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The D&B Collections Risk Solution
User Understanding & Compliance Manual

This document is intended to address the following questions:

- ✓ *What is the D&B Collections Risk Solution?*
- ✓ *What are the components of the Collections Risk Solution?*
- ✓ *How do I use the D&B Collections Risk Solution to build a collections strategy?*
- ✓ *What is the availability and how do I access the D&B Collections Risk Solution?*
- ✓ *How was the underlying Collections Risk Model constructed?*
- ✓ *How does the Collections Risk Model Perform?*
- ✓ *How was the D&B Collections Risk Solution implemented and tested?*
- ✓ *What are the assumptions and limitations of this solution?*

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I. Introduction

The D&B Collections Risk Solution was created to provide lenders with enhanced ability to optimally manage their collections resources through better segmentation of their portfolio of outstanding balances. Leveraging improvements in both data and advanced analytics, the new collections management tool provides a significant performance improvement over prior collections tools. By arming lenders with better insight into the potential for collecting on outstanding debt, this tool maximizes the ROI in collections resources. Using this solution, lenders are enabled to prioritize collections efforts and select the most appropriate risk mitigation actions for each account. This will allow lenders to focus on the individuals who may need further contact or support to bring their account up-to-date. The ability to make this distinction is essential, as companies often face the further challenge of balancing limited resources in this area as well as making sure that customers are treated fairly.

The solution will also give lenders the ability to dynamically view their total outstanding balances categorized in each of these priority levels as conditions change. The result is better management of the overall collections (and pre-collections) processes resulting in decreased cost of managing delinquent accounts and a higher overall recovery rate.

II. What are the components of the Collections Risk Solution?

The D&B Collections Risk Solution features a Prioritization Index derived from a crosstab (shown in Figure 1 below) of the Collections Risk Score ((risk segment) and AR aging (delinquency) category (measured in days-past-due (dpd) for a given portfolio of delinquent accounts. The Collections Risk Score (detailed in section V) is calculated on all commercial entities in the D&B US universe and is updated daily.

Figure 1: Prioritization Index Formulation

	AR Aging Category (dpd)				
Risk Segment	Current	1-30	31-60	61-90	90+
VH	**2A**	**1**	**1**	**1**	**1**
H	**3B**	**2A**	**2A**	**1**	**1**
M	**4**	**3B**	**3A**	**2A**	**1**
L	**5**	**4**	**3B**	**3A**	**2A**
VL	**5**	**5**	**4**	**3B**	**3A**

III. How do I use the Collections Risk Solution to build a collections strategy?

The D&B Collections Prioritization solution will not only prioritize accounts based on likelihood of making a payment, but also provide you a basis for selecting the type of approach to use on different customers. Some customers will naturally require less interaction than others to prompt a payment (See Figure 2 below for typical differentiation between how high risk and low risk customers are best handled). Deciding how frequently and through which channel to contact a given customer can be a challenging task. The wrong approach can set up a negative experience for the customer; as well as your recovery potential.

Figure 2 Establishing Risk-Dependent Actions

	Profile	Action	Result
High Risk	•Demonstrated Likelihood to Become Severely Delinquent •Likely to Require Pressure to Get Payment Early	•Early, Aggressive Calling •Faster Follow-up •Early Resolution to Third Party Collectors	✓Dollars Received Sooner ✓Higher Recovery per Call (earlier in cycle) ✓Higher Recovery via Third Party (earlier placement)
Low Risk	•More Likely to be Billing/Customer Service Issues •Likely to Respond to Letters	•Give Low Cost Letters Time to Work •Less Frequent Follow-up	✓Cost Savings From Applying Fewer Resources ✓More Resources Available for High Risk Accounts

By establishing different actions or sets of actions for each value of the prioritization index, bad debt risk can be better managed. Since the actions are strategic and crucial to effectively minimizing losses, careful thought should be given to their design. Some examples of the different actions that a lender can take, based on their insight of the borrower's propensity to repay are:

- **Call/Send letter to notify borrower of unreceived payment(s) and outstanding balance**
- **Queue accounts unlikely to make payment, be first to get paid in a liquidation**
- **Reduce work effort on accounts most likely to "self-cure"**
- **Decrease credit line or close account**
- **Consider offering an early settlement**
- **Involve a third-party collections agency**

The D&B Collections Prioritization Solution provides key insight into distinguishing between accounts likely to cure on their own and those that will not. This insight is essential to the

efficient use of your collections resources and maximizing the total recoveries achieved. When coupled with the current delinquency (AR receivable) status, the level of urgency as well as experience level of the account manager will vary accordingly – as the table (illustrative example only) below depicts.

Figure 3. Collections Prioritization Example

	Receivables Aging Category					Grand total
	Early Stage Collections			Late Stage Collections		
Collections Risk Score	1-30 DPD	31-60 DPD	61-90 DPD	91-120 DPD	121-180 DPD	
Very High	$ 50,000	$ 40,000	$ 30,000	$ 30,000	$ 25,000	$ 175,000
High	$ 55,000	$ 45,000	$ 25,000	$ 25,000	$ 25,000	$ 175,000
Medium	$ 60,000	$ 50,000	$ 20,000	$ 20,000	$ 20,000	$ 170,000
Low	$ 65,000	$ 55,000	$ 15,000	$ 15,000	$ 15,000	$ 165,000
Very Low	$ 70,000	$ 60,000	$ 10,000	$ 10,000	$ 15,000	$ 165,000
Grand Total	$ 300,000	$ 250,000	$ 100,000	$ 100,000	$ 100,000	$ 850,000

	Call (most experienced collectors)
	Call
	Call/ Send Hard Letter
	Send Soft letter
	Self Cure

Only limited activity appropriate here due to **high propensity to self-cure**.

Dedicate most experienced collectors here due to **high propensity of write-off**

IV. The Collections Risk Solution: Availability/Access

D&B can deliver the insight from this solution in either transactional (immediate) or batch mode. The collections risk score and associated risk segment (see Figure 4 in Section V) along with the prioritization index will be appended to each submitted customer record. D&B customers using DirectPlus™ will have transactional access facilitated by the application. The Collections Risk Solution is available on any business (or set of businesses) in D&B's credit-active Universe. For batch mode requests, the scores, risk segment and prioritization indices will represent trade data from the most recent month.

V. DEVELOPMENT OF THE UNDERLYING RISK MODEL

The underlying Collections Risk Score was developed using state-of-the-art statistical modeling techniques to select and weight the data elements that are most predictive of bad debt losses. The resulting model is statistically formulated mathematical equation that consist of a series of variables and associated coefficients (weights) that have been calculated for each variable.

In the model development process, data is collected from two time periods designated as an observation window and a performance window. The *observation* window defines the sample used in the model and all identification and characteristic data are collected from this time period. The predictive variables and segmentation schemes are defined from this snapshot. The *performance* window defines the length of time the businesses in the sample are tracked to examine their performance.

In building the development sample for the Collections Risk Score, accounts from four *observation* windows (Jan-June from each of 2015, 2016, 2017, and 2018) were extracted from D&B's commercial archive, along with their associated *performance* windows spanning the six months immediately after each observation window (Jul -Dec from 2015, 2016, 2017, and 2018). A total of 236,461 business accounts were used in development. Of this population, approximately 2.8% (6,589) progressed to Collections ("bad debt") status and the dependent variable was flagged accordingly.

The completed model development sample contains (for each record) a set of attributes with values as of the observation snapshot and an outcome (dependent) variable as of the performance snapshot. An exploratory analysis is conducted to funnel down the total pool of potential model variables to a set of statistically predictive attributes for inclusion in the final model-formulation process. Single variable regressions (against the outcome variable – in this case collections placement) were utilized for 'variable reduction', leveraging the associated Information Value and Variance Inflation statistics to gauge the level of predictiveness and lack of overlap with other variables (multicollinearity). The final model was then formulated as a single-segment algorithm incorporating the most predictive attributes from D&B's Credit Score Archive Database (CSAD) and Detailed Trade Risk Insight (DTRI) data sources, including, but not limited to:

- D&B's Delinquency, Viability and Financial Stress scores
- D&B's Paydex index
- Total delinquent balance by category of delinquency
- Recency of each delinquency
- The borrower's worst payment status (over the most recent 12 months)

The scoring algorithm was built using and "Even-Odds" value of 340 with each 40-point increment representing a doubling of the Good:Bad odds. Thus, lower scores are associated with higher risk and higher scores are associated with lower risk. The overall range of scores for this model is estimated to be 101-670.

To effectively translate the scores of this model into a component of the overall Collections Prioritization Solution, the scores have been categorized into 5 levels (along with their associated risk of entering collections processing) as follows:

Figure 4. Mapping of Model Scores to Collections Risk Segments

Score Range	Risk Segment	Bad Debt Rate*
< 471	VH	12.20%
471-510	H	6.80%
511-550	M	3.40%
551-590	L	1.90%
591+	VL	0.80%

The categorization of Collections Risk Model scores into 5 Risk Segments provides a key input parameter to the formulation of the Collections Priority Risk Index (shown in Section II - Figure 1)

VI. How Does the Collections Risk Scoring Model Perform?

Performance Measured on the Development Sample

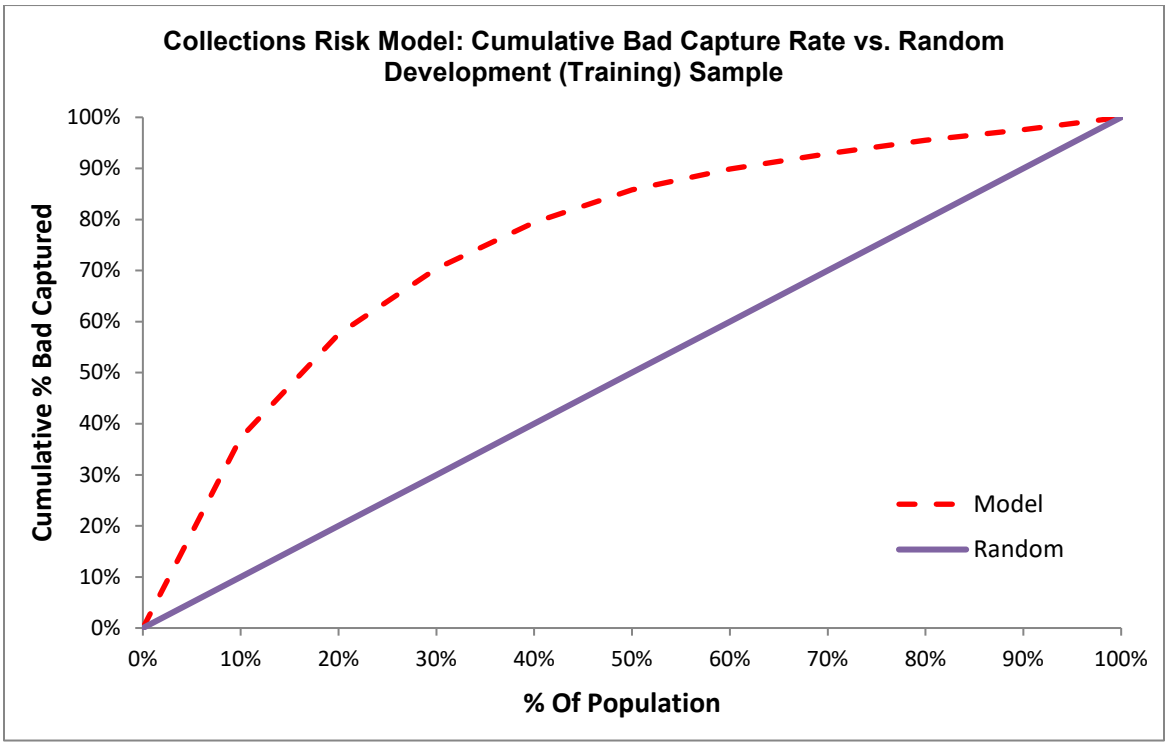
During model development, various statistics from the development sample are gathered like the trade-off curve shown above. Development statistics provide useful information that can be used to help management determine policy related to the use of the models. For several reasons, however**,** statistics from model development should not be construed as precise forecasts for individual portfolios, but rather as way of comparing models at the same stage of their lifecycle (e.g. “at time of development”)

One way to measure model performance is by examining a Cumulative Gains Chart. A Cumulative Gains Chart is a plot of ascending accumulation of good accounts vs. bad accounts. It is useful for illustrating model performance both at a score and across the spectrum of score distribution.

The Cumulative Gains Chart in **Graph 1** illustrates the effectiveness of the D&B Collections Risk Score. For example, in the worse scoring 20% of the cumulative population, the model identifies approximately 57.5% of the cumulative “bads”. This means that by eliminating the

worst scoring 20%, you would expect to capture or eliminate 57.5% of the “bads” in your portfolio.

Graph 1. Cumulative Gains Chart for The Collections Risk Score Development Sample



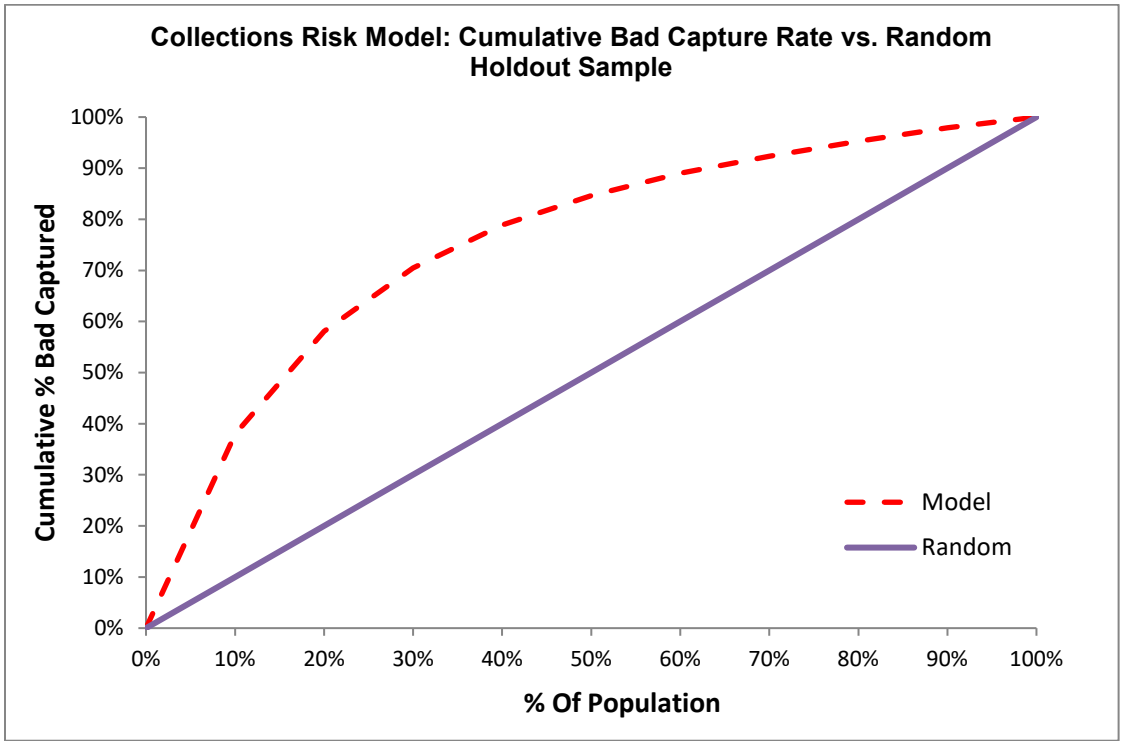
Summary Statistics
Development Sample Performance

	Sample Description
Number of Records	236,461
Number of Bads	6,589
Bad Rate	2.8%
	Performance Statistics
KS	41.9
GINI	53.6
Area Under ROC	76.8

Performance Measured on the Holdout Sample

The Cumulative Gains Chart in **Graph 2** illustrates the effectiveness of the D&B Collections Risk Score as measured on the "Hold-Out" sample. For example, in the worse scoring 20% of the cumulative population, the model identifies approximately 58.1% of the cumulative "bads". This means that by eliminating the worst scoring 20%, you would expect to capture or eliminate 58.1% of the "bads" in your portfolio.

Graph 2. Cumulative Gains Chart for The Collections Risk Score Holdout Sample



Summary Statistics
Hold-Out Sample

	Sample Description
Number of Records	177,345
Number of Bads	4,948
Bad Rate	2.8%
	Performance Statistics
KS	41.8

GINI	**53.4**
Area Under ROC	**76.7**

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VII. ASSUMPTIONS & LIMITATIONS

Model Assumptions

In D&B's Collections Risk Model (as in all predictive models) the most important assumption is that the relationships that were found to exist between the set of predictor variables and the outcome (in this case – the account being sent to collections) at the time of model development continue to hold true during future periods when the model is called upon to deliver insight.

Moreover, a reasonable level of consistency between the population used to develop (or "train") the model and that which the model is used to score is assumed

A more specific assumption: For business branch locations, the model will automatically produce results for the associated headquarter location

Model Limitations

A D&B Collections Risk score is available on approximately 28 million of the 30 million U.S.-based companies. D&B Collections Risk score is not available on business files that fall into the following categories:

- Business records with a missing or invalid address.
- Branch records with a foreign headquarter location.
- Businesses that have self-requested a DUNS Number and D&B has not yet investigated. Such cases are added to the D&B database as DUNS Support records and will remain as such until a thorough investigation yields more substantial information.

VIII. REGULATORY COMPLIANCE

All variables used as either segmentation or predictor variables in the D&B Collections Risk Scoring model strictly adhere to the requirements of the Equal Credit Opportunity Act. Specifically, this includes the handling of all protected classes (as it applies to commercial entities – officers, directors, owners, etc.) defined by the ECOA; including

- **Gender**
- **Age**
- **Race**
- **Color**
- **Religion**
- **National Origin**
- **Marital Status**
- **Ethnic Group**
- **With/Without Children**

In addition, there is no use of geographic-based predictors or segmentation variables (Zip, MSA, State, Region, etc.) in the Collections Risk Scoring Model.