GraydonCreditsafe Scorecard

Executive Summary 2023
Group Analytics
Version 1.0

1. Executive summary

The power of using exclusive data from both Creditsafe and Graydon, has been a key factor to develop a new suite of generic scorecards. This was done by the Group Analytics team. GraydonCreditsafe is continuously working on improving its credit scores, using the latest knowledge in the field of statistical scoring methods, and optimizing and maximizing the deployment of the ever-expanding database. This enables more and more relevant data from different processes and ensures that GraydonCreditsafe is utilising the most up to date and relevant information available in the market. This ensures that the way companies are scored is improved, and that better and more predictive assessments are done of a growing number of companies, even in cases where less information is available.

1.1 Scorecards and segmentation

The essential concept behind Creditsafe's scoring approach is to accurately predict business behaviour (in terms of their good/bad performance over the next 12 months) using a set of characteristics that clearly identify why doing business with them is considered to be high or low risk.

To increase the discriminative power of the scorecard solution, segmentation was conducted. The goal of segmentation is to define a set of sub-populations that, when modelled individually and combined, rank risk more effectively than a single model on the overall population.

The main base for the segmentation has been the size of the company in terms of the total assets level. Besides this, three scorecards were developed for companies where financial accounts do not exist. A scorecard for companies that are newly established and two scorecards for companies where public financials do not exist with trade payment data and without payment data.

Companies with financial accounts

1. Small
2. Medium
3. Large

Companies without financial accounts

4. New – companies who have not yet filed their accounts
5. Other companies without financials with trade payment data
6. Other companies without financials without trade payment data

1.2 Individual PD (Probability of Default) versus score 1-100

GraydonCreditsafe's scorecard provides a score between 1 and 100 representing the highest and lowest risk. This scale was produced using the probability of default (PD) output and is a simplified representation so companies can easily accept, or decline based on a rating from 1 to 100.

The GraydonCreditsafe score will always be accompanied with a PD, which is produced for each company based on individual combination of characteristics. It the attachment you can see the PD ranges per score.

1.3 Default definition

The credit score predicts the good or bad performance of a company for the next 12 months. To know whether a prediction is good or bad, we need to be able to identify defaults. The definition of a default is therefore identified is as follows:

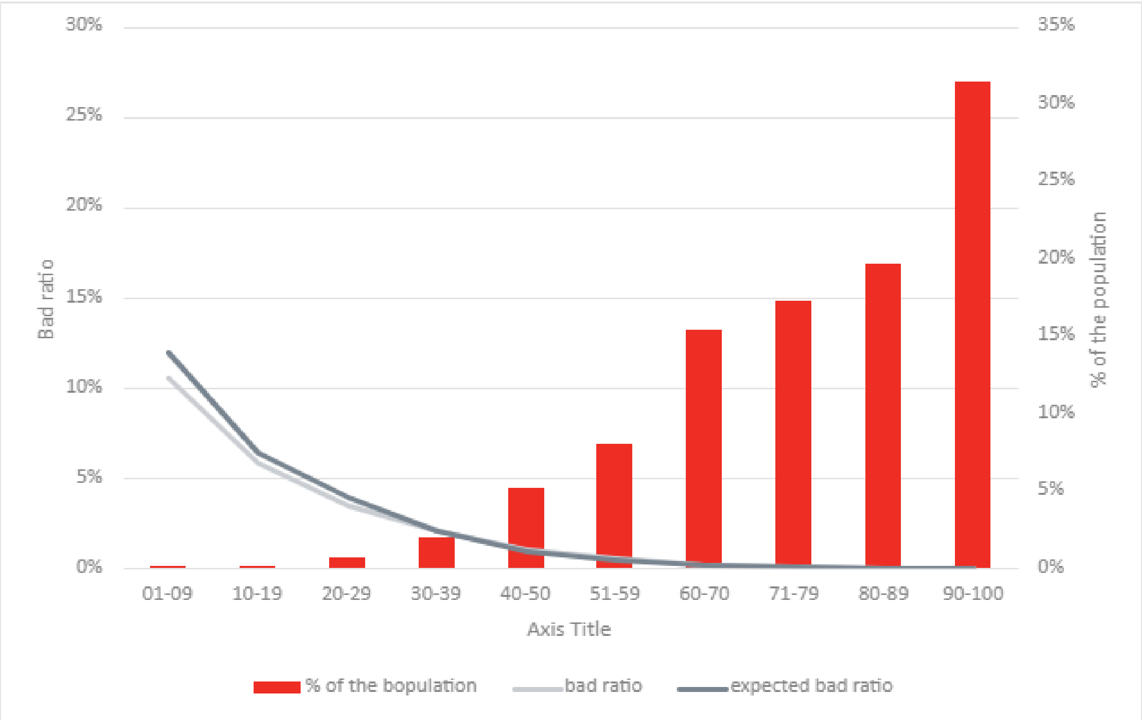
Defaults	Ltd	Non-Ltd
Bad	• Bankruptcy	• Bankruptcy • 3 payments (paid or owing) at least 91 days beyond terms
Good	• None of the above status definitions	• None of the above status definitions

1.4 Summary of results

1.4.1 Population matrix for companies with financial accounts

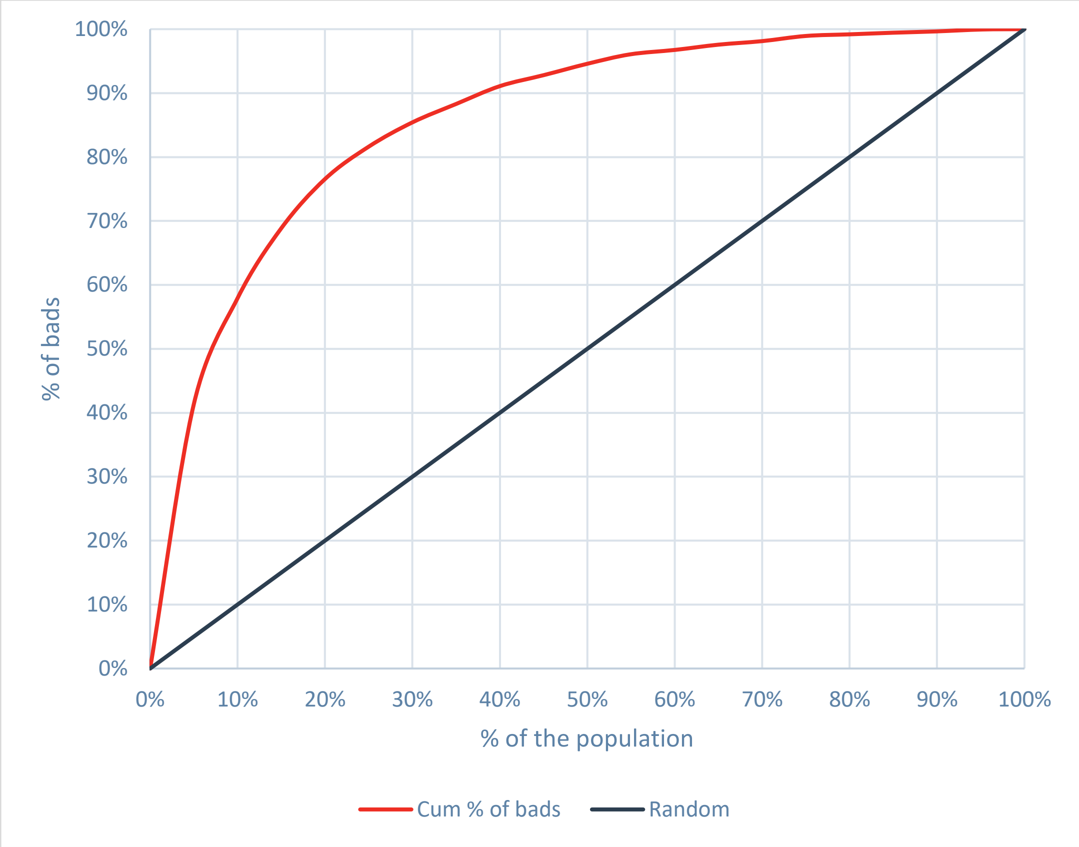
Score Band	Min PD	Max PD	Min score	Max score	Bad Ratio	Expected bads	% of population
A	0,01%	0,17%	71	100	0,05%	0,06%	68%
B	0,17%	0,72%	51	70	0,37%	0,34%	24%
C	0,72%	3,00%	30	50	1,37%	1,31%	7%
D	3,00%	99,99%	1	29	4,18%	4,95%	1%

1.4.2 Population distribution for companies with financial accounts



1.4.3 Predictive Power & Gini coefficient

The Gini coefficient shows excellent discrimination across all segments of the Dutch company population. To provide further comfort around the robustness of the scorecard, GraydonCreditsafe validated the scorecards using an out of time validation technique. The results show that all attributes were within tolerance and acceptable level of accuracy. GraydonCreditsafe continuously monitors and validates the scorecards to keep them robust. The Gini coefficient varies per segment and reaches up to 76. Below illustrates the predictive power for companies with financial accounts.



2 Data Preparation & Population Design

2.1 Sample Design

The scorecards were developed from a generic sample of Dutch data extracted from the GraydonCreditsafe data pool. The selection of the sample definition satisfied the following:

- The generic sample was created to recognise economically active companies. There are sufficient businesses to develop a robust scorecard.
- Each business had a 12-month exposure period, this is sufficient for business performance to be reliably assigned.
- The window covers a full year to avoid seasonality.
- The sample window is recent enough to be representative of the future NL population.

The scorecard development sample was created taking business information from 1st of January 2017 to 31st of December 2018, giving 24 months of information. A 12-month outcome period was then used from 1st of January 2019 to 31st of December 2019 to assign the good/bad population.

3 Scorecard development

3.1 Modelling Methodology

Stepwise Logistic Regression has been used to develop the scorecard. This is the preferred methodology within Creditsafe. Logistic Regression has the benefit of outputting a predicted probability of becoming bad in the next 12 months. The principles of logistic regression also explain, due to the algorithm behind the calculation, the exact reason why a specific company gets a certain probability of default.

3.2 Checking Business Logic

Even if a variable has predictive power, it is still necessary to check that its relationship with the outcome is logical and as expected. The first check on business logic is performed during the univariate analysis, discarding the variables that are not suitable from a business perspective.

It is also necessary however, to perform a check on the model results from the regression perspective as well. If the analysis was done correctly, the model should be predictive and correct from a mathematical point of view. These two points of views are therefore both taken into consideration.

As a final step, we need to verify that the score points given to a characteristic attribute, are assigned in a way that is consistent with the corresponding GB rate of the other characteristic attributes, and with the all the other characteristic attributes combined. Particular attention is given to the outcomes of the score, making sure that positive outcomes correspond with positive characteristics and negative outcomes correspond with negative characteristics.

3.3 Scorecard Calibration

The output from each logistic regression model produces individual PDs for each company. These PDs are then transformed into a 1-100 Creditsafe score using points that double the odds principle. This value was chosen to allow the score and PD to align, and to match the score distribution expected by the Dutch market. This score is therefore a direct representation of the underlying PD. The table in attachment 1 shows the PD bandwidths with the corresponding GraydonCreditsafe 1-100 scores.

Attachment 1: PD table - Score versus Probability of the default (PD)

Score		Min PD		MaxPD	Band	Score		Min PD		MaxPD	Band
100	>	0,0001%	<=	0,0202%	A	50	>	0,7162%	<=	0,7673%	C
99	>	0,0202%	<=	0,0217%	A	49	>	0,7673%	<=	0,8219%	C
98	>	0,0217%	<=	0,0234%	A	48	>	0,8219%	<=	0,8803%	C
97	>	0,0234%	<=	0,0251%	A	47	>	0,8803%	<=	0,9429%	C
96	>	0,0251%	<=	0,0270%	A	46	>	0,9429%	<=	1,0099%	C
95	>	0,0270%	<=	0,0291%	A	45	>	1,0099%	<=	1,0816%	C
94	>	0,0291%	<=	0,0313%	A	44	>	1,0816%	<=	1,1584%	C
93	>	0,0313%	<=	0,0337%	A	43	>	1,1584%	<=	1,2405%	C
92	>	0,0337%	<=	0,0362%	A	42	>	1,2405%	<=	1,3283%	C
91	>	0,0362%	<=	0,0390%	A	41	>	1,3283%	<=	1,4223%	C
90	>	0,0390%	<=	0,0419%	A	40	>	1,4223%	<=	1,5228%	C
89	>	0,0419%	<=	0,0451%	A	39	>	1,5228%	<=	1,6304%	C
88	>	0,0451%	<=	0,0485%	A	38	>	1,6304%	<=	1,7453%	C
87	>	0,0485%	<=	0,0521%	A	37	>	1,7453%	<=	1,8683%	C
86	>	0,0521%	<=	0,0561%	A	36	>	1,8683%	<=	1,9997%	C
85	>	0,0561%	<=	0,0603%	A	35	>	1,9997%	<=	2,1401%	C
84	>	0,0603%	<=	0,0649%	A	34	>	2,1401%	<=	2,2902%	C
83	>	0,0649%	<=	0,0698%	A	33	>	2,2902%	<=	2,4506%	C
82	>	0,0698%	<=	0,0751%	A	32	>	2,4506%	<=	2,6218%	C
81	>	0,0751%	<=	0,0808%	A	31	>	2,6218%	<=	2,8047%	C
80	>	0,0808%	<=	0,0869%	A	30	>	2,8047%	<=	3,0000%	C
79	>	0,0869%	<=	0,0934%	A	29	>	3,0000%	<=	3,2084%	D
78	>	0,0934%	<=	0,1005%	A	28	>	3,2084%	<=	3,4308%	D
77	>	0,1005%	<=	0,1081%	A	27	>	3,4308%	<=	3,6680%	D
76	>	0,1081%	<=	0,1163%	A	26	>	3,6680%	<=	3,9209%	D
75	>	0,1163%	<=	0,1251%	A	25	>	3,9209%	<=	4,1906%	D
74	>	0,1251%	<=	0,1345%	A	24	>	4,1906%	<=	4,4779%	D
73	>	0,1345%	<=	0,1447%	A	23	>	4,4779%	<=	4,7839%	D
72	>	0,1447%	<=	0,1556%	A	22	>	4,7839%	<=	5,1097%	D
71	>	0,1556%	<=	0,1674%	A	21	>	5,1097%	<=	5,4564%	D
70	>	0,1674%	<=	0,1800%	B	20	>	5,4564%	<=	5,8252%	D
69	>	0,1800%	<=	0,1936%	B	19	>	5,8252%	<=	6,2173%	D
68	>	0,1936%	<=	0,2083%	B	18	>	6,2173%	<=	6,6340%	D
67	>	0,2083%	<=	0,2240%	B	17	>	6,6340%	<=	7,0764%	D
66	>	0,2240%	<=	0,2409%	B	16	>	7,0764%	<=	7,5460%	D
65	>	0,2409%	<=	0,2591%	B	15	>	7,5460%	<=	8,0440%	D
64	>	0,2591%	<=	0,2786%	B	14	>	8,0440%	<=	8,5719%	D
63	>	0,2786%	<=	0,2997%	B	13	>	8,5719%	<=	9,1310%	D
62	>	0,2997%	<=	0,3223%	B	12	>	9,1310%	<=	9,7226%	D
61	>	0,3223%	<=	0,3466%	B	11	>	9,7226%	<=	10,3482%	D
60	>	0,3466%	<=	0,3727%	B	10	>	10,3482%	<=	11,0092%	D
59	>	0,3727%	<=	0,4008%	B	9	>	11,0092%	<=	11,7068%	D
58	>	0,4008%	<=	0,4310%	B	8	>	11,7068%	<=	12,4425%	D
57	>	0,4310%	<=	0,4635%	B	7	>	12,4425%	<=	13,2175%	D
56	>	0,4635%	<=	0,4984%	B	6	>	13,2175%	<=	14,0331%	D
55	>	0,4984%	<=	0,5359%	B	5	>	14,0331%	<=	14,8903%	D
54	>	0,5359%	<=	0,5763%	B	4	>	14,8903%	<=	15,7903%	D
53	>	0,5763%	<=	0,6196%	B	3	>	15,7903%	<=	16,7339%	D
52	>	0,6196%	<=	0,6662%	B	2	>	16,7339%	<=	17,7221%	D
51	>	0,6662%	<=	0,7162%	B	1	>	17,7221%	<=	99,9999%	D