

# Keys to robust credit risk modeling and decisioning for better customer experience



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## The importance of effective credit risk decisions

*To which customers or prospects should we make our most attractive offers?*

*What is the probability that certain customers - or those with similar profiles - will default?*

*What is the appropriate credit limit and interest rate for a given customer or purchase? For past-due accounts, which customers are most likely to respond to collections efforts?*

*Which customers should be allowed to use their credit cards even when they have missed their payment?*

*Does our lending portfolio represent an acceptable overall level of risk within the risk appetite of the bank?*

Answering such questions with speed, precision and confidence can dramatically change business results. This is true for any entity that extends credit, from traditional banks to alternative lenders, car dealers, mortgage companies, communications providers, government agencies, health care systems, insurance companies, credit management services and retailers that offer lines of credit. Speed, precision and confidence are key to a great customer experience at lower operating cost.

### Speed

Today, customers are expecting speedy credit decisions from financial institutions. The organization that takes longer to return a credit decision will lose out to more agile competitors. A lag of even 10 minutes can make a difference.

### Precision

Many banks still use highly manual processes for loan underwriting, subject to human bias and inconsistency that lead to poor decisions and underperforming loans. Firms that make more accurate credit decisions will maximize revenue and minimize defaults.

For better precision when making a lending decision, it's not enough to rely on scores from credit bureaus alone. Savvy organizations will use a wealth of alternative data for deeper insight. For example, in the UK - where there is no universal credit score or rating - lenders assess potential borrowers on their own unique criteria, using algorithms that are essentially trade secrets (and competitive differentiators). Market-leading banks build highly segmented models for unique types of customers - far more accurate than generic models.

### Confidence

Financial institutions that make the right offers will mitigate risks related to exposures and maintain regulatory compliance while reducing the cost of doing business. Those that have transparency and rigor in their credit scoring methodology can confidently defend the fairness and validity of their credit decisions.

The goal is to strike the right balance between risk aversion and business development. High credit exposure can lead to high default rates and charge-offs; too little risk appetite can mean lost revenue and damaged customer relationships.

While all firms will calculate credit scores/ratings for new credit applications and existing accounts to help manage this balancing act, traditional credit scoring approaches and decision management processes often have serious limitations.

## Limitations of legacy credit risk modeling approaches

### Long model development times

Organizations that develop their own credit risk models see long lead times to get them built and deployed. Business users determine a need for a new model, which triggers weeks or months of data collection and model development effort – as much as a year. By the time the new model is deployed, market conditions and customer needs have changed, so the process starts over.

### Cumbersome process

There are many activities throughout the model life cycle, such as getting business buy-in, accessing data, cleansing it, securing approvals, developing IT specifications, validating models, coding models, documenting them, producing audit reports and other operational activities. Fettered by handoffs and manual interventions, the entire analytics and modeling process can be slow and inefficient.

### High outsourcing costs

Consulting companies can manage custom model development, if you don't mind high annual costs, minimal control over the underlying credit risk algorithms and long turnaround for model updates. Segmentation is limited because it adds further costs.

### Incomplete view of risk

Improved views of risk require access to alternative data that would generate a more accurate risk score – or get the data fast enough to react to market changes, often not accessible to legacy credit risk tools. Tools based on disparate products that don't integrate well can increase regulatory risk.

### Data management issues

It's common to find different data definitions among business, IT and risk units. Users don't always follow data set naming conventions, so it's hard to find the right data set, understand its purpose or be sure which is the most recent one. Data updates may be sporadic with suspect data quality.

### Loss of corporate knowledge

Developers vary in their coding styles, and some use difficult-to-manage approaches. When they leave the organization, they take critical knowledge with them. Their replacements (if you can even find the right coding and modeling talent) typically rewrite code to match their own programming style. How do you validate and manage your corporate knowledge in such a patchwork process – or defend it to regulators?

## It's time to transform

Financial institutions have a prominent role to play in guiding the world toward economic recovery in the post-pandemic environment. There is new urgency to resolving the limitations in the credit risk modeling and decision-making process. Competitive pressures add to the urgency. Banks are rapidly losing ground to non-bank lenders, such as digital lenders, telecom providers and other entities, that are moving into financial services.

Lack of model precision can lead to erroneous client ratings that cause firms to take on risky or unprofitable loans – or worse, to decline eligible clients.

It is not unusual for months to pass from the moment you decide to build a new credit scoring model until the model is deployed in the production environment. All the while the old model is delivering less precision as the world continues to change.

IDC noted that to counter the uncertainty of the pandemic, 70% of corporate banks will revisit credit scoring models and prioritize an open data strategy to improve loan portfolio health by 2023. And by 2023, 75% of all consumer and small business loans will be originated through AI-enabled and automated processes.

Amid these realities, it's time to reevaluate the cost efficiency and sustainability of credit risk scoring models and processes. Banks and other financial institutions are going through large-scope risk transformations to address these limitations. It's time to transform the credit risk modeling and decision-making processes from time-consuming to automated and streamlined for future-proof credit risk management.

## Four pillars of modern credit risk modeling and decision making

As organizations see the benefits of modernizing the credit scoring environment, there is growing interest in establishing analytics and modeling disciplines in-house. But to get the expected value, they must have a comprehensive plan and long-term vision. This is especially true for banks, where modeling activities are heavily regulated and audited.

Technology advances such as high-performance, in-memory processing and machine learning have redefined the possibilities. Look beyond traditional modeling approaches and stepping-stone processes. Here are the six pillars of an effective and proactive credit risk modeling and decision system.

### 1. Robust data management with traditional and alternative data sources

Credit risk scoring is only as good as the data that feeds the process. So it's essential to have strong capabilities to access, transform, standardize and cleanse all requisite data - including third-party bureau, transactional, application, billing payment and collections data.

If you want to keep pace with new market entrants who are innovating their credit decision practices, look beyond traditional data sources. For example, business lending can make credit decisions based on creative new data points that include online reviews from sites such as Google, Amazon, Yelp and TripAdvisor; numbers of FedEx packages shipped or apps downloaded; eatery menus or smartphone activity. Thinking beyond account balances and credit bureau scores leads to new ways to become more customer-centric.

Where permitted by law and culture, consider using data from telco and utility payments, mobile phone use, e-money transfers, social media, online purchases, online browsing and psychometrics. Use these data sources with care, because causality can be hard to establish, and there's a fine line between being personalized and being intrusive.

To expedite data management tasks and reduce training costs, look for powerful and user-friendly interfaces for managing data, creating modeling data sets, mining data and reporting. To accelerate decisions with very large data sets, take advantage of powerful in-database processing capabilities.

When two people seek an answer to the same question or repeat the same exercise, they should get the same answer. This isn't happening when they're using different tools and programming approaches.

Lenders that capitalize on modern technology to re-engineer their credit risk scoring and decision systems can improve the quality of leads and make better recommendations, while reducing manual activities, maintenance costs and losses.

## 2. Advanced analytics for deeper and more proactive insights

Rules, thresholds and if-then decision logic based on business assumptions are no longer enough. For deeper insights, embed multiple forms of analytics into the scoring process. Combine analytics with decision logic to automatically deliver highly relevant, interactive offers in real time, even in high-volume environments.

When you layer multiple analytics methods, you can more accurately assess creditworthiness of an individual account or at the portfolio level. For example, anomaly detection and predictive analytics can uncover new forms of risk by examining what's happening right now, not just comparing it to the past. Online behavior analytics can establish links that represent potential pluses or red flags. And self-learning techniques take fraud detection to the next level.

When selecting a model development tool, look for the ability to:

- Perform application and behavior scoring for all lending products and customer segments, such as wholesale and retail.
- Support fast closing with high-performance, in-memory, parallel calculations at a granular level.
- Trace all calculation steps and store the results for future audit purposes.
- Streamline implementation with rich out-of-the-box capabilities that can be customized with imported code.
- Use GUI interfaces to reduce programming errors and reduce training time for new hires.

Consider whether the solution offers compatible products within related risk and finance areas, such as capital calculation and IFRS 9, to minimize integration work and maintain higher consistency among models and rules used across those areas.

Given the low level of regulatory tolerance for “black box” analytics models and processes, everything from data creation to analytics, deployment and reporting should be transparent. Not only is this information valuable corporate intellectual property, but it will also be needed if regulators question your credit decision methodology. Anyone who needs to see details on any phase of the development process should be able to easily do so.

For example, how data is transformed to create aggregated and derived variables, the parameters chosen for model fitting, how variables entered the model, validation details and other artifacts should be stored in one place and accessible through a graphical user interface for review.

## 3. Automated delivery of credit decisions

Once rules and models have assessed credit risk, you need to get that information immediately to the point of decision – operational systems that support loan origination, customer relationship management, debt collection, online banking, mobile banking apps, call centers, points of sale, ATMs and so on.

Create challenger models using novel methods and data, and backtest/parallel-run them to compare with existing champions as a low-risk way to experiment.



## Machine learning takes credit scoring to the next level

Machine learning makes discoveries and adapts to what it sees in the data through automated model building. With every iteration, the algorithms get smarter and deliver more accurate results. It's easy to see the value of machine learning to keep pace with the emerging risks of new digital channels – and the imperative to manage all credit risk more carefully and profitably.

Deep learning takes machine learning further by applying it to multilayer artificial neural networks. Deep neural networks move vast amounts of data through many layers of hardware and software, each layer generating its own representation of the data and passing what it “learned” to the next layer. One credit bureau that worked with SAS used the neural net approach to improve predictive ability by as much as 15%.

Trouble is, the process can be so complex that even its programmers do not know how the learning machine reached its results. Yet regulators require that results be interpretable.

Now it is possible to map inputs into the hidden layers of neural networks to be able to interpret the attributes coming into the final network. **This groundbreaking work** enables credit decisions to be based on hundreds of thousands of tested attributes. These fine-tuned algorithms determine what is most predictive of credit risk, far beyond conventional, static attributes such as account balance and transaction history.

For example, based on model results, a banking customer may automatically get a loan pre-approval message immediately after completing an application form on the bank's website. A credit card customer may get an invitation to a one-time credit limit increase or receive “convenience checks” in the mail to draw funds from that card at no interest rate for the next billing cycle.

The firm that can automate this process will rapidly deliver data-driven credit decisions in alignment with the organization's risk appetite and customer contact policies. To achieve that, look for a real-time decision management platform that:

- Combines analytics with business logic and credit strategies to automatically deliver intelligent, real-time recommendations to interactive channels.
- Supports complex decision diagrams and processes that can interact with multiple data sources and apply advanced analytics techniques and business logic.
- Taps into diverse data sources to make the right decision or take the best action – either historical data (previous interactions, payment information, preferences, etc.) or data received during the interaction (such as online behavior).
- Provides an intuitive graphical user interface so business users can easily define risk policy rules and construct automated decision processes without IT assistance – no complicated coding required.
- Streamlines the process of setting up decision processes by offering reusable, out-of-the-box tasks that can be augmented with custom tasks created by coding.
- Supports streaming analytics that enhance the customer experience by predicting their needs in real time and acting on analytical insights even before the customer realizes action is needed.

**The credit decisions you make are highly dependent on the models you use to make them. The challenge is to develop accurate credit risk models that get into production quickly and can be readily updated to support accurate lending decisions. Shorter time to value yields significant ROI.**

#### 4. An agile, integrated platform

Most vendors of credit risk systems focus on a specific area or customer segment. Or they're struggling to integrate technologies they have acquired to create a seamless and consistent end-to-end experience.

Smooth, systemic integration of these steps is essential. It reduces governance and implementation risk. It ensures that the output of each phase, including parameters and conditions for data sets and models, is seamlessly incorporated into the next phase. It reduces maintenance costs and key personal risk. And it brings unity and consistency to managing various types of risk, such as debt collection, stress testing and IFRS 9 and CECL compliance.

Credit models must reach production while they are still accurate and reflect what's happening today. Lending policies, economic conditions, products, pricing, competitive pressures and seasonality can all affect model performance. This calls for establishing a cohesive model risk management process - an automated environment to quickly develop, deploy, track and assess models.

Look for a risk modeling and decisioning platform that:

- Enables modelers to quickly develop new credit risk models, incorporate existing models and their own custom code, with no reprogramming required.
- Promotes collaboration and standardization through sharing and reuse of analytics assets such as data sources, data extraction logic, filters, segmentation logic, models, parameters and derived variables.
- Automatically self-documents the model life cycle, with all related information stored in one easily accessible place for audits.
- Enables use of microservices across different risk decision areas for more efficient strategy development and consistent customer experience.

A comprehensive credit risk modeling and decisioning platform with user-friendly graphical interfaces makes it possible to create and deploy models in days instead of months. Also, taking full advantage of model life cycle innovations requires **rethinking the ways in which data and models are used and provided**. The components of a modern cloud architecture open the possibility of automating multiple activities across the credit risk modeling life cycle. Forward-thinking firms have already begun this journey.

### Credit risk modeling and decision management in action

A modern credit risk and decision management platform enables the board, executives and owners of individual lending products to:

- Understand the impact of economic changes and business decisions on capital reserve and P&L.
- Plan capital investment and lending products based on reliable expected loss calculations.
- Support marketing in planning customer acquisition, cross-sell or up-sell campaigns.

Here are some prime possibilities for putting better credit risk management practices to work.

Automate and enhance the decision-making process for high-volume, customer-facing systems and carry out focused, consistent strategies across channels.

Model developers should have automated tools that easily explain the causality of all the major statistical relationships.



## Optimize credit limits to boost customer loyalty

With deeper, analytics-driven credit insights, you can be more confident when setting appropriate base credit limits for new customers, and then adjusting that limit over time based on usage and repayment patterns to optimize the amount of unused capacity on the credit card.

Suppose you have a customer who has opted into location-based awareness and typically uses 90% of his credit card limit. You see that he is going to a business where he normally makes purchases of \$150 to \$300, but he only has \$120 credit remaining on his card. Since he has a good payment history and good cash flow in his other accounts, the system automatically sends him an SMS with a limited time offer to increase his credit limit by \$500 for one month. The bank may have just earned (or reaffirmed) the customer's loyalty.

## Use risk-based pricing to win the business

Where should you set the interest rate for a given loan, such as a car loan, for a given customer? You could do market research, see what others are doing in the market and set it there.

## More effectively up-sell/cross-sell credit risk products

You could use standard tactics for expanding your share of a customer's wallet, such as promoting a credit card when selling a mortgage or car loan.

Or think more creatively. Use analytics to understand which credit cards to sell to specific customers based on their unique characteristics and what that might tell you about their rewards preferences. The frequent traveler may be more receptive to a card with air miles, the shopper more inclined to choose a card that offers discounts with partner retailers, the saving and investing types might prefer cash-back rewards.

## Proactively manage the portfolio of business loans

Assessing a portfolio of business loans typically involves assessing customers based on their annual financial statements, and then re-rating that customer based on interim financial reports.

Or think more creatively. You could integrate data from news feeds and social media, then apply text analytics to understand what's happening in the market, news about that customer and the tone of sentiment surrounding that customer. Are its mining activities creating real environmental damage? Did its CEO just make inflammatory comments or shoot a beloved lion? Did it just experience a big chemical spill or factory calamity? Are its online reviews and ratings favorable, indicating good business health and potential?

This breaking news can go into the rating model as supplemental attributes to re-rate the customer in real time or daily.

## Exploit machine learning in novel ways

Machine learning can uncover correlations among different attributes that traditional linear models would miss. Banks and nontraditional financial entities are turning to machine learning to make more precise decisions about debt collection, loan approval and such. Machine learning is proving especially valuable when using alternative data, where attributes may be indirectly correlated.

Use transaction history in customers' savings and checking accounts to gauge cash flows, and use that to adjust risk-based credit limits.

Or think even more creatively. Use machine learning to identify which variables have good predictive quality (it might not be what you'd think), and then pour that insight into traditional models. Or build a primary model with traditional modeling techniques or rules, and a parallel model with machine learning. While the machine-learning model can be difficult to interpret, the companion traditional model can explain the result.

## Successes around the globe

Not surprisingly, banks have been the early adopters, but similar successes are emerging in all types of organizations around the world. By investing in an end-to-end, automated platform, organizations see productivity gains, faster model turnaround, deeper corporate knowledge, and faster and more accurate credit decisions. For example:

- An Irish retail bank with 70% of its loan book in mortgages faced a spike in risk during a recession that slashed housing values by nearly 50% and led to a 16% impairment in its mortgage books. The bank used analytics-driven credit scoring with its marketing automation and campaign management system to make smarter debt management decisions. The bank forecast a 1% performance improvement – an estimated \$3.1 million – from more targeted collections efforts.
- A South American bank in a country of economic and political crises wanted to differentiate itself by improving its credit risk and market risk evaluations. The credit department streamlined the process for developing and implementing credit models. The solution gets better models into production about a year earlier and is expected to reduce annual credit losses by 5%, or US\$250 million per year.
- An Eastern European bank upgraded its collection processes based on deeper credit risk insights and increased claims recovery by 70%. It could now sustain profitability even during lean times by more accurately assessing batches of debt and individual debtors.
- A US bank with assets of \$1 billion was averaging credit losses of \$25 million a year. Using credit scoring tools that improved model performance and reduced the modeling cycle from four months to two months, the bank was able to reduce those losses by 5%.

Better models,  
more manageable  
and repeatable  
model processes,  
ongoing model  
performance modeling  
... It's easy to see how  
modernizing the model  
development process  
will reduce losses and  
operational risk.

## Closing thoughts

Bringing advanced analytics, process automation and enhanced governance to credit risk modeling and decision management delivers bottom-line benefits:

- **Improved credit risk model performance.** Develop new machine-learning models for better predictive power.
- **Smarter credit decisions due to more data.** Combine analytics with decision logic to meet customer needs with the right credit proposition at the right time.
- **Reduced time to decision.** Automate credit decision processes to minimize the time required for credit decisions.
- **Optimized IT resource use.** Empower business users to design and modify new, automated decision processes without IT assistance.

Whether your organization relies on outsourcing – or uses internally developed systems built from traditional coding or a combination of niche products – consider moving up to an adaptable, nimble credit risk modeling system. The future holds great promise as more technologies become available on the cloud – enabling even greater innovation across the entire credit risk model life cycle to deliver optimized credit decisions in a fast-moving, volatile world.

## SAS® and credit risk management

Risk management is a core strength and top focus area for SAS. SAS Risk Management solutions are deployed in more than 1,500 organizations in more than 60 countries.

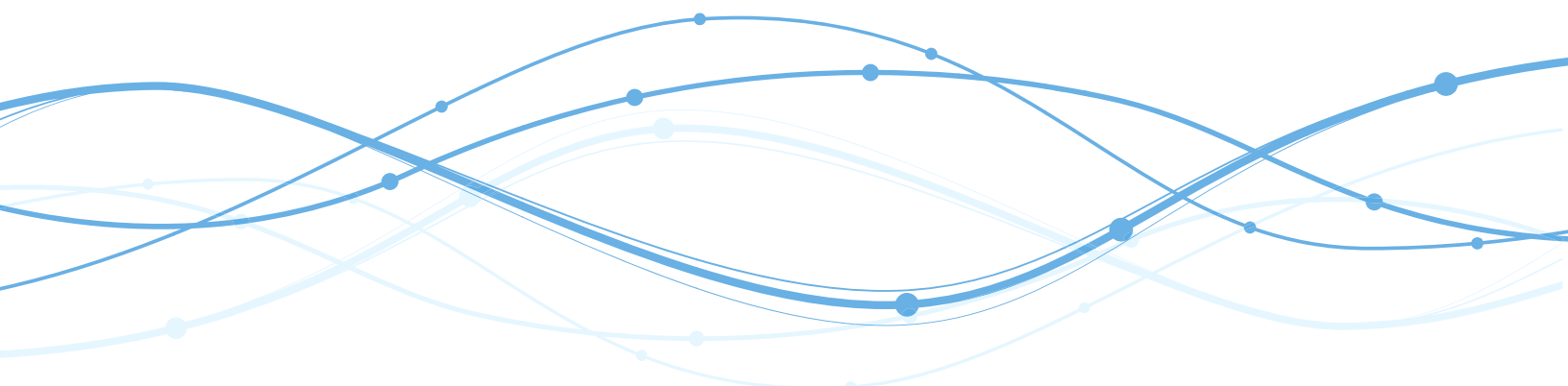
Ranked by Chartis in 2022 as a top five vendor in this category for the 15th consecutive year, SAS has also earned the distinction of being named the leader in Risk Technology Credit Consumer modeling (2021 and 2022), and as a leader in model risk management (2021).

SAS solutions for credit risk modeling and decision making are delivered through SAS Risk Modeling, Risk Modeling Add-on for SAS Visual Data Mining, [SAS Visual Data Mining and Machine Learning](#), and SAS Intelligent Decisioning on the cloud-native SAS® Viya® 4 platform. These offerings support a seamless experience for the end-to-end processes of developing and deploying credit models, rendering decisions, monitoring and reporting.

### Learn more

SAS Viya cloud solutions:

- [SAS Viya](#).
- [SAS Visual Data Mining and Machine Learning](#).
- [SAS Risk Modeling](#).
- [Risk Modeling Add-on for SAS Visual Data Mining and Machine Learning](#).
- [SAS Intelligent Decisioning](#).



Learn more about [SAS Credit Risk Management](#).

