dun & bradstreet

Understanding the Greek D&B Delinquency Score

THIS DOCUMENT IS INTENDED TO ADDRESS THE FOLLOWING QUESTIONS:

- What is the D&B Delinquency 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 D&B Delinquency Score and Delinquency Rates?

INTRODUCTION

The D&B Delinquency Score for businesses based in Greece predicts the likelihood that a business will pay invoices late in the next 12 months based on the information in the Dun & Bradstreet Data Cloud. A D&B Delinquency Score is also known in some markets as a D&B Commercial Credit Score (CCS).

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 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.

The Greek D&B Delinquency Score is designed to help predict the potential of your existing and prospective customers to pay their invoices in a timely manner. It can be used 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 Greek Delinquency Scoring System was developed.

GREEK D&B FINANCIAL STRESS 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 and commercial obligations, obtains legal relief from creditors or ceases operations leaving unpaid debt over the next 12 months, based on the information in Dun & Bradstreet Data Cloud.

The legal events which constitute Delinquency in Greece include:

- Bankruptcy
- Bankruptcy petition
- Payment order
- Seizure
- Movable Property Auction
- Real Estate Auction

Cases which are not out of business and have experienced one or more of the above events will receive a score of '0' (zero).

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

AVAILABILITY OF THE DELINQUENCY SCORE

The commercially active universe of Greek businesses is 400,000 records as of the date of this report.

The D&B Delinquency Score is available on approximately 150,000 Greek based businesses as of the date of this report. 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
- Businesses with uncommon legal forms. Common legal forms are Societe Anonyme (SA), Limited Liability Companies (LLC), Sole Shareholder Limited Liability Companies (SSLLC), General Partnerships (GP), Limited Partnerships (LP) and Sole Proprietorships (SP)
- Businesses with financial service activities, insurance, re-insurance, activities auxiliary to financial services and insurance activities as well as public administration and defense

The D&B Delinquency Score will not be calculated for branches. The headquarter location score will be applied to branch locations.

To ensure that our scores are based on sufficient information, Dun & Bradstreet has put in place a minimum level of data requirement. Only records that satisfy this minimum requirement will be scored. The list of minimum requirements is:

- The company's records have been recently updated (at least one contact with the company in the last 4 months)
- The derogatory data is checked for incidents up to the date of assessment
- All data fields required from the algorithm are filled in or take valid values (none missing).

Cases which do not meet these criteria are considered as part of the scorable universe, however will have a score of blank (null).

Some conditions do not lend themselves to treatment with a statistical tool. Examples 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. Additional business rules generated for score calculation in Greece are listed below.

- Companies with published financial elements (Total Assets, Sales) below a benchmark of <10,000 Euros or missing are assessed through an empirical algorithm that does not allow them to exceed an upper score limit.
- Companies for which there are special events are reviewed on a case by case basis by expert analysts. These events include:
  - payment incidents observed for the company's top management
  - the company is in the process of being set up
  - the company is under re-organization

SCORE DEVELOPMENT PROCESS

The Greek Delinquency Scorecards were developed using rigorous statistical techniques for all stages of the modeling process. This ensures 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 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.

For the development of the Greek D&B Delinquency Score, ten (10) moving windows were used for model creation in order to capture a sufficient number of 'bad' companies. For each year from 2000 through to 2009, January 1st is the observation point for that year and the following 12 months is the performance window.

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.

Dun & Bradstreet's statistical model development process includes the following steps:

- Segmentation analysis for optimal representation of risk behavior of various subpopulations of the scorable universe.
- Selection of optimal attributes (predictors) for each segment. The attributes selected by the statistical tool are also verified by the business experts to 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 ensure model's robustness and stability of predictors a test and validation approach for model estimation is used.

To 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 failure. This predicted probability is then converted to a score using a scorecard which assigns points to each selected level of each predictor.

SCORING OUTPUTS – SCORE VALUES

The Delinquency Score assigns the following measurements of risk:

1. **A "Raw Score" of 213 – 819** which is the initial output (sum of assigned points) where 213 represents businesses that have the highest probability of delinquency, and 819 which represents businesses with the lowest probability of delinquency. This Score provides a direct relationship between the score and the probability of delinquency. The marginal odds of being good doubles for each 40 point increase. For example, a business that scores a 340, on a marginal basis, is half as likely to be delinquent as a business that scores a 300. This score enables a customer to utilize more granular cut offs to drive their automated decision-making process.

2. **A "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 Data Cloud, and is most effectively used by customers to rank order their portfolios from highest to lowest risk of business failure.

SCORECARD PERFORMANCE

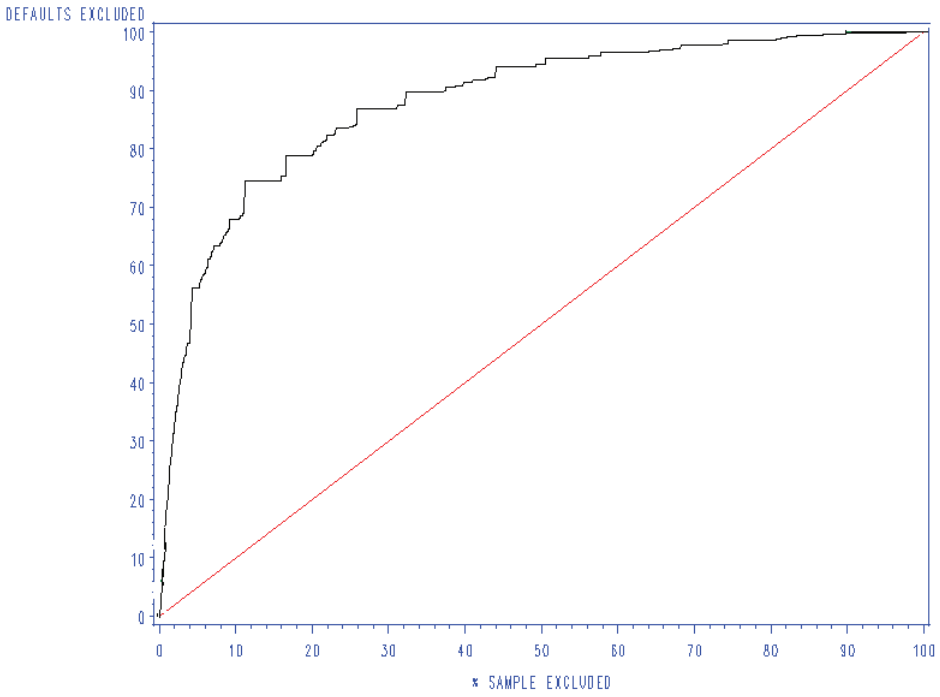
Dun & Bradstreet applies stringent rules to model performance designed to maintain the high performance standards we have set for our scores. Measurements of model performance include an assessment of risk ranking, robustness and discriminate power. Metrics used are:

- 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 the 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 identified approximately 69% 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 69% of the "bads" in that group.

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 identifying 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 2011 Delinquency statistics within the Dun & Bradstreet Data Cloud, is 12.1%.

The following table provides the national average delinquency rates by industry group based on information in the Data Cloud.

National Average Delinquency Rate by Industry
(Based on 2011 Delinquency Statistics within the Dun & Bradstreet Data Cloud)

MAJOR INDUSTRY GROUP	PROJECTED FAILURE RATE
Agriculture, Forestry, Fishing,	13.6%
Mining	11.5%
Construction	13.3%
Manufacturing	13.4%
Transportation, Communications	9.3%
Wholesale Trade	10.7%
Retail Trade	13.8%
Real Estate	7.6%
Services	8.7%
Public Administration	NA

APPENDIX A

LIST OF DATA ELEMENTS USED IN THE DELINQUENCY SCORING MODEL

Demographic/Public Records Information

FACTOR
Activity Sector
Legal Status
Staff
Special Events (Alarms)
Imports, Exports, Representations
Time Interval of The Most Recent Published Balance Sheet (During The Last 3yrs)
Macro-economic Outlook

Financial Information

FACTOR
Financial Leverage
Return (Profit Before Interest & Income Tax) On Capital Employed
Return (Profit Before Income Tax) On Equity
Equity to Capital
Interest Coverage (Net Sales)
Turnover of Capital Employed
Inventory Turnover
Profit Before Income Tax
Working Capital
Sales/Turnover
Share Capital
Collection Period
Payable Period
Total Fixed Assets
Gross Profit Margin
Total Debt to Equity Ratio
Cash Ratio

Payment Information

FACTOR
Occurrence of Payment Order
Occurrence of Real Estate Seizure
Occurrence of Real Estate Auction
Occurrence of Movable Property Auction
Value of Delinquencies / Net Sales
Percentage of Settled Delinquencies / Percentage of Total
Delinquencies
Number of Delinquencies According to the Type of the Data
Time interval since the Most Recent Delinquency

Note: Only Derogatory data in the last 2 years is considered

APPENDIX B

DETAILED PROJECTED PERFORMANCE TABLE

The following Projected Performance Table is based on Country specific data in our Data Cloud. Actual performance for a customer portfolio may vary based on the account selection within that portfolio.

Cumulative Delinquency Score Performance						Delinquency Score Performance Within Range			
SCORE RANGE	SCORE RANGE (APPROX)	% OF BUSINESSES (APPROX)	BAD RATE	% OF BADS IDENTIFIED	GOOD-BAD RATIO	SCORE RANGE	SCORE RANGE (APPROX)	BAD RATE	% OF BADS IDENTIFIED
791 - 819	96 - 100	0.56%	0.00%	100.00%	500.0	791 - 819	96-100	0.00%	0.00%
759 - 819	91 - 100	0.56%	0.00%	100.00%	500.0	759 - 790	91 - 95	0.00%	0.00%
739 - 819	86 - 100	0.83%	0.00%	100.00%	500.0	739 - 758	86 - 90	0.00%	0.00%
711 - 819	81 - 100	1.13%	0.23%	99.98%	436.0	711 - 738	81 - 85	0.86%	0.02%
690 - 819	76 - 100	1.84%	0.28%	99.96%	354.0	690 - 710	76 - 80	0.37%	0.02%
665 - 819	71 - 100	3.21%	0.65%	99.82%	153.5	665 - 689	71 - 75	1.14%	0.13%
641 - 819	66 - 100	5.38%	1.59%	99.28%	61.8	641 - 664	66 - 70	2.98%	0.55%
615 - 819	61 - 100	9.92%	1.88%	98.42%	52.1	615 - 640	61 - 65	2.23%	0.85%
589 - 819	56 - 100	14.20%	1.92%	97.70%	51.1	589 - 614	56 - 60	2.00%	0.72%
566 - 819	51 - 100	34.36%	4.53%	86.87%	21.1	566 - 588	51 - 55	6.37%	10.83%
542 - 819	46 - 100	41.41%	4.63%	83.83%	20.6	542 - 565	46 - 50	5.12%	3.04%
516 - 819	41 - 100	53.23%	5.17%	76.78%	18.3	516 - 541	41 - 45	7.07%	7.05%
492 - 819	36 - 100	68.67%	6.12%	64.55%	15.3	492 - 515	36 - 40	9.40%	12.23%
466 - 819	31-100	85.01%	6.87%	50.77%	13.6	466 - 491	31 - 35	10.01%	13.79%
443 - 819	26 - 100	90.41%	7.32%	44.18%	12.7	443 - 465	26 - 30	14.47%	6.59%
418 - 819	21 - 100	93.25%	7.74%	39.15%	11.9	418 - 442	21 - 25	20.97%	5.03%
392 - 819	16 - 100	93.83%	7.87%	37.75%	11.7	392 - 418	16 - 20	29.09%	1.40%
369 - 819	11 - 100	94.21%	8.00%	36.43%	11.5	369 - 391	11 - 15	40.27%	1.31%
343 - 819	6 - 100	94.72%	8.25%	34.09%	11.1	343 - 368	6 - 10	54.31%	2.34%
213 - 819	1 - 100	100.00%	11.86%	0.00%	7.4	213 - 342	1 - 5	76.59%	34.08%

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 819 (or 100 score). For example, a credit policy that approves 70% of all businesses requires accepting businesses between 492 and 819 (or 36 - 100 score). Businesses scoring below the cutoff (between 213 - 491) are reviewed, declined, etc.

- **BAD Rate:** Represents those businesses that score between the lowest value in the score range and 819. For example, the Delinquency rate for a credit policy which approves all businesses with a score at or above 492 (or 36 - 100 score) is expected to be 6.12%.

- **% of BADs Identified:** The percentage of total BAD businesses that score between 213 and the cutoff point for the approval rate. For example, approving businesses with a score at or above 492 (36 - 100 score) is expected to eliminate 64.55% 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 819 (or 100 score). For example, a credit policy which approves all businesses scoring at or above 492 (or 36 - 100 score) should result in a portfolio with 15.3 "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 213 - 342 (or 1 - 5 score) is expected to be 76.59%.

- **% of BADs Identified:** The percentage of delinquent businesses within the score range. For example, 34% of all delinquent companies are expected to score between 213 - 342 (or 1 - 5 score).

APPENDIX C

SUMMARY PROJECTED PERFORMANCE TABLE

TERM	EXPLANATION
D&B Delinquency Score	D&B Standard Risk Score predicting likelihood of late payment behavior, 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
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

dun & bradstreet