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## Credit Risk Analysis And Credit Scoring— Now And In The Future

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**C**omputers and the Internet have dramatically changed the way business is conducted, and credit departments are no exception. Credit risk analysis, through the use of credit scoring models, is becoming more automated with the use of computers and the utilization of the Internet to obtain and compile financial data. Credit scoring provides a way to quickly and easily numerically rate a company's credit risk so that assessments of individual buyers, or those in the same industry, are made on the same criteria. Automated credit scoring also has the advantage of reducing manpower by eliminating accounts that don't need individual review. This is becoming increasingly important as many credit departments are shrinking in personnel size.

Another advantage of automated or computerized credit scoring is it provides a way to document the criteria used in making credit decisions. Credit scoring systems can also plug into the accounts receivable data of a company to quickly assess the overall risk levels within its mix of accounts receivables and indicate collections procedures for risky or overdue accounts. The passage of the Sarbanes-Oxley Act of 2002 requires that chief executive and financial officers attest to the accuracy of financial statements. This law has made it more important than ever, from a legal standpoint, for executives of publicly traded companies to know and attest to the realistic value of accounts receivables, and other reported financial data. Credit scoring can be utilized as a vehicle to ensure accurate valuations.

Credit managers of smaller companies or those that transact business with a small number of buyers, may not have to automate their credit functions. They can rely on financial data about buyers from financial credit reports from firms such as D&B and Experian, and other sources such as trade group

data, public records—such as liens and judgments—and internal company records. PAYDEX scores on D&B reports, for example, indicate the status of the payment history of a company. This type of score, however, does not give a more comprehensive picture of the creditworthiness of a company. While credit scoring does not give a comprehensive view of creditworthiness either, it can indicate which companies need further, more detailed analysis of their credit status.

Some organizations, such as NACM affiliates, are equipped to provide specific payment history information on certain industries in a specific geographical area. NACM Houston President Kathleen Quill, CAE said her organization could provide "All pieces of information that you can use to verify that a company can pay you once you take an order." She said some sales really don't require the use of a credit score. "You can get fallacious scores... and it's why we don't score." She said her organization is set up "to give information to a credit professional that they might not get on their own."

Quill's organization gathers credit information on companies in a 40-county area in South Texas. She said her credit reports are timely and affordable. "My average credit report price is \$18. We have the ability to provide timely information because we're dealing in a smaller area. We consider a credit report to be out of date if 50 percent of the trade lines are six months old or older. If you buy it from me, I'm going to update it for free before I send it to you."

For companies with a large number of buyers that buy in smaller volumes, automated credit scoring is a cost-effective way to qualify buyers. This is especially helpful for companies that allow purchasing of their products and credit approvals through the Internet. There are two basic types of credit-scoring models which give credit risk evaluations for

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prospective buyers: rules-based and statistically-based. Rules-based systems are based on subjective judgments made from past experience on the relative importance of many variables such as customer payment history, bank and trade references, credit agency ratings, and other information gleaned from various financial statements.

Some of the disadvantages of rule-based—sometimes referred to as judgmental-based—scoring models, is that they are arrived at subjectively, and the judgments assumed in the scoring may not be statistically correlated to risk. Also, any errors in the judgments or values assigned in the models are difficult to isolate and detect.

Using a statistically-based credit scoring model can more accurately determine what factors contribute to the credit risk. Behavior-based credit uses multivariate statistical analysis to determine the relationships or correlations between variables. This analysis presents a quantitative picture of how these variables affect the credit risk of a particular company. Such variables might include payment history as well as other financial and credit data pertaining to the company. Credit scoring models are software based, and often can reach out over the Internet to obtain financial information from credit information providers such as D&B and Experian.

Albert Fensterstock, managing Director of Albert Fensterstock Associates, has extensive experience in building statistical credit scoring models for companies. He said he first looks at relevant historical data to plug into the models. "You are going to ask a company for a significant chunk of their history. When you do a model... at the very least I like 12 months."

Fensterstock contends that the design of a good credit scoring model that is comprised of good and relevant data provides an alternative to relying on credit reports. Data that Fensterstock said he would input into his model includes the last 24 months of accounts receivables history. "I'm going to ask you to send me as much monthly data as you have to start with."

Credit scoring models only give probabilities about the likelihood that a company will or will not default based on its past credit history. The relationships between variables in the model, as determined through statistical analysis, may or may not represent an accurate representation of what's actually happening or likely to happen. "In reality, life's not necessarily linear. The regression models lack the ability to analyze non-linear relationships," Fensterstock said.

Behavior-based models have other limitations, Fensterstock noted. "All the score does is give you risk level based on historical information." Models cannot predict unexpected real world situations, like a sudden general downturn in a particular sector of the economy or a change in the management of a company. However, credit scoring models best serve to arrive at a statistical understanding of the probability of creditworthiness as opposed to one based totally on subjective judgment. Sometimes a subjective or intuitive approach to understanding cause and effect relationships belies the statistical relationships behind real world events. The classical statistical example of coin tosses illustrates this. Some people believe that if a coin is flipped and lands on "heads" several consecutive times, that the probability of a subsequent is greater than 50 percent that it will land on tails. This is not statistically true, as all coin tosses—regardless of previous

coin toss results—have essentially a 50 percent chance of being heads or tails.

Credit scoring models serve to help identify those accounts that are highly likely to be good credit risks and those highly likely to be bad credit risks. Those accounts that fall into the middle range between good and bad credit risk can be set aside for a more detailed review by a credit analyst. This reduces the number of accounts that need more intensive and time consuming individual review.

Dan Meder, who is Director of Experian Commercial Risk Products, pointed out that his company also designs credit scoring models. "We produce off-the-shelf credit scoring products. We do offer software. We feed our data through it, and out comes a score that predicts if a company will go severely delinquent."

There are different models that relate to the size of an account. The commercial model is for larger accounts, such as publicly traded companies; while the small business model is for smaller firms, which are often individually or family-owned. In the case of the small business model, Meder said that in addition to typical commercial data on the business, personal or consumer credit data related to the owner or owners is also incorporated into the model. "We found a correlation between the way a small business person pays their bills in their personal life and how they pay in their commercial life." He pointed out that his company maintains 200 million consumer files and 18 million unique business files. Payment history of a firm, as with most credit scoring models, is important data, he added. "One of the key elements in all these models is how the companies pay their bills."

Attorney James Fullerton, of the law firm of Fullerton & Knowles in Clinton, VA, advises to first obtain permission before running a personal credit check on the principles of any limited liability corporation. "You should always have permission," Fullerton said. He pointed out that the federal Fair Credit Reporting Act contains language that suggests permission should be sought before running personal credit checks, so it is better to be safe by obtaining those permissions first.

Meder said the statisticians at his firm continually work to refine and revise the models based on their past performance. "We validate the performance of the scores. We go back 12 months and see how well they predict the scores we have today. Things change over time."

Mike Banasiak, President of Predictive Metrics, Inc., said of his company, "We basically do all kinds of credit scoring." He pointed out that he could provide a credit score for an industry as well as individual businesses. "The hottest product we have in this area is our Net30Score™ product. It's an industry-specific score designed for trade purposes. We would (also) provide a score for all of your customers."

Banasiak pointed out his credit scoring models, as with most others, are best suited for companies that do business with a large number of customers that involve smaller value transactions. "It's generally for companies that do a lot of business with many firms and are generally less than \$100,000 transactions." The models are validated against the results of his clients' own portfolios too. This is done through the performance of a back-test.

A back-test, Banasiak said, is a retrospective analysis that compares credit scores in the past to determine how well they predicted current credit results for a company's portfolio. "We take the data from last year and compare it with results from the recent year." He pointed out that doing this helps his company to constantly update the parameters of the credit scoring models to produce more accurate or predictive results. "It's being refined on a year-to-year basis. We're dealing with a lot of money. So it's very important to get it right."

Banasiak said his company's credit-scoring models, like some from other firms, could indicate what kind of actions credit collections departments should take on various accounts. "You're going to attack the ones that have the highest probability of a loss first. Do you want to make eight phone calls on those accounts, or one phone call on those accounts?" His company's credit scoring models can even distinguish differences in the credit picture of accounts with similar payment histories. He said they "can distinguish between an account that always pays 60 days past due, but is not a loss, from those that are likely to be a loss."

The data that is incorporated into his credit scoring models, Banasiak said, can be tailored to suit the needs of the credit manager. "You can use any data in the marketplace that the credit manager wants. We do a lot of that for our clients, and we will evaluate that to make sure it's effective."

In addition to behavior-based credit scoring models, there are two other types of statistical models that fall into the category of artificial intelligence. These are based on neural networks and genetic algorithms. In order to thoroughly understand how they arrive at results one would have to have some training in statistics. Fensterstock said neural networks could find unusual patterns between and among variables. "In very large, complex areas, neural networks have done very well. In credit scoring, not so well." Neural networks can be effective, he said, in learning about patterns such as how a person typically uses a credit card; so when somebody makes a credit card purchase, they can determine "if that's you using the card."

On the use of neural networks, Banasiak said, "We've tested the technology but we didn't find it any more predictive (than behavior-based models). It's good for fraud detection." Genetic algorithms, which Fensterstock described as employing the principle of the "survival of the fittest" because they evolve to produce ever more effective models, are still more in the realm of academic research institutions or product development departments." Banasiak said of them, "That's newer technology that we're currently testing. I'm not aware of any applications on the credit scoring side."

Credit scoring models can be developed in-house, if a company can afford to hire the necessary statisticians and other trained personnel. More commonly, companies choose to purchase the software and get the necessary training to work with them from firms specializing in this technology. "You don't have to have a roomful of guys that look like me, looking at this stuff," Fensterstock said. "They do the studies for you... and they run it for you."

"What we do is quite sophisticated and quite complex behind the scenes," Banasiak said. "We simplify it and make the tool easy for the credit manager."

Credit managers that use computerized credit-scoring models can be more confident in the documentation they must pro-

vide for Sarbanes-Oxley too. C.J. Wimley, Sr. Vice President of Product Planning and Development of GetPaid, said his credit scoring models help determine how a company's credit policies are controlling risk. His models also help document what officers in the company are involved in implementing credit decisions. "Anytime somebody touches one of the variables in the account, this documents it. We're not going to say not to have exceptions (to credit risk policies), but we're going to bring these exceptions up for management review."

Lyle Wallis, Vice President of the Credit Research Foundation, said a survey his organization conducted indicated that 80 percent of respondents intend to adopt credit scoring in the future as a way to assess credit risk. "It's already in play with lending institutions, it's already in play with credit cards. It's going to be adopted as a tool to make that job easier."

Three factors may convince more credit managers to adopt the use of credit-scoring models, Wallis noted. One is cost. "As technology goes on, it's going to be less expensive." He pointed out that new credit-scoring models are being developed for mid-size and smaller companies. Jeff Parisi, Senior Solutions Consultant for eCredit, said his company's credit scoring software can access various data bureaus to pull in information about a company and compute a credit score. The data bureau chosen, such as D&B, Experian or Equifax, will depend on the nature of the company being scored, Parisi pointed out. He noted that automated credit scoring for smaller companies and orders from them is a cost-effective way to analyze risk. "Scoring is more critical for your mom-and-pop shops."

Another factor that will drive increased adoption of automated credit scoring is the more rigorous financial reporting and documentation requirements of Sarbanes-Oxley. "It's driving people to do it—particularly if you're a publicly traded company: if you tie your decisions to automated decision-making you can bear out the fact that you're not just flipping a coin to make your decisions."

The third factor that will spur more use of credit scoring models is the increased use of the Internet as a source to easily acquire financial data and to conduct commerce. Wallis noted that more businesses operate websites that allow customers to place orders. Automated credit approvals for sales, via the Internet, will become more necessary in order to do business with buyers who want to quickly place and have orders approved. "He (customer) needs the instant gratification to know your order is okay and you're going to ship."

The future of credit risk analysis is an increased reliance on computerized credit scoring models. Automated decision-making will never take the place of the Credit Manager, but it can help make quick decisions to approve or disqualify the majority of transactions that fall above or below certain credit score parameters. Therefore, those Credit Managers that are not familiar with automated credit scoring technology would likely benefit from learning more about it. "It's incumbent to know what it's all about before you hire someone to come inhouse to set it up, or you buy it off-the-shelf."