RISK MEASUREMENT FOR SHORT TERM LOANS

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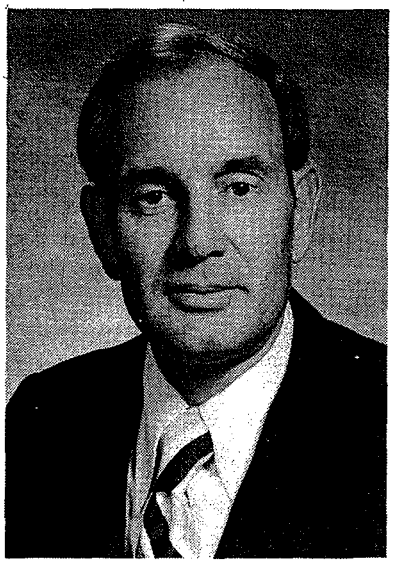
For a long time now financial aid administrators, foundation managers, and financial managers have been swapping horror stories about skyrocketing student loan delinquencies. The national news services have carried several stories about the millions of dollars in delinquent and uncollectible National Defense Student Loans. Colleges and universities throughout the country are reporting huge rip-offs in their short term loan programs and many student loan funds are so depleted that they are bankrupt, closed up, defunct. Other institutional loan funds are being converted to outright gifts to students rather than being continued as loan funds because of the difficulty in collecting. All this is happening while hundreds of commercial lending institutions, not without their present interest problems of course, are growing, prospering, and making a profit. The question is "what is the difference?" Why is the money available for car loans, installment loans, etc. continually available and growing, while university and college loan funds are shrinking away, drying up and disappearing?



Lee Spencer has worked in student loan accounting since 1969, taking over the management of short term loan collection in 1971 and presently serving as Coordinator for Student Loans at California State University in Fresno. He has recently completed his MBA degree, concentrating in finance, and this article is based upon his MBA project.

The answer to this question is not obvious or simple. However, commercial loan companies are doing something that universities and colleges are not doing. In fact, they are doing many things that colleges and universities are not doing, too many things to detail here. For purposes of this article the difference between commercial lending agencies and institutional lending activities is all going to be lumped together and described as ability to repay versus need. That is, the assumption is that commercial lending agencies loan solely on the basis of ability to repay while colleges and universities loan solely on the basis of student need. If this is accepted, then another assumption logically follows. The difference between the delinquency rates for roughly parallel kinds of loans made by the two different kinds of lending agencies may be explained primarily on the basis of the screening of applicants. Commercial enterprises, we will assume, discover and eliminate poor risks; educational institutions do not, and that is why one succeeds and the other fails.

Whether or not this is a valid assumption, whether or not it is wholly true, is a matter of debate. Often this is the subject of heated debates between university business managers and financial aid counselors. What cannot be denied is that this matter is argued much and discussed much. On the face of it, it appears that simple good judgement and common sense support the position that if colleges and universities followed commercial practices and screened out undesirable applicants, they would turn their failures into successes. The question is of course, how to do that, how to identify poor risks.

This is not an easy job to undertake. Commercial lenders draw from the total population, comprised of all ages. They insist upon collateral. Their applicants are working at full time jobs. Their applicants have credit histories, and so on. Colleges and universities, on the other hand, do not draw applicants from the total population. Their loan applicants cannot produce collateral, for nobody can, as of this writing, buy another man's degree at a cut-rate price and use it again like a repossessed refrigerator. Their students are generally of the same age group — young, without credit histories. They attend school full time, so do not have full time jobs. This means that criteria used by commercial lenders probably cannot be used by colleges and universities. As a matter of fact, post-secondary institutions probably are getting their borrowers from the very people to whom commercial lenders would be reluctant to lend without guarantees. So the question becomes what questions should you ask student borrowers in order to find out if they are poor risks, and how much should you count each answer. In other words, could an application be developed to screen out potentially poor risks. This is of course the same thing as the graded or scored credit application.

Predicting Delinquencies

After many, many trials and errors it was determined that there might be a statistical tool for answering these two needs — What questions should be asked, and how much should the answers to the questions count? This statisti-

cal tool is the step-wise multiple regression analysis. It was found that the stepwise multiple regression analysis ranked the answers to the questions on the application form according to their contribution to predicting delinquency. By defining delinquency in terms of months, and comparing this with 25 different answers from applications, significant results were achieved. The basic idea may be explained as follows: Y, the dependent variable is the number of months in arrears, and the X's, the independent variables are the characteristics of student borrowers obtained from an analysis of the application form.

The regression equation is:

$$Y = X + b_1 X_1 + b_2 X_2 \quad \ldots \; b_{25} X_{25}$$

Each X has a share in predicting the Y or the number of months in arrears. Also, according to the regression technique, values or residuals are assigned to each of the X's and these can be translated into various values, called normalized Beta values, which can be used as weights. Thus, the stepwise multiple regression analysis is a technique that can be used with the data available to answer the questions — Which answers on the application predict poor risks, and how much is each answer worth?

The 25 independent variables used may be found in Table 1.

Results

Running the data through the appropriate computer program revealed the results displayed in Table 2.

The critical F for 8 degrees of freedom at the 95% confidence level is 2.3. All F values above 2.3 are valid, that is they predict or help to explain the dependent variable. The value shown in Beta, is in essence the weight.

The result of the step-wise multiple regression analysis is that, of the 25 variables, eight explain about 80% of the delinquent loans. If you could describe the worst possible risk, according to this research, you would find a student without a phone, unmarried, in his first (or last) semester, with an old car, either 17 years old (or over 26), male, with a large loan who is unemployed.

The reason for the "ors" in two of the variables is that a single detailed analysis of the two variables tended to show very young or very old students were poor risks, and also that beginning students as well as students about to graduate were poor risks. If we had to pick one category only, we would pick 17 year old students in their first semester at the University.

A work sheet, assigning Beta values to each of the eight coded entries, follows (Table 3). This is really our version of a scored or graded application for short term loans.

If the final score is a negative value it means essentially that the student will pay on time. A positive value reveals a poor risk, theoretically the number of months the student will be delinquent. As the total approaches zero

and above, this form can be used as a good indicator of a poor risk. Two actual applications were used to work out the examples shown in Table 4. We were careful, of course, to pick out two that worked out right. We know the process will only work about 8 times out of 10. G. T. paid late, R. T. paid on time. We assume then that if we had denied G. T. a loan, we would have eliminated a poor risk.

The other 17 variables exhibit colinearity; that is, they correlate highly with the first eight variables or predict the same thing. Therefore, their use does not increase the accuracy of the prediction. Good examples are the variables "spouse working" and marital status. Both are essentially the same variable, are highly correlated and predict the same thing, except that "spouse working" is a better prediction than marital status, that is why marital status is not used.

Of course, no one would rely entirely on data obtained from a small sampling of 36 "poor risks". Nevertheless, it is clear that the probability of predicting subsequent payment behavior from an analysis of a well-constructed application is high. It seems to me that more research is needed, but it could produce very valuable and useable results which could put college and university loan funds back into the black. Graded applications and an analysis of need, along with compassion and understanding, could form the basis for changing the trend of our shrinking university loan funds.

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TABLE 1

POSSIBLE VARIABLES AFFECTING LOAN DELINQUENCY

NUMBER	VARIABLE
1	Housing (apt., dorm, house, parents' home)
2	Age (under 18, 18-19, 20-21, 22-23, 24-25, over 25)
3	Class (Fr., So., Jr., Sr., Grad.)
4	Semesters at CSUF
5	Major (1-9 as per 1972 catalog)
6	Sex
7	Employed (Yes, No)
8	Amount of Employment (1/4 time, 1/2, 3/4, full time)
9	Monthly Income (less than $150, $151-300, $301-450, $451-600, over $600)
10	Telephone (Yes, No)
11	Married (Yes, No)
12	Spouse Working (Yes, No)
13	Spouse's Income (same as 9)
14	Number of Children
15	Has Borrowed from other Agency (Yes, No)
16	Number of Creditors
17	Amount Owed (up to $250, $251-300, $301-450, $451-600, $601-750, $751-900, over $900)
18	Purpose of Loan (tuition and/or books, living, specific but personal, general)
19	Payback (work, another loan, grant, family, other)
20	Ownership of Car (Yes, No)
21	Car Paid For (Yes, No)
22	Age of Car (1-9 plus)
23	Amount of Loan (less than $26, $26-50, $51-75, $76-100, $101-125, $126-150, $151-175, $176-200)
24	Number of Loans Applied For
25	Total Amount Borrowed at CSUF (same as 17)

TABLE 2

RESULTS OF MULTIPLE REGRESSION ANALYSIS

Multiple R	0.89498
R Square	0.80098

VARIABLES IN THE EQUATION

VARIABLE	BETA	F
Telephone	—0.46441	19.128
Spouse	0.22861	5.287
Semester	—0.23258	5.095
Car Age	0.28112	8.609
Age	—0.23223	5.522
Sex	0.28234	7.804
Total	—0.23673	4.878
Employment	0.16290	2.301
(Constant)		

TABLE 3

WORKSHEET FOR SCORING LOAN APPLICATIONS

	Factor	Code	Weight	Score
1.	Telephone	No = 1; Yes = 2	—.46	
2.	Spouse Works	No = 1; Yes = 2; No Sp. = 0	+.23	
3.	Semesters at CSUF	Use Exact #	—.23	
4.	Age of Car	Use Exact # years ..... No car = 0	+.28	
5.	Age of Student	1 = to 17 4 = 22/23 2 = 18/19 5 = 24/25 3 = 20/21 6 = 26+	—.23	
6.	Sex	Female = 1; Male = 2	+.28	
7.	Total Amount Borrowed from All Loans	1 = $1-150 5 = $601-750 2 = $151-300 6 = $751-900 3 = $301-450 7 = $901+ 4 = $451-600	—.24	
8.	Employed	No = 1; Yes = 2	+.16	
			Total	

TABLE 4

TWO EXAMPLES OF APPLICATION OF THE ANALYSIS

Col.	Item	Col. Entry	Beta	Computed Weight
	G. T. — Paid 14 Months Late			
20	Telephone	1 X	—.46	—.46
22	Spouse	0 X	+.23	0
13-14	Semesters	3 X	—.23	.69
32	Car Age	8 X	+.28	+2.24
11	Age	3 X	—.23	—.69
16	Sex	2 X	+.28	+.56
35	Total	1 X	—.24	—.24
17	Employ	1 X	+.16	+.16
				+.88
	R. T. — Paid on Time			
20	Telephone	2 X	—.46	—.92
22	Spouse	1 X	+.23	+.23
13-14	Semesters	10 X	—.23	—2.30
32	Car Age	1 X	+.28	+.28
11	Age	5 X	—.23	—1.15
16	Sex	2 X	+.28	+.56
35	Total	2 X	—.24	—.48
17	Employ	2 X	+.16	+.32
				—3.46