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Understanding the UK D&B Delinquency Score

THIS DOCUMENT IS INTENDED TO ADDRESS THE FOLLOWING QUESTIONS:

- What is the Financial Stress Score?

- What does the D&B Delinquency Score predict?

- What is the availability of the D&B Delinquency Score?

- How is the D&B Delinquency Score calculated?

- How does the D&B Delinquency Score perform?

- What is the Relationship between the Financial Stress Score and Failure Rates?

INTRODUCTION

The UK D&B Delinquency Score, also known in some markets as the D&B Commercial Credit Score (CCS), predicts the likelihood that a company will pay its bills in a severely delinquent manner over the next 12-month period, based on the information in the Dun & Bradstreet Data Cloud.

To evaluate risks objectively and consistently, Dun & Bradstreet combines a large amount of business information with expert analysis and statistical techniques to determine the risk that can be associated with a business.

The integrity of the information contained in our Data Cloud is driven by our proprietary DUNSRight™ Quality Process. DUNSRight™ is our process for collecting and enhancing information. Plus, Global Data Insights and Analytics or GDIA strategy was created in 2012 to focus on advanced data improvements and innovations fueling the improvements in delivering predictive and actionable insight to our customers Our expert team of statisticians and economists lead the development of our Predictive Indicator solutions, the fifth and final component of the sequential DUNSRight™ process, and are responsible for turning our vast Data Cloud into actionable business insight, enabling you to make critical risk decisions with more confidence.

The UK D&B Delinquency Score is highly effective in helping to predict the potential solvency of your existing and prospective customers. The score can allow you to:

- Automate decisions for increased efficiency
- Process large volumes of transactions more quickly
- Free up resources to look at time-intensive borderline decisions
- Enable more consistent decisions across the entire organization
- Reduce the costs associated with full-scale application and annual risk reviews
- Apply scores across an entire portfolio to quickly identify risk and opportunity
- Manage collection resources with prioritized actions for delinquent accounts
- Satisfy regulatory needs for timely, consistent and objective review of decisions at the account level

This document explains in greater detail how the UK Delinquency Scoring System was developed.

UK D&B DELINQUENCY SCORE

WHAT THE D&B DELINQUENCY SCORE PREDICTS

The D&B Delinquency Score predicts the likelihood that a business will become severely delinquent in its payments over the next 12-month period. Dun & Bradstreet defines a severely delinquent company as one that fails to repay its financial obligations within 90 days past terms, or obtains legal relief from creditors, or ceases operations without paying all creditors in full over the next 12 months, based on the information in the Dun & Bradstreet Data Cloud.

The legal events which indicate a failed business in the UK are taken into account when predicting Delinquency and they are:

- Unfavorable out of business indicator
- Administrator Appointed
- Meeting of Creditors
- Bankruptcy
- 293 notice
- Voluntary Arrangements
- Sequestration Orders
- Administration Notice
- Petition to wind up
- Receiver registered
- Receiver appointed.

Companies which are not out of business and have experienced one or more of the above events will receive a raw score of 101 and a 1 to 100 score of '1' (one).

Note: Voluntary discontinuance involving no loss to creditors is not defined as financially stressed.

AVAILABILITY OF THE DELINQUENCY SCORE

The D&B Delinquency Score is available on approximately 5 million UK based businesses. This is known as the Scoreable Universe.

The following are not considered for scoring and are outside of the Scoreable Universe:

- Businesses which are Out of Business
- Foreign Registered Businesses

The D&B Delinquency Score will not be calculated for branches. Automatic trade-up to the headquarter location score will take place for branch locations.

To help ensure that our scores are based on correct information, Dun & Bradstreet has put in place a minimum level of data requirement. Only records that satisfy this minimum requirement will be scored.

To be given a score, businesses (Corporate and Non-Corporate) must meet the list of minimum requirements for UK:

- A valid SIC or
- Trade within 24 months or
- A CCJ or
- A charge or
- A Balance Sheet

Cases which do not meet these criteria are considered as part of the scoreable universe however will have a Raw Score of 100 and a 1 - 100 of Null.

Some conditions do not lend themselves to treatment with a statistical tool or are too severe to be dealt with by a statistical tool alone. Examples may include parent company in financial distress, special rare legal events or natural disasters. In these special cases, additional business rules may be applied in addition to the score calculation. The business rules generated in UK are listed below.

RULE	RAW SCORE	PERCENTILE
Foreign Company	Null	Null
Out of Business	Null	Null
Administrator Appointed	101	1
Bankruptcy	101	1
Winding Up Petition	101	1
Receiver Appointed	101	1
Sequestration	101	1
Company of Voluntary Arrangement	101	1
Meeting of Creditors	101	1
Receiver Registered	101	1
Administration Notice	101	1
293 Notice	101	1
First Gazette	396	5
Business Inactive	100	Null
Minimum Data	100	Null
Detrimental Auditors Report	396	5
High Risk Parent	396	5

SCORE DEVELOPMENT PROCESS

The Delinquency Scorecards were developed using rigorous statistical techniques for all stages of the modeling process. This helps ensure that the resulting model is stable and robust. Our process of checks and balances also includes validation of the models on separate samples from different time periods to help ensure stability over time.

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

January 2013 to December 2013. A total of 1,005,783 businesses were used in model development. Of this population, 934,093 were considered "Good" or non-financially stressed companies in the Dun & Bradstreet Data Cloud and 71,690 were considered "Bad", or financially stressed companies in the Dun & Bradstreet Data Cloud.

Sample data elements used in the model include:

- Demographic information such as industry size, corporate structure
- Financial information
- Dun & Bradstreet proprietary payment behavior information
- Legal events such as collections, liens and judgments

Appendix A contains a more comprehensive list of data elements which are used in calculating the score.

The following diagram shows the scorecard development steps
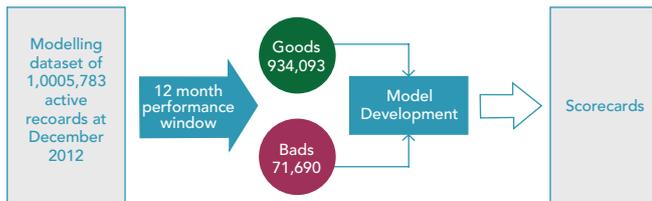
Dun & Bradstreet's statistical model development process includes the following steps:

- Segmentation analysis for optimal representation of risk behavior of various sub- populations of the scoreable universe.
- Selection of optimal attributes (predictors) for each segment The attributes selected by the statistical tool are also verified by the business experts to help ensure suitability in the local market conditions
- Optimal binning techniques to leverage data patterns observed in partition of the predictors
- Scoring algorithm calculation selected by the modeling technique used.

To help ensure model's robustness and stability of predictors a test and validation approach for model estimation is used.

To help ensure stability of the model over time, an additional validation is performed on samples from new time windows as well as on selected large customer portfolios.

The scoring algorithm formula calculates the probability of business delinquency. This predicted probability is then converted to a score using a scorecard which assigns points to each selected level of each predictor.

SCORING SYSTEM AND MODEL SELECTION

The ability to accurately assess risk varies greatly based on the availability of past payment performance data, so Dun & Bradstreet developed a scoring system that accounts for the correlation between past trade performance and future severe delinquency. The result is a suite of models consisting of multiple unique scorecards. This segmented approach is driven by the availability of trade data.

Each model was developed and optimized on a more homogenous subpopulation to account for both the size of the subject company as well as the amount of information contained in our Data Cloud on the business.

Having a system of models allows for better separation of "Good" and "Bad" accounts by focusing on unique populations. It also provides for the most predictive score possible optimized on the data available. The Delinquency Predictor Score, therefore, provides maximum risk discriminatory power with segmented scorecards for improved risk management decisions. Model segmentation is defined by:

- **No Trade Data:** Identifying those businesses that have not had trade data available for the past 12 months.

- **Dirty:** Identifying those businesses that have had detailed trade data available where 10% or more of the experiences are paid 90+ days beyond terms.

- **Clean:** Identifying those businesses that have detailed trade data available where less than 10% of the experiences are paid 90+ days beyond terms.

SCORING OUTPUTS – SCORE VALUES

The Delinquency Score assigns the following measurements of risk:

1. **A "Raw Score" of 101 - 999** is the initial output (sum of assigned points) where 101 represents businesses that have the highest probability of Delinquency, and 999 which represents businesses with the lowest probability of Delinquency. This Score provides a direct relationship between the score and the level of risk. The marginal odds of being Good doubles for each 40-point increase. For example, a business that scores a 240, on a marginal basis, is half as risky as a business that scores a 200. This score enables a customer to utilize more granular cutoffs to drive their automated decision-making process.

2. **A "Percentile Score" of 1 - 100,** where 1 represents businesses that have the highest probability of failure, and 100 which represents businesses with the lowest probability of Delinquency. This Score Ranking shows you where a business falls among businesses in the Dun & Bradstreet Data Cloud, and is most effectively used by customers to rank order their portfolios from highest to lowest risk of business failure.

As part of this release, the Raw Score calculation remains unchanged, i.e. the Raw Score is derived using the same algorithm and data elements as previously. The only change relates to a mapping table from the Raw Score to the Percentile Score. This was required to help ensure that the 1 - 100 score maintains a percentile distribution.
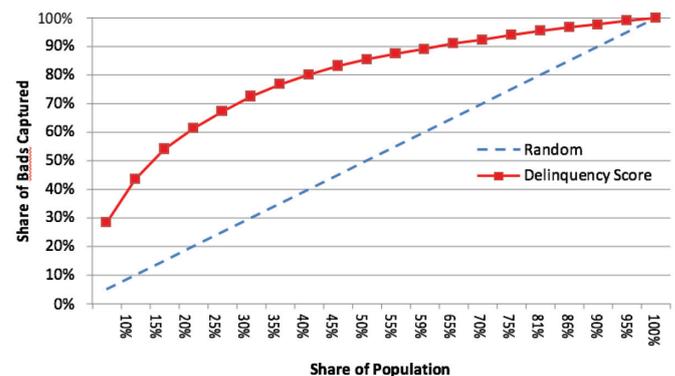
SCORECARD PERFORMANCE

Dun & Bradstreet applies stringent rules to model performance to help ensure that our scores meet the best in class performance standards. Measurements of model performance include an assessment of risk ranking, robustness and discriminate power. Metrics used are:

- Ranking accuracy by model, decile or quintile
- Close match between predicted and actual Bad rates
- The Kolmogorov-Smirnoff (K-S) statistic distance between cumulated distribution of Good and Bad cases as rank ordered by the model
- Predictive Index (Gini Index) assessment of model gains compared to a perforce classifier
- The lift Gain chart with emphasis on showing he improvement in capturing Bads at the 10th and 20th scores.

One of the typical ways to measure model effectiveness is by examining a trade-off curve. A trade-off curve is a plot of ascending accumulation of "Good" businesses vs. "Bad" businesses. It is useful for illustrating model performance both at a particular score and across the spectrum of score distribution.

The trade-off curve in Graph 1 illustrates the effectiveness of the Delinquency Score by identifying the delinquency captured within population groups. For example, at approximately 20% of the population, the Delinquency Score scores identified approximately 60% of the "Bads". This means that if a business focused on the worst scoring 20% of their portfolio using the Delinquency Score, they would capture 60% of the "Bads" in that group.

Graph 1: Delinquency Score Performance across All Size Segments

Scorecards are developed assuming that the relationships observed between past business characteristics and subsequent performance will hold true on future businesses. Because of this assumption, development statistics should be viewed as estimates and not precise forecasts of future performance at a given score.

SCORE PERFORMANCE MONITORING

Dun & Bradstreet is committed to delivering the highest quality scores to our Customers. Regular performance monitoring of the scorecards assures continual performance of the scores in helping identify risk. Scores that lose their predictive power are scheduled for redevelopment or recalibration.

RELATIONSHIP BETWEEN THE D&B DELINQUENCY SCORE AND PROJECTED DELINQUENCY RATES

The national average Delinquency rate, based on 2013 Delinquency statistics within the Dun & Bradstreet Data Cloud, is 7.13%.

Table 3 provides the national average Delinquency rates, based on information in the Dun & Bradstreet Data Cloud, by major industry group.

Table 3: National Average Delinquency Rate by Industry (Based on March 2016 Delinquency Statistics within the Dun & Bradstreet Data Cloud)

INDUSTRY GROUP	PROJECTED BAD RATE
Accommodation	6.62%
Administrative and Support Service Activities	7.83%
Agriculture	3.22%
Arts, Entertainment and Recreation	6.51%
Civil Engineering	5.37%
Construction of Buildings	6.55%
Consumer Manufacturing	5.88%
Domestic Personnel	9.43%
Education	5.26%
Electricity, Gas and Air Cond Supply	9.24%
Financial Activities	7.75%
Food and Beverage Service Activities	9.19%
Human Health and Social Work Activities	5.35%
Information and Communication	8.35%
Insurance	6.37%
Machinery and Equipment Manufacturing	4.77%
Mining	7.46%
Motor Vehicles and Motorcycles Trade	5.26%
Other	10.06%
Other Manufacturing	5.54%
Other Service Activities	6.47%
Postal and Courier Activities	7.74%
Professional, Scientific and Technical Activities	6.83%
Public Administration and Defence	7.42%
Real Estate Activities	8.43%
Retail Trade (Except Motor Vehicles)	7.34%
Specialised Construction Activities	5.77%
Transport Equipment Manufacturing	5.87%
Transportation and Storage	6.62%
Water Supply/Sewerage/Waste Manag.	7.03%
Wholesale Trade (Except Motor Vehicles)	6.29%

APPENDIX A

Following is a list of some of the data elements used in the Delinquency Scoring Model:

Demographic/Public Records Information

FACTOR
UK Region
Time since Registration
Primary SIC Code
Immediate Parent Financial Strength Indicator
Number of Mortgage Debentures
CCJs

Financial Information

FACTOR
Ratios and Trends from the Balance Sheet
Ratios from the P&L Account

Payment Information

FACTOR
Standard Deviation of PAYDEX®
Averages based on detailed incidences of late payments within specific time buckets

APPENDIX B

PROJECTED PERFORMANCE TABLES

The following Projected Performance Table is based on the Country database. Actual performance for a customer portfolio may vary based on the account selection within that portfolio. Based on March 2016 within the Dun & Bradstreet Data Cloud.

Detailed Projected Performance Table

CUMULATIVE DELINQUENCY SCORE PERFORMANCE					
SCORE RANGE	SCORE RANGE (APPROX)	% OF BUSINESSES (APPROX.)	BAD RATE	% OF BAD ELIMINATED	GOOD-BAD RATIO
584 - 615	100 - 100	5%	0.65%	99.05%	152
578 - 615	99 - 100	9%	0.74%	97.83%	134
573 - 615	98 - 100	14%	0.83%	96.34%	120
569 - 615	97 - 100	18%	0.89%	94.82%	111
565 - 615	96 - 100	23%	0.93%	93.02%	106
562 - 615	95 - 100	27%	0.96%	91.62%	103
556 - 615	93 - 100	35%	1.05%	88.31%	94
552 - 615	92 - 100	39%	1.12%	85.98%	88
548 - 615	91 - 100	43%	1.19%	83.81%	83
542 - 615	90 - 100	47%	1.26%	80.95%	78
527 - 615	88 - 100	54%	1.42%	75.52%	70
509 - 615	84 - 100	60%	1.59%	69.61%	62
496 - 615	76 - 100	65%	1.76%	63.57%	56
485 - 615	65 - 100	70%	1.93%	57.03%	51
476 - 615	55 - 100	75%	2.06%	50.86%	48
461 - 615	44 - 100	80%	2.18%	44.35%	45
449 - 615	33 - 100	85%	2.33%	36.96%	42
439 - 615	22 - 100	90%	2.51%	27.83%	39
426 - 615	9 - 100	95%	2.67%	19.32%	36
101 - 615	1 - 100	100%	3.13%	0.00%	31

DELINQUENCY SCORE PERFORMANCE WITHIN RANGE			
SCORE RANGE	SCORE RANGE (APPROX)	BAD RATE	% OF BADS ELIMINATED
584 - 615	100 - 100	0.65%	0.95%
578 - 583	99 - 99	0.83%	1.22%
573 - 577	98 - 98	1.01%	1.48%
569 - 572	97 - 97	1.09%	1.53%
565 - 568	96 - 96	1.09%	1.80%
562 - 564	95 - 95	1.11%	1.40%
556 - 561	93 - 94	1.38%	3.31%
552 - 555	92 - 92	1.68%	2.33%
548 - 551	91 - 91	1.90%	2.17%
542 - 547	90 - 90	1.99%	2.86%
527 - 541	88 - 89	2.46%	5.44%
509 - 526	84 - 87	3.19%	5.91%
496 - 508	76 - 83	3.89%	6.05%
485 - 495	65 - 75	4.16%	6.54%
476 - 484	55 - 64	3.86%	6.17%
461 - 475	44 - 54	3.97%	6.51%
449 - 460	33 - 43	4.71%	7.39%
439 - 448	22 - 32	5.41%	9.13%
426 - 438	9 - 21	5.79%	8.51%
101 - 425	1 - 8	11.59%	19.32%

EXPLANATIONS

CUMULATIVE DELINQUENCY SCORE PERFORMANCE

- **Approval Rate:** To use, select the appropriate projected score or score cutoff that yields the desired approval rate. Approved businesses are companies scoring between the lowest value in the score range (or score) and 999 (or 100 score). For example, if you have a credit policy that approves 70% of all businesses, this can require accepting businesses between 485 - 999 (or 65 - 100 score). Businesses scoring below the cutoff (101 - <484) can be reviewed, declined, etc.

- **Bad Rate:** Represents those businesses that score between the lowest value in the score range and 999. For example, the Delinquency rate for a credit policy which approves all businesses with a score at or above 484 (or (65 - 100 score) is expected to be 1.93%.

- **% of Bads Identified:** The percentage of total Bad businesses that score between 101 and the cutoff point for the approval rate. For example, approving businesses with a score at or above 485 (65 - 100 score) can be expected to eliminate 57.03% of the "Bad" businesses.

- **GOOD-BAD Ratio (Odds):** The ratio of "Good" businesses to "Bad" businesses among those businesses that score between the lowest value in the score range and 999 or 100 score. For example, if you have a credit policy which approves all businesses scoring at or above 485 (or 65> - 100 score) it could result in a portfolio with 51 "Good" businesses for every "Bad" business in the portfolio.

DELINQUENCY SCORE PERFORMANCE WITHIN RANGE

- **Bad Rate:** The incidence of Delinquency for those businesses that score within the score range. For example, the Delinquency rate for companies scoring between 475 - 484 (or 55 - 64 score) is expected to be 3.86%.

- **% of Bad Identified:** The percentage of total delinquent businesses within the score range. For example, 2.98% of all delinquent companies are expected to score between 503 and 516 (or 26 - 30 in the "Score 1 - 100").

APPENDIX C

SCORING TERMS GLOSSARY

Following is a list of some Scoring Terms used in this document.

TERM	EXPLANATION
D&B Failure	D&B Standard Risk Score predicting likelihood of a business failing and/or financial distress, also known as the D&B Financial Stress Score
D&B Delinquency Score	D&B Standard Risk Score predicting likelihood of late payment behaviour, also known as the D&B Commercial Credit Score
Raw Score	Score with a direct relationship to Probability of Default. The Delinquency form of the raw score is a 3-digit score
1 - 100 Score	Lesser granularity of the Delinquency Score: Value between 1 and 100 where 1 is the highest probability of default
Percentile Ranking	A ranking of the Data Cloud where 1 is assigned to the highest risk 1% of a scoring universe and 2 is assigned to the next highest risk 1% of a scoring universe. 100 is assigned to the lowest risk 1% of a scoring universe.
Scorable Universe	All records in the Data Cloud which meet criteria for score assignment. Examples of records excluded from the Scorable Universe include Out of Business records, Foreign Companies etc.
Scored Universe	All cases which are presented for a scoring assessment
Observation Point	Date, at which the data sample of active businesses is extracted and data elements observed at that point evaluated as potential predictors
Performance Window	Period where the data sample is monitored to classify businesses as Good and Bad
Bad	A business which meets the Bad definition
Good	A Business which does not have any information listed within the Bad definition
Out of Business	Business is no longer trading
Detailed Trade	Trade information in its raw state before any summarization

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ABOUT DUN & BRADSTREET

Dun & Bradstreet, a leading global provider of business decisioning data and analytics, enables companies around the world to improve their business performance.
Dun & Bradstreet's Data Cloud fuels solutions and delivers insights that empower customers to accelerate revenue, lower cost, mitigate risk, and transform their businesses.
Since 1841, companies of every size have relied on Dun & Bradstreet to help them manage risk and reveal opportunity. Twitter: @DunBradstreet

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