

# Understanding The Japan D&B Financial Stress Score

THIS DOCUMENT IS INTENDED TO ADDRESS THE FOLLOWING QUESTIONS:

- What is the Financial Stress Score?
- What does the Financial Stress Score predict?
- What is the availability of the Financial Stress Score?
- How is the Financial Stress Score calculated?
- How does the Financial Stress Score perform?
- What is the Relationship between the Financial Stress Score and Failure Rates?



## INTRODUCTION

The D&B Japan Financial Stress Score (FSS), also known as the D&B Failure Score predicts the likelihood that a business will seek legal relief from its creditors, cease business operations without paying all its creditors in full, voluntarily withdraw from business operation and leave unpaid obligations, go into receivership or reorganization, or make an arrangement for the benefit of creditors over the next 12 month period, based on the information in Dun & Bradstreet's files.

The Financial Stress Scoring System uses statistical probabilities to classify public and private companies into three risk classifications of Financial Stress: a 1,001-1,890 Score; a 1-100 Percentile Ranking, and a 1-5 Risk Class segmentation. These classifications are based on the chance of a business experiencing the above definition of "bad" performance over the next 12 month period. The Financial Stress Scoring models utilize the combined power of the Dun & Bradstreet Data Cloud of approximately 1.2 million active Japanese businesses including payment, public filing, demographic, and financial information when available.

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. 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 commercial Data Cloud into actionable business insight, enabling you to more confidently make critical risk decisions.

The Japanese Financial Stress Score is highly effective in helping to predict the potential insolvency of your existing and prospective customers. The solution allows you to:

- Automate decisions for increased efficiency
- Allow faster processing of large volumes of transactions
- 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 Japanese Financial Stress Scoring System was developed.

## JAPAN FINANCIAL STRESS SCORE

### WHAT THE FINANCIAL STRESS SCORE PREDICTS

The Financial Stress Score predicts a business's likelihood of experiencing financial stress over the next 12 month period. Dun & Bradstreet defines a financially stressed business as one that seeks legal relief from its creditors, ceases business operations without paying all its creditors in full, voluntarily withdraws from business operation and leaves unpaid obligations, goes into receivership or reorganization, or makes an arrangement for the benefit of creditors over the next 12 month period, based on the information in Dun & Bradstreet's Data Cloud.

The scores and underlying models are based upon the observed characteristics of hundreds of thousands of businesses in Dun & Bradstreet's Data Cloud and the relationship these characteristics have to the probability of a business experiencing financial stress over a period of 12 months.

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

The Financial Stress Score assigns three measurements of risk:

1. A "Score" of 1,001 – 1,999, where a 1,001 represents businesses that have the highest probability of financial stress, and a 1,999 which represents businesses with the lowest probability of financial stress. 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 score of 1,200, on a marginal basis, represents twice the risk of financial stress as a score of 1,240. This score enables a customer to utilize more granular cutoffs to drive their automated decision-making process.
2. A "Percentile" of 1 – 100, where a 1 represents businesses that have the highest probability of financial stress, and a 100 which represents businesses with the lowest probability of financial stress. This Percentile 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.
3. A "Risk Class" of 1 – 5, which is a segmentation of the scorable universe into five distinct risk groups where a one (1) represents businesses that have the lowest probability of financial stress, and a five (5) represents businesses with the highest probability of financial stress. This Risk Class enables a customer to quickly segment their new and existing accounts into various risk groups for high-level analysis and reporting.

Table 1 shows the distribution of the Financial Stress Risk Class in the Dun & Bradstreet Data Cloud. In addition, this table also displays the associated Percentile Ranking and Score.

Table 1: Distribution of Financial Stress Risk Class in Dun & Bradstreet's File

FINANCIAL STRESS RISK CLASS	% OF BUSINESSES WITHIN THIS FINANCIAL STRESS CLASS	FINANCIAL STRESS PERCENTILE	FINANCIAL STRESS SCORE
1	6%	95 - 100	1546 - 1890
2	26%	69 - 94	1479 - 1545
3	35%	34 - 68	1431 - 1478
4	32%	2 - 33	1285 - 1430
5	1%	1	1001 - 1284

### AVAILABILITY OF THE FINANCIAL STRESS SCORE

A Financial Stress Score is available on approximately 1.2 million Japan based businesses. Financial Stress Scores are not available on business files that fall into the following categories:

- FSS will automatically trade-up to the headquarter location score on business branch locations.
- FSS will not be available on:
  - Businesses whose financial report is not available for over 5 years.
  - Business records that have missing sales and profit information.
  - Scores are not calculated for businesses designated as having one of the following events: Bankruptcy, Voluntary Closure, Suspension of Operation, Dissolution, and Taken Over.

### MODEL DEVELOPMENT PROCESS

The models built for the Japan Financial Stress Score leverage Dun & Bradstreet's extensive commercial Data Cloud. All the information contained within our Data Cloud has passed through our DUNSRight™ Quality Process, driving greater accuracy, completeness, timeliness and consistency. One of the primary reasons our predictive scores are so powerful is the quality of the information used in their development.

The Financial Stress Scoring models were developed using state-of-the-art statistical modeling techniques to select and weight the data elements that are most predictive of business failure. The resulting Financial Stress Score models are mathematical equations that consist of a series of variables and coefficients (weights) that have been calculated for each variable.

Model development involves selecting data available at the time of observation that will indicate how the business is expected to perform over a certain period of time. For the Financial Stress Score, we selected a weighted sample of 'credit active' businesses. Dun & Bradstreet defines a 'credit active' business as one with 1+ credit inquiry to Dun & Bradstreet in the last 12 months.

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 behavior.

In the development of the Financial Stress Score the observation window was February 2008 and the performance window was the twelve months from March 2008 to February 2009. A total of 599,762 businesses were used in model development. Of this population, 595,508 were considered "good", or non-financially stressed companies in the Dun & Bradstreet Data Cloud and 4,254 were considered "bad", or financially stressed companies in the Data Cloud.

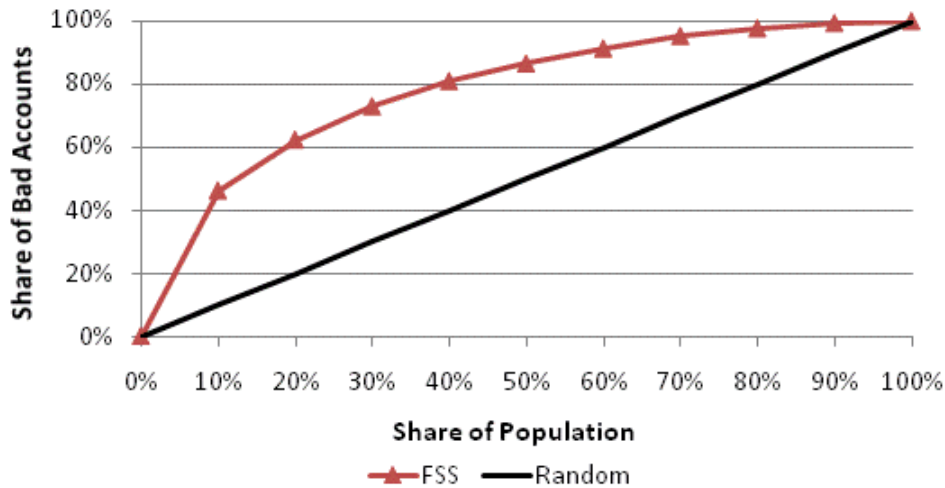
From the observation window data, Dun & Bradstreet performed extensive data analysis to determine those variables which are statistically the most significant factors for predicting financial stress and calculate the appropriate weights for each. Dun & Bradstreet identified predictive variables from evaluating a combination of both "good" and "bad" performing businesses in the Dun & Bradstreet Data Cloud. Appendix A contains a sampling of data elements.

## MODEL PERFORMANCE

One way to measure model performance 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 Financial Stress Score. For the example, at approximately 20% of the cumulative population, the Financial Stress Score models are projected to identify approximately 63% of the cumulative “bads”. This means that if a business focused on the worst scoring 20% of their portfolio using the Financial Stress Score, they would capture 63% of the “bads” in that group.

Graph 1: Financial Stress Score Performance across All Size Segments



During the course of model development, various statistics from the development sample are gathered, similar to the trade-off curve shown above. Development statistics provide useful information that can be used to help management determine credit 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.

In addition, models 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.

Nevertheless, models are robust tools for rank-ordering risk in changing circumstances; higher scoring businesses perform better than lower scoring businesses. Tracking the score distributions and the actual performance of customer accounts provides the most accurate projections for individual portfolios.

## RELATIONSHIP BETWEEN FINANCIAL STRESS SCORE AND PROJECTED FAILURE RATES

The national average failure rate, based on 2009 failure statistics within Dun & Bradstreet's Data Cloud, is 0.72%.

Table 2 provides the national average failure rates and cumulative percent of failures identified, based on information in the Dun & Bradstreet Data Cloud for each Financial Stress Risk Class.

Table 2: National Average Failure Rate by Risk Class (Based on 2009 Failure Statistics within Dun & Bradstreet's Data Cloud)

FINANCIAL STRESS CLASS	% OF DUN & BRADSTREET'S FILE REPRESENTED	PROJECTED FAILURE RATE WITHIN RISK CLASS	PROJECTED CUMULATIVE % OF FAILURES ELIMINATED
1	6%	0.02%	99.83%
2	26%	0.14%	94.89%
3	35%	0.37%	76.65%
4	32%	1.41%	13.52%
5	1%	9.68%	0.0%

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

Table 3: National Average Failure Rate by Industry (Based on 2009 Failure Statistics within Dun & Bradstreet's Data Cloud)

MAJOR INDUSTRY GROUP	PROJECTED FAILURE RATE
Agriculture, Forestry, Fishing	0.39%
Mining	0.89%
Construction	0.82%
Manufacturing	0.81%
Transportation, Communications	0.83%
Wholesale Trade	0.81%
Retail Trade	0.60%
Finance, Insurance, Real Estate	0.46%
Services	0.52%
Public Administration	0.00%

## APPENDIX A

### LIST OF DATA ELEMENTS USED IN THE FINANCIAL STRESS SCORING MODEL

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

#### Demographic/Public Records Information

FACTOR	IMPACT ON MODEL
Company Type	Businesses that are proprietorship or corporations are considered less risky. These businesses typically have the ability to utilize additional support if necessary.
Standard Industry Code	Line of business or Standard Industry Code (SIC). Some industries have higher levels of risk. Government protected industries such as public administration have less risk.
Total Number of Employees	In general, the larger the number of employees, the greater the stability of the business, and hence the lower the risk.
Ownership of Premises	Whether premises are owned or rented is an indication of stability of a business.
Geography	Certain regions have higher levels of risk.
Age of the business	How long a business has been operating is a measure of stability. The more years the business has been operating, the lower the risk.
TSR Rating	A unique rating applied manually following an investigation. The TSR rating is available within domestic reports.
Inquiries	The number of inquiries for a business is a significant indicator of failure risk.
Negative Information	Negative credit information is considered highly predictive.

#### Financial Information

FACTOR	IMPACT ON MODEL
Cash	The actual cash a company has available. The higher the amount, the lower the likelihood of risk.
Long Term Debt	Represents the level of debt that will take more than one year to pay off. Examples include mortgages, secured loans. Generally, the lower the long term debt, the lower the likelihood of risk.
Profit to Sales Ratio	Indicates the level of profit from sales. The greater the ratio, the lower the risk.
Total Current Liabilities	The claims to the business those are due within one year or the cycle of operations. Generally, the lower the business's total current liabilities, the lower its overall likelihood of risk.
Sales	Negative sales trend is considered to be higher risk.
Dividend	The amount paid to shareholders. A positive dividend is an indication of lower the risk.
Net Profit	Generally, the greater the net profit after taxes, the lower the likelihood of risk.
Equity	The remaining ownership in assets after all liabilities are paid. Generally, the higher the equity of a business, the lower its overall likelihood of risk.
Loan Receivable	The loan that customers or individuals owe the business. The lower the amount, the lower the risk.
Notes Payable	Represents the various amounts owed to vendors and suppliers of the business. The lower the amount, the lower the likelihood of risk.
Non-Operating Expenses	The expense incurred by activities unrelated to the core business operations. The lower the non-operating expenses, the lower the likelihood of risk.

## APPENDIX B

The following Summary and Detailed Projected Performance Tables are based on a representative sample and actual performance may vary based on individual customer portfolios.

### SUMMARY PROJECTED PERFORMANCE TABLES

CUMULATIVE FINANCIAL STRESS SCORE PERFORMANCE						
RISK CLASS	SCORE RANGE	PERCENTILE RANGE (APPROX)	% OF BUSINESSES (APPROX)	FAILURE RATE	% OF FAILURES IDENTIFIED	GOOD-BAD RATIO
1	1546 - 1890	95 - 100	6%	0.02%	99.83%	4744
2	1479 - 1890	69 - 100	32%	0.12%	94.89%	863
3	1431 - 1890	34 - 100	67%	0.25%	76.65%	398
4	1285 - 1890	2 - 100	99%	0.63%	13.52%	159
5	1001 - 1890	1 - 100	100%	0.72%	0%	139

FINANCIAL STRESS SCORE PERFORMANCE WITHIN RANGE				
SCORE RANGE	PERCENTILE RANGE (APPROX)	% WITHIN RANGE (APPROX)	FAILURE RATE	% OF FAILED IDENTIFIED
1546 - 1890	95 - 100	6%	0.02%	0.17%
1479 - 1545	69 - 94	26%	0.14%	4.93%
1431 - 1478	34 - 68	35%	0.37%	18.24%
1285 - 1430	2 - 33	32%	1.41%	63.14%
1001 - 1284	1 - 1	1%	9.68%	13.52%

## EXPLANATIONS

### CUMULATIVE FINANCIAL STRESS SCORE PERFORMANCE

- **% of Businesses:** To set an approval rate, select the appropriate percentile range that yields the desired approval rate. For example, to develop a credit policy that approves a projected 67% of all customers requires accepting businesses scoring at or above 1431 (or 34 - 100 percentile). Businesses scoring below the cutoff score (1001 - 1430) are reviewed, declined, etc.
- **Failure Rate:** The failure rate represents those businesses that score between the lowest value in the score range (or percentile) and 1890 (or 100 percentile). For example, the failure rate for a credit policy which approves all businesses with a score at or above 1431 (or 34 - 100 percentile) is expected to be 0.25%.
- **% of Failures Identified:** The percentage of total failed businesses that score between 1,001 and the cutoff point for the approval rate. For example, approving businesses with a score at or above 1431 (or 34 - 100 percentile) is expected to eliminate 76.65% 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 1890 (or 100 percentile). For example, a credit policy that approves all businesses scoring at or above 1431 (or 34 - 100 percentile) should result in a portfolio with 398 “Good” businesses for every “Bad” business in the portfolio.

### FINANCIAL STRESS SCORE PERFORMANCE WITHIN RANGE

- **Failure Rate within Range:** The failure rate for those businesses that score within the score range. For example, the failure rate for businesses scoring between 1285 and 1430 (or 2 - 33 percentile) is expected to be 1.41%.
- **% Of Failures Identified:** The percentage of total failed businesses within the score range. For example, 63.14% of failed businesses are expected to score between 1285 and 1430 (or 2 - 33 percentile).

DETAILED PROJECTED PERFORMANCE TABLE

CUMULATIVE FINANCIAL STRESS SCORE PERFORMANCE						FINANCIAL STRESS SCORE PERFORMANCE WITHIN RANGE			
SCORE RANGE	PERCENTILE RANGE (APPROX)	% OF BUSINESSES (APPROX)	FAILURE RATE	% OF FAILURES IDENTIFIED	GOOD-BAD RATIO	SCORE RANGE	PERCENTILE RANGE (APPROX)	FAILURE RATE	% OF FAILURES IDENTIFIED
1554 - 1890	96 - 100	5%	0.02%	99.85%	4577	1554 - 1890	96 - 100	0.02%	0.15%
1526 - 1890	91 - 100	10%	0.04%	99.42%	2336	1526 - 1553	91 - 95	0.06%	0.43%
1511 - 1890	86 - 100	15%	0.06%	98.77%	1661	1511 - 1525	86 - 90	0.09%	0.65%
1500 - 1890	81 - 100	20%	0.08%	97.87%	1294	1500 - 1510	81 - 85	0.13%	0.90%
1491 - 1890	76 - 100	25%	0.09%	96.80%	1068	1491 - 1499	76 - 80	0.16%	1.07%
1482 - 1890	71 - 100	30%	0.11%	95.58%	932	1482 - 1490	71 - 75	0.17%	1.22%
1475 - 1890	66 - 100	35%	0.12%	94.06%	805	1475 - 1481	66 - 70	0.23%	1.52%
1468 - 1890	61 - 100	40%	0.14%	92.49%	723	1468 - 1474	61 - 65	0.24%	1.57%
1461 - 1890	56 - 100	45%	0.15%	90.38%	646	1461 - 1467	56 - 60	0.27%	2.11%
1454 - 1890	51 - 100	50%	0.18%	87.69%	564	1454 - 1460	51 - 55	0.37%	2.69%
1449 - 1890	46 - 100	55%	0.20%	85.09%	502	1449 - 1453	46 - 50	0.47%	2.61%
1441 - 1890	41 - 100	60%	0.22%	82.04%	464	1441 - 1448	41 - 45	0.36%	3.05%
1435 - 1890	36 - 100	65%	0.23%	79.06%	426	1435 - 1440	36 - 40	0.50%	2.98%
1426 - 1890	31 - 100	70%	0.27%	73.84%	371	1426 - 1434	31 - 35	0.67%	5.22%
1417 - 1890	26 - 100	75%	0.30%	69.13%	336	1417 - 1425	26 - 30	0.70%	4.71%
1406 - 1890	21 - 100	80%	0.33%	63.55%	304	1406 - 1416	21 - 25	0.77%	5.58%
1393 - 1890	16 - 100	85%	0.37%	56.65%	272	1393 - 1405	16 - 20	0.96%	6.90%
1377 - 1890	11 - 100	90%	0.41%	48.03%	240	1377 - 1392	11 - 15	1.24%	8.62%
1350 - 1890	6 - 100	95%	0.49%	35.06%	203	1350 - 1376	6 - 10	1.84%	12.97%
1001 - 1890	1 - 100	100%	0.72%	0.00%	139	1001 - 1349	1 - 5	4.95%	35.06%



## EXPLANATIONS

### CUMULATIVE FINANCIAL STRESS SCORE PERFORMANCE

- **Approval Rate:** To use, select the appropriate projected score or percentile cutoff that yields the desired approval rate. Approved businesses are companies scoring between the lowest value in the score range (or percentile) and 1890 (or 100 percentile). For example, a credit policy that approves 70% of all businesses requires accepting businesses between 1426-1890 (or 31 - 100 percentile). Businesses scoring below the cutoff (1001 - 1425) are reviewed, declined, etc.
- **Failure Rate:** Represents those businesses that score between the lowest value in the score range and 1890. For example, the failure rate for a credit policy which approves all businesses with a score at or above 1426 (or 31 - 100 percentile) is expected to be 0.27%.
- **% of Failures Identified:** The percentage of total failed businesses that score between 1001 and the cutoff point for the approval rate. For example, approving businesses with a score at or above 1426 (31 - 100 percentile) is expected to eliminate 73.84% 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 1890 (or 100 percentile). For example, a credit policy which approves all businesses scoring at or above 1426 (or 31 - 100 percentile) should result in a portfolio with 371 “Good” businesses for every “Bad” business in the portfolio.

### FINANCIAL STRESS SCORE PERFORMANCE WITHIN RANGE

- **Failure Rate within Range:** The incidence of failure for those businesses that score within the score range. For example, the failure rate for companies scoring between 1417 and 1425 (or 26 - 30 percentile) is expected to be 0.70%.
- **% of Failures Identified:** The percentage of total failed businesses within the score range. For example, 4.71% of all failed companies are expected to score between 1417 and 1425 (or 26 - 30 percentile).



#### 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](https://twitter.com/DunBradstreet)