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VantageScore 4.0 Overview



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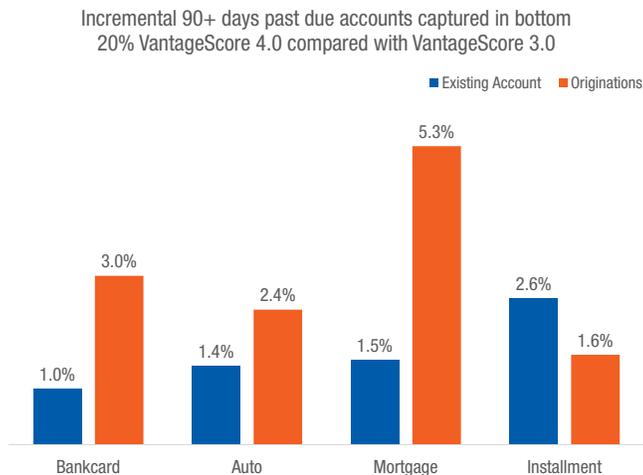
VantageScore 4.0, the fourth-generation tri-bureau credit scoring model from VantageScore Solutions, sets a new standard for predictive performance and modeling innovation, pioneering several industry “firsts” that benefit lenders and consumers alike.

VantageScore 4.0 builds on the rollout of the VantageScore 3.0 model in 2013, which introduced many innovations, including enhanced ability to score more consumers and improved transparency and consistency of scores across all three Credit Reporting Companies (CRCs) – Equifax, Experian and TransUnion. The success of VantageScore 3.0 powered tremendous growth in the usage of VantageScore models. More than 8 billion VantageScore credit scores were used by more than 2,400 financial institutions and other industry participants in the 12-month period from July 2015 through June 2016.

Figure 1: Predictive performance on holdout U.S. population sample

VantageScore 4.0	Gini Value	
	Account Management	Originations
Bankcard	83.2	70.2
Auto	81.1	72.7
Mortgage	84.0	73.1
Installment	79.9	68.4

Figure 2: Incremental defaulting account capture rate in bottom 20 percent for VantageScore 4.0 as compared with VantageScore 3.0



KEY PERFORMANCE INDICATORS

VantageScore 4.0 delivers superior risk predictive performance across credit categories and across the population distribution.

Predictive Performance – Gini

Figure 1 reflects VantageScore 4.0 superior predictive performance (Gini). Gini is a statistical measure of a model’s capacity to identify consumers who are likely to default by assigning low scores to those consumers while consumers who are likely to pay receive higher scores. Gini statistics range from 0 to 100. A Gini of 100 indicates that a model perfectly identifies whether a consumer defaults or pays. A Gini of zero occurs if a model randomly identifies whether a consumer is likely to default or pay. Models with Gini results above 45 are considered to rank order consumers effectively.

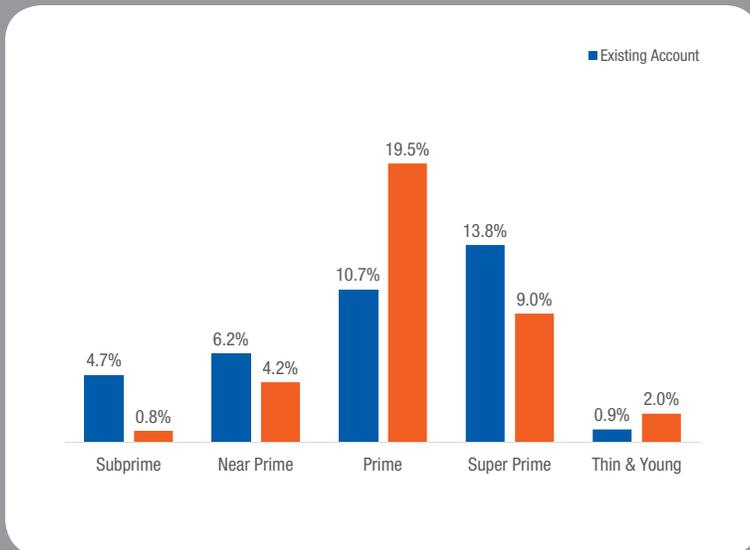
Figure 2 shows the value of this improved predictive lift in capturing more of the defaulting accounts in the bottom 20 percent of the population. Compared with VantageScore 3.0, VantageScore 4.0 captures an average of 1.5 percent more defaulting accounts in existing account management across key industries and an average of 3 percent more defaulting accounts in originations across key industries.

DEVELOPMENT HIGHLIGHTS

Trended Data Attributes

VantageScore 4.0 is the first and only tri-bureau credit scoring model to incorporate trended credit data newly available from all three national credit reporting companies. Trended credit data reflects changes in credit behaviors over time, in contrast to the static, individual credit-history records that have long been available in consumer credit files. The VantageScore 4.0 model leverages trended credit data to gain deeper insight into consumers’ borrowing and payment patterns, particularly among consumers in the Prime credit-score bands.

Figure 3: Incremental predictive performance due to the use of trended data attributes in VantageScore 4.0 as compared to the use of only static data attributes



To estimate the contribution of trended data attributes to predictive performance, credit-tier based scorecards were developed both with and without trended data attributes (Figure 3). The analysis showed substantially enhanced performance lift from trended attributes, most significantly in the Prime credit tiers. (See *VantageScore 4.0 – “Trended Attribute Modeling” white paper for a further discussion on how and why this performance lift was captured.*)

Universe Expansion – Using Machine Learning Techniques to Score Those with Dormant Credit Histories

VantageScore 4.0 leverages machine learning techniques in the development of scorecards for consumers with dormant credit histories (i.e., consumers who have scoreable trades but do not have an update to their credit file in the last six

months). These consumers are not scored by conventional models, which require a consumer to have a minimum of six months’ of credit history on the credit file or an update to their credit file at least once every six months.

Machine learning techniques were used to develop multi-dimensional attributes that more effectively capture the behavioral nuances of consumers who have dormant data files. Multi-dimensional attributes were designed primarily for revolving products and installment products. The performance definition for these populations was also enhanced to expand the volume of useable performance trades. FCRA compliant reason codes were assigned to each multi-dimensional attribute. These attributes were subsequently incorporated into structured scorecards and aligned with the overall VantageScore 4.0 algorithm.

Figure 4: Incremental defaulting account capture rate for Universe Expansion population in the bottom 20% for VantageScore 4.0 as compared with VantageScore 3.0

Incremental 90+DPD accounts captured in bottom 20% VantageScore 4.0 compared with VantageScore 3.0

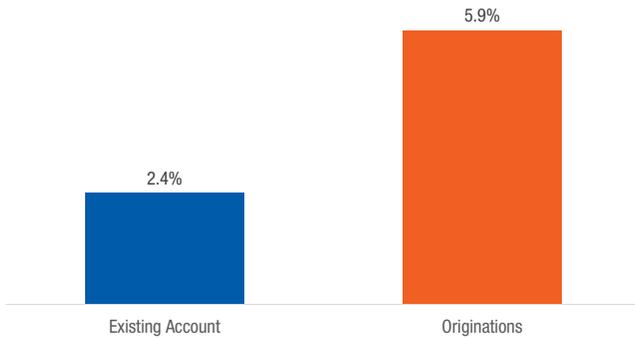
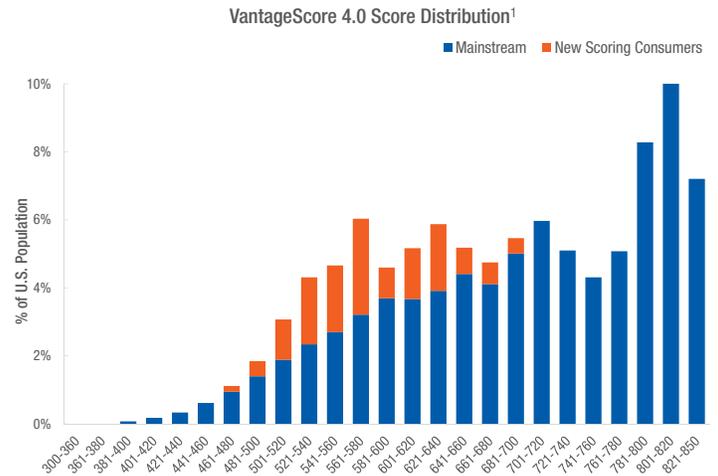


Figure 5: Score distribution for New Scoring (Universe Expansion) population¹



This approach yielded a substantial enhancement in scoring accuracy among consumers who cannot obtain scores from traditional scoring models, strengthening VantageScore 4.0’s ability to accurately score between 30-35 million more consumers¹ (Figure 4). The VantageScore 4.0 Gini on the universe expansion population is 52.1 compared to a VantageScore 3.0 Gini of 49.7, capturing between 2.4 percent and 5.9 percent more bad accounts (respectively) in the bottom 20 percent of the population than VantageScore 3.0 did (Figure 4). (See *VantageScore 4.0 – “Scoring Credit Invisibles” white paper for a further discussion on the scorecard development approach.*) Figure 5 shows the score distribution for the universe expansion or new-to-score population.

Public Records and Collection Trade Reduction

VantageScore 4.0 is the first and only tri-bureau credit scoring model to be built in anticipation of the removal and/or reduction in volumes of public records and collection trades. VantageScore 4.0 has newly redesigned attributes related to public records to accommodate these shifts in volume while having the capacity to continue the consideration of public record information when it is included in the credit file. A similar approach was used when considering collections trades.

(See research insights on <https://www.vantagescore.com/ncap> for further details.)

¹ Reduction in public records and collection trade lines in consumers’ files will cause the number of consumers who would be newly scoreable using the VantageScore credit scoring model to decline.

Consistency

VantageScore 4.0 is the only commercially-available risk score with tri-CRC leveled attributes. This patent-protected attribute-leveling process enables the identical algorithm to be deployed at each CRC for purposes of scoring consumers. The identical algorithm continues to ensure consumers receive highly consistent credit scores when requested from multiple CRCs. A random sample of one million consumers were scored across each of the CRCs. Figure 6 shows the percentage of consumers that received three scores within a given score range. Specifically, 92.2 percent of consumers received VantageScore 4.0 credit scores from the three CRCs that fell within a 40-point score range. This compares with 90.7 percent of consumers who received VantageScore 3.0 credit scores within a 40-point range.

Model Composition

The VantageScore 4.0 model was built using a refreshed data set from 2014-2016, which takes into account the latest credit products and trends in consumer behavior. Development was based on 45 million credit files of anonymized consumers from all three CRCs. As with VantageScore 3.0, VantageScore 4.0 optimizes the originations and account management data concentration in order to maximize performance value on both types of loans. Figure 7 shows the segmentation architecture for VantageScore 4.0.

Two dedicated scorecards were developed for universe expansion consumers. Segment 1 scores 'No Trade' consumers who have no scoreable trades on their file but who have collections and public records. Segment 2 scores the 'Dormant' segment, who have scoreable trades but have had no update to their credit file in the last six months. Segment 3 scores consumers with 'Thin files,' i.e., those with two or fewer trades, or no trade older than 6 months. Segments 4 thru 7 score 'Full file' consumers, those with 3 or more trades. Consumers are assigned to one of these full file scorecards based on their risk severity. A stepwise discriminant process was applied to reduce the attributes to the most predictive subset. Finally, Figure 8 shows the general predictive contribution of the primary credit behavior factors to the credit score.

Figure 6: Consumer score consistency when scored at the three CRCs

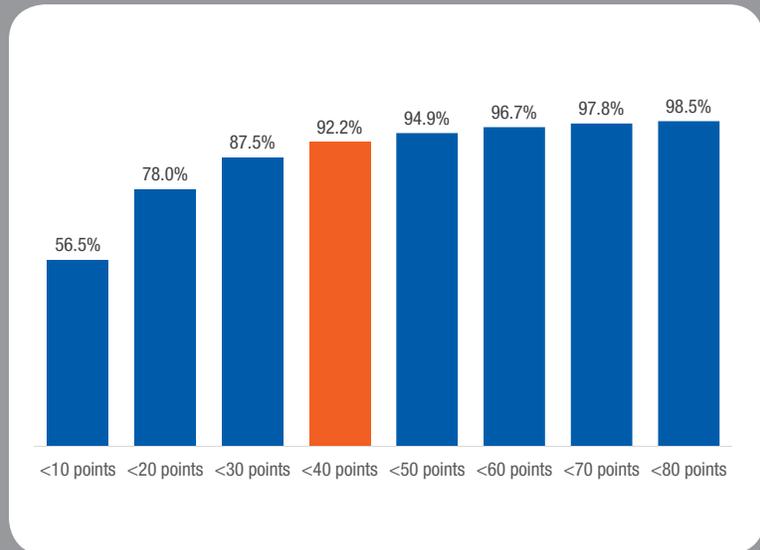


Figure 7: Segmentation architecture for VantageScore 4.0

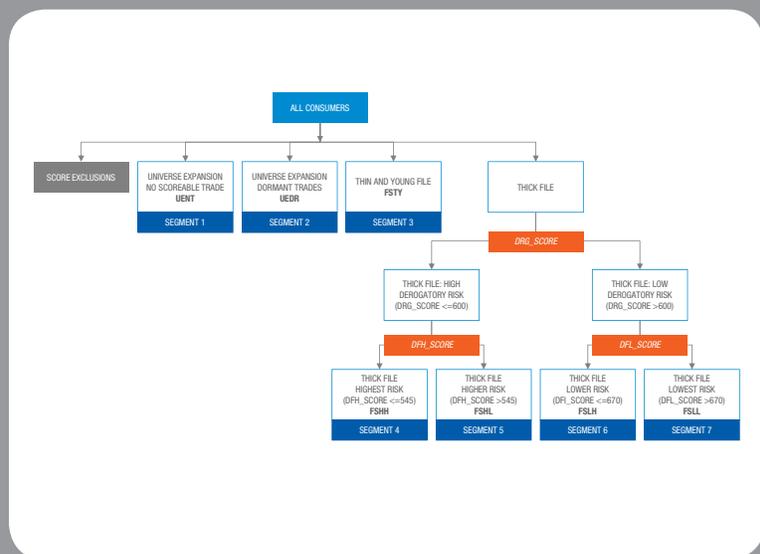
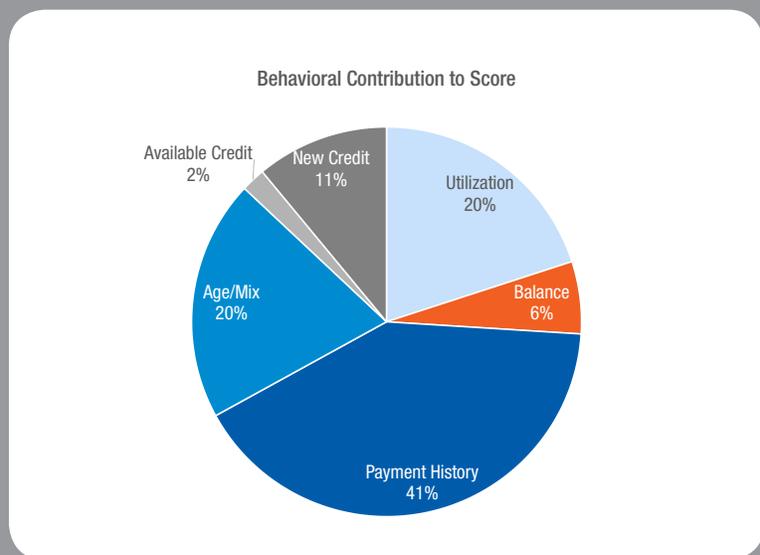


Figure 8: Credit Behavior Contributions By Credit Factor



CONCLUSION

For more than a decade, VantageScore Solutions LLC has consistently delivered superior risk modeling tools to the financial services industry. With VantageScore 4.0, risk modeling and assessment has taken a major step forward with the incorporation of CRC trended data, innovation via the use of machine learning and alignment with recent changes in public records. We encourage lenders to evaluate VantageScore 4.0's performance on their business. VantageScore 4.0 is scheduled to be available for commercial use from all three CRCs in Fall 2017.

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 latest VantageScore 4.0 credit score model, may contact one of the following CRCs listed for additional assistance:



Call 1-888-414-4025

<http://VantageScore.com/Experian>