

2023 VantageScore® 4.0 Credit Model Scoring Assessment



Contents

Performance	2
Score Consistency	4
Statistical Bias Testing	6
Conclusions	7

VantageScore Solutions, LLC (“VantageScore”) conducts annual performance assessments of VantageScore credit scoring models. In keeping with its mission to promote transparency and aid in model governance, VantageScore publishes the results of these assessments annually, along with updated odds/performance charts.

All VantageScore models are empirically derived and statistically sound, using proven testing methods that are central to our own analytical approach. This 2023 VantageScore 4.0 credit score model assessment report represents the sixth annual model performance assessment of VantageScore 4.0 credit scoring model (“VantageScore 4.0”). VantageScore 4.0 is the first and only tri-bureau credit scoring model to incorporate both trended credit data and leverage machine learning for superior performance. Trended data supplements the static borrowing and payment activity which has been historically recorded in consumer credit files and used to develop risk models. Trended data captures the trajectory of borrower behaviors over time, thereby allowing additional insights into consumers’ credit risk profile.

As part of the annual assessment, VantageScore 4.0 performance results are compared with the performance results of the other VantageScore credit scoring Models, that were developed earlier and contain only static credit attributes, as well as other commonly used generic credit scoring models in the market.

A key benefit of all the VantageScore credit scoring models is the high degree of consistency in the level of a consumer’s credit scores obtained from each of the three CRCs. This consistency is achieved by using credit attributes that are leveled or measured consistently. Testing and comparisons related to score consistency are also included in the annual performance assessment of the VantageScore models.

Finally, a critical requirement of credit scoring is that there is no statistical bias in the calculated scores which would result in a significant difference in the observed default rates for consumers from different groups who are assigned the same or similar credit scores. The results of tests for such bias are referenced in this document.

2023 Highlights:

- **OUTPERFORMS:** VantageScore 4.0 outperforms prior versions of VantageScore credit scoring models as well as other commonly used generic credit scoring models within, Originations and Account Management, across all major product categories, including Bankcard, Auto, Mortgage and Personal Installment Loans.
- **TRENDED DATA DRIVING LIFT:** VantageScore 4.0's use of trended attributes has brought significant predictive performance improvements within both the lower scoring and higher scoring credit originations segments.
- **CONSISTENCY:** Aided by the proprietary VantageScore attribute leveling process, a high level of score consistency across the CRCs is maintained. VantageScore 4.0 continues to provide the most consistent credit scores of all our models.
- **RESILIENT:** Superior predictive performance has been maintained throughout the COVID-19 pandemic period that included unprecedented interventions in the consumer credit market.
- **UNBIASED:** VantageScore 4.0 continues to provide unbiased, consistent results across ethnic groups.

All VantageScore credit scoring model performance assessments were based on 15 million anonymized and randomly selected U.S. consumer credit files from the databases at each national CRC. The performance timeframe was from June, 2020 to June, 2022 which has a significant overlap with the economically tumultuous COVID-19 pandemic period. The Coronavirus Aid, Relief, and Economic Security (CARES) Act, put into law on March 27, 2020, as well as many pandemic-related borrower accommodation programs, have resulted in changes in data reported on consumers' credit files. Further, disruptions in economic activity and numerous federal and state level relief activities put in place have led to temporary changes in consumers' credit behavior.

These events undoubtedly impacted observed credit data and calculated credit scores. As always, inter-period comparisons should be done with caution. VantageScore performs additional, more frequent, detailed model performance assessments covering the more recent timeframe. Those additional analyses are not in the scope of this document.

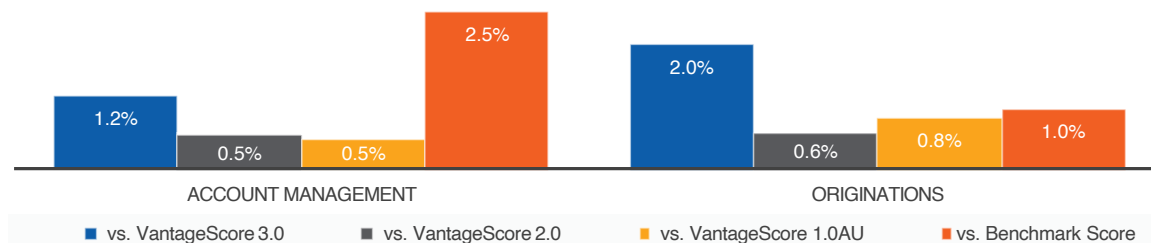
PERFORMANCE

Credit reporting changes driven by the pandemic have impacted the performance of all models. VantageScore 4.0 maintains a consistent performance lift over prior versions as well as over commonly used generic credit scores across all major product categories.

Bankcard

- VantageScore 4.0 continues to show improved predictive performance compared to all previous versions of VantageScore models especially in the Originations space (average of 0.7% lift in Gini value¹), as well as in the Account Management space (average of 1.1% lift in Gini value).
- VantageScore 4.0 achieved predictive performance lift over the VantageScore 30 model of 2.0% within Originations.
- VantageScore 4.0 achieved an average predictive performance lift over benchmark scores of 2.5% within Account Management and 1.0% within Originations.

Figure 1: VantageScore 4.0: %Lift in Performance - Mainstream Consumers – Bankcard

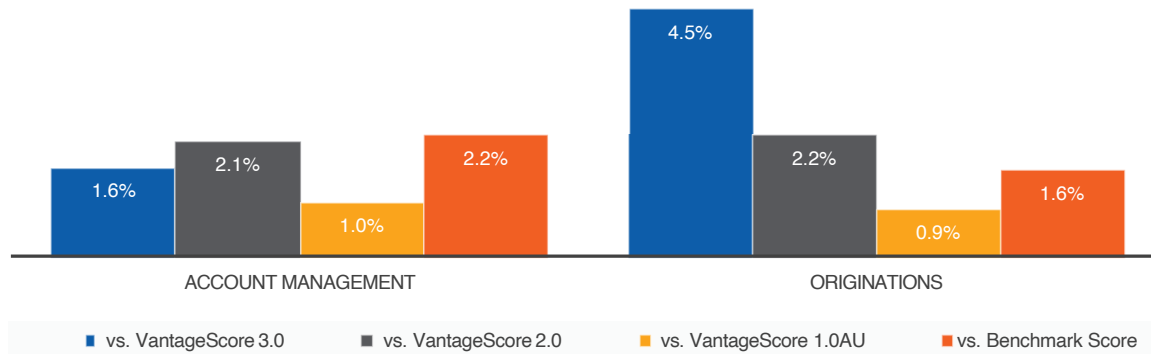


¹ The Gini coefficient of a credit score compares the distribution of defaulting consumers with the distribution of non-defaulting consumers across the credit score range. The coefficient has a value of 0 to 100. A value of 0 indicates that defaulting consumers are equally distributed across the entire credit score range. In other words, the credit score fails to assign lower scores to consumers who default more frequently, and is thus not predictive. A coefficient value of 100 indicates perfect prediction ability.

Mortgage

- VantageScore 4.0 predictive performance lift over all previous versions of VantageScore models averaged 1.6% and 2.5% in the Account Management and Originations spaces respectively.
- VantageScore 4.0 achieved predictive performance lift over the VantageScore 3.0 model of 4.5% within Originations.
- VantageScore 4.0 achieved an average predictive performance lift over benchmark scores of 2.2% within Account Management and 1.6% within Originations.

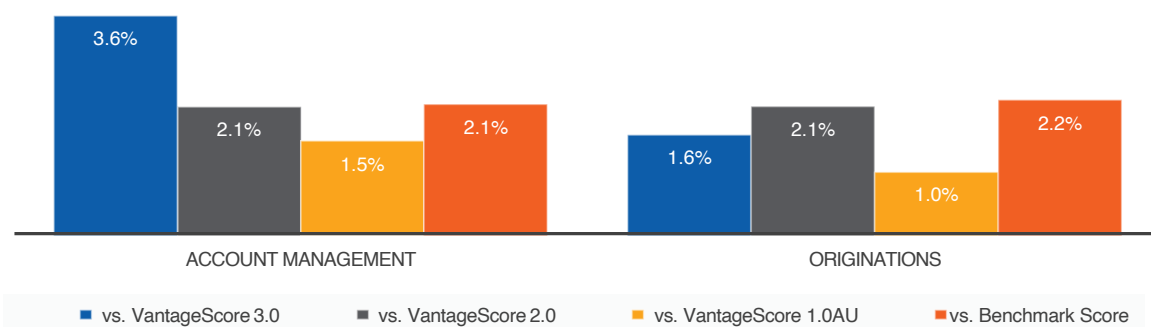
Figure 2: VantageScore 4.0: %Lift in Performance - Mainstream Consumers – Mortgage



Auto

- VantageScore 4.0 predictive performance lift over all previous versions of VantageScore models averaged 2.4% and 1.6% in the Account Management and Originations spaces respectively.
- VantageScore 4.0 achieved predictive performance lift over the VantageScore 3.0 model of 1.6% within Originations.
- VantageScore 4.0 achieved an average predictive performance lift over benchmark scores of 2.1% within Account Management and 2.2% within Originations.

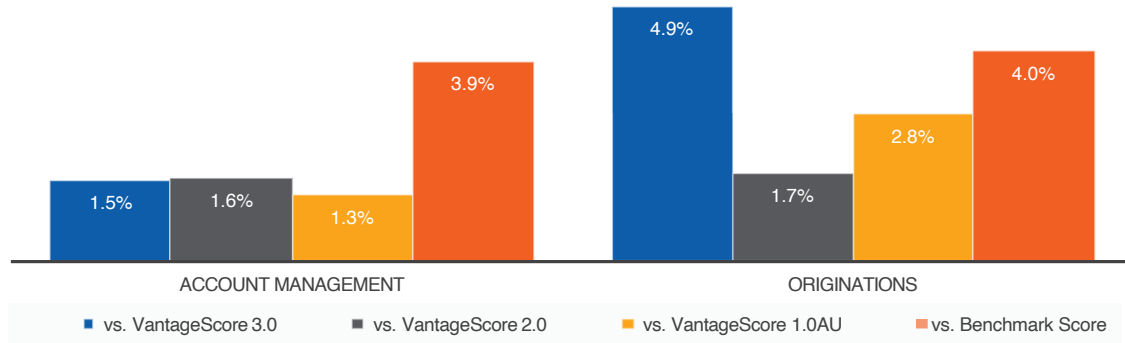
Figure 3: VantageScore 4.0: % Lift in Performance - Mainstream Consumers – Auto



Personal Installment

- VantageScore 4.0 predictive performance lift over all previous versions of VantageScore models averaged 1.5% in Account Management and 3.1% in Originations.
- VantageScore 4.0 achieved predictive performance lift over the VantageScore 3.0 model of 1.5% in Account Management and 4.9% in Originations.
- VantageScore 4.0 achieved an average predictive performance lift over benchmark scores of 3.9% within Account Management and 4.0% in Originations.

Figure 4: VantageScore 4.0: % Lift in Performance - Mainstream Consumers – Personal Installment



SCORE CONSISTENCY

VantageScore 4.0 and earlier VantageScore credit scoring models are the only credit scoring models to employ the same characteristics information and the same model at each of the three CRC national databases. Consequently, the credit scores calculated at each of the CRCs are highly consistent with each other and any differences are solely attributable to variances in the consumer’s credit file data. On a sample of consumers with credit files at all three CRCs, 81% had three VantageScore 4.0 credit scores within a 20-point range and 94% of the consumers had three scores within a 40-point range.

Comparing scores for consumers with bankcard and mortgage products across the 3 CRCs, over 84% of VantageScore 4.0 credit scores are within 20 points of each other and 95% within 40 points of each other. Likewise, comparing consumers with auto loans across the 3 CRCs, 80% had VantageScore 4.0 credit scores within 20 points and 94% had 3 scores within 40 points.

Figure 5: VantageScore 4.0 Score Consistency – Overall

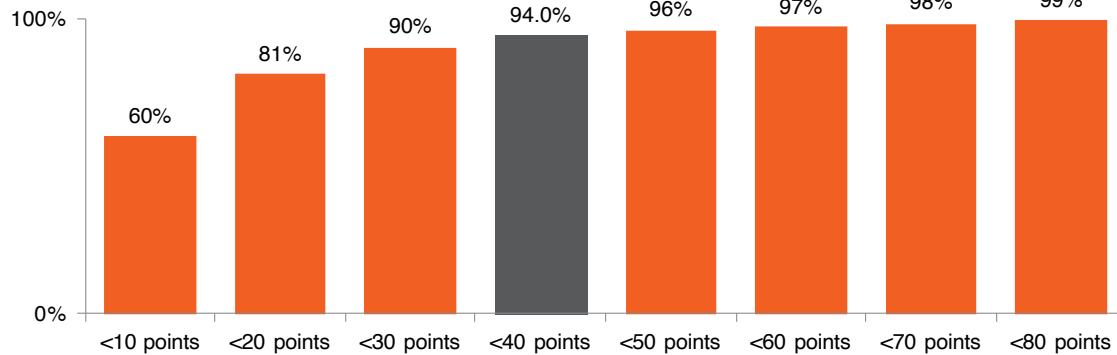


Figure 6: VantageScore 4.0 Score Consistency – Bankcard

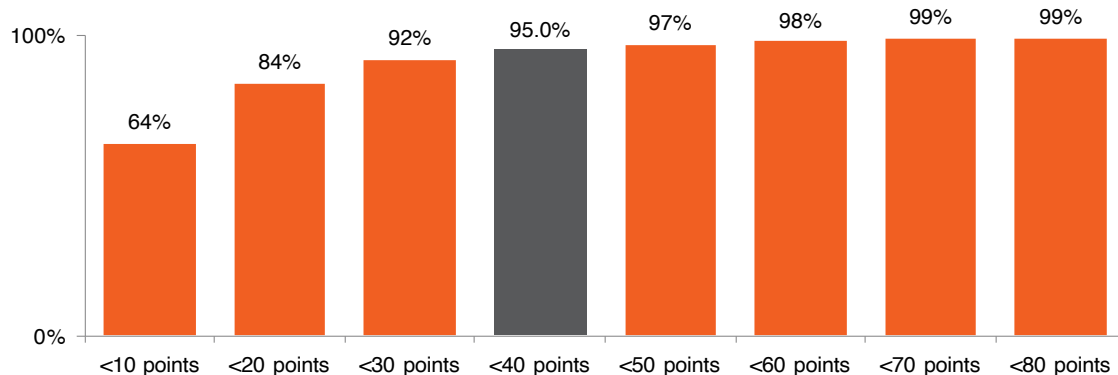


Figure 7: VantageScore 4.0 Score Consistency – Mortgage

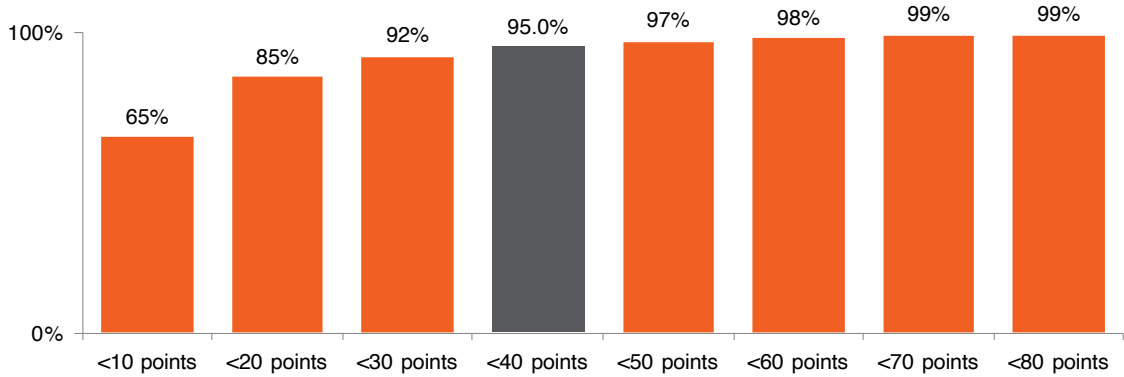
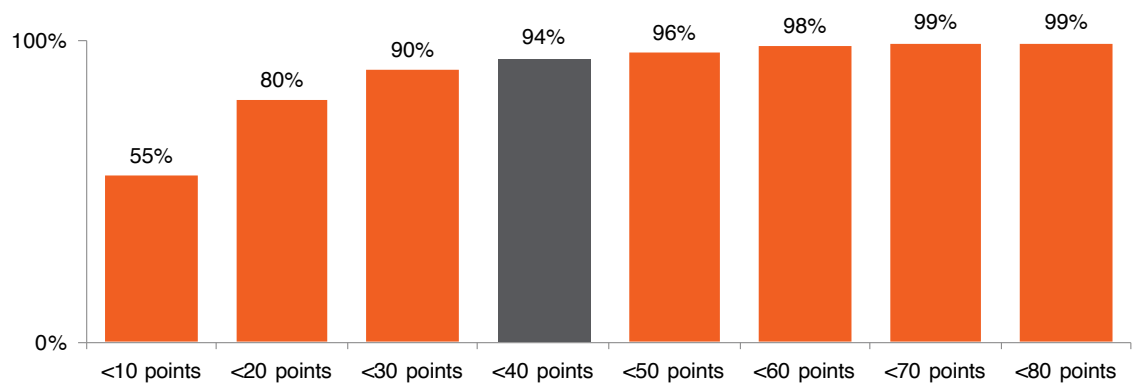


Figure 8: VantageScore 4.0 Score Consistency – Auto Loan



In terms of predictive consistency, VantageScore 4.0 Gini results between CRCs remain strongly consistent for both Account Management and Originations. In terms of score risk alignment, the score-to-risk level relationship (90+ days past due) is consistent across all CRCs for both Account Management rates and Originations.

Figure 9: VantageScore 4.0 Performance Consistency Overall

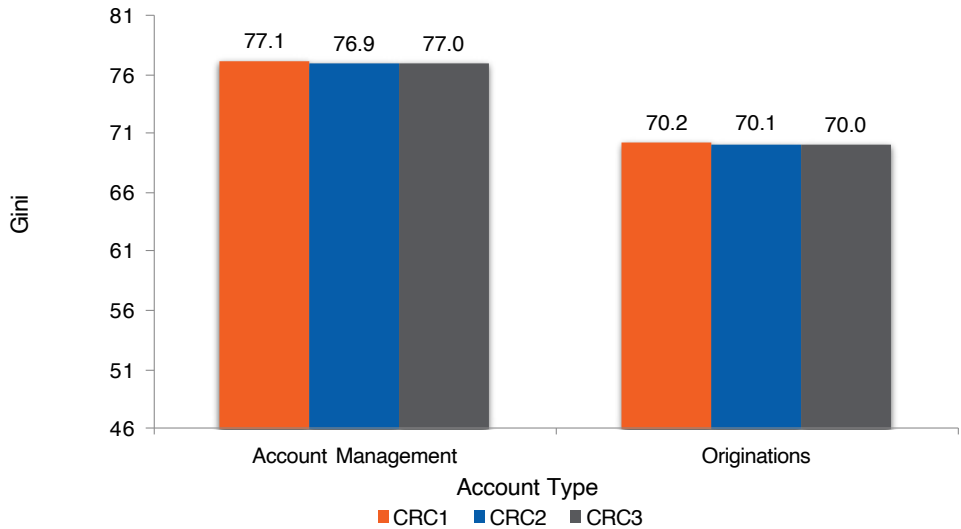


Figure 10: VantageScore 4.0 Odds Alignment Overall Originations

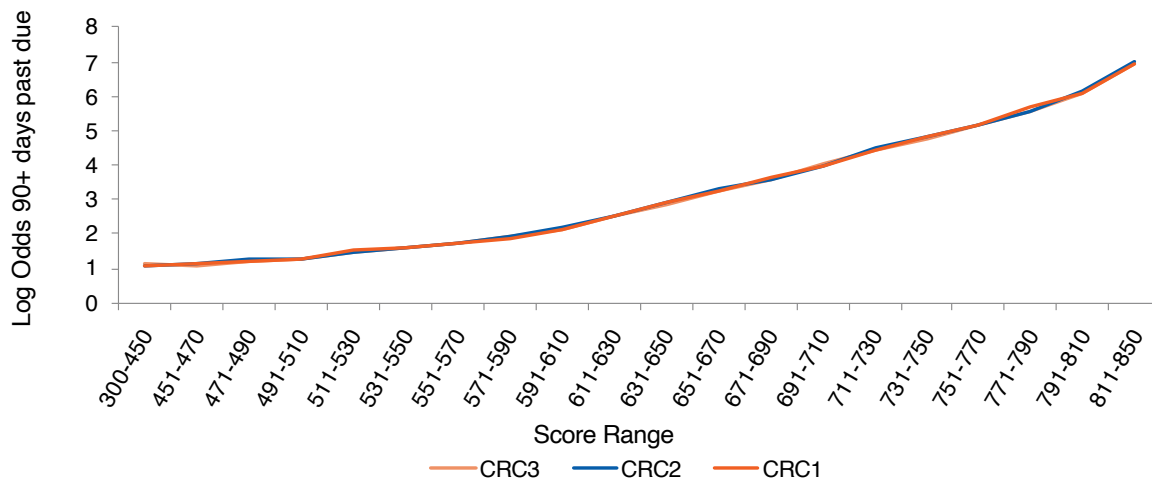
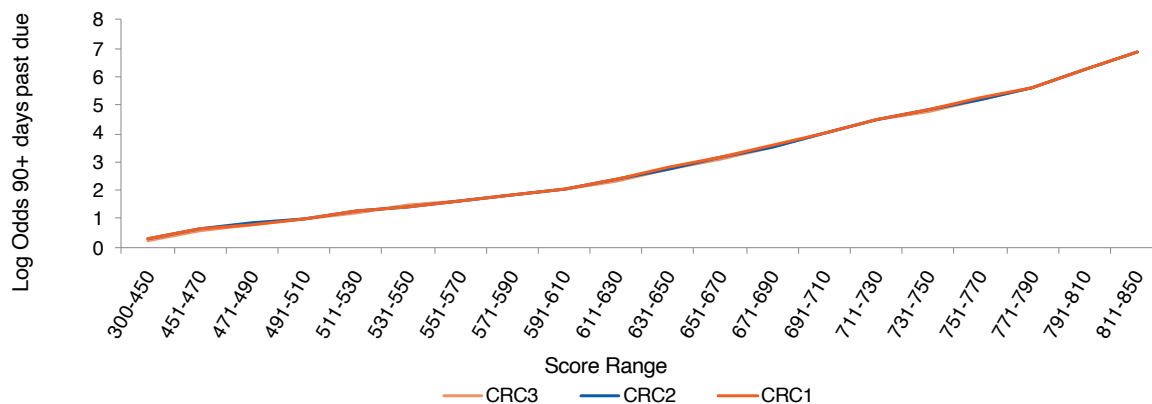


Figure 11: VantageScore 4.0 Odds Alignment Overall Account Management



STATISTICAL BIAS TESTING

Fairlending concerns could also arise with respect to any credit scoring model if the resulting scores represent different levels of risk (probability of default) for two similarly situated consumers belonging to different population classifications. Conversely, if the score to default risk relationship is consistent across different population classifications, then there is no statistical bias, and the model treats consumers across different classifications equally. A key element of the annual model performance assessment process is to ensure that VantageScore 4.0 continues to be free from any such statistical bias by comparing default rates observed for a given credit score between consumer ethnicity groups.

The results of the statistical bias testing conducted for VantageScore 4.0 provide conclusive evidence that the model provides equal treatment across population classifications. That is, consumers with similar scores have similar default rates regardless of their respective population classifications. Please refer to the whitepaper titled “Statistical Bias Testing of VantageScore Models: 2020-2022 Results” for a more detailed discussion.

CONCLUSIONS

The 2023 assessment of VantageScore 4.0 has shown a continued material benefit when compared to benchmark models in the key areas most associated with performance: predictiveness and consistency. Additionally, like all VantageScore credit scoring models, VantageScore 4.0 is free from statistical bias, providing a consistent score to risk relationship across different population classifications.

Given the severe dislocation of the U.S. economy as well as significant impacts to consumers, their credit activity and reported credit data because of the COVID-19 pandemic, period-to-period comparison of performance metrics may be difficult, particularly for certain products where significant percentage of accounts remain in deferment with suppressed delinquency reporting. VantageScore has implemented additional, more frequent monitoring and model performance analyses covering the more recent timeframe. The results of these additional, detailed monitoring analyses can be made available upon request. As a model risk management practice, credit scoring model users should continue to independently monitor performance of all models used in their decision-making processes, based on their specific population data, to ensure continued model effectiveness.

The VantageScore credit scoring 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 scoring models, including the VantageScore 4.0 credit scoring model, may contact one of the following CRCs listed for additional assistance:

VantageScore Solutions, LLC.
May 2023
Copyright © 2023
www.vantagescore.com

EQUIFAX®

Call 1-888-202-4025

<http://VantageScore.com/Equifax>

The Experian logo consists of a stylized 'e' made of four colored squares (blue, red, purple, and pink) to the left of the word 'experian' in a lowercase, sans-serif font.

Call 1-888-414-4025

<http://VantageScore.com/Experian>

The TransUnion logo features the letters 'tu' in a blue circle to the right of the word 'TransUnion' in a blue, sans-serif font.

Call 1-866-922-2100

<http://VantageScore.com/TransUnion>