

Credit Scoring: Is It Right for Your Bank?

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Introduction

This paper is not intended to be a step-by-step manual of the tasks required to implement a credit scoring system in your bank – because banks operate in different environments, have different procedures and policies, and sell credit products differently, such a manual would probably result in more questions than it would answer. Instead, this document aims to provide you with a *road map* of the steps in we recommend in designing, implementing and monitoring a custom credit scoring model.

We hope that by considering the basic steps outlined herein and augmenting this knowledge with other available literature about credit scoring you will be able to:

1. Determine whether credit scoring is right for your bank.
2. If “yes,” begin the process of implementing a scoring model into your bank.

While credit scoring could be a valuable teaching and risk management tool in virtually any bank setting, it is probably low on the totem pole of priorities in banks with more fundamental underwriting problems such as inexperienced loan officers, seriously inadequate procedures, persistent arrears problems, etc. If that is the case in your bank, for now you might want to keep scoring in mind as a goal for the future. The remainder of this paper assumes that this is not the case, that your bank has sound underwriting procedures, an adequate MIS system and therefore could potentially benefit from the efficiencies credit scoring offers.

One disclaimer before we move on: the process described below is not an “off-the-shelf” scoring system or standardized product. The actual amount of time and effort required to introduce a credit scoring system in your bank will depend on the amount of time you and/or your team dedicate to the project, the level of commitment and support from bank senior and line management, and the time and budget constraints of the technical assistance (TA) or engagement contract. Therefore, you are probably wondering, “how much time does this really take?” The simple answer is: “it varies.” In the case of the large Baltic bank we will discuss in this article, where the bank had limited small business loan historic data to draw upon, it kept two consultants busy for 18 months. For banks with ample historic data, scoring consultancies are able to design statistical models in as little as 2 months, although, once again, implementation is the ultimate key to success and will invariably require ongoing support and management for the duration of the model’s use. Because each bank is a unique entity with unique needs, a customized solution, whether it is or is not scoring, is appropriate in every consulting engagement.

Finally, for the sake of this paper, small business loans are defined as those less than €30,000 equivalent, the amount the EBRD uses as a ceiling for its “micro-loans” classification.

With an understanding of the above, let’s move on to what credit scoring really means.

What is Credit Scoring?

“Credit scoring” uses quantitative measures of the performance and characteristics of past loans to predict the future performance of loans with similar characteristics.

Credit scoring is a scientific method of assessing the credit risk associated with new credit applications. Statistical models derive predictive relationships between application information and the likelihood of satisfactory repayment. Models are empirically designed; that is, they are developed entirely from information gained through prior experience. Therefore, credit scoring is an objective risk assessment tool, as opposed to subjective methods that rely on a loan officer’s opinion. Clearly, credit scoring is a risk management tool. Scoring systems can help a bank ensure more consistent underwriting and can provide management with a more insightful measure of credit risk.

Credit scoring cannot predict individual loan loss; rather it predicts the likelihood or odds of a “bad” outcome, as defined by each bank – usually this will be some level of average or total days in arrears at which associated costs make the loans unprofitable. Nor should a credit scoring system alone approve or reject a loan application; rather the underwriter must decide how he or she will incorporate the credit score into the loan review. Finally, credit scoring is not meant to increase approval rates; rather, it promotes consistency and efficiency while maintaining or reducing historic delinquency rates. It also allows the users to focus their attention and time on applications that are not obvious approvals or obvious declines. Table 1 below presents these relationships.

Table 1:What Scoring Can and Cannot Do

Credit Scoring Does Not:	Credit Scoring Can:
Predict individual loan loss	Predict the likelihood or probability of a “bad” outcome as defined by the bank
Approve or reject a loan application	Focus underwriting time on borderline cases, while automatically identifying very good and very bad applicants and reducing time spent reviewing them
Increase approval rates.	Increase the profitability of small business lending by reducing time spent on collections and workout.

Banks have been using credit scoring successfully for nearly 20 years to make decisions on consumer loans for autos, personal lines of credit, and credit cards. The credit quality of a small business often mirrors its principal’s credit behavior – if the principal of a business does not pay personal creditors, chances are good that he or she will not pay a business loan.

“Scoring” the Risk of a Small Business

In contrast to the complex risk rating and scoring approaches used by banks to evaluate large loans to corporations, the nature of very small, or micro, loans to sole proprietors and small businesses allow underwriters to reduce both underwriting time and costs by focusing loan analysis on a small number of key indicators indicative of repayment risk.

A small business often is managed by one “key” entrepreneur, and the likelihood of timely repayment is directly related to that entrepreneur’s *willingness* to repay. Many of the entrepreneur’s personal characteristics may be highly predictive of his likelihood to repay, often more so than the business’s financial health ratios routinely considered in underwriting larger loans to larger companies. Thus, the characteristics of small businesses warrant scoring that carefully balances indicators of the entrepreneur’s credit worthiness with anticipated available business cash flow to cover loan repayment.

The underwriting and collections of small business loans can be handled more consistently and cost-efficiently using custom designed scoring models, which can be either statistical or rules-based (judgmental) depending on the availability of appropriate data at the time of model design.

Statistical Models

If a bank has a large pool of loan application data and repayment history for small business loans over a multi-year period, it is possible to use the data to derive a statistical model that predicts the risk of a good or bad outcome as defined by the bank. For example, a statistical model can indicate that a given applicant has a 25% likelihood of experiencing average arrears of greater than 7 days or one spell of arrears greater than 30 days. Such a model can be tested and validated prior to use. Given at least approximate loan cost and profit information, the bank can then quantify its appetite for risk in terms of profit it will realize by granting or rejecting loans at a certain probability level.

Statistical models are the most powerful scoring models, and building one generally requires an initial data loan pool with at least 1,000 “bad” outcomes, but ideally considerably more. The actual factors in any custom statistical small business loan model will be determined by testing, although some key indicators are likely to be found predictive in many models.

Judgmental Models

For banks that lack a pool of historic small business loan data adequate for deriving a statistical model, a customized rules-based model can be set up to consistently weight the key factors the bank feels describe the credit risks of small business borrowers and rank order loans from low to high risk by assigning a risk rating. Such risk rankings can be useful for consistent risk-based pricing, credit policy implementation and prioritization of collections.

Focusing on a narrowly defined group of factors that best describe the risks specific to small businesses tends to reduce underwriting time and cost on the smallest volume loans by reducing lengthy analysis of what are often misleading official financial statements. While in and of itself a rules-based model can significantly reduce underwriting time and improve the profitability of small business lending, it can also be used as an intermediary step to the construction of a more powerful statistical model. In the latter case, loan data is systematically collected and analyzed over an adequate time-period (which depends on lending volume) and can then be used to derive a statistical model. Initially a judgmental approach also has the advantage of facilitating the collection of certain factors key to the risk of small business loans that may not have been captured in the banks earlier underwriting procedure.

Practical Implementation

Since September 2000, we have been working with one of the largest banks in the Latvia, which in turn is owned by the largest Swedish banking group, to develop a judgmental scoring system that bank management intends to transform into a statistical model as the portfolio of loans made using the current model grows and matures. In addition, we are in the early stages scoring model design and implementation in several other banks in countries throughout Central and Eastern Europe. In the Latvia case, which will be the focus of this paper, a lot of things have gone right from day one of the assignment, such as senior bank management having a clear idea of what type of system they wanted us to design. Obviously this will not be the case in every project, and step one below takes this into consideration. The next five steps in the six-step process below draw on our own experience and best practices to provide you with a roadmap of how to apply a scoring approach in your bank.

Six Steps To Credit Scoring

1. Present the concept

With constant improvements in technology and growing competition, credit scoring approaches are likely to be relevant to small business lending in the overwhelming majority of the banks throughout the world. This does not mean, however, that all banks will be aware of scoring and its potential benefits and drawbacks.

In cases where management has not already put scoring on its agenda, a concise (approximately one hour), informative presentation on the topic of credit scoring will always add at least the value of exposing management to what is an ever more popular approach to consumer and small business lending in western banking markets.

While it is very common for bankers unfamiliar with scoring to initially react to it with considerable skepticism, equally often we have found experienced bankers quickly come to appreciate the great potential scoring holds for improving lending efficiency, consistently implementing credit and pricing policy, and reducing collection times. If you bait the bank's interest with a short presentation of what scoring can do for them, you are likely to find yourself moving to step two below.

2. Understand what kind of system, if any, would work in your bank

Now that the bank is interested in using a scoring approach, you need to do some serious due diligence work to determine just what that approach should be. A credit scoring system not only has to fit well within a bank's institutional business strategy and technology plans, but also it must be integrated into the bank's policies, procedures and limits. While a scoring system can and probably should recommend certain policy changes, these should refine rather than redefine the bank's overall credit policy.

This second step is probably the most important in the process – it requires you to talk to a lot of people and analyze a significant amount of data in order to answer the question “is scoring really right for the bank?” If so, what kind of system is needed? To understand how a scoring approach can most effectively be integrated into the retail underwriting function, we advise that associates endeavor to:

1. Understand the bank's credit policies and procedures, particularly as they apply to small loans. This is assuming there are such policies.
2. Understand the credit department and branch structure and their respective lending limits.
3. Discuss credit processes with credit personnel at all levels to understand the role each position plays in the underwriting process.
4. Understand and document staffing patterns and diagram the process involved in making a loan, both for small and large loans.
5. Analyze existing analytical models, forms, and applications with an eye towards streamlining them.
6. Analyze the existing portfolio of target market loans to determine whether credit scoring should replace existing small loan underwriting procedures or, more likely for banks actively lending to small businesses, complement existing procedures. If the bank is not currently making small business loans, scoring would obviously be a new procedure designed for a new target market.
7. Visit as many branches as possible to examine the credit process in practice (versus as described by head office staff). Many times credit processes and policies are interpreted differently across the branches. Particularly, branch visits help you understand of how credit policy/procedures are *really* implemented, as opposed to how they are written.

In addition to gathering and analyzing this data, it is very important to begin feeding your early impressions back to senior management from all the main functional areas (retail, credit, credit risk, marketing, IT, and legal) in your formal and informal meetings. Such a communication loop will not only help you to gauge managers' perceptions of how credit scoring will impact their respective departments, but also helps to raise the visibility of the scoring project and encourages “buy-in” to the system in its earliest stages of development. It is equally important in these early meetings to understand management's goals for the target sector and expectations for the proposed credit scoring model, as these will guide the development in step three below. In Latvia, small businesses were viewed as one of the last large untapped markets and thus a source of future growth, while the scoring model was expected to lower the underwriting costs and thus enable profitable volume lending to this target market.

Finally, you will need to determine how loan data is stored in the bank's systems. This entails determining where it is stored, how its stored, in what form, for how long, and the process by which it is stored. We cannot stress enough how very important data and its systematic retention is to the successes of both judgmental and statistical credit scoring models.

3. Put together a “steering committee” to discuss strategic and technical issues

At this point you should have a decent feel for whether the bank has the ability and capacity to make scoring work and an idea of what type of model, judgmental or statistical, you want to develop. The results of your analysis should now be drafted into a recommendation and action plan that you will present to the bank. But before you address the invitations to the presentation, make sure you have identified the key players – senior managers from each of the functional departments (retail, credit risk management, credit department, IT, legal and if available audit/compliance) – credit scoring will touch. These people should form your credit scoring “steering committee.”

A management steering committee is instrumental in guiding the design, implementation and management of the credit scoring system through its various development stages. As already mentioned, the design and implementation of a scoring system involves careful planning among and coordination of various functional areas of the bank, so each functional area should be represented in the committee from the outset, or strategy formulation phase.

Each time the steering committee meets, you are essentially asking senior management to “buy-in” to your ideas and objectives. In our case, we have used a steering committee as the decision making body which approves each of the major steps in the process prior to seeking any required approvals from the bank's board of directors. Each functional area's steering committee representative should be given the opportunity to express his or her views on the model's objectives and the department's role in the scoring process.

Your initial presentation should relate all of your due-diligence findings and proposed path forward to the steering committee. In a way, you are testing the assumptions you would like to incorporate into a scoring model prior to actually building the model. Additionally, the first steering committee meeting would be the place to discuss whether or not to market scored loans as a separate retail product. We had great success in Latvia developing a new micro-loan product based on the time saving features of the credit scoring methodology.

By the end of the first steering committee, in addition to having forged a consensus strategy for moving forward, you should have a good feel for which of the steering committee members will be likely to “champion” the scoring project. In our case, it was obvious even prior to this meeting, but in your situation it might take longer for a champion to emerge. The champion will support the project both in the steering committee meetings and in senior management bank meetings, and this person's importance should never be underestimated – remember, a scoring model, whether statistical or judgmental, is only as valuable as bank management's commitment to using, monitoring and, where necessary, refining the model.

4. Design and test the model

Once the steering committee has decided to move forward, you will have to hunker down to design and test the model. We won't recommend how to design your model – this will depend upon whether it is judgmental or statistical and on the credit policies of your bank. Given limited historical data, we designed a judgmental model for Latvia. However, if your bank has significant small loan historical data, for example four years of loan application and subsequent payment performance data for 15,000 loans, then you may have an opportunity to look into developing a statistical model. If you have experience with modeling or statistics, you or relatively inexpensive local experts with your oversight, can use logistic regression analysis to test your data set and derive a model. Texts on data mining and statistics are available to assist you with some of the steps. If you do not have such expertise, then depending on the flexibility and nature of your TA or engagement contract, assistance may be outsourced to develop and test a statistical model – the time frame for this would be at least two months.

Model design and testing, whether statistical or judgmental, is the most technically challenging step. While a lot of the model development work is number crunching, analytical work, it is nevertheless very important that you always keep communication channels open to coordinate your efforts with management, both on an individual basis and in the project steering committee, throughout the design period. This enables you to receive feedback as you go, so that by the time you are ready to present the model to the steering committee, everyone has basically already signed off on the model.

Regardless of the quality of the data set you have available, you will always rely to some extent on historical data in designing the actual model.

Statistical models rely exclusively on historical data, mining that data for predictive relationships between applicant information and loan performance. Using a data set spanning four years, the first three years of data might be used to derive the model, while the final year of data would be used to test the predictive power of the model in what is referred to as an “out-of-sample” test, since the model is tested on data that was not included in the development data set (the first three years of data). Much more detail on approaches to designing and testing statistical models is available in credit scoring literature.

A judgmental model, on the other hand, is appropriate when there is not enough historical data to derive a statistical model or when the new model will introduce the consideration of factors previously not considered in historic small loan underwriting. Most likely, the choice to use a judgmental model will stem from some combination of these two considerations. This was the case in Latvia, where both loan applicant and repayment data for the historic loan portfolio was not catalogued in a way that could be analyzed statistically and we were also recommending several new indicators that weren't necessarily captured in existing underwriting procedures, such as years industry experience, and quantified character and business plan evaluation ratings. Historical data is nevertheless heavily referenced to determine appropriate ranges for model parameters and for testing the models performance in assigning relative risk ratings. We tested Latvian bank's model on 100 randomly selected loans.

In contrast to a statistical model, the judgmental model's test results, much as the model's ability to quantifiably predict risk, will necessarily be less scientific by the nature of the model, but this same lack of science and reliance on heuristics, or credit rules, can arm you with a powerful tool in teaching your bank's sales staff or loan officers the key differences in the analysis requirements for small business versus large corporate loan applicants, which certainly adds value in the context of TA or consulting engagements. The Latvia bank scorecard model, in fact, can be viewed as a structured and weighted application of the 5 Cs of credit to each small business loan evaluation, with the weightings reflecting local and best practice experience as to which factors most affect the risk of small business loans.

Once you have completed and presented the model to the steering committee, and assuming the steering committee approves it, you would then further test the model on a pilot program basis. Pilot program objectives will obviously differ depending on the type of model you developed. Statistical model developers have certain recommended piloting stages that we will not examine here. For a judgmental model, we recommend selecting 3-5 of the bank's best branches in terms of staff skills and portfolio quality to pilot test the methodology. Ideally, the branches will be located in a combination of small and large cities so the model is exposed to a wide range of borrowers and loan structures, from micro rural loans to small business city loans.

Use of the scoring model in a pilot project can generally take one of two approaches:

1. Score loans parallel to the existing lending procedures, where decisions are still made according to existing procedures, but every loan is also scored. After the pilot is finished, the scores can be analyzed to see if they properly rank risk in comparison with the existing procedures. This method is the most conservative.
2. Let the scoring procedure stand alone immediately in the pilot branches, thereby requiring all loans below the ceiling amount to be scored. This helps to institutionalize the scoring approach from the beginning and better enforce credit and pricing policy suggested by the model, as well as avoiding duplication of work. This approach is probably not wise for statistical models, but can be appropriate for judgmental models in banks with a culture of high quality underwriting. In the case of Latvia, we piloted the scorecard in three branches and used the scorecard from day one.

In either case, the pilot loans must be closely monitored and feedback constantly solicited from the "trenches" to identify problems and introduce improvements in the model and processes prior to bank-wide roll out of the model.

Finally, prior to starting the pilot you will need to provide training to pilot branch personnel who will handle the model. This can either be done on a branch-by-branch basis or through a large group session. Our experience is that the smaller the group, the more people will ask questions if they do not understand the process or model, so branch-by-branch worked best for us. The training should include an overview of the theoretical objectives of introducing the model, an explanation of how the model determines risk, and "hands-on" training on the policies, procedures and use of the model interface. We also provided written instructions for using the model.

5. Present the model and provide introductory training

After the pilot test has run for a predetermined period of time or issued a certain number of loans, you will need to analyze the data gathered to that point – not only the loan and scoring data, but also the feedback of the pilot branches – to determine the initial success of the model and to prepare a recommendation to the Steering Committee. At this point it is crucial to consider how all marketing and credit issues need to come together to result in a successful launch of the scoring model bank-wide. As mentioned earlier, in the bank in Latvia, scored loans were broken out into a new product, which required a marketing campaign. In all cases, new procedures will need to be drafted and approved, both by the steering committee and board, and all branches must be trained prior to roll-out of the scoring model.

As mentioned in step two above, we encourage you to think about creating a separate product for the scorecard. Once a separate loan underwriting procedure is established for small business loans, the time-saving benefits can be shared with customers through the creation and promotion of a separate product that champions a quick decision and disbursement process. In Latvia, the micro-loan was given given a unique product name, in translation *Entrepreneur Loans*, and advertised as offering small businesses and start-ups competitive rates and a loan decision within a day. While a majority of borrowers over the first 18 months were existing customers with existing businesses, as opposed to new customers and start-ups, the bank has nevertheless led the market in introducing products targeted specifically to small businesses and may potentially reap share-of-mind benefits from that in the future.

If the “product” approach is taken, you will need to work with the bank’s marketing department to create a marketing campaign to introduce your new product to the market. We helped the bank prepare a full-fledged product-marketing plan and worked with the marketing department on implementing it.

Procedures will need to be drafted to formalize the use of the model and make sure it is agrees with general credit polices in all areas for which there are no explicitly new or different procedures. In Latvia, our counterpart at the bank prepared the procedures, but we should point out the need to allow ample time for this step, as it is somewhat tedious and requires board-level approval to become part of operating procedures prior to roll-out.

Finally, how do you train all of the branch personnel on the model before rollout? Again, we have tried both regional training and branch-by-branch, and as mentioned above, in our experience the small-group, hands-on approach promotes dialogue and ultimately better prepares staff to use the model.

6. Monitor the model and provide follow up training

The final step in model implementation is monitoring the portfolio and the model performance and either adjusting or, in the case of statistical models, refreshing the model.

In addition to standard portfolio analysis reports, several reports described in the scoring literature are used for all types of scoring models to determine how well the model is predicting risk. One or two credit people should consistently monitor these reports to manage the portfolio of scored loans by exception. That is, with a large portfolio it is impractical to closely follow each small loan, so the portfolio manager should focus on past due reports and look for trends that identify branches or loan officers who are not complying with credit policy or who need additional training in using the model. For example, if the model predicts risk well in 25 branches but terribly in two, there is a good chance the problem is in the branches, not the model. If, on the other hand, the model is poorly predicting risk across the board, the model and its design need to be revisited. In addition to managing the reporting function, the portfolio manager should visit all the branches from time to time to look at loan files, answer any questions, etc. Much of the valuable information we have gathered on problems with procedures, credit policy, etc. we learned on branch visits.

One potential problem area in implementing a judgmental model is that you have to lend for quite a while before you can get an idea of whether the model is adequately ranking risk in terms of timely loan repayment. Obviously you don't want to find out 18 months down the road that yes, the model is doing a lousy job predicting risk and you've got a bundle of problem loans. In Latvia, one test we performed about six months into lending was a standard underwriting review of 50 randomly selected scored loans by a small team of credit analysts. Without looking at the score, the analysts reviewed the 50 loan files and used standard underwriting procedures to assign a risk rating according to the bank's standard underwriting system. The risk ratings assigned by the analysts were then compared with the risk ratings inherent in the model scores (model scores are automatically transformed into the bank's risk ratings based on a pre-defined conversion scale). While perfect correlation is impossible due to the nature of the credit analyst's judgmental decisions, the basic risk distribution of the 50-loan sample was very close to that determined by the scoring model, which indicated that the model was doing about the same job of ranking risk as the credit analysts could do using a longer underwriting procedure. We have further monitored the risk distribution of the scored loan portfolio as compared to the risk distribution of the bank's historic portfolio of same size loans, and find the risk distribution of scored loans to be similar, an indication that the judgmental model is providing time-saving benefits while maintaining portfolio quality. However, patience is required, as only time will tell whether the model is doing a good job in practice.

For statistical models, it is generally recommended to "refresh" the model after considerable time has passed by deriving a new regression. Refreshing the model should improve its predictive power, since the older data on which the original model was based may no longer have the same predictive power in a lending environment 5-10 years later. For judgmental models, if you have systemized the collection of application and payment information, then in 4-5 years time, given an adequate loan volume, you can use this data to transform the judgmental model into a statistical model, which should be more powerful in its ability to predict the probability of a bad outcome. However, as indicated above, adjustments to the judgmental model need to be made on an ongoing basis any time persistent model related problems are identified or there are other significant political or economic changes that would affect the data considered by the model.

As a final note on monitoring, in Latvia, given that scoring was linked to a new loan product, we also conducted two surveys three months after rolling out the model to identify whether the product and scorecard was meeting its credit and marketing objectives. One survey targeted branch personnel responsible for selling and processing the product and the second was sent to the first 100 customers to take *Entrepreneur Loans*. The survey data confirmed that the scorecard and product were meeting the goals and objectives both from the standpoint of the customer and the bank.