



Understanding Credit Scorecards

THE MODERN WAY TO AUTOMATE CREDIT DECISIONS
ON NEW ACCOUNTS AND TRANSFORM YOUR BUSINESS



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Introduction

The credit profession is fond of the mantra “trust your gut,” where your past experience in determining creditworthiness is revered in the industry.

You can tell when a customer or prospect account might pay late if you’ve seen the signs before. At the same time, you know when things look too good to be true. Credit professionals interpret data – many different types of data – to inform this “hunch” and arrive at a logical decision of credit terms and limits. It’s a combination of smart data, sharp instincts, and time spent on due diligence.

But if there’s one thing that’s in short supply these days, it’s time. Credit managers can’t spend hours looking at spreadsheets, reading credit reports, calling trade references, and leaving voicemails before an order can be filled or a new account can be onboarded. Routine credit decisions need to be made quickly and efficiently to shorten the sales cycle so that time and resources can be better spent focused on higher exposure accounts or more strategic projects.

Like so many other professions, the role of the credit manager has had to evolve to keep up with the times. The “ship now, chase later” mentality was replaced by reasonable due diligence, and now due diligence needs to be done in minutes or even seconds to become modern and sustainable. In today’s fast-paced business environment, managing credit risk, reducing days sales outstanding (DSO), optimizing cash flow, and complying with regulations are more challenging than ever as credit teams are under pressure to make their department function more efficiently. In addition, the risk of incurring potential bad debt due to bankruptcy and fraud is also becoming a more common threat. The 2018 Report to the Nations from the Association of Certified Fraud Examiners (ACFE) found that businesses are experiencing significant economic damage from fraud, with nearly one in four respondents reporting losses of 5 percent of company revenues.¹

¹ Association of Certified Fraud Examiners (ACFE), 2018 Report to the Nations, p. 8

In today's business environment, credit teams are challenged to:

- Manage credit risk
- Reduce DSO
- Optimize cash flow
- Comply with regulations

So how can credit managers quickly identify the customers who might pay late or pose other serious credit risks and yet approve all reasonable requests for credit in order to keep the business running?

The answer – credit scorecards. Implementing a formulaic credit scorecard can alleviate these time-consuming manual reviews and provide more consistent credit decisions.

Simply put, a credit scorecard is a formula that uses data elements, or variables, to determine a threshold of risk tolerance. Some of these variables can include third-party credit scores, which use historical data and statistical analysis to predict future behavior. The weighted point scores of each variable in the scorecard (for example, four variables each “worth” 25% of the score) are added together, and the total points determine a credit decision of “yes,” “no,” or “maybe (pending further review).” In essence, a scorecard calculates a credit decision in much the same way a person does, but by using the formula, decisions can be made quickly (even automatically in some instances) and consistently.

From this paper, you'll learn how easy it can be to set up a credit scorecard to calculate that very first credit decision for new accounts. You'll get a better understanding of the commonly used types of data variables and be able to determine which ones address your company's definition of creditworthiness.

 Credit scorecards alleviate time-consuming manual reviews and provide more consistent credit decisions. 

CHAPTER 1:

Traditional Process for Credit Decisions

As any credit professional can tell you, initial credit reviews and decisions on new accounts can be a subjective process that takes a lot of time and manual effort.

Some professionals spend hours and even days reviewing and analyzing all the necessary materials, such as a credit report from a credit bureau, trade references, and financial statements (which some small and/or private businesses can be reluctant to share).

When reviewing a report from a credit bureau, credit managers look at both performance-based and predictive analytics, such as scores that benchmark a company's past payment behavior and those that predict the likelihood of a future delinquent payment. Other considerations include the history of the business, public records (such as liens or UCC filings), and trade data (such as payment history). For example, if a company scores positively on an index that ranks past payment behavior (Dun & Bradstreet refers to this score as the PAYDEX®), has been in business for 20 years, and is in a stable or growing industry – those indicators can easily help point a credit professional to a “yes” decision.

Yet most credit decisions are not so easily determined, and here the professional's expertise is important and not to be discounted. As with physicians, years of direct experience in determining

creditworthiness aids in making a proper “diagnosis.” A credit manager who's spent years issuing credit terms in a particular industry will rely on their own institutional knowledge, and perhaps train other coworkers in their methods. However, this approach is still subjective and can leave room for error and perhaps for unconscious bias. Every analyst considers things differently: One analyst might look at 10 different data variables but regard only three as most influential to their decision, while another might look at five different variables but give equal consideration to all five. By obviating the need to manually consult reports, trade references, and financial statements and then arrive at a subjective credit decision (which may not be consistent with other analysts' decisions), a credit scorecard provides an immediate, consistent decision, so that anybody looking at the information will arrive at the same answer. And it frees up the time needed for those accounts and unique requests that do require a certain amount of manual review in order to make a proper diagnosis.

CHAPTER 2:

Understanding Data Inputs – What Goes in the Scorecard

At its simplest, a credit scorecard for new accounts typically comprises four to five variables, but it can include more than a dozen. These variables usually include statistical credit scores from a third-party credit bureau in scorecards for new accounts, as there's no established payment history or other internal data yet available from the new customer. Also, third-party providers have access to vast quantities of reliable data that can provide a more complete picture than internal data or self-supplied references from the customer. For example, Dun & Bradstreet's statistical scoring models are based on dozens of data variables. Here are the most common types of third-party credit scores used in a scorecard for new accounts.

Common Types of Third-Party Commercial Credit Scores:

Delinquency Score

This score predicts the likelihood that the company will make an overdue payment. Dun & Bradstreet defines a severely delinquent company as one that has at least 10 percent of its dollars 90+ days beyond payment terms.

Failure Score

This score goes a step further than predicting a delinquent payment. It predicts the likelihood that the company will experience financial instability in the next year by seeking legal relief from creditors and perhaps even filing for bankruptcy. Dun & Bradstreet calculates this score based on a company's business history, payment habits, and industry norms.

Fraud Score

This score predicts the likelihood of whether a company will commit certain types of business fraud, such as misrepresentation (submitting false information on a credit application) or attempting to obtain credit with no intention to pay.

Payment Rating

This score assesses a company's credit history and payment performance. At Dun & Bradstreet, this well-known score is called the PAYDEX®. It's based on trade experiences reported by vendors and is derived from a weighted average of a company's combined individual payment experiences (i.e., larger invoice amounts weigh heavier in the overall index).

Rating Code

Exclusive to Dun & Bradstreet, an overall rating code such as the D&B Rating is a proprietary indicator that assesses creditworthiness based on financial strength, payment behavior, and company age and size, among other factors. The multidimensional D&B Rating is made up of the Financial Strength rating (based upon information from a company's balance sheet) and a Risk Indicator score that expresses the company's Composite Credit Appraisal and overall assessment, on a simple scale of 1 to 4.



Of course, third-party credit scores only make up part of a scorecard. The most predictive scorecards use a range of information. Other data can include:

Payment Experiences

Accounts receivable (A/R) and accounts payable (A/P) provide an accurate picture of how a particular company is paying a variety of financial obligations.

Public Record Information

These filings, including lawsuits, liens, judgments, bankruptcies, and UCC filings, could indicate a company's ability to pay and survive. In a scorecard formula, a bankruptcy filing should be set up as an automatic disqualifier for credit, and a company with more than one reported lien could be flagged as a "maybe" decision, requiring further review.

Financial Information

Overall financial information, such as cash flow from operations, current liabilities, current assets, working capital, and net worth, provides an understanding of the financial strength of a business and its ability pay on time.

Firmographic Information

Data such geographic location, industry, size (employee, sales), years in business, business history (such as ownership changes), and business type (for example, headquarters or branch location) can help to identify higher-risk business segments.

It's important that credit professionals fully understand the underlying data elements that go into a scorecard so they can trust its output. And when credit teams understand the event the model is predicting (more on this below), they'll come to rely on the scorecard when it reinforces their "hunches" by providing accurate insight.

Common types of data used as variables in credit scorecards:

Payment Rating Score	% of Slow or Negative Payments	Number of Suits on Account
Years in Business	% of Total Past Due	Number of Liens on Account
Number of Judgments on Account	Net Worth	Rating Code
Delinquent Payment Prediction Score	Business Failure Prediction Score	# of Employees
Total Liabilities to Net Worth %	Revenue	Years with Current Management

CHAPTER 3:

Key Benefits of Scorecard Automation

In its most basic form, a credit scorecard can be a formula in a spreadsheet. While this manual process still takes up the credit managers' time to find and input the necessary data elements, it does provide consistent answers because everyone uses the same formula. Credit teams that have scorecard capabilities within their ERP or risk management solution can automate the function altogether for instant decisions. Implementing a scorecard to open new accounts serves as the foundation for automating the credit function, a key differentiator for modern, proactive credit departments. Automating routine new credit requests allows credit teams to scale and eliminate any inefficient workflows and presales processes. It also enables growth by accelerating the sales process – automatically providing prescreened credit decisions to the salesperson.

Benefits of Automation:

Delinquency Score

Automation can decrease bad debt and lower DSO/DBT (days sales outstanding/days beyond terms) by reducing exposure to high-risk accounts, as any red flags are detected upfront.

Increase Speed and Scale

Automation creates an instantaneous, centralized process for handling routine or obvious approvals or declines. Since the credit decision has been boiled down to focus on less than a dozen data points, less data is needed to make accurate decisions.

Increase Efficiency

Automating routine requests allows credit analysts to focus their efforts on unique decisions and difficult accounts, and it increases the volume of accounts that staff can evaluate, since what used to take an hour is now done with a few clicks. Automated decisioning can also bring less experienced analysts up to speed faster without additional training or mentorship by seasoned credit analysts.

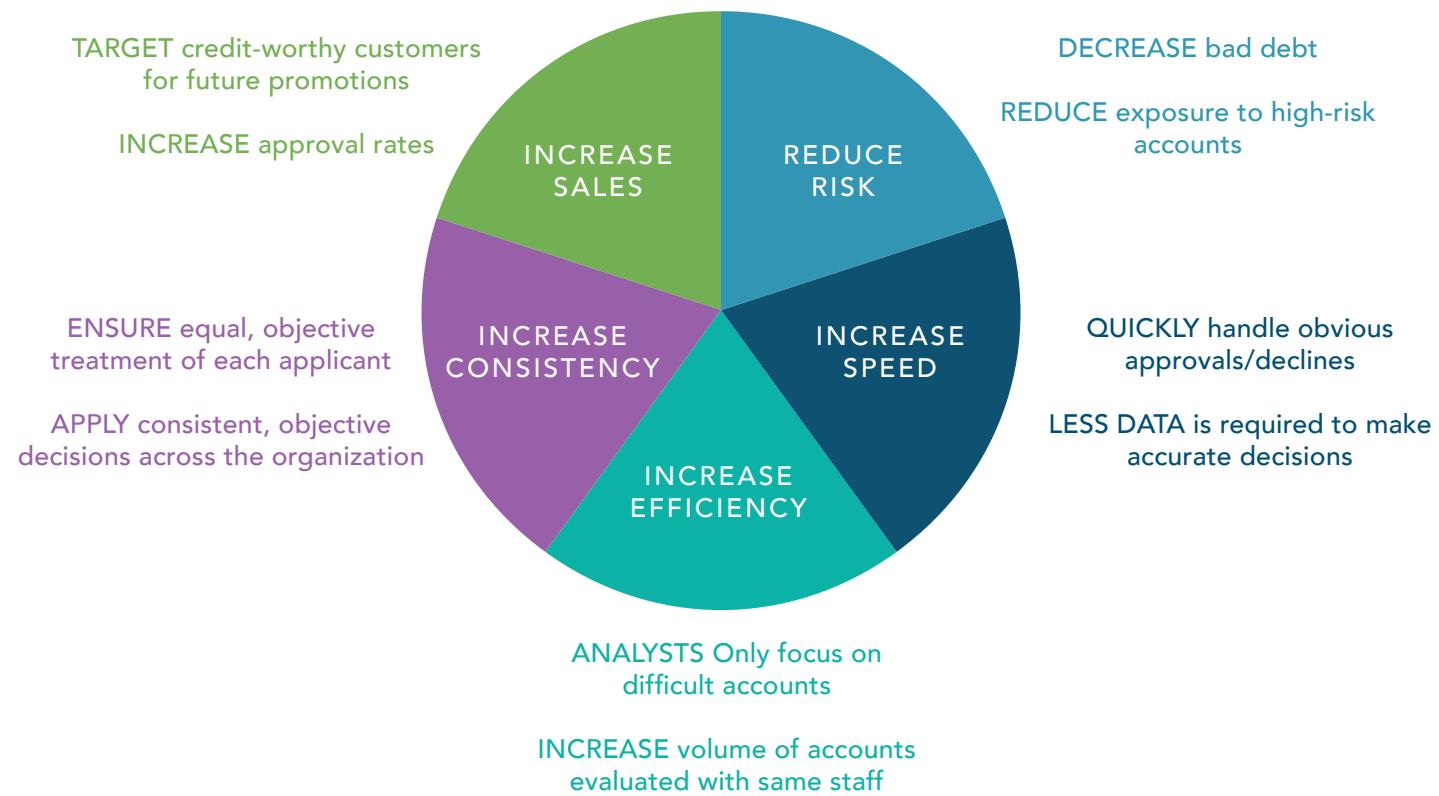
Increase Consistency and Quality Control

Calculating new, routine credit decisions with the same formula becomes a repeatable process that ensures equal, objective treatment of each applicant by removing any subjectivity. In addition, applying consistent decisions creates a level of conformity necessary for any regulatory requirements, such as the Sarbanes-Oxley Act and ASC 606. Consistent decisioning can lead to fewer disputes and customer services issues as well.

Increase Sales

Once automation is set up for new accounts, the formula can be re-evaluated and applied for subsequent invoices to increase approval rates. This can help boost sales, by targeting those creditworthy accounts for future promotions, and foster better collaboration with the sales team.

Automating routine requests allows credit analysts to focus their efforts
on unique decisions and difficult accounts.



CHAPTER 4:

Setting Up Your Scorecard

A credit scorecard set up to evaluate new accounts is still hugely beneficial even if it is as simple as a formula in a spreadsheet. The time saved and consistent decision-making are worthwhile in themselves. And while pre-approval credit scorecards quantify risk and provide guidance to decide who will get credit, it can still be up to the credit professional to decide how much credit is granted and under which payment terms. (Dun & Bradstreet reports provide a recommended credit amount, and the company's other offerings allow for instantly rendered custom credit limits.)

GETTING STARTED

The first step to creating a credit scorecard is to define what the scorecard should predict. There are two main categories of bad accounts that credit managers aim to avoid – those that pay slowly (but will eventually pay, whether it's 30, 60, or 90 days late) and those that file for bankruptcy or go out of business (and will never be able to pay). This requires a general understanding of a company's bad accounts in order to choose which data elements make the most sense for the scorecard.

As mentioned above, there are a variety of data elements to choose from when defining the scorecard's underlying variables, including third-party credit scores, financial information, trade experiences, public filings, and industry data. This information allows for scoring companies on useful metrics, such as a delinquency prediction and percent of past due dollars. A point value (usually out of ten) is assigned to each variable, depending on where a company's score on that variable falls in a range of potential scores. The point values are weighted based on the variable's importance, the results are added up, and the total score generates the credit decision. For example, a score of 0–3 means "no credit" given, 3.1–5.5 means "maybe" (and would require further review), 5.5–7 means "conditional approval" (e.g., granting 75 percent of the requested credit), and a score of 7.1–10 would grant 100 percent of their requested credit.

Companies commonly set up their scorecards with conditions when results fall in a mid-range score, such as granting a percentage of the requested credit or tightening the payment terms. This allows them to set a threshold for risk while still approving routine and reasonable credit requests. It's also a best practice to test the scorecard by running at least 10 known "good" and 10 known "bad" accounts through it to see if the chosen data elements and weights produce the expected result.

In the example below, the scorecard weights four variables – two are predictive scores from a credit bureau, one is a performance-based (past history) score, and one is from the customer's financial data.

VARIABLE	WEIGHT	SCORE RANGE	POINTS
Delinquent Payment Prediction Score*	35%	91 to 100	10
		70 to 90	8
		50 to 69	6
		30 to 49	2
		0 to 29	0
% of Total Past Due Dollars	25%	0 to 9.99	10
		10 to 14.99	8
		15 to 19.99	6
		20 to 24.99	4
		25 to 29.99	2
		30 to 100	0
		Unavailable	0
Business Failure Prediction Score†	25%	95 to 100	10
		69 to 94	9
		34 to 68	7
		2 to 33	3
		0 to 1	0
Payment Rating‡	15%	80 to 100	10
		70 to 79	8
		60 to 69	5
		50 to 59	3
		40 to 49	1
		1 to 39	0

* Score Range calculated using the D&B® Delinquency Score.

† Score Range calculated using the D&B® Failure Score.

‡ Score Range calculated using the D&B® PAYDEX Score.



Now, let's apply this scorecard in a couple of different scenarios.

Scenario A:

If an applicant has:

- A Delinquent Payment Prediction Score of 72, they would get 8 points ($8 \times 35\% = 2.8$ weighted points)
- 12 percent of their dollars past due, they would get 8 points ($8 \times 25\% = 2.0$ weighted)
- A Business Failure Prediction Score of 61, they would get 7 points ($7 \times 25\% = 1.75$ weighted)
- A Payment Rating of 73, they would get 8 points ($8 \times 15\% = 1.2$ weighted)

The total weighted score ($2.8 + 2.0 + 1.75 + 1.2 = 7.75$) meets the threshold above (7.1-10) for approving the applicant's requested credit.

In the second scenario, the applicant may not receive their full requested credit amount, despite having less than 10 percent of their dollars past due. Though this applicant is able to pay on time more often than not – perhaps because they only have small lines of credit active with other vendors – their overall score was driven down because of the fairly high Business Failure Prediction Score. A quick look at the company's credit report would show that the Business Failure Prediction Score was assigned due to reported UCC filings, a high number of inquiries to the credit bureau, evidence of open lines of credit, and notes that the present management team has been in control for a limited time. Therefore, with a score of 5.8, the credit manager could decide to extend a percentage of credit, change payment terms, or even grant the full amount of credit, if there otherwise seemed to be a low probability of delinquency or default.

Scenario B:

If an applicant has:

- A Delinquent Payment Prediction Score of 65, they would get 6 points ($6 \times 35\% = 2.1$ weighted points)
- less than 10 percent of their dollars past due, they would get all 10 points ($10 \times 25\% = 2.5$ weighted)
- A fairly high Business Failure Prediction Score of 8, for 3 points ($3 \times 25\% = .75$ weighted)
- A Payment Rating of 58, for 3 points ($3 \times 15\% = .45$ weighted)

The total weighted score ($2.1 + 2.5 + .75 + .45 = 5.8$) means they'd get their credit – but with some conditions.

The example to the right provides a template for a simple credit scorecard when self-supplied financial data from the new applicant is not available. Many companies use years in business or number of employees to give a small amount of weight (less than 10 percent) to companies that are more stable. It's important to remember that the scorecard's goal is to predict if an applicant might make a delinquent payment or default altogether, and so commercial credit scores that are predictive in nature should be weighted more than past-performance-based scores such as a payment rating. In this scorecard, the payment rating has a greater weight than in the previous example, so its point scale is slightly reduced for companies that have a score less than 50.

VARIABLE	WEIGHT	SCORE RANGE	POINTS
Delinquent Payment Prediction Score*	40%	91 to 100	10
		70 to 90	8
		50 to 69	6
		30 to 49	2
		0 to 29	0
Business Failure Prediction Score†	30%	95 to 100	10
		69 to 94	9
		34 to 68	7
		2 to 33	3
		0 to 1	0
Payment Rating‡	25%	80 to 100	10
		70 to 79	8
		60 to 69	5
		50 to 59	4
		40 to 49	2
		1 to 39	0
Years in Business	5%	More than 20 years	10
		>10 years to 20 years	8
		>5 years to 10 years	6
		>3 years to 5 years	4
		>1 year to 3 years	2
		1 month to 1 year	0
		Unavailable	0

* Score Range calculated using the D&B® Delinquency Score.

† Score Range calculated using the D&B® Failure Score.

‡ Score Range calculated using the D&B® PAYDEX Score.

$$(\vec{E} \cdot \vec{S}) = E_S, \quad \oint (\vec{E} d\vec{S}) = \int \operatorname{div} \vec{E} dv \quad \oint (\vec{E} dl) = 0$$

$\operatorname{div} \vec{E} = (\nabla \cdot \vec{E}) = \frac{\partial E_x}{\partial x} + \frac{\partial E_y}{\partial y} + \frac{\partial E_z}{\partial z}$

$$\eta = 1 - \frac{T_x}{T_m} \quad \delta Q = dU + \delta A$$

$$\eta = 1 - \frac{Q_u}{Q_m} \quad Q_m = A_{u3} = VRT$$

$$Q_m = u_2 - u_1 + A_{12}$$

DEVELOPING A WINNING FORMULA

There is no one-size-fits-all approach to credit scorecards. When developing a credit scorecard for new customer accounts, it's best to start off simple. As the business better understands its needs and criteria, the scorecard can become more complex and fine-tuned for each type of customer. In fact, proper implementation includes a combination of validation, testing, readjustment, and refinement to understand if it's capturing the right amount of risk or if the data elements need to be reweighted. While this might sound like a daunting task, success depends on the credit team's ability to continuously evaluate their risk exposure and adjust those risk strategies at scale.

Best-in-class credit teams have multiple scorecards to refine the decisioning outputs for different segments of their portfolio. For example, there could be different scorecards depending on the size of

the customer – small businesses could have tighter credit restrictions and larger customers could be given looser parameters. A scorecard for small business customers could be appended with relevant third-party scores, such as Dun & Bradstreet's Small Business Risk Index. Industries and geographic location can also play a role in segmentation, as there could be a narrower risk threshold for customers in volatile industries or international locations.

Ultimately, the scorecard's success comes down to its return on investment. If credit teams find themselves spending less time on manual credit reviews for seemingly routine applications and the scorecard is reducing DSO/DBT by accurately identifying risky credit requests and risky customers, then credit teams have developed a winning formula.

$$Q_m = u_2 - u_1 + A_{12}$$

$$P_1 P_2 P_3 P_4 \cdot v_1 v_2 v_3 v_4 = P_1 P_2 P_3 P_4 v_1^{\delta} v_2^{\delta} v_3^{\delta} v_4^{\delta}$$

$$P_1 P_2 P_3 P_4 \cdot v_1 v_2 v_3 v_4 = P_1 P_2 P_3 P_4 v_1^{\delta} v_2^{\delta} v_3^{\delta} v_4^{\delta}$$

$$L(p) = \min \left\{ \begin{array}{l} p_1 + 2p_2 + 3p_3 \\ 3p_1 + p_2 + 2p_4 \\ 2p_1 + 3p_2 + p_3 \end{array} \right\} \rightarrow \min_p$$

$$P_1 V_2 = P_2 V_1 + P_3 V_3 + P_4 V_4$$

$$\varphi_{i+1j} + \varphi_{i-1j} + \varphi_{i,j+1} + \varphi_{i,j-1} = 4\varphi_{ij}$$

$$\delta Q = dU + \delta A$$

$$Q_m = A_{u3} = VRT$$

$$Q_m = u_2 - u_1 + A_{12}$$

$$P_1 V_2 = P_2 V_1 + P_3 V_3 + P_4 V_4$$

CHAPTER 5:

Conclusion

Setting up a credit scorecard to automate even a partial percentage of new customer account decisions is a smart way to strike the right balance between **managing risk and optimizing resources**.

When the scorecard aids in initial credit decisions, those decisions become more consistent and the credit analyst is free to focus his or her time and effort on unique decisions and difficult accounts and – more importantly – is now able to dig deeper and find out where those unique decisions and difficult accounts are. Most every company can benefit from implementing a credit scorecard for new decisions, but it's especially helpful for those with a large volume of accounts or those who face competitive pricing pressure. While it takes some research, planning, and consideration to understand the appropriate data elements and weights, the results are worthwhile – more revenue, less bad debt, and increased profitability.





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