

## CREDIT SCORING FOR SME BANKING



By Jamal E. Rahal and Grace Mungai

### > INTRODUCTION

Credit scoring comprises a set of proven techniques, widely used by large banking and credit organisations, in emerging as well as in mature markets, to manage retail and SME customers. This Technical Note (TN) introduces the topic of credit scoring, discusses the different contexts in which such systems are used, the benefits of using these systems, and the challenges faced in developing and implementing them.

Currently there seems to be a degree of confusion within institutions about what constitutes scoring. The aim of this TN is to provide a clear picture of what credit scoring is all about, and equally important, what it is not about; to talk about the considerable benefits derived from using credit scoring and show how these far outweigh the challenges of implementation; and finally to examine the main reasons why some scoring developments fail.

Much can be learned, possibly more, from the implementation failures and challenges of credit scoring as can be from successful examples.

It should be noted that credit institutions consider credit scoring and related topics to be highly sensitive domains. Consequently it is very difficult to get any information of substance on successful or unsuccessful implementations. This TN includes some SME related specific case study developments in which the author was personally involved. The cases given are anonymous and general in their comments.

### > HISTORY OF SCORING

#### 2.1 WHAT IS SCORING?

Under the label "credit scoring", sits a set of quantitative risk assessment techniques that were developed throughout the 1960's and 1970's and have grown to become common/best practice in a variety of areas of activity.

### About GrowthCap

Over the past few years FSDK has been at the forefront of SME banking development through conducting market assessments and studies in areas such as trade finance and SME equity funds, as well as supporting development of the credit reference bureau. Through its partnerships with its Action Research Partners (ARPs), FSDK's GrowthCap initiative is supporting adoption of SME best practices by individual financial service providers.

This paper is part of a series of Technical Notes and Resource kits that are being developed out of work with the ARPs. These provide detailed information about the best practices and are intended for use by financial service providers and those supporting such institutions which are entering the SME market.

### Abstract

This Technical Note introduces the topic of credit scoring, discusses the different contexts in which such systems are used, the benefits of using these systems, and the challenges faced in developing and implementing them.

#### About the authors



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Many financial institutions (FIs), especially the large ones, rely on a number of credit scoring systems to help manage every aspect of their prospect/customer relationship

Following a slow start in the early 1970's, the rate at which these techniques were adopted increased substantially, as the advantages of credit scoring versus traditional credit assessment techniques became apparent. In mature markets, traditional, judgmental risk assessment techniques have disappeared in retail banking and many SME portfolios. Many financial institutions (FIs), especially the large ones, rely on a number of credit scoring systems to help manage every aspect of their prospect/customer relationship.

## 2.2 THOSE THAT STARTED SCORING

A number of key people have contributed to the development of credit scoring approaches. Some have done so through the development of statistical methodologies which, whilst they were not specifically designed with credit scoring in mind, have been capitalised upon by credit scoring developers. In this respect, the famous statistician Fisher and a less well known figure in the area of information theory, Dr Solomon Kulback, made major contributions.

Others have taken existing technologies and adapted them for the needs of credit scoring. In this respect, two names come to mind as the real founders: Bill Fair and Earl Isaac, who did most of the technical pioneering work in the late 1960's and early 1970's and turned credit scoring into a proven, efficient decision making science<sup>1</sup>.

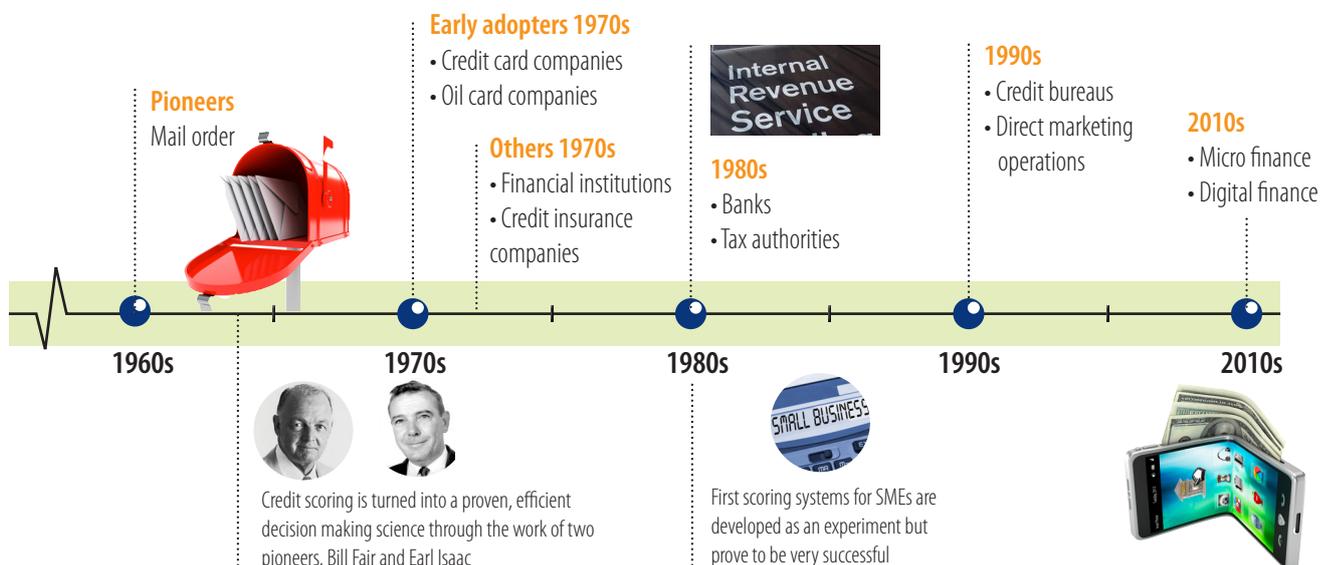
It took some time, before Fair and Isaac's ideas got traction in the banking sector; in the 70's and 80's banking was a resource intensive industry, requiring costly branch networks and face-to-face interactions with customers.

The very idea that a statistically based system could do a better job at assessing risk than human judgment was viewed with a mix of disdain and fear by branch managers, whose main responsibility was in effect to make such decisions.

Early adopters of credit scoring systems tended to be those credit institutions operating in branch-less environments such as mail order and credit cards, characterised by a large number of decisions, smaller credit amounts, and little applicant information on which to base decisions. Slowly but surely, credit scoring built its credentials and became increasingly used in other business areas of banking; mortgage provision; SME finance and other operational areas such as credit limit management. Early adopters included large credit granters including banks, finance companies, oil companies, retail

<sup>1</sup> Bill Fair and Earl Isaac were initially part of the Stanford Research Institute but moved on to create their own company "The Fair Isaac Companies" which is better known under the acronym of FICO. [www.fico.com/en/about-us#at\\_glance](http://www.fico.com/en/about-us#at_glance)

**Figure 1: Penetration of Scoring in the Credit Industry**



merchants and travel and entertainment cards<sup>2</sup>. Over time these have been followed by others as shown in Figure 1.

### 2.3 EARLY SCORING SYSTEMS FOR SMES

One of the very first scoring systems for SMEs was developed in the early 1980's, by Jamal E. Rahal, for the Australian Guarantee Corporation. At that time, such a development was very experimental but proved to be successful.

The hope was that this success would provide a clear signal for SMEs' credit specialists worldwide to adopt credit scoring in their operations. In any event, penetration of credit scoring within bank SME lending has been slower than its adoption within the retail side.

#### > BENEFITS OF CREDIT SCORING

Credit scoring systems are used in a number of different ways and at different points in the customer life cycle. They have brought tremendous tangible and intangible benefits to most institutions that have embraced them. Origination was one of the very first areas in the service delivery process to use credit scoring. The goal was to better select, among new applicants, who should be accepted and who should be rejected. Scoring systems used in

<sup>2</sup> Capon, Noel, Credit Scoring Systems: A Critical Analysis, Journal of Marketing, 46:2 (1982:Spring), <http://socsoc2.ucsd.edu/~aronatas/project/academic/credit%20scoring%20systems%20critical%20analysis%20by%20capon.pdf>

this context bear the name of 'application scoring.'

The benefits of application scoring were quantified in the early 80's and 90's, when a larger number of 'first-time' application scoring systems were implemented in the US and in the UK. By 'first time', we mean scoring systems that replace those credit assessment approaches based solely on human judgement.

From a business perspective, an FI that implements application scoring, for the first time, can expect to experience a reduction of bad debt that ranges from 20% to 40%. To put a financial value on the yearly benefits of credit scoring, one need only to apply those percentages (20% being conservative and 40% optimistic) to yearly bad-debt provisions passed by the institution.

The magnitude of bad debt reductions applies to new accounts and so it takes some time for an institution that is introducing scoring, to witness the full effects of these systems on its whole lending portfolio. Moreover, credit scoring systems do decay over time and need to be re-developed as will be discussed later. When a credit scoring system replaces an existing scoring system, the benefits are not as marked. The benefits stem from replacing a selection tool that is no longer optimal, by a more up to date and more effective selection tool.

Bad debt reduction is probably the most tangible and quantifiable benefit of using credit scoring systems but there are many other less quantifiable advantages as Figure 2 shows.



**An institution that implements application scoring, for the first time, can expect to experience a reduction of bad debt that ranges from 20% to 40%.**

Figure 2: Benefits of application scoring

Bad debt reduction	Uniform decisions	Capacity to automate	Faster decisions
<ul style="list-style-type: none"> <li>Scoring helps make better decisions leading to better applicants (credit-worthy) on average</li> <li>On average, bad debt reduction of 20% to 40% can be achieved the first time an application scoring system is implemented</li> </ul>	<ul style="list-style-type: none"> <li>Judgmental assessments are carried out by humans and hence can vary</li> <li>A scoring system renders the same verdicts consistently</li> <li>A scoring system is not prejudiced and does not hold a priors.</li> </ul>	<ul style="list-style-type: none"> <li>Encapsulating human judgment into a computer has been tried using artificial intelligence, but this has not proved very successful</li> <li>Computing a score on each applicant is an easy task for a computer</li> </ul>	<ul style="list-style-type: none"> <li>Quicker decisions are a strong differential advantage in highly competitive markets</li> <li>Automation does help speed up decision making time</li> <li>Credit committees processes can benefit from scoring even without automation</li> </ul>



**Figure 3: Customer management life cycle**



**> BEYOND APPLICATION SCORING**

“  
**Scoring approaches are used increasingly by banks at every stage of their customer management relationship**”

It is important to recognise that credit scoring is not only used at account origination and underwriting.

Credit specialists talk about the ‘customer management life cycle’ as illustrated in Figure 3. This follows from prospect management, origination and underwriting through customer management and collections through to new prospect

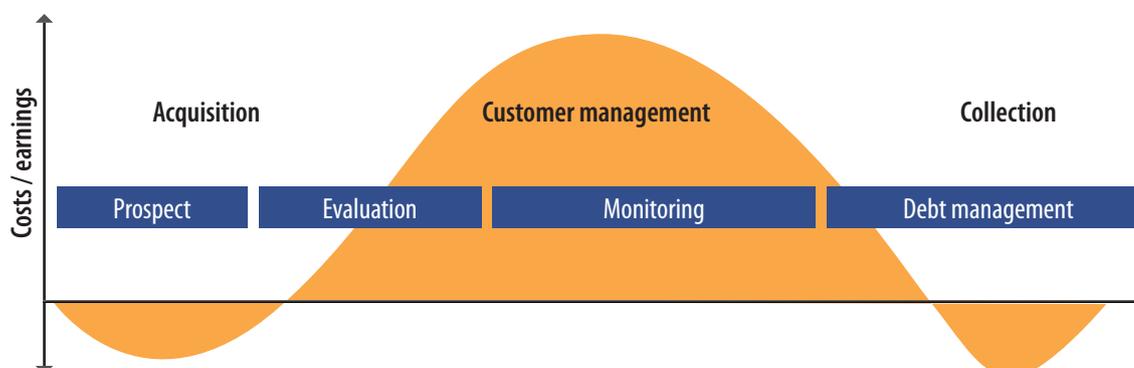
management. Scoring approaches are used increasingly by banks at every stage of their customer management relationship.

Different types of scoring systems have been developed over time to address the different needs that arise at the different points along this customer management life cycle, as illustrated in Table 1. The underlying technology and main principles of the credit scoring approaches used at each stage remain the same however the form of data used and goals of such systems at each stage do differ.

**Table 1: Different Domains for Credit Scoring**

Area	Type of scoring	How it works	Data used
Prospect management	Prospect scoring	Helps select from the outset those customers most likely to accept a given product offer	Geo-demographic indicators, marketing databases
Origination	Application scoring	Helps select credit-worthy applicants	Applications, credit bureau reports, business databases, balance sheet statements of income
Customer management	Behavioural scoring	Drives: Credit limit management Attrition programmes Cross sell/up sell	Internal data on past customer behaviour
Collections	Collection scoring	Helps select the most appropriate collection strategy	Same as behavioural scoring and possibly credit bureau data

Figure 4: Top and bottom line of a credit operation



To understand the benefits brought about by the different types of systems, one must first understand the challenges they address all along the customer management life cycle. Figure 4 presents a simple overview of this in terms of costs and earnings to the FI.

Customer acquisition is essentially a cost-centric process. It costs money to bring prospects in contact with the FI and to turn them into customers. The challenge is to cut down on costs and the time it takes to do so. Consequently, the sooner a decision is made (to grant or decline a credit) the better.

Once a customer is on board, the main challenge is to get the most out of the relationship:

- Maximise customer potential.
- Retain good customers and cross sell/up sell.
- Manage credit limits adequately.

Collections, again, are cost-centric processes/exercises. The main challenge here is efficiency. FIs must make the best use of their limited collections teams to collect as much as possible and as fast as possible.

The different types of credit scoring systems address the different challenges in their own different ways:

- Prospect and application scoring are both about reducing the acquisition costs.
- Application scoring is about reducing bad-debt and the number of customers going into collection, hence reducing collections costs.

- Behavioural scoring is about increasing earnings from existing customers.
- Collection scoring is about increasing the efficiency of collection processes.

## > TECHNICAL UNDERPINNINGS OF CREDIT SCORING

Engineering a credit scoring system is a highly technical and specialised area of work. Nevertheless this section illustrates, briefly, some of the core concepts and processes that underpin the approach.

As a starting point it is important to note that credit scoring is primarily about assessing and quantifying probabilities of default, at different moments in the life of the relationship between the customer and the institution. Application scoring is used below as an example to walk through the core elements of building a credit scoring system.

### 5.1 WHAT DOES SCORING REALLY TELL US?

Scoring is about assigning what is termed a 'default probability' to every applicant. What do we mean by this term? Let us look at some examples to help provide an explanation. A credit scoring system will "tell" a credit manager that:

- ACME enterprise has a default probability of 2%
- ABC enterprise has a default probability of 0.5%
- XYZ enterprise has a default probability of 7%



### First what do we mean by “probability”?

If you flip a coin, you can expect to get a head side with a probability of 50% and a tail side with a probability of 50%. This means if you flip the same coin 100 times you are likely to see heads 50 times and tails 50 times. In practice you may see 52 heads and 48 tails, in one given experiment. However if you repeat the experiment a large number of times the average number of heads and tails will come closer and closer to 50.

### What do we mean by “default”?

Default can be defined differently depending on the context

#### Box 1: Defining Default

The Basel Committee definition of default is essentially a delinquency stage of 90 days or more. Payments in arrears, the oldest of which 90 days or more overdue.

In the eyes of the Basel Committee<sup>3</sup> this delinquency status must be coupled with a “high likelihood that the debtor will not be in a position to repay, without giving up one or many pledged collaterals”.

The views of scoring specialists about default do not differ greatly from that of the Basel Committee. They like to define default as a delinquency stage from which the customer is unlikely to recover without undue hardships.

Another view of default is a customer with whom the FI

<sup>3</sup> Basel Committee on Banking Supervision provides a forum for regular cooperation on banking supervisory matters. Please refer to <http://www.bis.org/bcbst/>

in which it is used. A summary in Box 1 provides a short technical discussion, of default. However for the purpose of this discussion a customer who goes into default (defaulter), is one who does not repay a substantial proportion of their loan or the entire loan.

We can now understand what the credit scoring system is telling our credit assessor: “if you were to accept 100 enterprises like ACME, then on average 2 of them would default.”

To be clear, the scoring is not telling which specific 2 enterprises, out of the 100, will go bad only that on average 2 out of any of 100 will do so.

Credit scoring again, is about probabilities and only that.

## 5.2 DEFAULT PROBABILITY TABLES

As stated above, credit scoring provides us with a default probability on an applicant. In this instance, it tells us that ACME enterprise has a default probability rating of 2%. How is this 2% default probability calculated?

The first step in developing an application scoring system, involves computing a score for the applicant. Think of a score as a type of grade given to clients, and a grade that can vary between let us say 1 and 100.

will not want to do business again, even if they end up repaying their loan in full.

Default (as defined by Basel or for scoring purposes) ties up into financial and operational considerations:

- defaulters’ debt is written-off (or at least a substantial proportion of it)
- defaulters’ are reported, by the FI, to credit referencing agencies as having had a “strongly adverse credit history”, a clear signal, sent to all other institutions that they should refrain from doing business with this person or company

In summary, default is seen as a point from which debtors are highly unlikely to return. Even if they did, no FI would want to do business with them, at least for a few years.

Each score is associated with a default probability and the two are brought together in what is called a default probability table (DPT). Table 2 provides an example of what a DPT looks like:

**Table 2: Example of a DPT**

Score range	Probability of default
91 and +	0.1%
81 to 90	0.5%
71 to 80	2.0%
61 to 70	3.5%
51 to 60	4.5%
41 to 50	6.0%
31 to 40	9.2%
21 to 30	12.5%
11 to 20	14.3%
Below 10	16.0%

For our ACME enterprise example, the FI's scoring system computes a score of 75 for ACME. The DPT above shows that with a score of 75 then ACME's default probability is 2%, in other words ACME has a 2% likelihood that it will default.

A DPT is established at the same time as a credit scoring system is developed and each scoring system has its own DPT. The DPT is the most vital element of the whole scoring system.

*Using a scoring system without having the DPT to hand is akin to using a compass without knowing what direction it points to!*

Now that we understand better how an application scoring is used, let's look at how it is developed.

### 5.3 ENGINEERING THE SCORE

#### Variables

Credit scores are brought together in what is called a scorecard, a collection of data elements that we will call variables. These variables pertain to various characteristics of the applicant and include things such as:

- Sector of activity of the SME
- Age of the enterprise (time since the company was created)
- Turnover
- Residential status of the owner (do they own or rent their place of dwelling?)

For application scoring, the client application form is obviously the primary source of data. Other sources of information can include credit bureau references and the financial statements of the business such as balance sheet, profit and loss statement, cash flow statements, and bank account statements.

#### Predictors

By analysing the behaviours of past customers, we can identify which characteristics or variables tell us something about how likely the applicants are to default.

For example we can expect the SME's sector of activity to tell us something about the SME's likelihood of repaying a loan. The age of the SME, computed at the time of the loan application, is usually very highly predictive of future repayment behaviour. All credit managers will agree an SME that has been in business for 10 years is a much better risk than an SME that has been created only 6 months ago.

The variables that tell us a great deal about the probability of default are referred to as 'Predictors'. They effectively predict credit behaviour of clients. Statistical weights are then assigned to each predictor of a new applicant depending on how important they are seen to be and the sum of the weights makes the applicant's score.

#### Scorecards

A scorecard is the most powerful combination of predictors that we can build, using the variables at our disposal at application. Scorecards are the result of very sophisticated statistical analysis applied to a sample of customers. Box 2 briefly describes the key steps involved. Although development of the scorecards is complex once they have been developed, their working is rather simple.



**Box 2: Developing a Scorecard in 5 steps**

- 1 Extract a sample of existing customers, whose behaviours are known, comprising both good payers and bad payers.
- 2 Analyse the data captured at the time they applied for credit to identify a set of potential variables and assess their predictive power. ie to assess how much these variables tell us about the observed business repayment behaviour.
- 3 Just as one can measure heights in centimetres using a ruler, one can use specific statistical techniques to assess the predictive power of different variables.
- 4 The variables that are identified as being most

informative are called primary predictors.

- 5 A Scorecard is made up of a combination of these primary predictors. The selection of the primary predictors that go into a scoring system is not a random process. It combines statistical skills and a strong know how in scoring.

Scoring experts look not only at the predictive power but also at the stability of variables over time. As an example, income can be predictive, but decays rapidly with time, especially in a high inflation environment. The name of the game, in developing a scoring system, is to identify that combination of predictors that will provide the strongest combined predictive power and that will be stable over time.

Before moving onto the next step, one word of caution: Scorecards do not last forever.

The predictive performance of scoring systems does decay over time, mainly because of changes in applicants' profiles and in the broader economic conditions in which their businesses are operating.

Some systems in very stable economic environments will last for many years. Where the environment is turbulent scorecards may need to be redeveloped rapidly - say after a couple of years. Scoring systems require intense monitoring to determine if and when they are due for review and overhaul.

**> FROM SCORING TO CREDIT DECISIONS**

It is important to note that scoring systems do not provide credit decisions. They provide us with a score and a probability of default. If this is the case then how does a credit manager move from probabilities of default to the actual credit decision of "accept" or "reject"?

**6.1 CUT-OFF SCORES**

Think of the high jump as the selection process. Those who jump high enough (above the cut-off score) are accepted, those

who do fail to jump high enough who do not pass the cut-off score are rejected. The question then is where do you put the bar? How do you choose a cut-off score?

Drawing further on the high-jump analogy, if you put the bar very high, those who pass it are very fit, but if you put it too high, you could end up with a situation where hardly anyone is successful in clearing the bar or passing the cut-off point.

In business terms, it means that you are rejecting most if not all the applicants. This means that you unlikely to have any bad debts whatsoever, but you will run out of customers and eventually out of business. Conversely, if you put the bar too low, the likelihood is that almost everyone is likely to succeed. Many of those who pass and are given credit will not be in good shape, meaning that default and bad debt levels are likely to be high.



Cut-off selection takes into account three crucial parameters that drive in opposite directions:

- Risk levels: what ultimate bad debt levels the institution is willing to take?
- Business development: what proportion of applicants does the institution want to accept? This ties up into the amount of funds available for disbursement.
- Risk management wants high cut-offs, business development wants low cut-offs!

Selecting a cut-off score is probably the most important decision that an institution wishing to implement a freshly developed credit scoring system needs to make. This is discussed in more detail in the Annex A

## 6.2 SCORING, UNDERWRITING COMMITTEES AND POWER TO ACCEPT

Scoring systems for SME financing are not stand-alone processes but must be integrated into the reality of SME lending i.e. the underwriting committee process.

Except for very specific circumstances, the capacity to automate underwriting for SMEs will have its limitations when compared to experience in retail lending. Underwriting committees are here to stay and hence the issue is to see how credit scoring systems can support and add value the work of these committees.

More generally scoring must work alongside and support the “power to accept” mechanisms that are in place within the institution. Figure 5 below illustrates a typical “chain of

### CASE STUDY N° 1

*Below is the example of a successful SME scoring implementation experience that author (Jamal Rahal) supervised, when in charge of credit for a major finance house, whose geographical scope included southern Europe and North Africa. The SME Portfolio size was about 50,000 customers and the bad debt book was about 2 % of the overall lending book.*

#### Target Applicant population

A credit scoring system was developed and implemented for what was at the time considered to be “that grey area lying between retail and corporate”. It included specifically formal businesses, whether they had a corporate legal structure or whether they operated as ‘sole trader’ independent entrepreneurs. The SME portfolio had a wide variety of sectors of activity including transport, services, manufacturing, construction and trading.

#### Development and implementation

The system was developed over a 9 month period (from start to final implementation within IT origination systems). The system was then adjusted in the first 6 months to reflect changes in economic trends that had affected business in the preceding year.

The cut-off level was set at board-level. Initially, a cut-off score that would provide the same acceptance rate (55%) prior to implementing the scoring system was selected.

#### Results

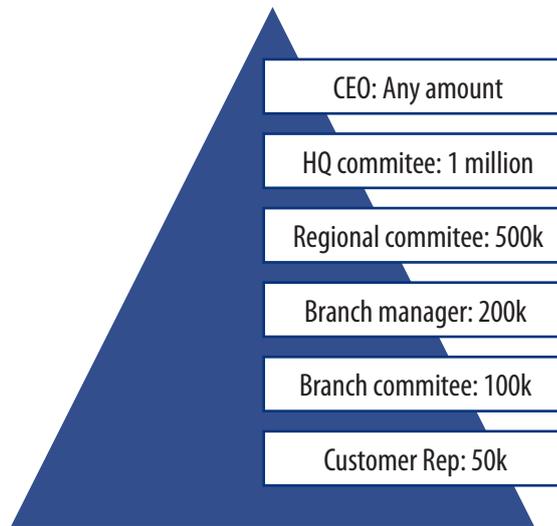
After 12 months of operations, a drop in default rates of about 30% was realised. Senior management took the decision to lower the cut-off score with a clear aim of increasing business.

Lowering the cut-off score moved acceptance rates rose from 55% to 60%, but some of the gains on default rates were lost, but they nonetheless remained substantially below pre-scoring levels.



command” within a credit institution (units and amounts are fictitious).

**Figure 5 Power to Accept Chain of Command**



Powers are usually expressed in terms of lending limits. Limit being the maximum amount beyond which a particular level of banker cannot approve an application and must escalate this to the decision maker at the next level up. With scoring the approval limits include both the approval limits as well as the score itself, as Table 3 indicates.

**Table 3: Scores and Powers to Accept**

Score	Power to accept/approve
91 and above	Customer rep
81 to 90	Branch committee
71 to 80	Branch manager
61 to 70	Regional committee
51 to 60	HQ committee
41 to 50	CEO
40 or less	Decline

**CASE STUDY N° 2**

*The case study illustrates the power of scoring for SMEs lending in a banking context. The system was developed and implemented by the author as a consultancy for a large banking group operating in an African country. Portfolio size was circa 25,000 SMEs, bad debt on the SMEs sector was very high, circa 4%.*

**Target applicant population**

The bank was lending only to its own customer base, in other words to SMEs who had one corporate account with the Bank, knowing that in most cases that account was their primary account.

**Development and implementation**

Examining the chronological events recorded in these accounts, the team extracted powerful predictors of future credit behaviour, which were then used to build a powerful SMEs scoring system.

**Results**

The results were striking. In the 6 months following implementation, the bank registered a 45% decrease in delinquencies in SMEs lending. To be fair, the bank had selected a cut-off point that provided a slightly lower acceptance rate than in the pre-scoring period (45% as

opposed to a previous 50%). Nevertheless, the results were unmatched, and provide additional proof about the validity of using scoring systems to assess SMEs.

**Post implementation developments**

The bank then moved on to use the system not only for making credit decisions, but to drive a variety of customer management decisions including credit limit increases, cross selling, up selling, as well as using scoring as a pre-delinquency alarm system.

**Lessons drawn**

The very strong predictive power of bank account data was consistently observed. When such data is available, it can prove invaluable and provide much stronger predictors than any information from client application forms.



## ➤ SPECIFIC CHALLENGES IN DEVELOPING AND USING SCORING

Credit scoring systems can make a huge difference to SME lending practices and results when time is taken to develop them to match the needs and fit alongside an FI's existing systems. However, there are a number of challenges that are typically faced in successfully designing, developing and implementing scoring systems for SMEs.

### Executive buy in



Developing and implementing a scoring system, whether the development is carried out internally, or using a third party supplier, is ALWAYS resource intensive which can limit executive buy-in.



Developing a scoring system requires resources (time and money), project management, and full support from senior management. Without this, the project is bound to die-out.

### Processes and people



Scoring implementation requires substantial process re-engineering. It not only has implications on the processes but also on the resources required to implement and manage these processes. If credit scoring is perceived, exclusively, as an automation tool that will make the credit staff/team redundant, then resistance is to be expected.



It is critical to clearly communicate the benefits of using a scoring system for everyone involved. These systems should be about helping staff to be more effective in decision making rather than replacing their jobs.

### One size does not fit all



Cutting and pasting a competitors credit scoring system, or implementing a system that has been quickly concocted on the back of an envelope will not work. Powerful scoring systems are highly personalised to a given FI. They are the result of a sound and deliberate development process requiring know how and experience.

Take time to develop a scoring system that is home grown. It should take into account the organisations' tacit knowledge, brand perception, customer base, product lines and history.

Scoring systems that work well have taken time to be developed by experts in the field. They are highly tailored to a given organisation and to the profiles of its through the door applicant population.

### Data Quality



A major practical difficulty encountered in developing any scoring system is the lack of quality data about clients that is needed for developing effective predictors and scorecards. This scarcity of data is usually the result of poor application form design, resulting in poor data being collected and this in turn limits information for application processing systems and processes.

Even when application forms are well designed, completed with great care and application processing systems are of good quality, the processes are often not in place to ensure high quality data entry in application forms. As a result some fields may be wrongly encoded resulting in manual extraction of account data to build scores, which is very time consuming. This is particularly a problem for many FIs working in emerging market economies.



Ensure all efforts are made to have accurate data capture and superior safeguarding of applicant and customer data takes place. The way customers have managed their bank accounts in the past (if we can have access to this information) tells us a great deal about their likelihood of default in the future.

Effective data capture starts with a clear, efficient application form. As a general rule when designing an application form for each element of information requested ask one question: for what purpose are we asking for this? If the answer is "do not know", then just remove the question from the application form.

### Sample Sizes



Another practical difficulty concerns sample sizes. Scoring systems are developed using sophisticated statistical algorithms and statistics require reasonable sample sizes in order to make reliable projections.

Samples of at the very least 500 past defaulters are required. Using a default rate of 10% to illustrate, a sample of 500 defaulters requires at the very least a portfolio size of 5000 accounts.



An institution with a relatively small portfolio size may then want to look at how to define simple business rules that will benefit its credit personnel, without going all the way to developing a "full-blown" scoring system.

## > CONCLUSION

Credit scoring comprises a set of proven techniques, widely used by large banking and credit organisations, in emerging as well as in mature markets, to manage retail and SME customers.

Different types of scoring systems have been developed over time to address the different needs that arise at the different points along the customer life cycle.

Developing scoring systems for SMEs is not primarily about automation but rather about helping to streamline credit processes, helping the various credit committees' work more efficiently and inducing a certain level of homogeneity in the way credit decisions are made.

When conditions permit, it is highly advised to invest in developing such systems, as the benefits can be great. With regards to the financial impact, they can range from 20% to 40% reduction in bad debt, without a reduction in the volume of business.

## > ANNEX A : HOW TO SELECT A CUT-OFF SCORE

Selecting a cut-off score is probably the most important decision that an FI wishing to implement a freshly developed credit scoring system needs to make.

It should be noted that the example given below does not come from any live scoring system, past or present. Let us look again at the probability of default table and let us enrich it with an additional column: applicant's distributions.

Table A lists the probability of defaults associated with each score band. It also provides an estimate of the proportion of applicants that on average will fall, within each score range.

**Table: A probability of default and applicants' distribution**

Score / Range	Probability of default	Percentage of applicants
91 and +	0.1%	8.2%
81 to 90	0.5%	11.2%
71 to 80	2.0%	9.7%
61 to 70	3.5%	12.0%
51 to 60	4.5%	7.5%
41 to 50	6.0%	10.0%
31 to 40	9.2%	12.2%
21 to 30	12.5%	9.2%
11 to 20	14.3%	8.3%
Below 10	16.0%	11.7%
		<b>100.0%</b>

With the help of such a table, users of the scoring system will want to define a cut-off score, a threshold below which they will systematically decline and above which they will systematically accept credit applications. The setting of such cut-off score is based upon the maximum probabilities of default the institution wants to expose itself to as well as the acceptance rates it wants to maintain.

As an example, in Table B an FI may want to select a cut-off score of 40. In other words, accept all applicants that score above 40 and decline those that fall below this score. In this case, the worst risk the institution is willing to accept is 6%. The acceptance rate resulting from such a cut-off score can be computed as 58.6%.

**Table B: Selection of cut off score points**

Score / Range	Probability of default	Percentage of applicants
91 and +	0.1%	8.2%
81 to 90	0.5%	11.2%
71 to 80	2.0%	9.7%
61 to 70	3.5%	12.0%
51 to 60	4.5%	7.5%
41 to 50	6.0%	10.0%
31 to 40	9.2%	12.2%
21 to 30	12.5%	9.2%
11 to 20	14.3%	8.3%
Below 10	16.0%	11.7%
		100.0%

*Choice of a cut-off score*

What we have described above is a very simple, rather crude business rule: accept all applicants that score above 40 and conversely decline all others. In practice, business rules can be a lot more complex and sophisticated. In addition to the score, they incorporate other important variables. The decision itself will not be as simple as "accept or reject", but will also indicate the maximum amount to be lent and possibly make allowance for counter proposals for "borderline" applicants.

In the context of underwriting committees and decentralised operations, as shown in Table C, powers to approve credit requests can be structured via a series of cut-off points, the lowest (21-30) being the exclusive power of the highest authority within the institution. Below this (11-20) the credit application would be declined.



**Table C: Power to approve credit applications based on score ranges and probability defaults**

Score / Range	Probability of default	Percentage of applicants	Power to approve
91 and +	0.1%	8.2%	Sales Representative*
81 to 90	0.5%	11.2%	Customer Relationship manager*
71 to 80	2.0%	9.7%	Head of Branch*
61 to 70	3.5%	12.0%	Regional underwriting committee **
51 to 60	4.5%	7.5%	Regional Head
41 to 50	6.0%	10.0%	HQ underwriting committee at **
31 to 40	9.2%	12.2%	CEO**
21 to 30	12.5%	9.2%	PRESIDENT**
11 to 20	14.3%	8.3%	Decline
Below 10	16.0%	11.7%	Decline
		100.0%	

\*Traditionally and in most FIs these types of functions do not have authority to approve loans, more so where a 'yes' decision is required. They can say 'no' to a client on the basis of insufficient information to proceed or a complete breach of credit policy. However when there is a 'definitive yes' to make they put forward a positive recommendation to the team with discretionary limits. Often that team (some of the functions represented by \*\* above) sits under Credit Risk Functions of a bank. The role of business development roles such as above is

to build volume sales whilst the role of credit risk functions is primarily to safeguard the bank by ensuring 'prudent' lending is practiced through strict adherence to lending policies or confirmed exemptions where necessary.

In this context, one can think of the automation stage as another hierarchical level. The highest scores and the lowest amounts can be accepted automatically.

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