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Factors Affecting the Probability of Default: Student Loans in California

By Jennie H. Woo

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Much of the recent research on the causes of student loan default has focused on the characteristics of borrowers and the schools they attended. Little attention has been given to post-college experiences as a determinant of default. By linking a large database of California student borrowers with background financial and demographic information and post-college employment data, this study examines factors that predict default for borrowers in the Federal Family Education Loan program, including post-college variables. Background demographic and financial characteristics, leaving school without a degree, having low wages after leaving school, or experiencing unemployment were major determinants of default. Also, controlling for these socioeconomic variables, the analysis revealed that vocational schools, especially privately held ones, are more likely to have students who default on their loans.

The Federal Family Education Loan (FFEL) program has been quite successful at providing the means for students to finance their higher education. Since its inception in 1966, the FFEL (formerly Guaranteed Student Loan) program has lent roughly $317 billion to students to attend college. About 12 percent or $39 billion has ended up in default. The principle focus of research on the causes of default in the federally guaranteed student loan program has centered on who is responsible, the borrower or the schools. Previous studies of the determinants of default in the student loan program concentrated on the characteristics of borrowers and of the schools they attended. The consensus of most of these studies was that borrower-based characteristics predicted almost all the default behavior and that, aside from completing the school program, the school-based variables added very little explanatory power. Very few studies have examined post-college experiences, such as employment or repayment histories, to see if what occurs after leaving school is as significant in explaining default as either pre-college or college experiences. Also, very few studies had access to large databases that included all types of degree and vocational programs and large numbers of students.

This study attempts to remedy these deficiencies by linking a large database of California student borrowers with background financial and demographic information and post-college employment data to examine more thoroughly the question of what causes default. The study finds that school and post-school characteristics add explanatory power to the default equation.

Recent Research

A number of important empirical studies have examined the causes of student loan default (Wilms, Moore & Bolus, 1987; Knapp & Seaks, 1992; Flint, 1994; Podgursky, Ehlert, Monroe & Watson, 2000). They compare student background information, such as ethnicity, gender, family income, and high school performance, with institutional characteristics such as school type, selectivity, wealth, or financial aid counseling. Some of them (Ryan, 1993; Dynarski, 1994; Volkwein & Szelest, 1995; Monteverde, 2000) also include post-college indicators such as current employment, earnings, or credit ratings.

While there are some major differences in the findings of the studies, they share several strong conclusions. First, failure to complete the academic program is strongly associated with student loan default. Students who graduate are far more likely to pay off their loans than students who do not complete their coursework.

Second, low income in the form of low earnings or unemployment, both for the family of the student before attending school and for the student after leaving school, is the other most common factor associated with default. Students are most likely to default because they cannot afford the monthly payments rather than because they refuse to or cannot understand how to pay back the loan.

Third, much previous research (Wilms, Moore & Bolus, 1987; Knapp & Seaks, 1992; Flint, 1994; Dynarski, 1994; Volkwein & Szelest, 1995) seems to show that institutional characteristics are insignificant when background characteristics and current employment are entered into the model. In other words, to predict default it is more important to know the background of the students than what type of school they attended. The above authors generally conclude that the high default rates of community colleges and vocational schools are a function of the type of students they enroll, rather than some factor associated with the school itself.

Our study has various features that distinguish it from many of the previous default studies. The variables examined in this study come from several aspects of borrowing behavior. They include pre-college background characteristics, aspects of the college or school attended, and post-college experiences including employment and loan servicing factors. The data combine information extracted from the databases of a large guarantee agency, a state grant agency, the U.S. Department of Education, and a state agency that collects employment data. These four databases form the operational foundations of these four public agencies and are subject to constant checks and confirmation.

Methodology and Data

Our analysis used multivariate logit to estimate the probability that a borrower will default. The model had a binary dependent variable where one denotes at least one incidence of default and zero denotes no defaults.

The borrowers in the study were Californians who took out student loans in 1994-95 in the Federal Family Education Loan program and supplied complete information on the Free Application for Federal Student Aid (FAFSA). The background data from the FAFSA was for a specific year, so the data could be considered as describing the cohort who borrowed in 1994-95. (Many borrowed in other years as well.) Cases with complete information were then matched with labor market earnings data. This limited the sample to borrowers who were earning wages and reporting them in the state of California. Borrowers who were not seeking employment and borrowers who had migrated out of the state were excluded. Since California is the largest labor market in the United States, the pool of borrowers was still quite large, at 211,065.

A further constraint on the size of the study was the availability of ethnicity, gender, and school performance indicators. Previous research indicated that these variables, particularly ethnicity, would be important to control for in examining predictors of default (Wilms, Moore & Bolus, 1987; Knapp & Seaks, 1992; Flint, 1994; Dynarski, 1994; Volkwein & Szelest, 1995; Podgursky, et al., 2000). Ethnic, gender, and school performance data ceased to be collected after the Reauthorization of Higher Education Act in 1993-94, when the FAFSA was created. The only available file with ethnic, gender, and grade point average (GPA) information was a file of Cal Grant applicants from 1991-92. Cal Grants are the statewide grants available to residents of California who have financial need and show academic promise. This meant that only borrowers who had applied for a Cal Grant three years earlier could be included in this study. Because the application for a Cal Grant was the same as for federal loans in 1994, requiring only an additional box to be checked and an additional $2.50 for processing, it was decided that the file, while smaller, would not be biased. The only reason for exclusion of any case was the absence of data. Table 1 details the points of comparison between the larger cohort of over 211,000 borrowers and the final sample with complete data, which was for approximately 31,000 borrowers.

The only significant difference between California borrowers in general and this sample containing ethnic, gender, and GPA data was the proportion of borrowers who attended only short-term programs. About one third of all borrowers received student loans for only the first or second years. In the sample with complete data, only 15 percent did. The sample also has a lower percentage of borrowers whose last school was a two-year public, a two-year private, or a vocational school program of two years or less. (See Table 1.) Probably, matching 1992 and 1995 data lost a disproportionate number of borrowers who attended short-term programs. This meant that the sample containing ethnic data somewhat underrepresented borrowers at shorter-term schools. A larger sample without ethnicity

The only significant difference between California borrowers in general and this sample...was the proportion of borrowers who attended only short-term programs.

TABLE 1
Comparison of Initial Cohort and Final Sample with Ethnic Data

Variable	All Borrowers Sample Size	Percentage	Cal Grant Applicant Borrowers with Complete Data Sample Size	Percentage
All	211,065	100.0%	30,871	100.0%
Default Rate		11.7%		9.4%
Academic Level of Latest Loan as of June 1999				
Freshman/first year	37,930	18.0%	1,806	5.9%
Sophomore/second year	32,190	15.3%	2,726	8.8%
Junior/third year	33,167	15.7%	5,713	18.5%
Senior/fourth year	60,292	28.6%	12,272	39.8%
Fifth year/other undergraduate	13,687	6.5%	2,801	9.1%
First year graduate/professional	13,327	6.3%	2,157	7.0%
Second year graduate/professional	9,111	4.3%	1,405	4.6%
Third year graduate/professional	5,441	2.6%	952	3.1%
Beyond third year graduate/professional	5,739	2.7%	1,010	3.3%
Total	210,884	100.0%	30,842	100.0%
School Type (last school attended)				
Public two-year	19,056	9.2%	1,275	4.1%
Public four-year	118,118	57.0%	21,336	69.1%
Private two-year	3,997	1.9%	150	0.5%
Private four-year	48,430	23.4%	7,223	23.4%
Vocational, two-year or less	13,777	6.6%	606	2.0%
Vocational, more than two-year	4,003	1.9%	281	0.9%
Total	207,381	100.0%	30,871	100.0%
Program Status				
Dropped out	90,788	43.1%	14,536	47.1%
Graduated	120,098	56.9%	16,335	52.9%
Total	210,886	100.0%	30,871	100.0%
Unemployment Compensation				
Filed for unemployment	32,709	15.5%	5,758	18.7%
Did not file	178,356	84.5%	25,113	81.3%
Total	211,065	100.0%	30,871	100.0%
Parent's Income (dependents only)				
Zero	18,801	21.3%	4,071	24.9%
1 to $10,000	7,671	8.7%	1,950	11.9%
$10,001 to $30,000	24,468	27.7%	4,916	30.0%
$30,001 to $60,000	24,290	27.5%	3,990	24.4%
$60,001 or more	13,178	14.9%	1,444	8.8%
Total	88,408	100.0%	16,371	100.0%
Loan Amount				
Less than $3,000	34,748	16.5%	3,257	10.6%
$3,000 to $10,000	80,396	38.1%	10,435	33.8%
$10,001 to $25,000	72,102	34.2%	12,718	41.2%
$25,001 or more	23,819	11.3%	4,461	14.5%
Total	211,065	100.0%	30,871	100.0%

Due to rounding, details may not add to 100%.

was used to examine some specific questions related to vocational schools, which are mostly short-term.

The sample consisted of borrowers from all postsecondary grade levels, school types, and loan types in the federally guaranteed loan program. It represented all fields of study, all ages, all income and asset ranges, and both financially dependent and independent students. All borrowers had subsequently left school and were either repaying their loans, had already repaid, or had defaulted. The default outcome of the borrowers was measured at the end of 2000, which was roughly five years after obtaining a loan.

National Comparison

Table 2 compares the borrowers in our final sample with all borrowers in the nation. The national statistics are from the National Postsecondary Student Aid Study in 1996 (one year after the California sample) and summarize all students, both undergraduate and graduate, who had borrowed to finance their higher education. There are several striking differences between this sample and all U.S. borrowers. Except for short-term vocational school enrollment, these differences can be attributed to differences between California and the nation in general. A general description of California higher education is available in Swail, Gladieux, and Lee (2001). California has a large, well-funded public sector with relatively low tuition, so Californians are much more likely to attend public colleges and universities and to borrow less than the rest of the nation. For more details on borrowing in California, see Gladieux and Lee (2001).

The California sample, reflecting California students in general, had a somewhat smaller proportion of African Americans, and a much larger proportion of Hispanic, Asian, and other minorities than the nation. Also reflecting the state's ethnic mix and particularly the large influx of immigrants, the sample had lower parents' education levels and lower income levels than borrowers in the entire nation. For example, 36 percent of the mothers of California college students who borrowed had college degrees versus 43 percent of mothers of all U.S. borrowers (Table 2).

Borrower Profile

Table 3 summarizes the sample profile of the 1994-95 borrower cohort. About 82 percent of the cohort borrowed at the undergraduate level, and 18 percent borrowed to attend graduate or professional schools. The loan amount refers to the total amount borrowed by the student in the loan program up to that point. The delinquency periods refer to remitting a student loan payment more than 60 days past due.

The percentage of borrowers in each major category who defaulted is indicated in the last column of Table 3. Almost 10

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TABLE 2
Comparison of Sample Borrowers to National Borrowers

Variable	Sample Distribution	National Distribution
Sample size	30,871	41,482
School Type (last school attended)		
Public two-year	4.13%	10.09%
Public four-year	69.11%	46.95%
Private two-year	0.49%	1.66%
Private four-year	23.40%	30.16%
Vocational, two-years or less	1.96%	9.75%
Vocational, more than two-years	0.91%	1.39%
Total	100.00%	100.00%
Gender		
Female	58.3%	57.84%
Male	41.7%	42.16%
Total	100.0%	100.00%
Ethnicity		
African American	10.0%	13.88%
Hispanic	26.2%	8.29%
Asian	29.8%	5.10%
American Indian	1.0%	0.95%
Caucasian	33.0%	71.18%
Other	0.0%	0.60%
Total	100.0%	100.00%
Dependency Status		
Dependent	51.88%	50.85%
Independent	48.12%	49.15%
Total	100.00%	100.00%
Father's Education Level		
Elementary	19.20%	8.04%
High school	36.95%	43.63%
College	43.85%	48.33%
Total	100.00%	100.00%
Mother's Education Level		
Elementary	20.26%	6.56%
High school	43.39%	50.26%
College	36.35%	43.18%
Total	100.00%	100.00%
Parent's Income (dependents only)		
$10,000 or less	36.78%	9.63%
$10,001 to $30,000	30.03%	26.52%
$30,001 to $60,000	24.37%	38.09%
$60,001 or more	8.82%	25.76%
Total	100.00%	100.00%
Student's and Spouse's Income (independents only)		
$5,000 or less	54.31%	27.67%
$5,001 to $10,000	19.43%	19.91%
$10,001 to $30,000	21.48%	36.73%
$30,001 or more	4.77%	15.69%
Total	100.00%	100.00%

Source: EDFUND Portfolio, NPSAS:96, NCES.
Due to rounding, details may not add to 100%.

TABLE 3
Profile of Sample Borrowers

Variable	Percentage in Each Category	Sample Size	Percentage Defaulted
All		30,871	9.4%
Academic Level of Latest Loan as of June 1999			
Freshman/first year	5.9%	1,806	20.3%
Sophomore/second year	8.8%	2,726	17.5%
Junior/third year	18.5%	5,713	12.2%
Senior/fourth year	39.8%	12,272	8.0%
Fifth year/other undergraduate	9.1%	2,801	5.6%
First year graduate/professional	7.0%	2,157	4.3%
Second year graduate/professional	4.6%	1,405	4.4%
Third year graduate/professional	3.1%	952	2.8%
Beyond third year graduate/professional	3.3%	1,010	2.5%
Total	100.0%	30,842	9.4%
Gender			
Female	58.3%	18,002	8.2%
Male	41.7%	12,869	11.0%
Total	100.0%	30,871	9.4%
Ethnicity			
African American	10.0%	3,090	22.2%
Hispanic	26.2%	8,096	11.5%
Asian	29.8%	9,197	6.0%
American Indian	1.0%	314	18.5%
Caucasian	33.0%	10,174	6.5%
Total	100.0%	30,871	9.4%
Program Status			
Dropped out	47.1%	14,536	11.8%
Graduated	52.9%	16,335	7.2%
Total	100.0%	30,871	9.4%
Parent's Marital Status			
Single	4.7%	864	15.7%
Married	66.8%	12,366	6.6%
Separated	5.3%	979	12.5%
Divorced	16.9%	3,135	8.6%
Widowed	6.3%	1,165	8.8%
Total	100.0%	18,509	7.8%
High School Graduate			
Yes	90.1%	27,799	8.8%
No	10.0%	3,072	14.7%
Total	100.0%	30,871	9.4%
Aid to Families with Dependent Children			
Student or family receives AFDC	10.4%	3,209	14.7%
Student or family does not receive AFDC	89.6%	27,662	8.8%
Total	100.0%	30,871	9.4%
Unemployment Compensation			
Filed for unemployment	18.7%	5,758	17.5%
Did not file	81.4%	25,113	7.5%
Total	100.0%	30,871	9.4%

Due to rounding, details may not add to 100%.

TABLE 3
Profile of Sample Borrowers (cont.)

Variable	Percentage in Each Category	Sample Size	Percentage Defaulted
Delinquency Periods			
No delinquency	66.6%	20,555	0.0%
One delinquency	16.5%	5,107	25.2%
Two delinquencies	7.8%	2,409	25.8%
Three or more delinquencies	9.1%	2,800	27.4%
Total	100.0%	30,871	9.4%
Grade Point Average			
Less than 2.00	3.0%	913	19.8%
2.00 to 2.50	7.4%	2,295	15.4%
2.51 to 3.00	21.8%	6,731	12.8%
3.01 to 3.50	36.9%	11,402	9.0%
3.51 to 4.00	26.8%	8,282	5.1%
4.01 or more	4.0%	1,248	4.1%
Total	100.0%	30,871	9.4%
Family Assets (dependents only)			
Zero	30.5%	4,992	12.8%
$1 to $10,000	53.7%	8,792	7.4%
$10,001 to $30,000	4.9%	799	3.9%
$30,001 to $60,000	2.4%	399	3.0%
$60,001 or more	8.5%	1,389	4.4%
Total	100.0%	16,371	8.5%
Loan Amount			
Less than $3,000	10.6%	3,257	10.9%
$3,000 to $10,000	33.8%	10,435	10.0%
$10,001 to $25,000	41.2%	12,718	9.3%
$25,001 or more	14.5%	4,461	6.9%
Total	100.0%	30,871	9.4%
Student's Wages			
Zero	2.6%	813	6.8%
$1 to $10,000	11.9%	3,669	13.3%
$10,001 to $25,000	16.6%	5,130	14.4%
$25,001 to $35,000	14.4%	4,452	11.8%
$35,001 or more	54.4%	16,807	6.5%
Total	100.0%	30,871	9.4%

Due to rounding, details may not add to 100%.

percent of the cohort defaulted. Since some of the borrowers are still repaying loans, the eventual default rate of this cohort could be higher. The author found, in other research, that three quarters of defaults in California occur within the first three years of entering repayment. Because these borrowers average almost five years in repayment, it is likely that most of the default behavior is captured. A higher percentage of borrowers who borrowed only for their first year defaulted and the numbers lessened as the grade level increased.

Borrowers with low wages had higher default rates, except for those with no earnings. Borrowers with no earnings

probably had few defaults because most of them were in their grace period and just beginning the search for a permanent job. The earnings are not annual, but represent five quarters (i.e., fifteen months), of earnings from all sources that were reported to the state government.

Estimation Results

Table 4 reports the results of the logistic regression model. This table displays the variable type, the mean, the parameter estimate and the change in probability with respect to the original probability. The original probability is the probability of default when the dummy variables are set to zero and the continuous variables are at the mean. The last column gives the percent change in the original probability when each dummy variable equals one or the continuous variables increase by one unit. Because the magnitudes of family income, family assets, current wages, amount borrowed and grade point average were so much larger than the other variables, we calculated the change in probability for these five variables when they increased by one standard deviation. For example, having filed for unemployment benefits at least once increases a borrower's probability of defaulting by 83 percent. This means that with the original probability being 9.7 percent, everything else being equal, if a borrower files for unemployment benefits his probability of default increases to 18 percent.

Twenty-three variables were statistically significant below the 10 percent level in predicting default. They can be grouped into background variables, campus variables, post-school variables, and school-type variables.

Background Variables

Several background variables had significant effects on the probability of default. Being African American or Hispanic were significant and positive predictors of default. Being female decreased a borrower's chances of default by 36 percent. The cumulative grade point average, on a 4.00 scale, also had a significant negative effect on the probability of default. One standard deviation increase in the grade point average (i.e., 53 points or half a grade), reduced a borrower's chances of default by nearly 14 percent. Graduating from high school also lowered the probability of default.

Another statistically significant background variable was the age of the student at the time the FAFSA was submitted in 1995. Older students were more likely to default, all other things being equal, possibly due to a weakening of ties to the parents and other family members who might assist a student with financial difficulties.

All of the other significant background variables—characteristics that pre-dated the school experience—were directly related to the financial situation of the students and their

TABLE 4
Logit Analysis of Factors Affecting Default

	Variable Type	Mean	Parameter Estimate	Standard Error	Probability Greater than Chi-Square	Change in Prob/Original Probability
Constant			-1.219	0.215		
Background Variables						
African American	Dummy	0.100	0.966	0.070	<.0001	126.79%
Hispanic - Chicano or Latino	Dummy	0.262	0.432	0.063	<.0001	46.36%
Asian American	Dummy	0.298	-0.027	0.071	0.7032	-2.41%
Female	Dummy	0.583	-0.483	0.046	<.0001	-35.89%
Not U.S. citizen	Dummy	0.187	0.094	0.062	0.1328	8.78%
Family assets	Continuous	$14,021	-0.002	0.001	0.0065	-13.47%
Family income	Continuous	$19,470	-0.005	0.001	<.0001	-10.14%
Family receives AFDC	Dummy	0.104	0.253	0.069	0.0002	25.28%
Grade point average	Continuous	3.166	-0.003	0.000	<.0001	-13.54%
High school graduate	Dummy	0.900	-0.272	0.067	<.0001	-22.03%
Age of student in 1995	Continuous	25.636	0.017	0.004	<.0001	1.53%
Student's dependents (incl. self)	Continuous	1.481	0.038	0.018	0.0340	3.44%
Father attended college	Dummy	0.364	-0.002	0.052	0.9692	-0.18%
Campus Variables						
Withdrew from school	Dummy	0.471	0.483	0.046	<.0001	52.85%
Graduate or prof. student	Dummy	0.179	-0.776	0.098	<.0001	-51.44%
Number of schools	Continuous	1.290	-0.369	0.048	<.0001	-28.72%
Studied business or computers	Dummy	0.223	-0.111	0.058	0.0555	-9.55%
Number of loans	Continuous	4.206	0.058	0.016	0.0003	5.34%
Lender of Last Resort	Dummy	0.001	0.089	0.499	0.8579	8.35%
Amount borrowed	Continuous	$14,966	-0.002	0.004	0.6388	-2.49%
Post-school Variables						
Had loan in deferment or forbearance	Dummy	0.283	-2.543	0.089	<.0001	-91.36%
Filed for unemployment	Dummy	0.187	0.701	0.050	<.0001	83.37%
Number of delinquency periods	Continuous	0.705	0.452	0.013	<.0001	48.86%
Current wages	Continuous	$39,049	-0.018	0.001	<.0001	-35.81%
Number of servicers	Continuous	1.238	0.185	0.051	0.0003	17.97%
Loan was sold	Dummy	0.821	-0.114	0.060	0.0577	-9.82%
Had loan rehabilitated	Dummy	0.000	-11.903	159.500	0.9405	-100.00%
Had loan repurchased	Dummy	0.014	0.049	0.150	0.7449	4.47%
Had a prior defaulted loan	Dummy	0.022	-0.008	0.120	0.9458	-0.73%
School-type Variables						
Latest school was private 2-year	Dummy	0.005	0.495	0.232	0.0329	54.36%
Latest school was proprietary <2-year	Dummy	0.020	0.261	0.140	0.0620	26.18%
Latest school was proprietary >2-year	Dummy	0.009	-0.106	0.241	0.6593	-9.20%
Latest school was public 2-year	Dummy	0.041	0.064	0.109	0.5617	5.88%
Latest school was public 4-year	Dummy	0.691	-0.028	0.063	0.6610	-2.45%

Dependent variable: Flag for defaulting on at least one loan
Sample size: 30,792   -2 log likelihood: Intercept and covariates: 14,317
Chi-square for likelihood ratio: 4,830   DF=34 pr <.0001
Original probability of default (with dummies set to zero and continuous variables set to mean): 9.7%
Percent correctly predicted (out of sample) = 85.8%
Pseudo R²: 14.1%
Four variables were entered in the logit equation in thousands of dollars: family income, family assets, current wages, and amount borrowed.

families. Having a high income or valuable assets for either the student or the student's family was a strong negative predictor of default. Receipt of Aid to Families with Dependent Children (AFDC), a sign of economic difficulties, was a positive predictor of default. Having dependents to support, particularly those other than a spouse who might contribute economically, also added to a student's chances of defaulting. Clearly, all other factors being equal, coming from a poor background indicated that a borrower was more likely to default. However, this analysis also shows that background is not an insurmountable barrier. The original probability of default for a borrower in this model with an average income of $19,470 and $14,000 in assets, is 9.7 percent. The receipt of AFDC only increases those chances of default to 12.2 percent. Clearly, most borrowers, even from poor backgrounds, are not defaulting.

Campus Variables

Among the school experience variables, one of the strongest and most reliable predictors of default was whether the borrower had ever dropped out of school. This dummy variable was defined as positive if a borrower had ever left any school program for which he had taken a student loan without graduating or receiving a certificate. It was found that 47 percent of the cohort had withdrawn from school. This number may appear high because it includes any students who stopped out for more than a summer, took semesters off, or transferred. It does not reflect how many students ultimately received degrees. Nonetheless, leaving school was a significant risk factor in predicting default. This was true for students in all programs and types of schools.

Another significant negative predictor of default was whether the borrower had attended graduate or professional school. While these students incurred more debt and took longer to begin earning money, they clearly were more successful in school and had very good prospects in the labor market, with significantly higher earnings. A borrower who dropped out earned on average $37,600 for five quarters, while one who graduated earned $42,390. A borrower who attended college for four years or less earned $38,800 and a borrower who attended graduate or professional school had an average income of $46,394. A corollary to this was the number of schools a borrower had attended. The average was between one and two. If borrowers had attended more than one school they were less likely to default. Generally, it is the more successful students who continue schooling through graduate school.

This study indicates that those who incurred the smallest debt were, in general, most likely to default on their loans. High debt, for most borrowers, is a harbinger of success, not failure. Total amount borrowed was not significant in predicting default when controlling for level of education. This is partly because those who attended more schooling, either by staying in school or by going on to higher levels, were more likely to

borrow more and to default less. The average total amount borrowed for non-defaulters was $8,948 and for defaulters it was $4,664. At the extreme end were the graduate and professional students, with an average total loan amount of $28,727 and a default rate of 4.9 percent. In the FFEL Stafford Loan program, borrowers are free to borrow any amount up to the loan limits set in statute and lenders are not allowed to deny loans on the basis of perceived credit risk.

Post-school Variables

Several variables representing the conditions the borrower encountered after leaving school were significant in predicting default. The strongest post-school variable was filing for unemployment insurance. Borrowers who experienced unemployment showed an 83 percent increase in their probability of default over their original probability. The unemployment variable was obtained from state labor market data and was defined as a dummy variable that was positive if the borrower had ever filed an unemployment claim with the Unemployment Insurance Program in the period between January 1997 and June 1999. The labor market data did not contain details such as the nature or duration of the unemployment, and eligibility for or receipt of compensation.

Since wage levels and employment are strong predictors of default, a general economic downturn would lead to increased defaults. The default rate for this cohort, which was in repayment between 1996 and 2000 in a period of dramatic economic growth in California, was 9 percent. This is historically one of the lowest rates witnessed by the FFEL program for the state. The general condition of the economy clearly played a role. California had student loan default rates of greater than 20 percent for cohorts who began repaying in 1990 and 1991.

Borrowers who are unemployed are entitled to a loan deferment during which they can postpone the payment of principal and even interest if the loan is subsidized. A deferment variable was created indicating whether the borrower had ever used forbearance or a deferment for unemployment or economic hardship. These types of deferments are given for periods of up to three years, although the average length of time was much lower. The variable was negatively related to default. It could be that borrowers who are organized enough to follow through on using deferments (forbearances are comparatively rare) are also better able to handle repayment in general. Also, deferment directly prevents the occurrence of default, at least temporarily.

Borrowers who went into delinquency on their student loan debts more than once were more likely to default. When delinquency occurs, the lender automatically refers the borrower to a guarantee agency for default prevention activities. Twenty-seven percent of borrowers who had an earlier delinquency ended up defaulting. Each period of delinquency increased

the borrowers' chances of default by 4.8 percentage points, which is almost 50 percent of the original probability.

Borrowers whose loans were held by more than one servicer were more likely to default, with each additional servicer increasing the chances of default by 18 percent. Also the number of loans, but not the amount borrowed, was related to the propensity to default, with more loans signaling a higher risk. The number of servicers and loans presumably bore some relationship to the number of checks the borrower had to send monthly and perhaps to the ease with which his debts could be assessed and managed.

Having one's loan sold, conversely, was negatively associated with probability of default. This is surprising, because changing owners would presumably be another confusion factor for borrowers trying to repay their loans. However, it may be that only loans with good prospects can find ready markets. The negative association with default could reflect some financial institutions' rating systems of the risks of default. The low-risk loans could be more likely to be sold and the low-risk status could override any negative effects caused by the loan sale. Also, having one's loans sold might increase the likelihood of having a single servicer.

Not surprisingly, borrowers with higher overall wages from employment after leaving school were less likely to default. The average wages for the five quarters between April 1998 and June 1999 for borrowers in this cohort were $39,050. The original probability of default was 9.7 percent. With a one standard deviation, or a $26,900 increase in wages, the probability dropped to 6.2 percent, a 36 percent decrease. This was a larger impact than for either of the other two financial variables: family income, or family assets. Understandably, there is a far greater and direct impact on repayment behavior from a borrower's current earnings than from his or her financial background years before. This emphasizes the risks of students who take out loans for college to enter careers with low-paying prospects, especially without some other safety net. But this variable was only half as strong as the variables for unemployment or dropping out of school in predicting default. Indicating an intention to study business management, computer sciences, or engineering, all of which have very good employment prospects, lowered the probability of default, but was not a consistently strong variable.

School-type Variables

Other influences on predicting default were variables denoting the type of school the borrower had last attended. Since all the students in the database had left school, their last school was considered most representative of their final achievement educationally. A dummy variable was entered for each of five segments; the sixth, borrowers at four-year private universities, was the omitted condition. Two of the school segment variables

were significantly positively related to default. Borrowers who attended private non-profit schools with programs lasting two years or less had the largest increase in their probability of default of all the school types. Their probability increased from a base of 9.7 percent to 15 percent, an increase of 54 percent, when all other effects were held constant. Attending vocational (for-profit) schools with programs lasting less than two-years was also a factor that significantly increased a borrower's chances of default. The other segments were not significant in predicting default.

Vocational Schools

A separate model was estimated for borrowers who attended vocational schools. Due to the small number of vocational borrowers in the first sample, this model used another sample of borrowers that did not include ethnicity, gender, and grade point average information. When these three background characteristics are removed from the equation in the first model, there is almost no change in the parameters for the other variables. The percentage correctly predicted is virtually identical (from 90.2 percent to 90.4 percent). This suggests that while these background characteristics are very significant, they do not add greatly to the overall fit of the equation and their absence does not cripple the predictive effects of a model that does not include them.

The results are shown in Table 5. It is clear that the average student who attends this segment is quite different from student borrowers as a whole. This group was financially worse off and had poorer prospects in the labor market than students at the other school types. The average family income of vocational school students, as reported on the FAFSA, was $11,800 compared with the overall average of $20,500 for all borrowers in the cohort. Vocational school students had average earnings in the labor market of $30,500 compared with $36,200 for all borrowers, and the rate of growth of those wages was slower. Only 22 percent had a father who completed college, compared with almost 40 percent for the full sample. Thirty-seven percent had indicated that they filed for unemployment benefits, while in the full sample only 19 percent had. Nonetheless, the same variables were significant in predicting default for this group. Filing for unemployment benefits, having more than one servicer handling loans, leaving the program before obtaining a certificate, having previous periods of delinquency, and receiving AFDC were all strongly associated with increasing the probability of default, as they were in the full model. Having higher current wages, higher family income and assets, being a high school graduate, and having the loans sold were all indicators that the borrower might not default, just as in the full sample.

Further variables were entered in this model to determine if aspects of the schools themselves were relevant in predicting default. Several dummy variables were entered on type

TABLE 5
Logit Analysis of Borrowers at Vocational Schools: Predictors of Default

Variable Name	Variable Type	Mean	Parameter Estimate	Standard Error	Change in Prob/Original Probability
Constant			-1.449	0.100	
Background Variables					
Family income	Continuous	$11,792	-0.008	0.001	-10.91%
Family assets	Continuous	$4,687	-0.003	0.001	-10.13%
High school graduate	Dummy	0.809	-0.168	0.046	-12.41%
Family receives AFDC	Dummy	0.230	0.313	0.046	26.19%
Student's dependents (incl. self)	Continuous	1.880	0.047	0.015	3.69%
Financially independent student	Dummy	0.688	0.158	0.049	12.72%
Not U.S. citizen	Dummy	0.174	-0.424	0.053	-28.98%
Age of student in 1995	Continuous	27.586	0.013	0.003	1.03%
Campus Variables					
Withdrew from school	Dummy	0.288	0.323	0.040	27.13%
Amount borrowed	Continuous	$8,599	-0.013	0.005	-8.73%
Number of loans	Continuous	3.366	-0.127	0.016	-9.47%
Post-school Variables					
Filed for unemployment	Dummy	0.369	0.604	0.037	53.91%
Number of delinquency periods	Continuous	1.156	0.257	0.011	21.23%
Number of servicers	Continuous	1.401	0.398	0.034	33.97%
Current wages (five quarters)	Continuous	$30,575	-0.014	0.001	-23.02%
Loan was sold	Dummy	0.580	-0.246	0.037	-17.72%
School-type Variable					
School was publicly traded	Dummy	0.274	-0.162	0.043	-11.98%

Note: All variables shown had a significance level below 1%. Variables that were not significant at this level were school had single owner, school was partnership, school was proprietorship, intended studying business or computers, father attended college, mother attended college, or loan was in Lender of Last Resort Program. Four variables were entered in the logit equation in thousands of dollars: family income, family assets, current wages, and amount borrowed .
Dependent Variable: Flag for defaulting on at least one loan   Mean = .27
Sample size: 18,548   -2 log likelihood: Intercept and covariates: 19,209
Original probability of default: 22.7%   Chi-Square for covariates: 2,432 with 24 degrees of freedom (p=.001)

of ownership and a series of dummy variables were entered indicating the nature of the subject matter taught at the school. The subject matter variables all proved to be insignificant. A more precise connection between skills taught and local labor market demand might have revealed a connection, but these data were not available. An investigation by the United States General Accounting Office (1977) found an often weak connection between skills taught in proprietary schools and market demand for them. The ownership variables for partnership, proprietorship, or other single owner were also insignificant.

One ownership variable, however, was significant and negatively associated with default: whether a publicly traded corporation owned the school. Borrowers who attended for-profit schools that were owned by publicly traded corporations were

less likely to default than borrowers at other types of for-profit schools. This finding might reflect basic principles of business organization. For-profit schools with a separation between management and ownership, where management answers to shareholders through a board of directors in the public environment of a stock market, might perhaps be run more efficiently, competitively, or with a higher degree of accountability. Also, it may be more within the abilities and desires of large corporate entities that are under the scrutiny of the financial markets to take strong steps to avoid enrolling students who are likely to default. For example, some of these publicly traded schools require students to be in the work force before admission. Nevertheless, the reasons behind this connection deserve much further research.

Discussion

For all types of students, failure to complete the academic program is one of the strongest predictors of default. This supports the findings of previous default studies by Wilms, Moore & Bolus (1987); Knapp & Seaks (1992); Lein, Rickards & Webster (1993); Flint (1997); Ryan (1993); Dynarski (1994); Volkwein & Szelest (1995); Monteverde (2000); NYSHESC (1999); and Podgursky et al. (2000). Those who did not get the full academic benefit of the scholastic program would not fare as well in the job market, either from lack of skills, lack of a diploma, or both, and would be less capable of paying back the loans. The absence of the diploma is probably a barrier to finding and holding good jobs, since economists have reported a definite "sheepskin effect" in labor market success (Jaeger & Page, 1996).

Examining underlying conditions could probably increase the explanatory power of the model. The study by Podgursky et al. (2000) further distinguished between continuous enrollment (having no dropout time) and graduation. They found that while both were significant in predicting default, continuous enrollment was stronger than graduation in its effects on default.

There seems to be a correlation between leaving college without a degree and other factors that may bear directly on default. Data on persistence from the National Center for Education Statistics (NCES) indicated that among students who started in four-year institutions, only 60.4 percent received any degree four years later. For those who started in two-year schools, the rate was only 38.4 percent four years later. (NCES, Digest of Education Statistics, 1999, Table 315.) Data from the NCES Beginning Postsecondary Student Longitudinal Survey (Horn, 1999) indicated that students who left in the first year had a lower parent's education level, were more likely to receive financial aid, and had poorer academic records and less academic integration with the school than those who continued to the second year. They were also more likely to work full-time while enrolled, indicating financial need. Nevertheless, while underlying problems, financial and otherwise, may cause both drop-

ping out and defaults, this represents clear evidence that failure to finish a degree program is a reliable signal of default risk. It is a clearly discernable step that raises the probability of later failures.

The only factor related to the operation of the student loan program that was significant in predicting default was having more than one entity responsible for servicing loans. Flint (1997) also found that having more than one lender was positively associated with default.

Type of School Is Important

Is default proclivity a "pre-existing condition," as Monteverde (2000) claims? Do schools that enroll large numbers of high-risk students have high default rates simply because of the students they serve? Would penalizing schools for defaults only penalize the low-income and minority students they serve by denying them access? These results suggest not. This contradicts the conclusions of the previous studies by Knapp and Seaks (1992); Volkwein and Szelest (1995); Flint (1997); and Monteverde (2000) that institutional variables are not important once background and current employment are entered into the equation. However, most of these previous studies have a limited range of schools represented in the samples, a small number of borrowers, or in the case of Monteverde, a limited range of programs. Dynarski (1994) and Volkwein and Szelest (1995) used National Postsecondary Student Aid Study (NPSAS) samples, but even their studies each contained only 4,000 borrowers. Dynarski found his school-type variables for proprietary school and two-year schools to be significant and positively related to default. Dynarski discussed the possibility of simultaneity bias, because the decision to attend one type of school over another, with their vastly different programs and expected labor market outcomes, could be caused by other factors that are also related to default. Vocational schools often use this argument and there may be some truth in it. The results of this model seem to suggest that, even after controlling for poor family backgrounds, minority status, high dropout rates, low future earnings, and spells of unemployment, the type of school makes a significant difference in a student's chances of later defaulting.

Conclusion

High debt is not a factor in predicting default. Borrowers with small debts are more likely to default than those with large debts. It appears that the decision to incur additional debt by a borrower who is already in school is not nearly as consequential as the initial decision to borrow in the first place. High debt does not lead to default, but borrowing for certain types of education by certain types of students and failures along the educational and workplace path, does. To summarize, there are many factors, often interrelated, that predict default. Several of them

are financial or have direct financial implications. Some are background demographic variables that are poorly understood and need more examination. From the perspective of public policy and operation of the federal loan program, the critical question is which ones are amenable to policy change and how can the program best be structured to assist students to get a college education. While the state of the economy clearly plays a major role, there are aspects of the schooling process and the administration of the loan program that also significantly affect default. These have to do with the success of students in school, the type and quality of program they undertake, and the ease with which they can get a job and repay their debts. There are two critical aspects of this. First, because there are so many entities involved in the provision of loans, they must all work in concert to make this process simple and efficient. Second, none of the entities, nor the borrower, should lose sight of the economic function of a loan. It is predicated on the ability to increase earning power in the future. It is an investment but also a risk, tied to the chances of economic success of the student. It is clear that while loans work well for most students, there is a group for which loans are a distinct failure. For their sakes, and for ours as a society, these students might have been better off receiving grants.

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