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In recent years, credit scoring systems have received a lot of criticism. Can a statistically-sound scoring system make credit recommendations fairly? Can one make your lending program cost-effective? Finally, can credit scoring systems make responses to member-loan applications within a reasonable time period?

Answering yes to these questions, Northwest Federal Credit Union in Seattle has developed a statistically-based credit scoring system uniquely geared to its membership.

Northwest had used basic credit scoring techniques since 1970, but made few revisions. Then with the passage of the Equal Credit Opportunity Act (ECOA) and Regulation B, it recently became necessary to develop a statistically-sound scoring system.

Regulation B classifies scoring systems in three ways: "Demonstrably and statistically sound, empirically-derived credit systems (DSSEDCS); "Judgmental systems;" and "Empirically-derived credit systems."

A DSSEDCS classification must:
- Use appropriate sampling techniques in collecting data.
- Serve a legitimate business need of the creditor, such as minimizing loan losses.
- Separate creditworthy and noncreditworthy applicants at a statistically-significant rate.
- Be revalidated periodically, using appropriate statistical principles.

An empirically-derived system may be based on an empirical comparison of sample groups. A judgmental system is any one that is not a DSSEDCS. The Act and Reg B don’t require the use of any particular system.

Revisions to ECOA and unsatisfactory results from the existing judgmental scoring system, led Northwest’s credit committee to evaluate existing loan underwriting methods. The committee found:
- The revised methodology leans toward statistically-based credit scoring. It permits more objective decision-making.
- Arbitrary methods of selecting credit criteria weren’t reliable. Delinquency and loss experience fluctuated despite attempts to control it. The delinquency and loss write-offs are a function of the collection effort. But changes occurring in both collection personnel and lending philosophy made it difficult to identify the cause of fluctuating delinquency and loss ratios.
- Primarily due to internal conditions, supply of funds fluctuated, making it difficult to tighten or loosen credit lines using a judgmental credit granting system.
- In addition, turnover among lending department staff caused problems. The credit committee handled only denials, delegating approval authority to loan officers. And inexperienced loan officers were not supervised closely by the credit committee.

So, a DSSEDCS held considerable promise for helping the credit union solve its problems. Other benefits included:
- Faster response to changing circumstances, particularly in funds supply, by adjusting the minimum score necessary to receive credit.
- A consistent decision tool, even if staff turnover continues. The system enables handling of significant loan demand without substantial increase in staff size.
- A means of defense if challenged on a loan decision in court or at the regulatory agency. While the effects test concept of Regulation B is difficult to defend against, a validated scoring system makes a defense of "valid business necessity" easier to support.

Design considerations

Members fit two distinguishable groups—civilian-federal and military employees.

Would the credit scoring system treat both groups fairly?

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Could each group be more accurately evaluated if judged separately? Credit union officials believed so. Orientation toward military, rejecting more applications than warranted. In a dual system, each—civilian and military—member group would be compared within its own ranks, providing a more equitable system than one with a single population base.

Two major stages

The statistical phase of the scoring system is divided into two major stages: Selection of predictive variables and deriving weights for the variables. The beginning phase variable selection is data collection. Each loan application has information on an applicant’s profile, the loan type, and its terms. Ideally, data on all available variables in each application in the sample should be collected for statistical analysis. This maximizes the scoring system’s ability to predict. But, cost of such data collection must be weighed against the potential gain in making accurate predictions.

The credit committee reviewed and approved the list of variables from data collection. After collecting and editing data, each variable was examined to see if there was a significant difference in the distribution between groups of good and bad loans. It’s best to have little or no overlap in the distributions of good and bad loan variables. Such variables may be good indicators of good and bad credit risks.

It’s useful to perform the analysis to get some idea about the difference in behavior of each variable between the two groups (good and bad). Several variables may be deleted from further analysis while others are combined. For example, several variables use "loan purpose," but lack a sufficient number of observations to produce reliable statistical results.

The credit scoring system calculates a weighted average of scores of selected predictive variables for each loan application. A statistical method called linear discriminant analysis determines the final set of variables used and the weights attached each variable. The technique determines the weights so the distribution of the total score for good and bad loan groups are as far apart as possible. In this way, the probability of making an error—rejecting a good loan and accepting a bad loan—is minimized (Figure 1).

There’s also another innova-

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the coefficients of the predictive function. The final coefficients are used to determine the relative weights in the scoring system. Now, without incorporating the reject data, only partial information from operations is utilized (Figure II). If rejected applications are not used, the mean of the bad distribution may fall closer to the mean of the good distribution, causing greater distribution overlap.

Implementing the system
Loan officers complete the credit scoring sheet on every application. The credit committee determines the minimum scores for granting credit based on board policies. Most applications are processed automatically, based on whether the score is higher than the minimum requirement. But loan officers also review several established criteria that are difficult to quantify in a statistical system—such as refinancing previous loans and exposing pyramiding consumer obligations.

The loan officer may approve a low-scored application if the loan purpose is to acquire an asset worth more than the loan balance, or if the applicant has a substantial income and there is no adverse credit information.

When denial is recommended, a loan officer must supply specific reasons why an applicant was not able to qualify for credit.

Loan officers’ reaction
At first, loan officers complained about the new system. Some scores attributed to the statistical analysis differed from the intuitive reasons developed in earlier judgmental systems.

So, the committee chairman prepared materials explaining the scoring system’s development and its statistical techniques. It is imperative that all people using the system understand it.

Revalidation process
A DSS/EDCS requires periodic revalidation using appropriate statistical principles. The credit union routinely samples the system. One person has the primary responsibility for assuring the quality of new data. And management staff monitors day-to-day activities of sampling. No final decision on the interval between revalidations is expected because the data will be processed at approximately two-year intervals.

Use for loss control
The scoring system development also provides other residual benefits. It is the basis in estimating loan losses. Using historical application data and statistical data at selected score levels, management can predict expected levels of loan losses. This information is useful in illustrating the effects of various board policies, and it’s a useful tool for long-range planning.

So, while credit scoring is under fire in some lending circles, the system developed for members of Northwest Federal Credit Union is alive and well.

Donald Machel and H. Tamura

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