Boosting Predictive Power using Multiple Scores in the Credit Invisible Population

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INTRODUCTION

Tens of millions of consumers in the United States are part of the “credit invisible” population, those who are unable to receive a conventional credit score. However, by using the VantageScore® 3.0 universe expansion scoring method, these consumers can now be scored. This paper demonstrates that by evaluating VantageScore 3.0 from three independent sources (i.e., Credit Reporting Companies or “CRCs”), lenders can easily boost the predictive level of risk assessments – by more than 20 percent for a quarter of consumers who are typically credit invisible – to the accuracy levels that are obtained when assessing the default risk of consumers with full credit files who are scored by typical generic credit scoring models.

CONTEXT

Credit invisible consumers are those who either have not engaged with credit in the last six months or only have seriously derogatory information, such as public records or third-party collections, in their credit files. They are mostly Sub-Prime or Near Prime in terms of credit behaviors. When evaluating the quality of a scoring approach designed for these consumers, its effectiveness should be compared using three criteria:

- How does the statistical measure of predictive model performance compare with models designed solely for full-file consumers who fall into similar credit tiers?
- Does the model effectively rank order credit invisible consumers, with no evidence of non-monotonicity?
- Does the model score credit invisible consumers such that their default rate at a given score band aligns with the default rate for full-file consumers in the same score band?

VantageScore Solutions annually validates its universe expansion scoring method to ensure that its performance satisfies all three of these criteria. The white paper Universe Expansion: Is the way you score customers state of the art or state of denial? provides a full discussion of these results.

The results are summarized below:

- The universe expansion scoring method has a Gini coefficient of 54.78.
- The method effectively rank orders consumers with sparse credit files, demonstrating a monotonic default rate profile.
- Default rates for universe expansion consumers in a specific credit score band align with those for consumers scored using full credit file data and conventional scoring models.

In a companion white paper, The Predictive Value of Score Consistency, the study demonstrated that by using two VantageScore 3.0 scores, each sourced at the same time from two independent CRCs, lenders can boost credit score performance by using a credit score verification process. The same verification process also can identify potential credit model risk exposure from credit scores that cannot be verified in this manner.

This white paper examines a verification process that uses credit scores from all three CRCs on the universe expansion population. By using VantageScore 3.0 from all three CRCs, lenders can identify new opportunities on an underserved population while enjoying significant increases in predictive power. This methodology is especially relevant for mortgage lending, where multiple credit scores are obtained to determine how to originate and set the terms of the loan.
SUMMARY INSIGHTS

VantageScore 3.0 has expanded the credit consumer base to reach the traditionally “credit invisible” population. Although the information in these consumers’ credit files is thinner than the information contained in the credit files of traditional consumers, combining the credit scores from multiple reports can boost predictive accuracy for lending decisions. By establishing a credit score “verification” process, VantageScore 3.0 can yield a ‘twice verified score’ which delivers more than 20 percent predictive performance improvement in the credit scores of approximately a quarter of these consumers. Alternatively, for those consumers whose credit scores cannot be verified, this analysis will bring to light the risk exposure from using such unverifiable credit scores.

ANALYSIS BACKGROUND

For this analysis, 1.2 million universe expansion consumers were sampled and scored using VantageScore 3.0 from one of the CRCs in the 2013 timeframe. The same sample of consumers was then scored using VantageScore 3.0 from the two other CRCs in the same time frame. Then all three VantageScore 3.0 scores were used in a credit score verification process where the original VantageScore 3.0 was verified using the VantageScore 3.0 scores from the other two CRCs by using the rank percentile method described below.

THE VERIFICATION PROCESS USING MULTIPLE CREDIT SCORES

Credit scores are a three-digit score that are used to measure probability of default. Credit scores can use a variety of ranges, 300 to 850, 200 to 900, 501 to 990, etc., which is challenging when trying to make a direct comparison for verification purposes. Yet, the message is the same regardless of credit score range: the higher the credit score, the more likely the consumer will not go into default meaning 90 days past due over a two-year time frame.

All credit scores have an underlying principle of rank ordering consumers from best to worst in terms of their probability of not defaulting. Given this principle, the rank ordered population can be assigned to a specific population percentile to indicate its risk tier relative to the rest of consumers. This scaling approach is no different than the SAT/ACT score percentile or childhood development (e.g., height and weight profiles) population percentiles. For example, a consumer in the 5th percentile based on their credit score rank is in the top 5 percent of the population. A consumer in the 80th percentile is in bottom 20 percent of the population.

Using this percentile assignment approach, the consumer’s risk assessment from any credit score can be compared with their risk assessment from another credit score to analyze the scores’ ability to assign the consumer to the same percentile of risk or to very different percentiles. When the percentile is the same or very similar from both credit scores, the risk assessment is verified. When the percentile rankings are very different, the risk assessment is not verified.

For the purposes of this analysis, if the two percentile rankings are within four percentile ranks of each other, the credit scores are verified. If the difference is five ranks or greater, then there is greater risk exposure in using that particular credit score for credit evaluation.

MEASURING CREDIT SCORE CONSISTENCY FROM INDEPENDENT CRC SOURCES

Although VantageScore 3.0 is used at each CRC, the individual credit score distributions of VantageScore 3.0 at each CRC may differ. A straight-forward method to compare such credit score distributions is to establish a common range for all credit score distributions. A direct comparison of any credit scores, regardless of initial credit score distribution, can then be made by measuring the difference in the consumer’s percentile ranking for each credit score. In other words, you would compare the percentile ranks of each credit score to see if they put the same consumer in the same risk percentile. The extent to which the resulting percentile ranks are aligned will reveal whether the three credit scores yield consistent risk profiles on the same consumer or result in different risk profiles.

IDENTIFYING CONSISTENT CREDIT SCORES BOOSTS PREDICTIVE POWER

For this study, VantageScore 3.0 universe expansion credit scores were gathered on 1.2 million consumers across the three CRCs. The percentile ranks were calculated on each of the VantageScore 3.0 credit scores from the CRCs. The percentage-based verification process was then conducted comparing the differences, if any, between the two scores’ percentile ranks.

Using this method, a credit score can be verified, at most two times, by two VantageScore 3.0 credit scores from two separate CRCs. The following table shows the population distribution of universe expansion credit scores being verified by two other sources (Figure 1).
Figure 1: Percent of universe expansion population by credit score verification level.

<table>
<thead>
<tr>
<th>Verification Level</th>
<th>Universe Expansion Population %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twice verified</td>
<td>23.5%</td>
</tr>
<tr>
<td>Once verified</td>
<td>38.1%</td>
</tr>
<tr>
<td>No verification</td>
<td>38.4%</td>
</tr>
</tbody>
</table>

Over 60 percent of universe expansion credit scores can be verified at least one time and nearly 25 percent of universe expansion credit scores can be verified twice.

How much more predictive is a verified credit score versus an unverified credit score? A standard measure of predictive power is a Gini coefficient. 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 credit score possible. If a credit score has a Gini coefficient of 45 or greater, that is considered a good result by industry standards.

The bar charts below highlight the predictive improvement by verifying universal expansion credit scores from other CRCs when determining 90 days or more past due events on both originations (Figure 2) and existing account management (Figure 3).

The red lines show the overall Gini coefficients for both new accounts and existing accounts. A universe expansion credit score that verifies twice yields an 11 to 14-point improvement versus the overall predictive performance. This translates to a 20 to 26 percent improvement in overall credit score levels.

**Risk Quality**

What credit score values do these twice verified consumers typically get? Figure 4 on the following page shows the cumulative credit score range of twice verified universe expansion credit scores by percentage that fall above specific VantageScore 3.0 score levels. In terms of population distribution, about 37.6 percent of the twice verified universe expansion credit scores were greater than 600 and, therefore, those consumers would qualify in the conventional lending space. Indeed, 22.6 percent of these consumers score above 660.

This translates to between 2-3 million highly creditworthy consumers with twice verified credit scores using the VantageScore 3.0’s universe expansion credit scoring models.
CONCLUSION

When using credit scores from the universe expansion population, lenders may have some lingering questions about the accuracy of these credit scores since they don’t rely on conventionally updated credit risk profiles. The foregoing analysis demonstrates that by combining and verifying such credit scores using VantageScore 3.0, lenders can improve those score’s predictive levels to traditional credit scoring levels by using a two-CRC verification process to identify consistent and predictive risk scores. On the other hand, if the credit scores do not verify, lenders should consider whether they should conduct further evaluations to ensure that they will not be exposed to unnecessary defaults or lost revenue opportunities.

This analysis further shows that there are approximately three million additional credit-worthy consumers who are currently underserved by conventional generic credit risk models but who may be credit scored using VantageScore 3.0 in this manner, with a resulting predictive performance which is on par with conventional consumer risk models.