VantageScore 4.0 2015-2017 Validation:

Inaugural VantageScore 4.0 Trended Data Model Validation

Contents

VantageScore Solutions, as part of its mission, annually validates VantageScore credit score models at each of the credit reporting companies (CRCs) - Experian, Equifax and TransUnion. To promote transparency and aid in model governance, VantageScore Solutions publishes the results of these validations annually, along with updated odds/performance charts.

The 2017 Validation report from VantageScore represent the inaugural validation of VantageScore 4.0, the first credit scoring model to use trended data to predict consumer credit risk. Trended data provides additional insights to consumer credit risk as it monitors credit usage patterns over a 24-month period. Traditional credit scores only use information from the most recent usage of credit whereas trended data examines the underlying patterns that have lead the consumer to their most recent report.

These inaugural validations will highlight performance on mainstream consumers using trended data from the CRCs by comparing VantageScore 4.0 with the most recently developed static-only credit scoring model, VantageScore 3.0. Additionally, the validations will show VantageScore 4.0 outperforming across all major lending industries in both existing account management results along with new account originations as compared to all pre-existing versions of VantageScore and bureau scores.

Formal Universe Expansion validations are now done by comparing the latest VantageScore 4.0 machine learning based models with earlier VantageScore 3.0 UE models. Finally, score consistency will be compared with VantageScore 3.0 results. By using levelled trended attributes VantageScore 4.0 was able to provide the most consistent version of VantageScore yet.

VantageScore 4.0 was validated based on 15 million anonymized and randomly selected U.S. consumer credit files from the databases at each national credit reporting company (CRC): Equifax, Experian and TransUnion. The performance timeframe was from 2015 to 2017.

VantageScore
a higher level of confidence

2017 Highlights

- On a U.S. population representative of Mainstream consumers (consumers conventionally scored by generic scoring models)
  — VantageScore 4.0 outperforms all previous versions of VantageScore, as well as all CRC scores in both originations and account management and all product areas.
  — VantageScore 4.0 greatly improves upon VantageScore 3.0 in the Bankcard and Mortgage Originations space.
  — VantageScore 4.0 use of trended attributes has brought significant improvements in Prime and Super-Prime settings where half the attributes being used to score are based on trends. 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 provided by the machine learning techniques used in its development on this sparse data population.
- Emerging from the VantageScore attribute leveling process (extended in VantageScore 4.0 also to attributes computed 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 Data Results

Trended attributes make a significant contribution to VantageScore 4.0. For consumers in the prime and super-prime score range trended attributes have provided significant improvements in determining credit risk. The following chart highlights the "contribution to score" (CTS) profiles that trended attributes provide. Trended attributes contribution to score more than doubles in low risk (Prime and Super Prime) scorecards as compared to high risk (Subprime, Near Prime and Thin & Young) scorecards.
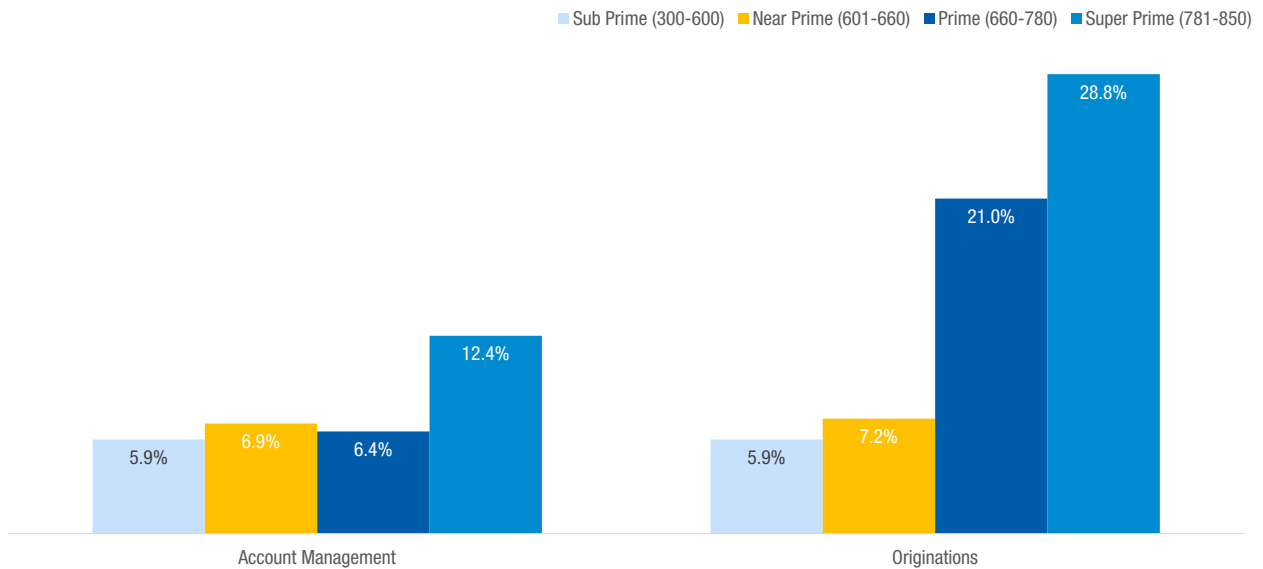
Figure 1
Trended attributes contribution to Model by Credit Tier: Mainstream Consumers

■ Trended ■ Static

	Sub Prime	Near Prime	Prime	Super Prime
Trended	17.1%	19.5%	42.5%	44.5%
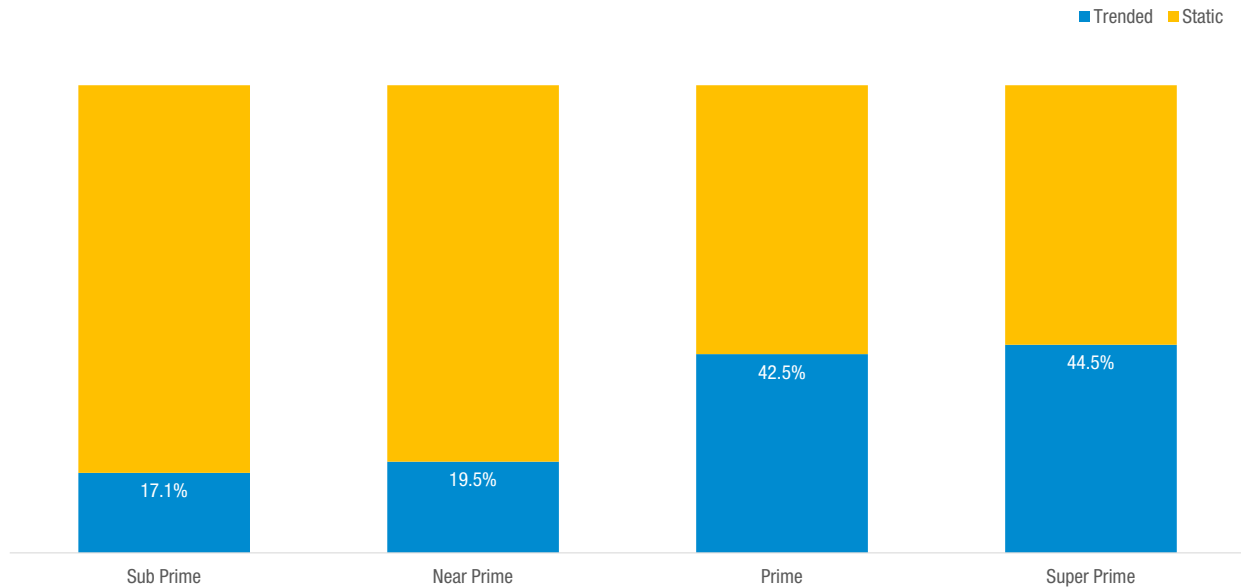
VantageScore 4.0 with trended attributes show significant improvements, especially in originations. Prime and Super Prime consumer scores outperform VantageScore 3.0 by 20%-30% for new account originations and 6.5%-12% for existing account management.

Figure 2
VantageScore 4.0 vs. VantageScore 3.0: % Gini Lift by Credit Tier (Mainstream Consumers)

■ Sub Prime (300-600) ■ Near Prime (601-660) ■ Prime (660-780) ■ Super Prime (781-850)

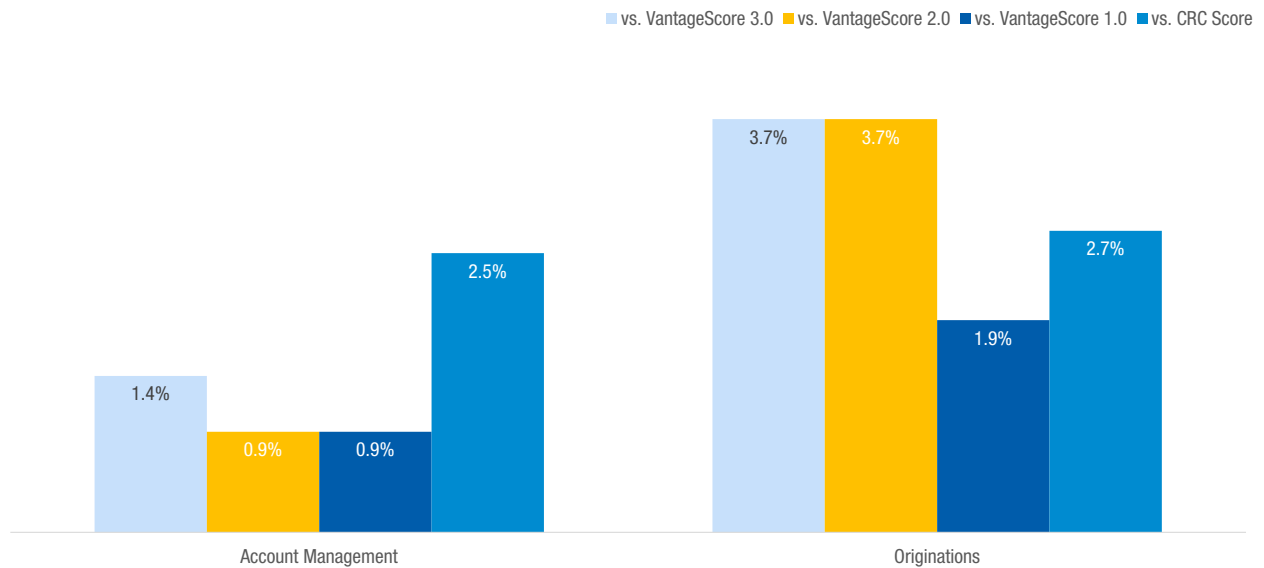|	Sub Prime	Near Prime	Prime	Super Prime
Account Management	5.9%	6.9%	6.4%	12.4%
Originations	5.9%	7.2%	21.0%	28.8%

Score performance on mainstream consumers will showcase how VantageScore 4.0 outperforms all previous versions of VantageScore for all major lending industries.

INDUSTRY RESULTS

Bankcard Overall Performance:
VantageScore 4.0 shows improved predictive performance when compared with all previous versions of VantageScore with Bankcard accounts. Highlighted by improvements in the Originations space (average of 3% lift in Gini value), as well as in the Account Management space (average of 1% lift in Gini values) VantageScore 4.0 improves upon both VantageScore 3.0 and VantageScore 2.0. VantageScore 4.0 shows an average of 2.5% lift comparing with all CRC models and all account types.
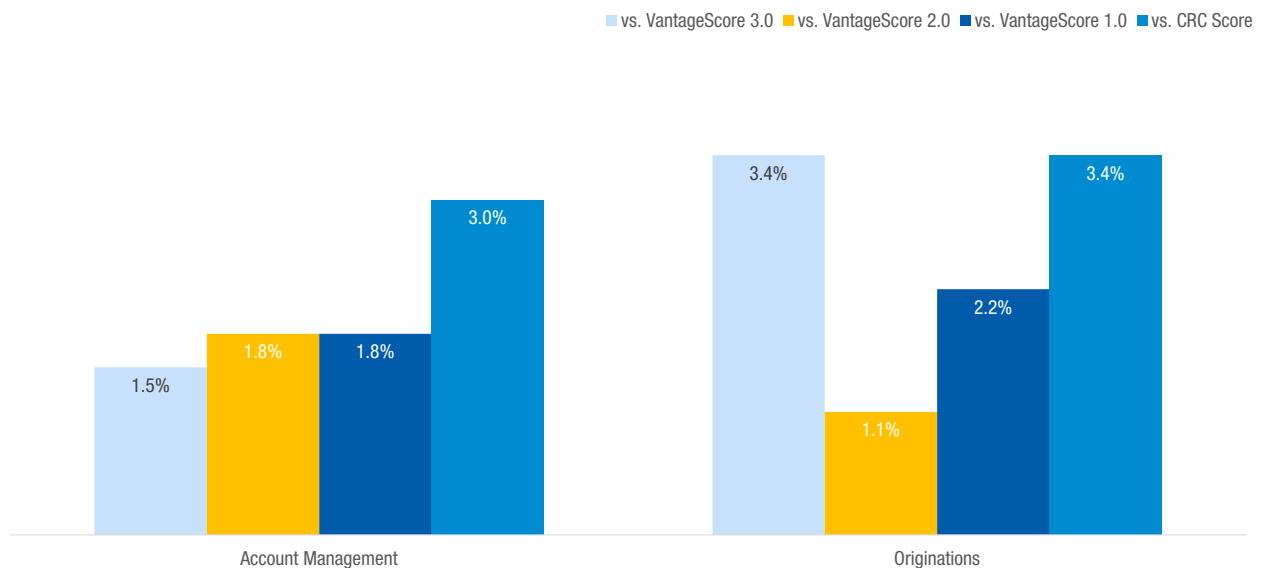
Figure 3
VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Bankcard

Legend: ■ vs. VantageScore 3.0 ■ vs. VantageScore 2.0 ■ vs. VantageScore 1.0 ■ vs. CRC Score

Account Management: 1.4%, 0.9%, 0.9%, 2.5%
Originations: 3.7%, 3.7%, 1.9%, 2.7%

Mortgage:
VantageScore 4.0 shows improved predictive performance comparing with all previous versions of VantageScore. In terms of new account origination trades, VantageScore shows an average of 2.2% lift in Gini value with VantageScore 4.0 improving on VantageScore 3.0 by 3.4%. With on-going account management trades VantageScore 4.0 shows an average of 3.0% lift comparing with all CRC models and a 1.5% to 1.8% improvement amongst all previous versions of VantageScore.

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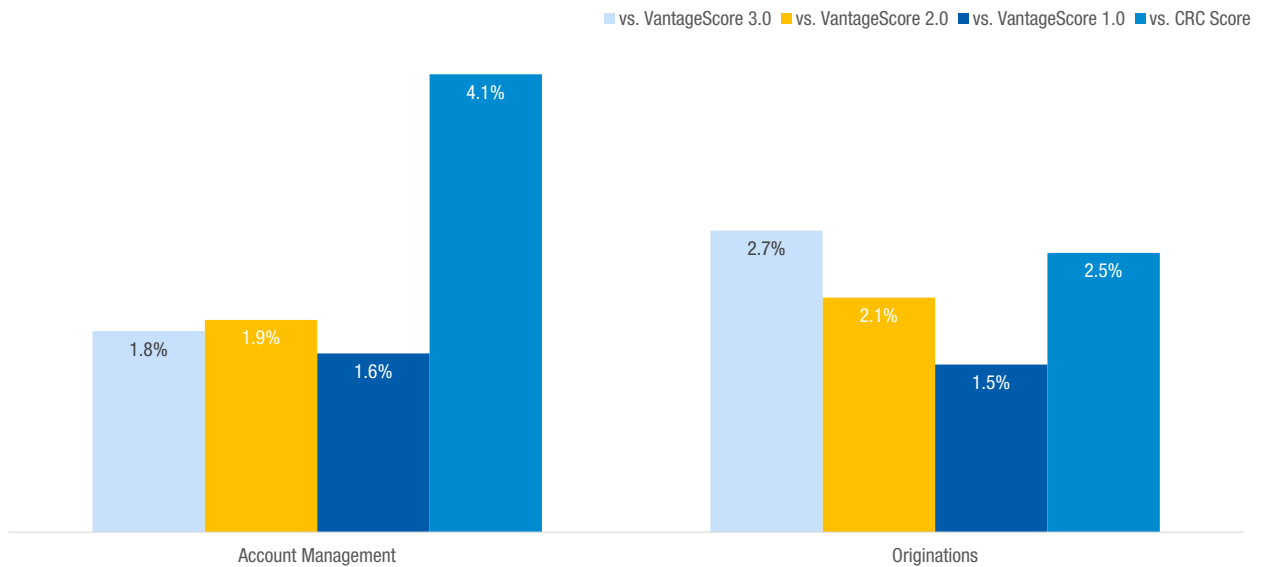**VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Mortgage**

Legend: ■ vs. VantageScore 3.0 ■ vs. VantageScore 2.0 ■ vs. VantageScore 1.0 ■ vs. CRC Score

Account Management: 1.5%, 1.8%, 1.8%, 3.0%
Originations: 3.4%, 1.1%, 2.2%, 3.4%

Auto:

VantageScore 4.0 shows improved predictive performance comparing with all previous versions of VantageScore. In the Originations space VantageScore 4.0 outperforms by an average of 2% lift in Gini value over previous versions of VantageScore. In the Account Management space VantageScore showed an average of 1.8% lift in Gini values over previous VantageScore versions. VantageScore 4.0 shows an average of 3.3% lift comparing with all CRC models and all account types with an emphasis on existing accounts with a 4.1% increase.

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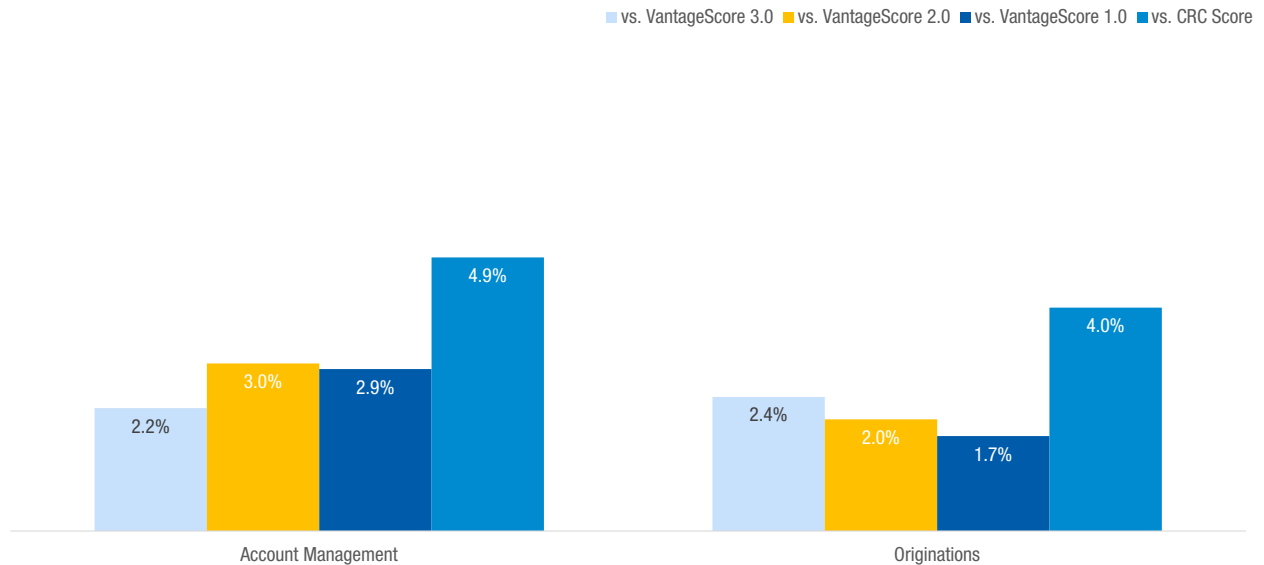**VantageScore 4.0: % Gini Lift by Credit Tier (Mainstream Consumers) – Auto**

vs. VantageScore 3.0 ■ vs. VantageScore 2.0 ■ vs. VantageScore 1.0 ■ vs. CRC Score

	Account Management				Originations			
vs. VantageScore 3.0	1.8%				2.7%			
vs. VantageScore 2.0		1.9%				2.1%		
vs. VantageScore 1.0			1.6%				1.5%	
vs. CRC Score				4.1%				2.5%

Installment:

VantageScore 4.0 shows improved predictive performance comparing with all previous versions of VantageScore 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 comparing with all CRC models and all account types.

Figure 6

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

vs. VantageScore 3.0   vs. VantageScore 2.0   vs. VantageScore 1.0   vs. CRC Score

Account Management
- 2.2%
- 3.0%
- 2.9%
- 4.9%

Originations
- 2.4%
- 2.0%
- 1.7%
- 4.0%

Score Performance – Universe Expansion Consumers

Universe Expansion consumers are generally thought of as consumers, who through their unconventional use of credit, cannot be scored by traditional credit scoring methods. There are approximately 30 million consumers in the US that are defined by this credit usage. These consumers are defined as:

- New Entrants – consumers with trades that are six months or younger;
- Infrequent Users – consumers who have not used credit within the last six months but have used credit within the last 24 months;
- 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.

VantageScore 4.0 has redeveloped it's modeling of these consumers by leveraging machine learning techniques to determine the best attributes to determine risk on these consumers. The 2017 validation report represents the first time UE validations can be compared using VantageScore 4.0 to VantageScore 3.0 Gini coefficients. VantageScore 4.0 outperforms VantageScore 3.0 by 10% for new account originations and 4.2% for existing account management trades.
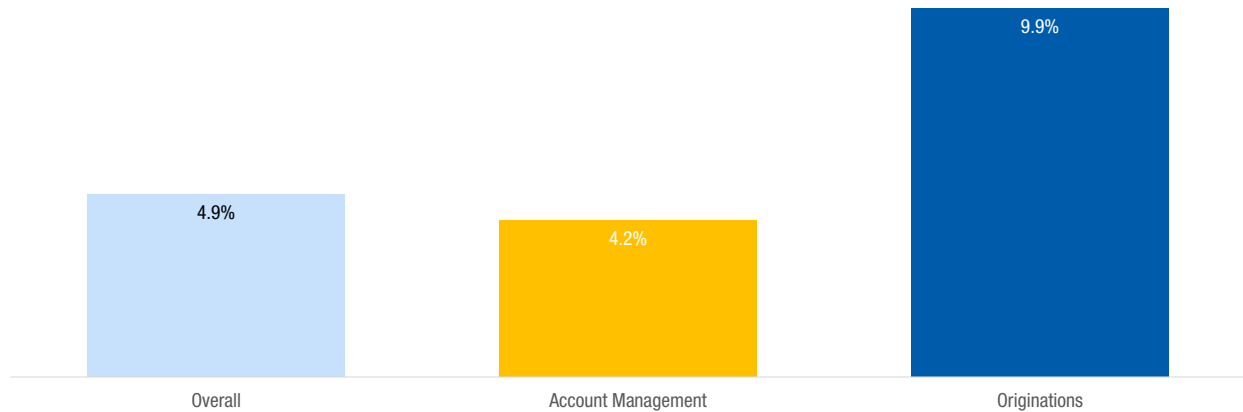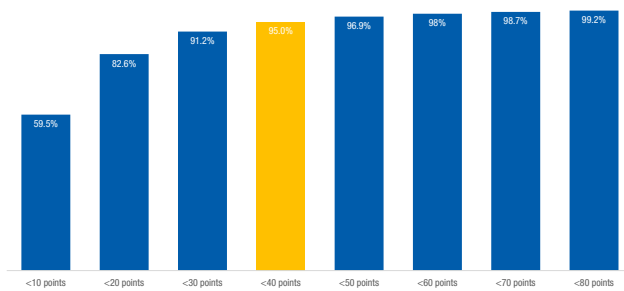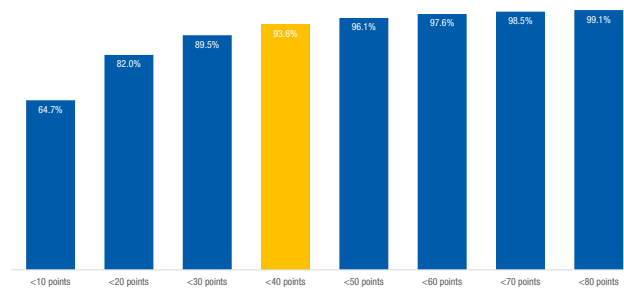
Score Consistency

VantageScore 4.0 and earlier VantageScore models are the only credit score models to employ the same characteristics information and the same model at each of the three CRC national databases. Consequently, differences in credit scores are solely attributable to variances in the consumer's credit file data. On a sample of bankcard consumers with credit files at all three CRCs, 82.0% had three VantageScore credit scores within a 20 point range and 94.8% of the consumers had three scores within a 40 point range. Likewise, comparing mortgage consumers across the 3 CRCs, 82.6% had the VantageScore credit scores within 20 points and 95.0% had 3 scores within 40 points. The consistency consumers receiving scores within 40 points of VantageScore 4.0 has improved upon VantageScore 3.0by 1.2% to 1.4% with bankcard consumers and mortgage consumers respectively.
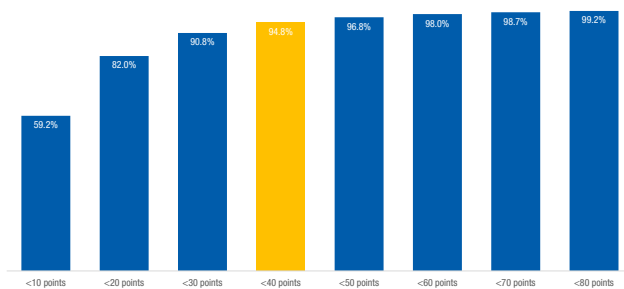
Figure 8
VantageScore 4.0 Score Consistency – Mortgage

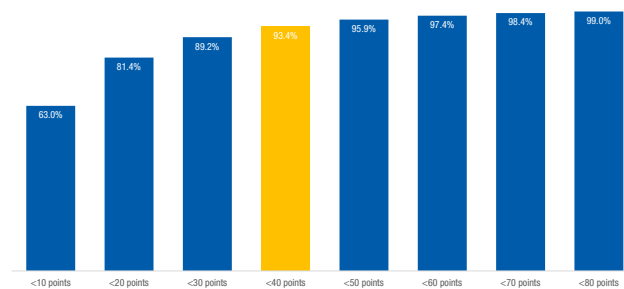VantageScore 3.0 Score Consistency – Mortgage

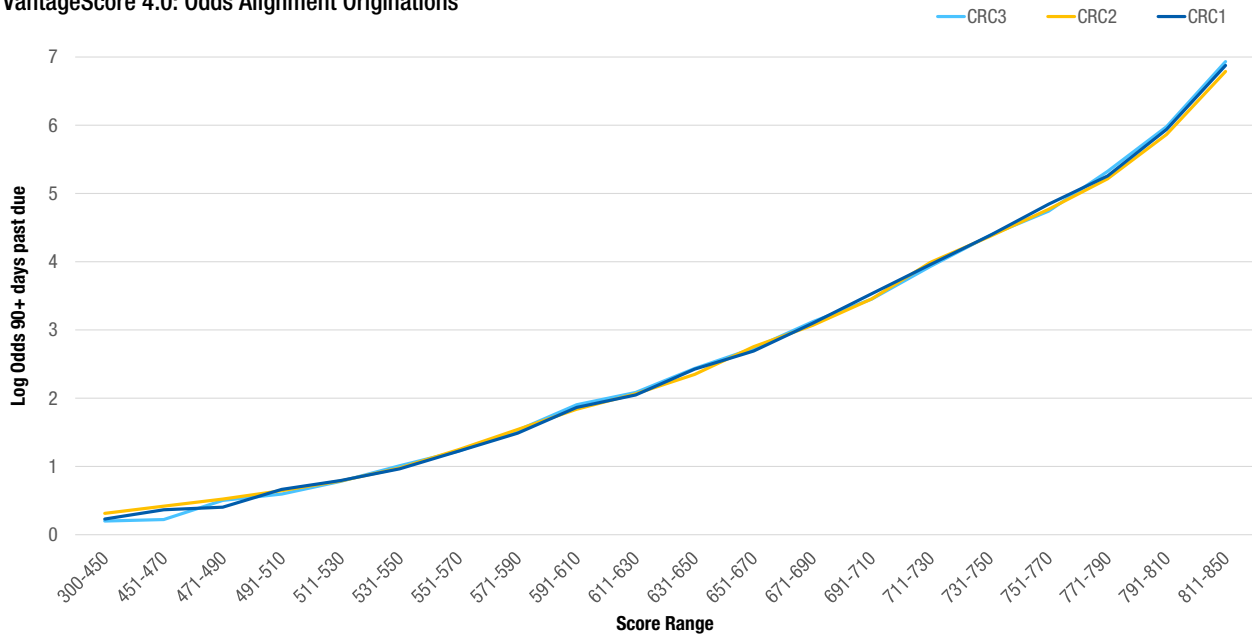**Figure 9**
VantageScore 4.0 Score Consistency – Bankcard

VantageScore 3.0 Score Consistency – Bankcard

In terms of predictive consistency, VantageScore 4.0s Gini results among bureaus remain strongly consistent for both Originations (0.5 Gini difference) and Account Management (0.1 Gini difference). 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 origination rates.

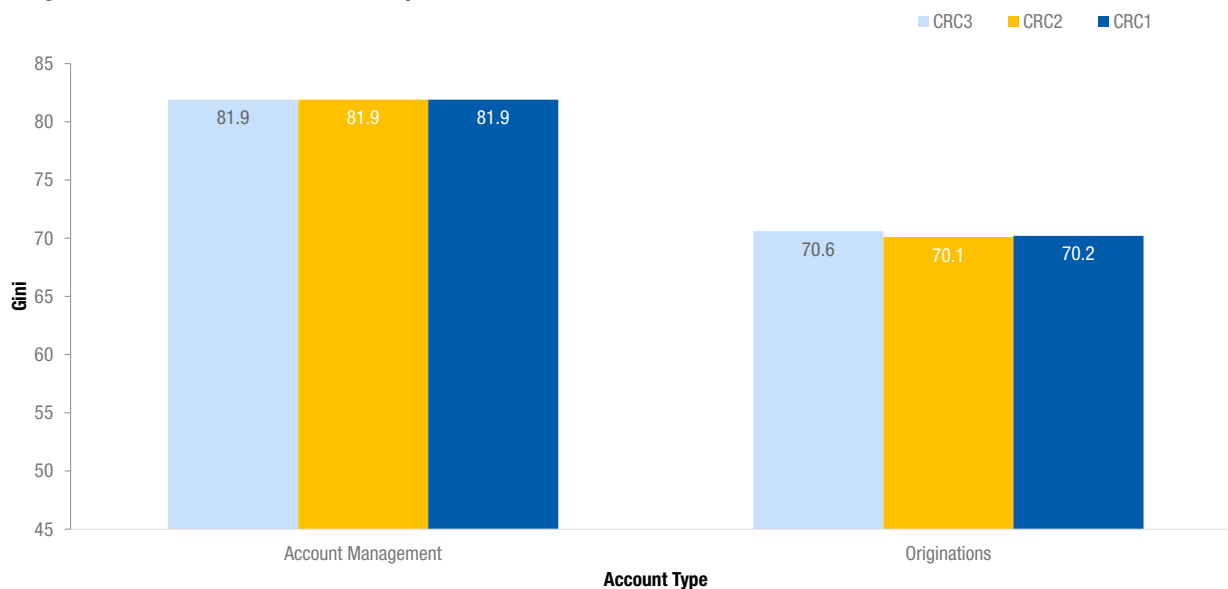**Figure 11**
VantageScore 4.0: Odds Alignment Originations

Figure 11
VantageScore 4.0: Odds Alignment Account Management

Figure 10
VantageScore 4.0: Performance Consistency Overall
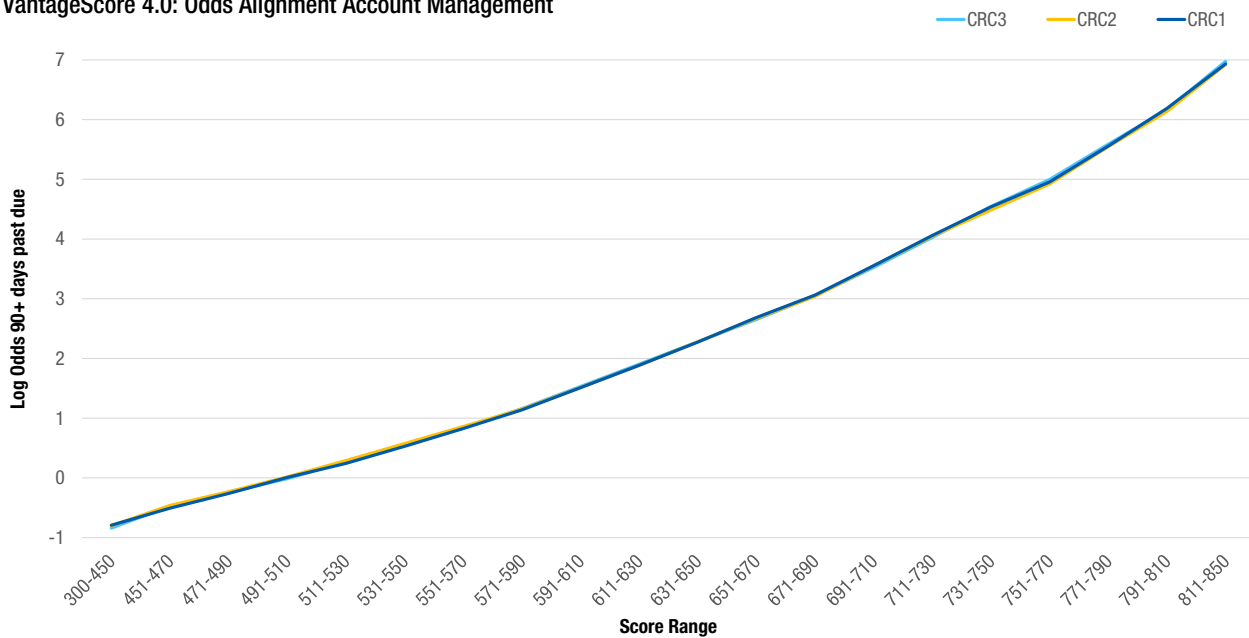
Figure 10: VantageScore 4.0: Performance Consistency Overall

CONCLUSIONS

The 2017 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. VantageScore 4.0 leverages trended data for mainstream consumers and newly designed machine learning attributes for non-mainstream consumers. In both settings VantageScore 4.0 has outperformed all previous versions of VantageScore and has produced our strongest results to date.

Although lenders should independently validate models based on their own portfolios and strategies in accordance with the OCC 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 on the consumers credit file.

The VantageScore model is licensed to the three major CRCs, Equifax, Experian, and TransUnion, who each in turn market and sell the credit scores. Lenders and other commercial entities interested in learning more about the VantageScore models may contact one of the CRCs listed to the right 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:

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