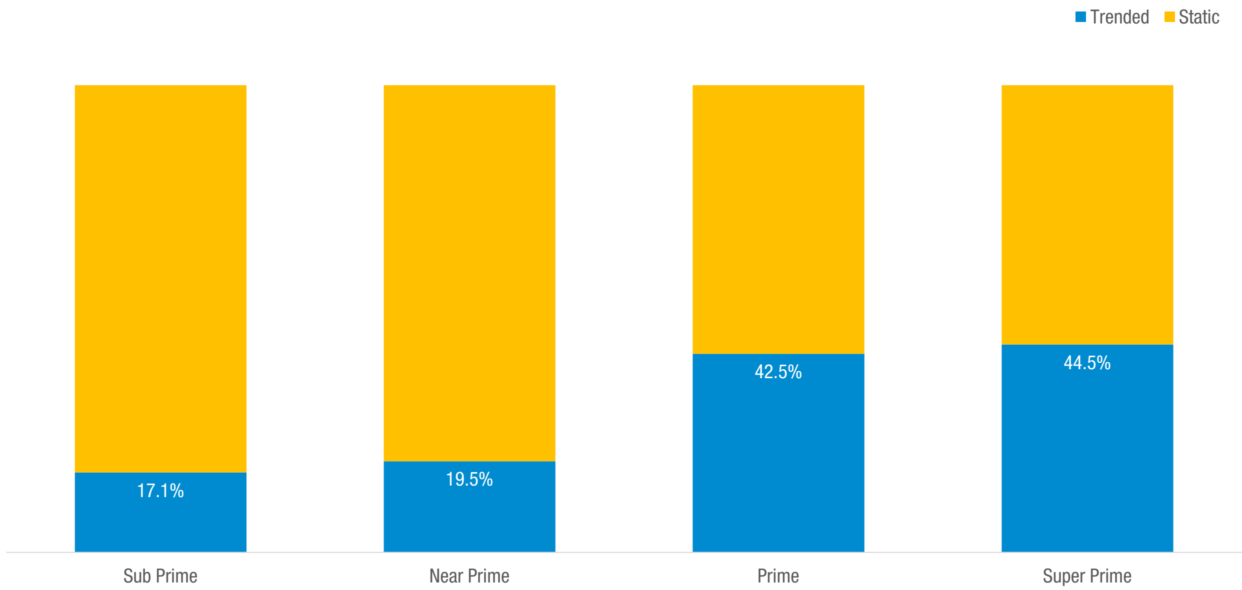
SCORE PERFORMANCE – MAINSTREAM CONSUMERS

Trended Credit Data Results

Trended attributes make a significant contribution to the overall VantageScore 4.0 model architecture. For consumers in the Prime and Super-Prime score range, trended attributes have provided significant improvements in determining credit risk. Figure 1 highlights the "contribution to score" (CTS) profiles that trended attributes provide. Trended attributes' contribution to the model more than doubles in low risk (Prime and Super-Prime) scorecards as compared with high risk (Subprime, Near-Prime and Thin & Young) scorecards. This provides better separation in lower risk segments, a highly desired population for many lenders.

Figure 1

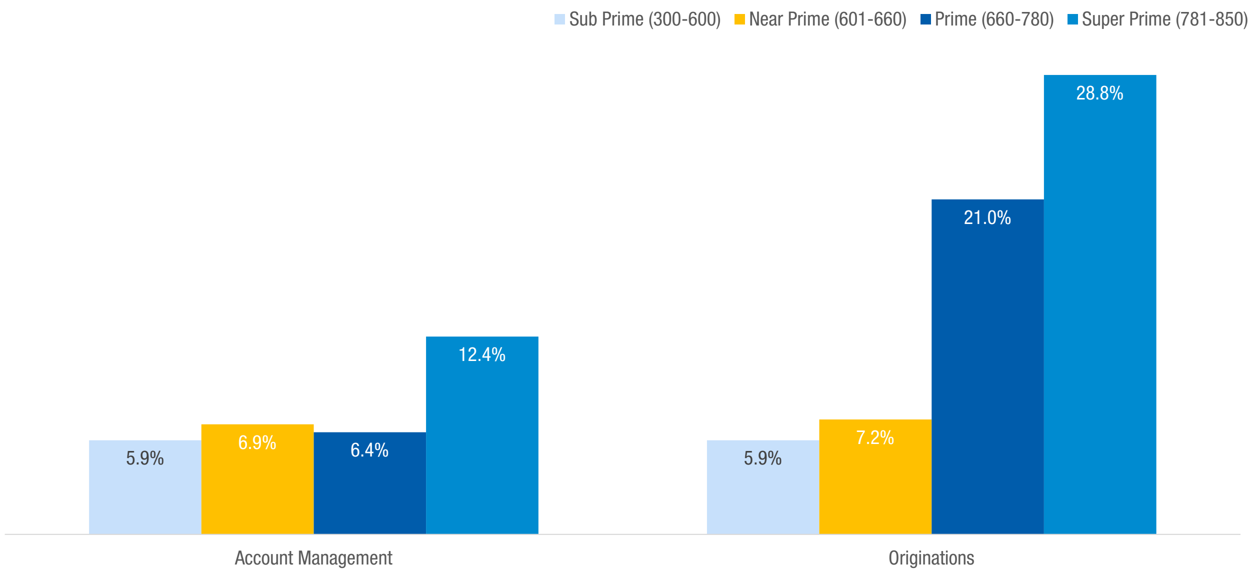
Trended attributes contribution to Model by Credit Tier: Mainstream Consumers



VantageScore 4.0, with its trended attributes, shows significant predictive performance improvements, especially in the area of originations. Figure 2 shows that Prime and Super-Prime consumer scores outperform VantageScore 3.0 by 21%-28% for new account originations and by 6%-12% for existing account management.

Figure 2

VantageScore 4.0 vs. VantageScore 3.0: % Gini Lift by Credit Tier (Mainstream Consumers)



This means that in the population segments that lenders most often seek and that are the most expensive to target, VantageScore 4.0 can provide better segmentation and identify those consumers who pose greater risk of default.

INDUSTRY RESULTS

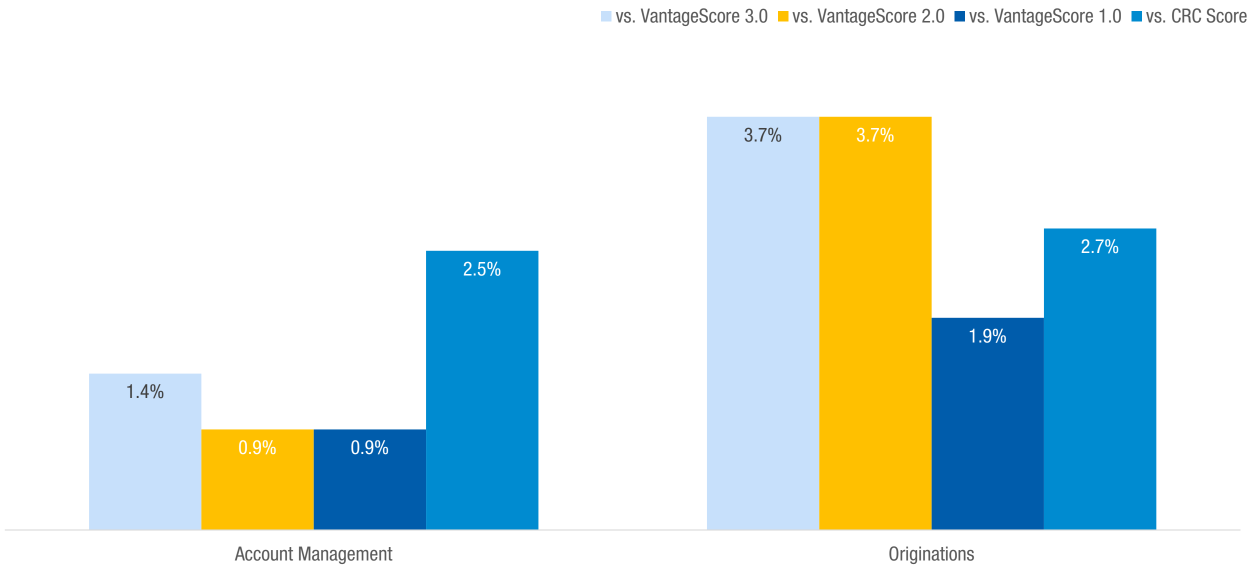
Model performance on mainstream consumers showcases how VantageScore 4.0 outperforms in terms of predictive performance all previous VantageScore models for all major lending industries. Figures 3-6 demonstrate predictive lift no matter what asset class the model is used for.

Bankcard Overall Performance:

VantageScore 4.0 shows improved predictive performance in the Bankcard sector (Figure 3) when compared with all previous VantageScore models. Highlighted by improvements in the originations space (average of approximately 3% lift in Gini value), as well as in the account management space (average of approximately 1% lift in Gini value), VantageScore 4.0 improves upon the performance of both VantageScore 3.0 and VantageScore 2.0. VantageScore 4.0 also shows an average of 2.6% predictive lift for all account types as compared with all of the CRC scoring models.

Figure 3

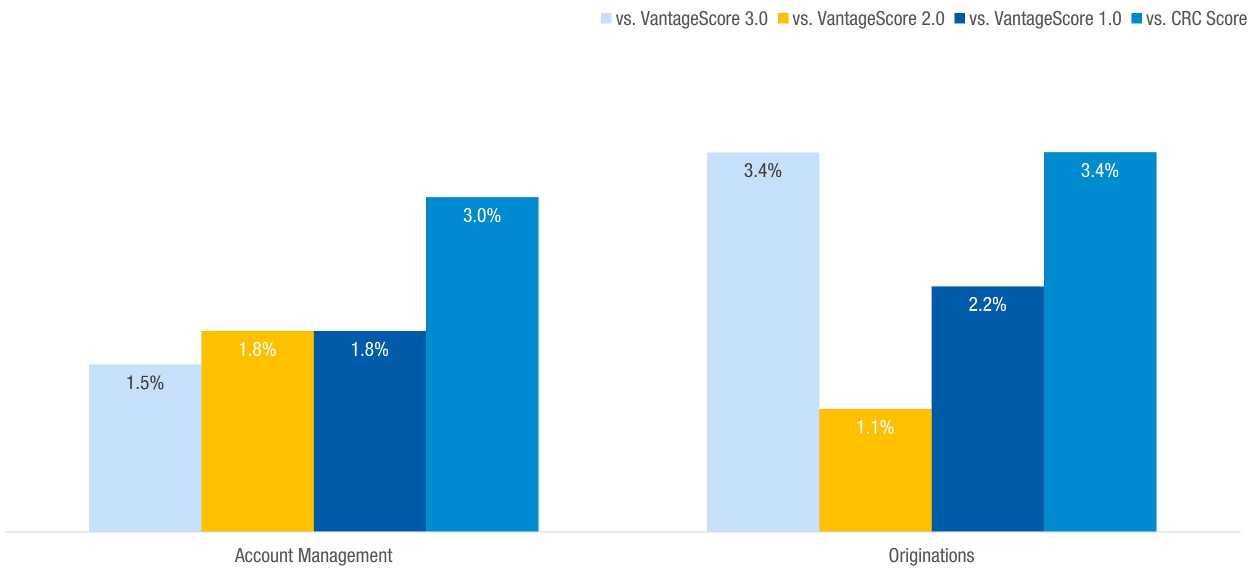
VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Bankcard



Mortgage Overall Performance:

VantageScore 4.0 shows improved predictive performance in the Mortgage sector (Figure 4) when compared with all previous VantageScore models (Figure 4). In terms of new account origination trades, VantageScore 4.0 shows an average of 2.5% lift in Gini value, improving on VantageScore 3.0 by 3.4%. With ongoing account management trades, VantageScore 4.0 shows an average of 3% lift when compared with all of the CRC scoring models and a 1.5% to 1.8% improvement when compared with all previous VantageScore models.

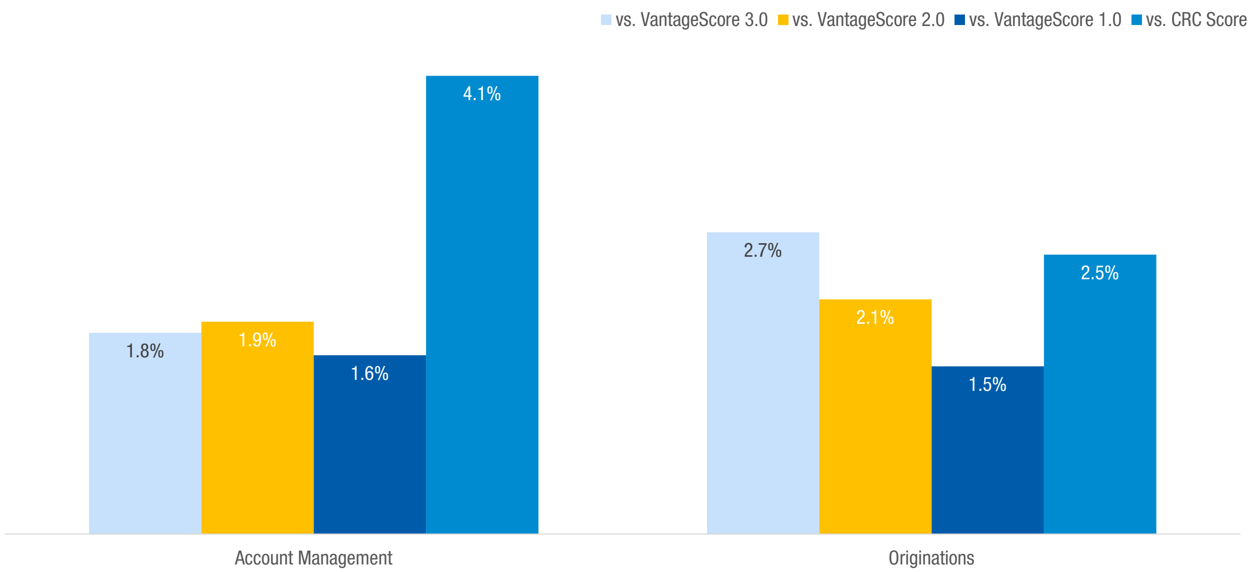
Figure 4
VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Mortgage



Auto Overall Performance:

VantageScore 4.0 shows improved predictive performance in the Auto Finance sector (Figure 5) when compared with all previous VantageScore models. In the originations space, VantageScore 4.0 outperforms by an average of 2.1% lift in Gini value over previous VantageScore models. In the account management space, VantageScore 4.0 shows an average of 1.8% lift in Gini values over previous VantageScore versions. VantageScore 4.0 also shows an average of 2.5% lift in originations compared with all account types for all of the CRC models and a 4.1% increase in existing accounts.

Figure 5
VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Auto



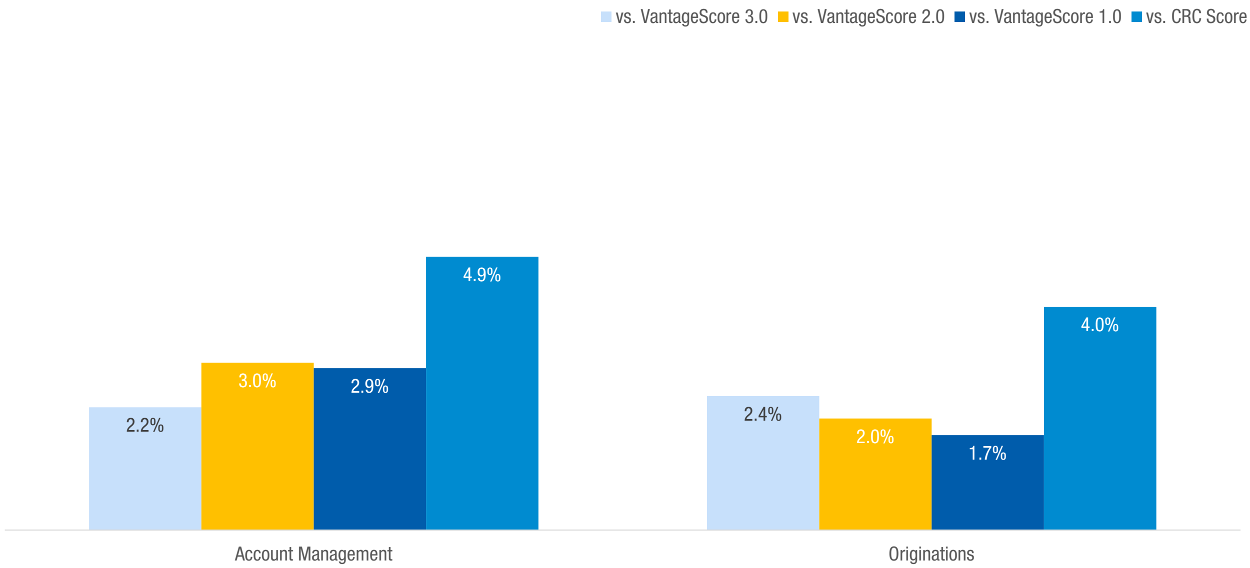
Installment Overall Performance:

VantageScore 4.0 shows improved predictive performance in the Installment loans category (Figure 6) when compared with all previous VantageScore models, especially in the account management space (average of 2.7% lift in Gini value) as well as in the originations space (average of 2% lift in Gini values).

VantageScore 4.0 shows an average of 4.5% lift for all account types when compared with all of the CRC models.

Figure 6

VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Installment



Score Performance – Universe Expansion Consumers

Universe Expansion (UE) consumers are generally thought of as a group who cannot be scored using generic credit scoring methods because of their conventional use of credit. There are approximately 30 million consumers in the US who fall into this category. These consumers are defined as:

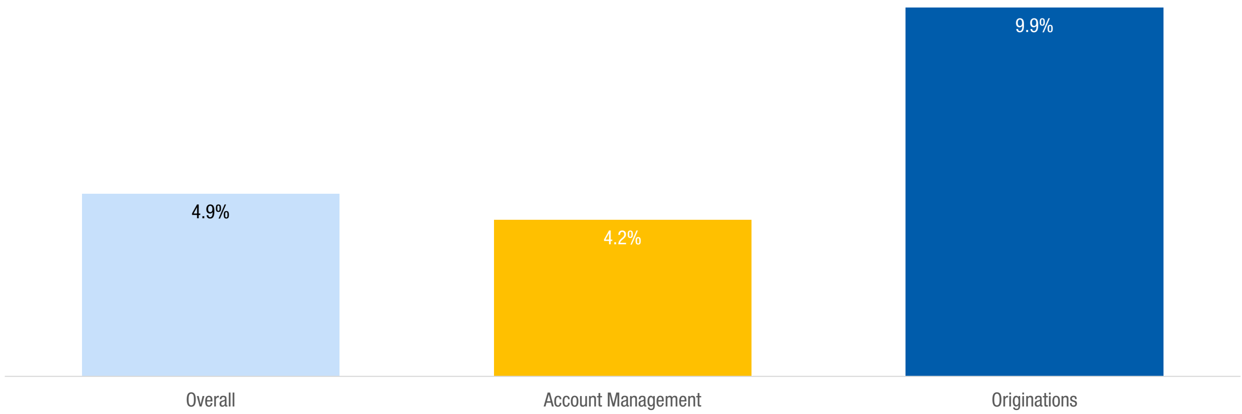
- **New Entrants** – consumers with trades that are six months-old or less;
- **Infrequent Users** – consumers who have not used credit within the last six months but have used credit within the last 24 months (also known as "dormant");
- **Rare Credit Users** – consumers who have not used credit in the last 24 months; and
- **No Trades** – consumers with only public record and collections records.

These populations are often ignored by lenders because lenders are either unable to effectively score these groups or must manually underwrite them, which can be costly.

VantageScore 4.0 has redeveloped its modeling of these consumers by leveraging machine learning techniques to determine the most predictive attributes displayed by these consumers. The current validation report represents the first time a UE validation can be compared using the VantageScore 4.0 model versus VantageScore 3.0 Gini coefficients. VantageScore 4.0 outperforms VantageScore 3.0 by nearly 10% for new account originations and by 4.2% for existing account management trades (Figure 7).

Figure 7

VantageScore 4.0: % Gini Lift vs. VantageScore 3.0 – New Scoring Consumers



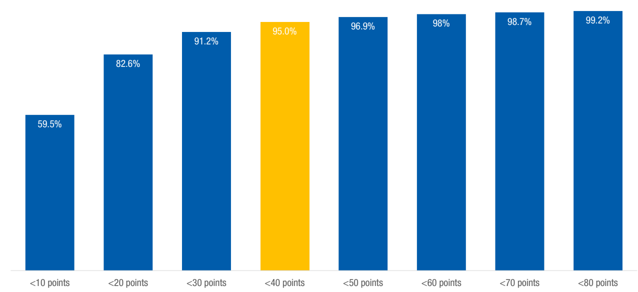
Score Consistency

VantageScore 4.0 and earlier VantageScore models are the only credit scoring models to provide the same characteristics information and the same algorithm to each of the three CRCs. Consequently, differences in a consumer's credit scores from the three CRCs are solely attributable to variances in the consumer's credit file data contained in the three CRCs' respective databases.

Among all of Bankcard users taken from the random sample of 15 million consumers who have credit files at all three CRCs (Figure 8), 82% had three VantageScore 3.0 credit scores that fell within a 20-point range, and 93.6% of those consumers had three scores which fell within a 40-point range. Similarly, when comparing Mortgage consumers across the three CRCs, 82.6% had VantageScore 4.0 credit scores that fell within a 20-point range, and 95.0% had three scores which fell within a 40-point range. The percentage of consumers who receive scores from the three CRCs that fall within 40 points using VantageScore 4.0 has increased over those scored with VantageScore 3.0 by 1.2% to 1.4% for both Bankcard and Mortgage consumers (Figure 8 and 9).

Figure 8

VantageScore 4.0 Score Consistency – Mortgage



VantageScore 3.0 Score Consistency – Mortgage

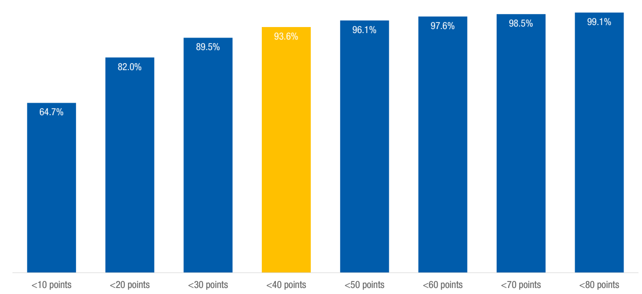
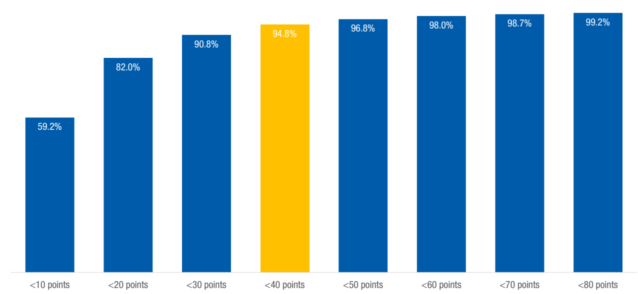
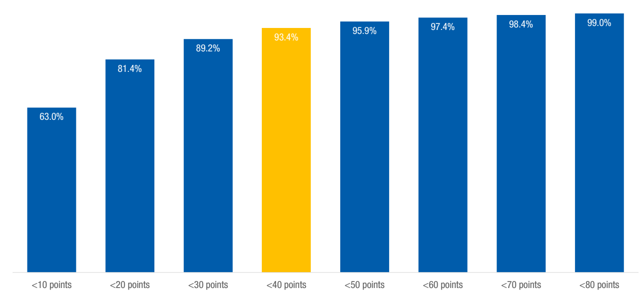


Figure 9

VantageScore 4.0 Score Consistency – Bankcard



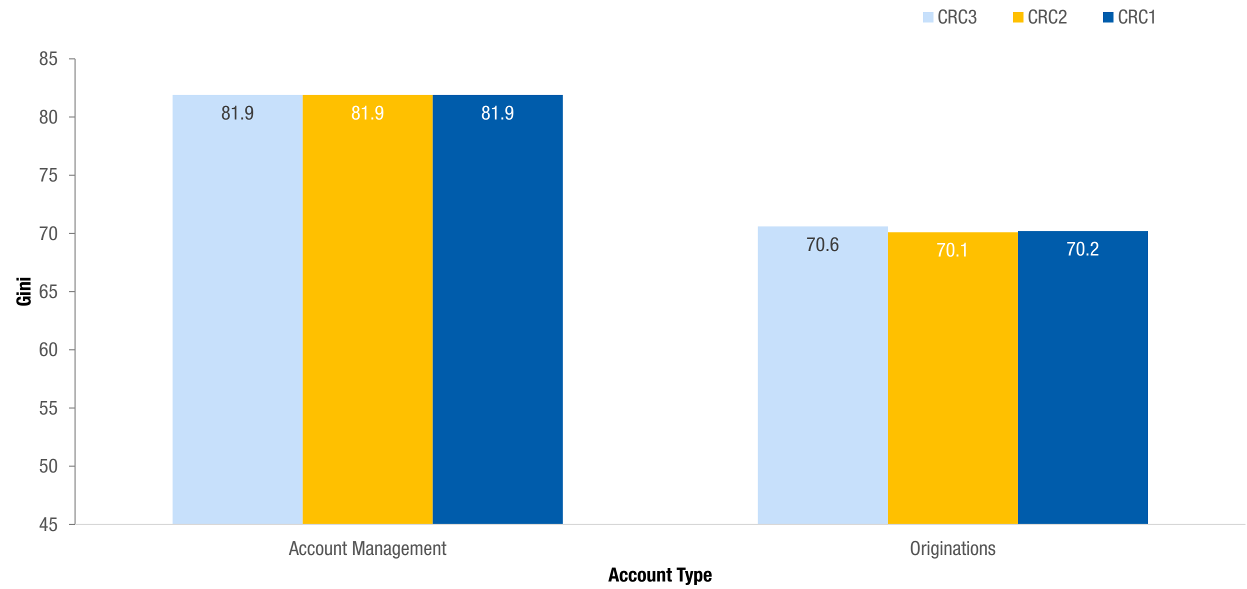
VantageScore 3.0 Score Consistency – Bankcard



In terms of predictive consistency (Figure 10), VantageScore 4.0's Gini results among the three CRCs remain highly consistent for both originations (0.5% Gini difference) and account management (0.1% Gini difference).

Figure 10

VantageScore 4.0: Performance Consistency Overall



The score-to-risk level relationship (90+days past due) is also consistently aligned across all three CRCs for both account management rates and origination rates (Figure 11).

Figure 11

VantageScore 4.0: Odds Alignment Originations

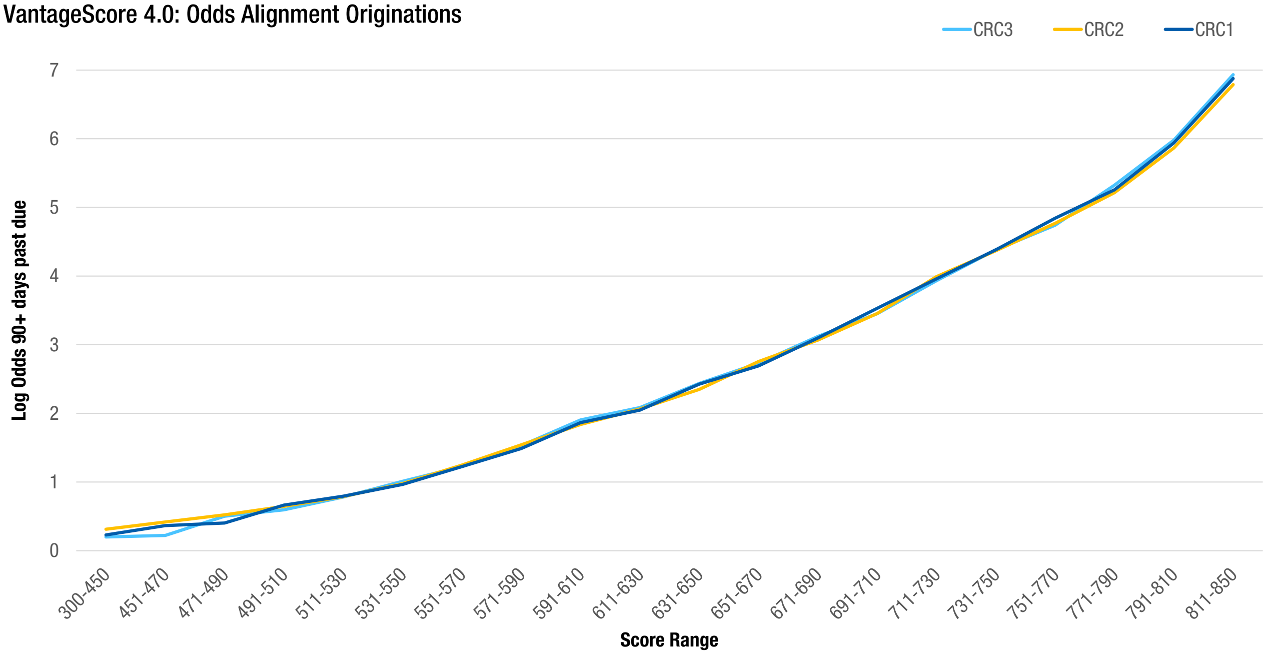
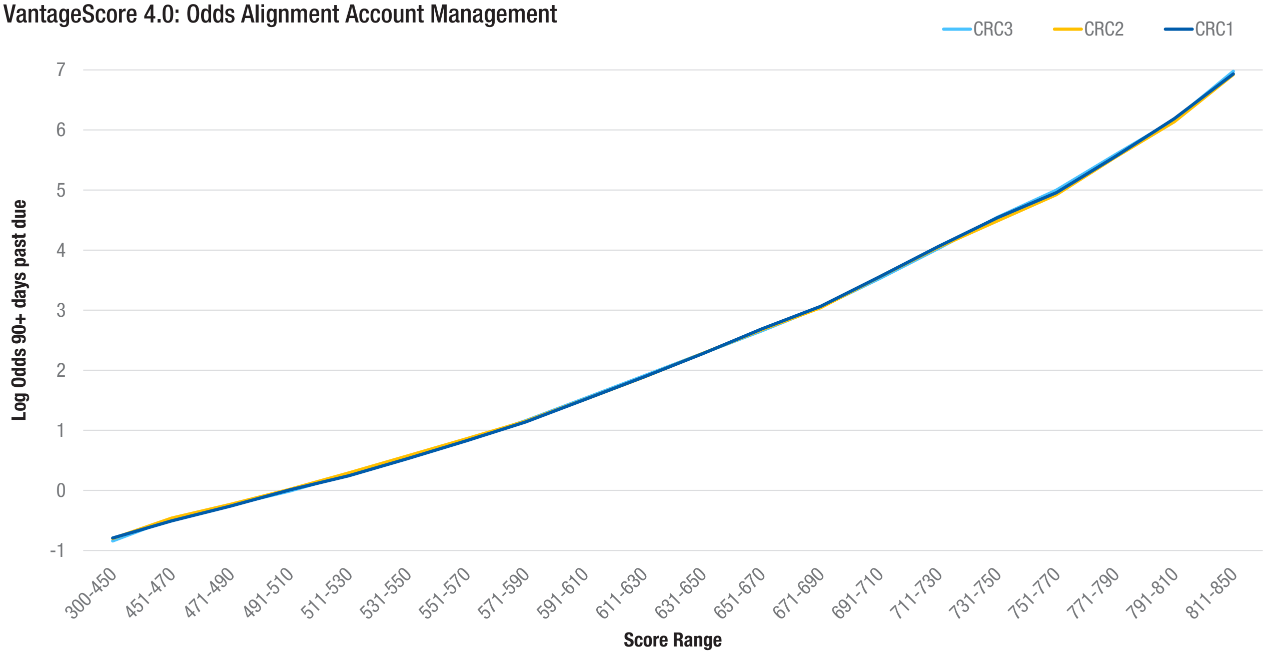


Figure 11

VantageScore 4.0: Odds Alignment Account Management



CONCLUSION

The validation of VantageScore 4.0 has shown a material lift when compared to benchmark models in the key areas most associated with performance: predictiveness, universe expansion, and consistency. By leveraging trended credit data for mainstream consumers and newly- designed attributes (developed by machine learning techniques) for non-mainstream consumers, VantageScore 4.0 has outperformed all previous VantageScore models and also has produced the strongest predictive results to date.

Although lenders should independently validate models based on their own portfolios and strategies in accordance with the regulatory guidelines, those who use the VantageScore 4.0 model in their decision-making processes can have confidence in the model's best-in-class performance and most comprehensive use of data available in consumers' credit files.

The VantageScore model is licensed to the three national CRCs - Equifax, Experian, and TransUnion - each of whom, in turn, market, price and sell the credit scores independently. Lenders and other commercial entities interested in learning more about the VantageScore models may contact one of the CRCs (listed on the bottom) for additional assistance.

The VantageScore credit score models are sold and marketed only through individual licensing arrangements with the three major credit reporting companies (CRCs): Equifax, Experian and TransUnion. Lenders and other commercial entities interested in learning more about the VantageScore credit score models, including the VantageScore 4.0 credit score model, may contact one of the following CRCs listed for additional assistance:

EQUIFAX®
Call 1-888-202-4025
http://VantageScore.com/Equifax

experian™
Call 1-888-414-4025
http://VantageScore.com/Experian

TransUnion
Call 1-866-922-2100
http://VantageScore.com/TransUnion

VantageScore
September 2018

www.vantagescore.com