

Undergraduate Borrowing: A Study of Debtor Students and Their Ability to Retire Undergraduate Loans

by Steven A. Harrast

Steven A. Harrast is assistant professor of accounting for the University of Northern Iowa.

This study finds that at one university, college major, ethnicity, grade point average, age, and number of semesters required to complete a degree are relevant in determining the student loan debts of recent college graduates. Gender is found to be irrelevant in determining student loan balances. A large percentage of recent graduates have student loans in excess of lender-recommended levels leading to concerns that the benefits of higher education are being slowly eroded by the increasing debt burdens of graduates.

Billions of dollars in student loans are disbursed each year to assist students in financing their higher educational pursuits (College Board, 2000). It is important that students and society be made better, not worse off, by student borrowing. Recent data show that median student loan indebtedness for baccalaureate graduates from public universities more than doubled during the 1990s, increasing from \$6,449 in 1992-1993 to \$15,375 in 1999-2000 (ACE, 2001). Much of the increase in educational debt may be attributed to legislative changes enacted in the 1992 reauthorization of the Higher Education Act. The reauthorization broadened eligibility for subsidized loans, increased loan limits, and opened the unsubsidized loan program to all students. Currently, independent undergraduates may borrow as much as \$46,000 in cumulative undergraduate loans under the Stafford Loan program.

Growing debt levels and significant default costs for student loans highlight the need to better understand the factors surrounding student loan indebtedness. A study combining graduates' payroll and university records would provide a significant foundation for examining their earnings and their abilities to repay educational debts. Specific knowledge of salaries and tolerable debt levels by major would also be a useful addition to the discussion of student loan financing. Prior literature groups analysis by degree or uses medians for all undergraduates (ACE, 2001; Baum and O'Malley, 2003). Because of differences in earning across majors, focus needs to be placed on the outcomes of a particular major. Research into the factors surrounding student loan indebtedness will help increase the understanding of debt in the outcome assessment literature.

According to the American Council on Education, debt levels remain reasonable for most borrowers (ACE, 2001). However, there are signs that debt burdens are becoming heavier and more widely distributed. Over the 1990s, both the median

debt and student loan volume for undergraduates at public institutions increased by more than 100 percent. The current study examines student records and payroll data of recent baccalaureates to obtain a clearer picture of their ability to repay student loans and the factors influencing the amount of loans incurred.

In addition to public student loan programs, students may apply for private loans, generally at less favorable terms. Beyond loans specifically directed to education, a substantial number of U.S. students carry significant credit card balances (King & Frishberg, 2001), and many also have automobile loans and obligations such as cell phone plans. The cumulative amount of debt that recent college graduates carry is unprecedented. Concerns arise about the quality of life students may lead after college with such high debt burdens, and the effect on the economy when large portions of graduates' incomes are used for debt retirement. The debt burden of recent college graduates is reason to reflect on whether the benefits of higher education, both to the individual and to society, are being reduced by the lingering debt burden that graduates often carry.

Efforts to improve the lending program are bearing fruit, with a steady decrease in default rates from a high of 22.4 percent to 5.6 percent during the decade of the 1990s.

Upon graduation, students who are unable to manage large debt burdens may seek relief through default or bankruptcy. In an attempt to shore up the student loan system, Congress has made default and bankruptcy particularly painful options for student loan borrowers. Student loan default may result in loss or denial of professional license, wage garnishments, credit report damage or forfeiture of state and federal tax refund payments (Bilski, 1990). Since 1998, student loans are dischargeable in bankruptcy only upon demonstration of undue hardship (11 U.S.C. §523 (a)(8)(B)). The petitioner must demonstrate that the loan would reduce the borrower below a minimal standard of living, that this condition is likely to persist, and that the borrower has made a good faith effort to pay off the loan (Brunner v. New York State Higher Education Services Corp., 1987). Efforts to improve the lending program have been bearing fruit, with a steady decrease in default rates from a high of 22.4 percent to 5.6 percent during the decade of the 1990s (Cosgrove & Prasso 2001). Graduates in fields with the lowest earnings have the highest incidence of repayment problems (Finnie & Schwartz 1996). Borrowers who leave school without a degree, have low wages, or experience unemployment are at higher risk of default (Woo 2002). It is estimated that 7 to 8 percent of all bachelor's level graduates have repayment difficulties (Finnie & Schwartz 1996). Graduates devoting 7 percent or more of their income to student loan repayment are much more likely to report payment difficulty than those devoting smaller percentages of their incomes to loan payments (Baum & O'Malley 2003).

Credit experts and lenders in the United States recommend that educational loan payments account for no more than 8 percent of gross income (King & Frishberg, 2001). Because of

pre-graduation uncertainty surrounding salary and debt payments, keeping debt within lender-recommended limits is often a product of chance. Even a knowledgeable individual may have difficulty determining future payments as interest rates fluctuate, loans change hands or are consolidated, and interest is capitalized. Recent surveys show that many students significantly underestimate the amount they will have to repay (King & Frishberg, 2001).

In this study, a dataset was developed combining state unemployment tax (salary) information and university student data. Salary data maintained by government agencies reveal a clear cross-sectional view of the earnings of college graduates. Student enrollment data, financial aid files, and degree information maintained by universities provide a picture of student characteristics, major, and debt. Merging state unemployment tax files and university data creates a rich, multidimensional dataset for an analysis of the salary and debt environment of undergraduate students. The multidimensional database approach has great potential for explaining patterns in undergraduate debt and identifying factors that can help avoid excess debt and the risk of default.

From an educational outcome assessment perspective, this study is important because student loans are a growing, dynamic outcome of the U.S. system of higher education. A great deal is known about many of the effects of higher education, but the dynamic nature of debt is particularly important as political and social decisions are made about who will bear higher education costs. As increasing numbers of students enter postsecondary education, the debt burden of graduates is a growing concern. In addition to interest in student loan debt in the United States, European nations are beginning to expand their higher education systems by providing student loan financing (Johnes, 1994). As nations become more interested in student loans, curiosity about their effect on educational outcomes is growing internationally.

Background

A large body of literature exists analyzing the economic returns to higher education (Leslie & Brinkman, 1986; Pascarella and Terenzini, 1991). While measurements of the financial of higher education have been controversial, research shows baccalaureate alumni hold a significant earnings advantage over high school graduates (Pascarella & Terenzini, 1991; Jencks et al, 1979). However, it is probable that student loan payments are beginning to erode the high returns baccalaureate alumni have previously enjoyed. Economic returns studies have generally avoided the issue of debt. This is likely due to lack of debt variables in the common datasets including the U.S. Census datasets (Becker & Chiswick, 1966; Eckaus, 1973; Freeman, 1975; Becker, 1975; Carnoy & Marenbach, 1975). Census data also lack detail concerning the returns to specific majors. Studies using

more focused survey data conclude that curricular choice is often the most potent variable in predicting alumni income (Seeborg, 1975; Angle & Wissmann, 1981; Smart, 1988; Reed & Miller, 1970; McMahan & Wagner, 1981), and that engineering and business majors enjoy the highest returns to educational costs (Seeborg, 1975; Angle & Wissmann, 1981; Reed & Miller, 1970; Koch, 1972; McMahan & Wagner 1981). However, debt remains an elusive issue.

Unfortunately, prior datasets have not facilitated the study of student loan indebtedness. A by-major analysis is critical because area of study is a potent variable in predicting alumni income (Seeborg, 1975; Angle & Wissmann, 1981; Smart, 1988; Reed & Miller, 1970; McMahan & Wagner, 1981), and alumni income constrains manageable payment amounts. It has been shown that most students believe they will earn more than the average salary of a college graduate when they enter the workforce (King & Frishberg, 2001). To form a complete picture of how college affects peoples lives, it is necessary to examine the very significant and growing area of student loan indebtedness.

Analysis

Data for this study were obtained from recent university and state unemployment tax (salary) records. The data provide a recent cross section of salary and debt information as well as a rich set of student variables. Like many studies, the data represent students from one large public university and are thus limited in their representation of students from other institutions (Seeborg, 1975; Koch, 1972; Groat, Chilson & Neal, 1982). Nevertheless, the present data permit an unprecedented view of actual (not self-reported) salaries and debts of recent college graduates. Students populating the study were undergraduate alumni of a public, urban, Carnegie Doctoral/Research - Extensive university. The university is comprised of nine colleges and schools, has an annual budget of over \$273 million with a total undergraduate and graduate enrollment of 20,332. Undergraduates comprised 15,612 or 77 percent of fall 2001 enrollment. Graduate and professional students are not considered in this study though their debts are generally higher than the debts of undergraduates (Baum & O'Malley 2003).

Data Sources

Six years of unemployment insurance records accumulated by the Department of Labor and Workforce Development were merged by Social Security number with corresponding student records from university files.

Unemployment Insurance File

The Department of Labor and Workforce Development accumulates records of earnings for every individual employed in the state who is covered by the unemployment insurance program. Each quarter, it is mandatory for employers to report employee

Social Security number, total earnings paid, employer identification number, and industry code from the Standard Industrial Classification Code. Reported wages were adjusted for inflation using the published Consumer Price Index data.

Individuals who work in jobs not covered by the unemployment insurance system are excluded from the records. Neither job title nor responsibility is found in the record; therefore, it is impossible to determine whether the individual is working in a profession associated with their original field of study.

Student Enrollment File

The Student Enrollment File contains records (captured every semester) on all enrolled students. The data elements include a variety of information on student academic programs, hours attempted and earned, grade point averages, probation status, etc. In this study, the file was used to determine when the student first entered the university and the total academic career duration.

Degree File

The Degree File collects individual records on graduates. It contains such elements as birth year, ethnicity, citizenship, residency, gender, degree, major, semester and year degree awarded, and semester and year program completed.

Financial Aid File

The Financial Aid File contains financial aid data on individual students. It includes records on fund description, aid source, award year, and the total amount of debt accumulated at the time of graduation. For transfer students, debt was cumulative reflecting amounts accrued from prior universities.

Variable Development and Data Merging

The records were sorted and merged by Social Security number. Table 1 reports the sample by academic year.

The analysis of the sample shows that 10,752 of 11,592 (93%) graduates of the university were matched with salary data on the unemployment insurance (UI) file. The 841 (7%) students not matched either found employment outside the state or worked in occupations that were not subject to unemployment taxes. Exempted employees include most students who work at educational institutions, self-employed individuals, and partners operating in legal partnership entities.

The 11,592 baccalaureate graduates were matched with financial aid data. Structurally, the financial aid file contains fewer years of data than the graduate file because the data set was originally designed to track a cohort from incoming freshmen (or transfer in) through graduation and into the workforce. Cumulative debt was recorded only as the cohort began graduating. For the three years that cohort graduations were recorded, 42 percent of the cohort was matched with financial aid data.

Table 1
Analysis of Sample Size of Graduates of a Southeastern University
Summer 1995 to Spring 2001

	Graduation Term and Date						Total
	Summer 1995- Spring 1996	Summer 1996- Spring 1997	Summer 1997- Spring 1998	Summer 1998- Spring 1999	Summer 1999- Spring 2000	Summer 2000- Spring 2001	
Number of bachelor's degree recipients	2,069	1,932	1,815	1,865	1,983	1,928	11,592
Graduates matched on unemployment insurance file	1,838	1,774	1,696	1,758	1,878	1,808	10,752
Graduates matched on financial aid file				659	875	901	2,435
Graduates matched on unemployment insurance file and financial aid file				635	860	877	2,372

Source: Office of Institutional Research, University of Memphis

Salaries for Popular Majors

To determine the amount of debt a student can reasonably support at graduation, it is necessary to analyze salary by major. Table 2 reports salaries for the 26 most popular majors by year. To avoid salary bias due to age, a subset of the baccalaureates graduating below the age of 25 (traditional-aged) was selected for analysis. Salaries were analyzed from the second quarter after graduation to the end of quarter 13 for a total of 12 quarters of analysis (three years). Majors were ranked by median salary in year one. Table 2 also shows majors ranked by median salary after three years.

For most majors, salary differences persist over time. Of the 10 majors with the highest median salaries in year one, eight remain in the top 10 after three years. Two majors—special education and human development and learning—dropped out of the top 10 and were replaced by finance and management. After three years, the top majors by median salary consist of engineering, business, and healthcare (nursing), exclusively. These findings are generally consistent with prior research in this area (Seeborg, 1975; Angle & Wissmann, 1981; Reed & Miller, 1970; Koch, 1972; McMahan & Wagner 1981).

It is interesting to note that during the three-year period, salaries for the three majors with the lowest salaries in year one (history, biology, and theatre or communication) increased by an average of 81 percent. After three years, the majors with the highest and lowest salaries were mechanical engineering (\$46,182) and political science (\$24,755), respectively.

Table 2
Rankings of Baccalaureate Salaries: A Three-Year Trend of Students Receiving
Bachelor's Degrees from a Southeastern University
Summer 1995 to Spring 2001

Major	Year 1 Salary			Year 2 Salary				Year 3 Salary				Salary Rank after Three Years
	N	Mean	Median	N	Mean	Median	Percent Change in Median from Year 1	N	Mean	Median	Percent Change in Median from Year 1	
Electrical Engineering	13	37,807	45,050	21	42,343	41,991	-6.8%	17	43,651	42,583	-5.5%	3
Mechanical Engineering	16	37,577	39,100	25	41,349	41,934	7.2%	16	43,987	46,182	18.1%	1
Management Information Systems	50	36,977	35,926	39	39,903	38,655	7.6%	24	41,045	42,873	19.3%	2
Civil Engineering	14	34,111	34,854	14	40,003	42,286	21.3%	16	39,340	37,719	8.2%	6
Nursing	79	33,699	33,346	63	36,616	36,065	8.2%	44	36,406	36,385	9.1%	8
Logistics/Marketing	13	39,393	31,404	18	44,522	34,807	10.8%	17	37,929	38,318	22.0%	5
Accounting	97	28,628	29,418	107	33,565	33,253	13.0%	75	35,906	37,206	26.5%	7
Special Education	10	26,825	28,214	12	30,370	31,595	12.0%	10	31,887	32,167	14.0%	14
Sales	24	29,354	27,461	28	34,725	32,977	20.1%	36	41,951	40,444	47.3%	4
Human Development and Learning	146	25,009	26,843	183	30,343	32,102	19.6%	133	32,462	33,310	24.1%	12
Management	28	28,354	26,809	35	30,817	29,377	9.6%	23	34,221	35,176	31.2%	10
Finance	67	27,251	26,565	78	32,318	31,338	18.0%	61	39,045	35,760	34.6%	9
Marketing Management	56	25,254	24,803	63	31,242	30,347	22.4%	47	34,040	34,845	40.5%	11
Art	21	23,642	23,727	28	29,382	26,869	13.2%	19	28,685	28,833	21.5%	19
Political Science	17	24,136	23,721	14	27,152	26,459	11.5%	16	27,202	24,755	4.4%	26
Consumer Science & Education	13	21,463	23,493	14	26,861	27,908	18.8%	16	28,497	27,861	18.6%	22
Journalism	45	21,522	23,260	40	28,002	26,945	15.8%	44	31,471	29,570	27.1%	17
English	44	19,852	22,182	49	26,818	27,645	24.6%	40	27,721	28,121	26.8%	21
Individual Studies	14	21,047	21,412	20	25,826	28,301	32.2%	13	29,276	28,211	31.8%	20
Sociology	15	19,463	20,069	21	24,980	26,218	30.6%	19	29,580	26,809	33.6%	24
Criminology and Criminal Justice	23	20,133	19,901	33	28,817	29,876	50.1%	21	31,030	30,628	53.9%	15
Physical Education	14	19,459	18,826	17	26,318	28,711	52.5%	19	26,286	26,616	41.4%	25
Psychology	68	17,290	18,020	71	22,817	23,139	28.4%	45	27,035	27,731	53.9%	23
History	20	17,816	17,850	17	24,887	25,579	43.3%	19	31,903	32,584	82.5%	13
Biology	36	17,199	16,600	45	25,356	24,490	47.5%	33	30,240	29,226	76.1%	18
Theatre or Communication	40	17,757	16,305	48	23,912	23,316	43.0%	30	30,930	29,923	83.5%	16

Source: Office of Institutional Research, University of Memphis

Generally, there is a healthy upward trend in salaries; majors with low starting salaries tend to show high-percentage increases.

While a visual analysis of Table 2 reveals that salaries differ significantly across major, a one-way ANOVA (unequal *n*) was used to compare mean earnings by major for three years following graduation to determine if measurable differences in salaries exist. The ANOVA is a liberal test comparing each major's salary to the salary of every other major. The ANOVA test reported in Table 3 reveals that significant differences in salaries continue to exist three years after graduation.

Table 3
ANOVA Results Showing Significance of Major in
Mean Salary Differences Across Traditional-Age
Baccalaureate Recipients, Summer 1995 to Spring 2001

	Salary Differences Across Majors		
	Year 1	Year 2	Year 3
<i>R</i> ²	0.301	0.200	0.130
<i>N</i>	983	1103	853
<i>F</i> Value*	16.50	10.78	4.96

**Salary differences significant at $\alpha = .05$ for all years tested.*
Source: Office of Institutional Research, University of Memphis

The *R*² value indicates the amount of variation in mean salary explained by major, while the *F*value is a measure of the significance of major in the single-factor ANOVA model.

While the ANOVA results are intuitive, they provide substantive evidence from recent salary data that salaries differ significantly across graduates of different undergraduate majors and that salary differences persist over at least a three-year period after graduation. Over time, academic major explains less of the salary difference. It is likely that salaries across majors tend to move toward parity although there is no evidence that measurable salary differences disappear.

Student Loan Debt

Most governments recognize the benefits of higher education to individuals and society and promote education through various state programs. Outside the United States, a number of countries provide free or highly-subsidized higher education to citizens, while other countries are also experimenting with student loans to expand educational opportunities to the general population. In the United States, federal and state governments provide direct subsidies to universities and students, tax-favored

educational savings plans (Section 529 plans), and educational loans to encourage participation in higher education.

Research suggests that a majority of students underestimate the total costs of their loans and overestimate their future income (King & Frishberg, 2001). Table 4 shows the debt

Table 4
Baccalaureate Debt for the 26 Most Popular Majors
for Students Graduating Summer 1999 to Spring 2001
from a Southeastern University

Major	N	Mean Debt at Graduation	Standard Deviation	Minimum Debt at Graduation	Median Debt at Graduation	Maximum Debt at Graduation
Special Education	24	21,301	2,226	2,668	20,184	43,515
Physical Education	7	20,406	5,248	5,280	20,085	46,419
Civil Engineering	25	16,330	1,898	2,434	18,784	42,034
Sociology	52	21,348	1,868	2,508	18,277	57,105
Individual Studies	73	18,681	1,319	1,392	17,911	51,074
Theatre or Communication	84	17,943	1,209	960	17,814	47,759
Human Development & Learning	389	18,027	514	450	17,486	51,332
Art	45	18,808	1,379	2,625	17,247	42,820
Political Science	37	19,471	2,120	1,375	16,800	47,725
Journalism	82	15,944	849	1,344	16,631	42,854
English	119	16,782	933	592	16,009	43,644
Nursing	143	16,515	849	2,000	15,790	47,985
Management	62	17,916	1,589	809	15,746	47,828
Psychology	137	15,451	763	375	15,694	40,984
History	57	17,513	1,547	2,640	14,918	42,476
Criminology and Criminal Justice	67	15,526	1,172	970	14,905	45,703
Biology	53	15,539	1,502	768	14,759	45,651
Electrical Engineering	18	15,993	2,320	1,439	14,703	36,516
Accounting	101	15,941	1,081	289	14,293	45,696
Management Information Systems	120	14,147	810	200	13,816	40,931
Finance	81	13,606	960	486	12,045	38,658
Marketing Management	75	13,803	1,072	1,680	12,005	43,541
Consumer Science and Education	30	15,678	1,967	1,480	11,888	40,251
Mechanical Engineering	27	14,542	1,822	504	11,749	38,840
Logistics/Marketing	10	12,890	2,822	3,214	11,147	29,364
Sales	14	10,861	1,883	2,016	9,097	25,705

Source: Office of Institutional Research, University of Memphis

levels of undergraduate students who graduated between summer 1998 and spring 2001 in the 26 most popular majors. It shows student loan means, standard deviations, minimums, and maximums by major. The table reveals large differences in borrowing across majors. Median debt for the most indebted major (special education) is more than twice as high as median debt for the least indebted major (sales). Given that tuition is the same for all students, it is remarkable that debt amounts vary significantly across major.

As an explanation for disparity in student loan amounts, some have suggested that student loan balances should be lower for majors with limited vocational relevance because of relatively low discounted expected lifetime income (Johnes, 1994). Our sample, however, shows that a number of majors with low vocational relevance rank very high on debt (e.g., sociology ranks third from the bottom on salary after three years but ranks fourth highest on cumulative debt). The paradox of low vocational relevance majors with high debt levels indicates that additional work is needed to explain debt levels of recent college graduates.

To gain insight into the determinants of student loan debt, student and debt records were matched with salary data across the years 1998 to 2001 resulting in 2,372 observations. Due to missing values, the regression sample was reduced to 2,369. Ordinary least squares regression was employed to determine the relationship between student variables and debt. The following equation describes the regression model,

$$\text{Debt} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{GPA} + \beta_3 \text{Terms} + \beta_4 \text{Major} + \beta_5 \text{Gender} + \beta_6 \text{Ethnicity} + \varepsilon$$

where *Age* is the age at graduation, *GPA* is the cumulative grade point average at graduation, *Terms* is the number of semesters attended before graduation, *Major* is one of 58 undergraduate majors at the undergraduate level, *Gender* is male or female, *Ethnicity* is one of six ethnic groups, and *Debt* is the cumulative undergraduate student loan debt outstanding at graduation based on financial aid records. Table 5 shows the results of the regression.

Age

According to the regression analysis, each year of age adds an average of \$312 to cumulative student loan debt. While a student cannot control age, embarking on a degree early in life tends to decrease debt. Anecdotal evidence indicates that younger students are more likely to depend on family support, reducing their reliance on student loan funding. Conversely, older students are likely to be more independent of parents and have a broader definition of necessities, creating greater needs for funds over time and leading to higher debt amounts.

Grade Point Average (GPA)

Each point of college GPA reduces debt by an average of \$4,402. Hence, a student with a 3.0 GPA would have (on average) \$4,402 less debt at graduation than a student with a 2.0 GPA, all else being equal. This leads to an interesting observation: academically successful students are also economically better off because they tend to have lower student loans at graduation. The reason for the inverse relationship between GPA and student loan debt is not studied in this paper. However, it is suggested that a high GPA is a prerequisite for many scholarships,

Table 5
Ordinary Least Squares Estimates of the Effects of Selected Explanatory Variables on Student Loan Debt for Graduates of a Southeastern University Summer 1998 to Spring 2001

Variable	Coefficient Estimate	F Value
Age	312.06*	92.79
Grade Point Average	-4,402.29*	72.66
Terms	418.02*	35.79
Major		1.68
Special Education	8,897.93 ^a	
Computer Engineering	29,926.54 ^a	
Sociology	8,795.42 ^a	
Art History	13,809.13 ^a	
Risk Management and Insurance	18,360.97 ^a	
Production Operations Management	—	
Gender		2.61
Female	-681.32	
Male	—	
Ethnicity		3.04
Asian	3,659.58	
African American	2,586.92 ^b	
Hispanic	6,957.68 ^b	
White	2,821.43 ^b	
American Indian	-6,586.13	
Foreign	—	
N	2,369	
R ²	0.14	
Mean Debt	16,683.28	

Source: Office of Institutional Research, University of Memphis
 "Production management," "male," and "foreign" are comparison variables.

* $p < .01$.

^a significantly different from production operations management ($p < 0.05$)

^b significantly different from foreign student ($p < 0.05$)

assistantships and other forms of aid that can significantly decrease the amount of loans required to complete a college degree.

Terms

For the average student, debt increases \$418 for each term (semester) of university study. The increase in debt over semesters is not surprising given that tuition and living expenses accrue over time. Aside from semester increases in debt, the median debt for students who take five or more years to finish their degree is 58 percent higher than students who finish in four years or less (\$16,526 for degrees completed in five or more years and \$10,440 for degrees completed in four or less years). Strategically, minimizing the time spent at the university through preparation and planning is a clear way to minimize student loan debt. Universities, likewise, may promote timely graduation by admitting qualified students, providing well-trained advisors, and developing an efficient curriculum. By implication, poor academic preparation will result in longer college careers and higher debt burdens—debt burdens that will likely cause lingering economic disadvantages after graduation.

Aside from semester increases in debt, the median debt for students who take five or more years to finish their degree is 58 percent higher than students who finish in four years or less.

Major

The regression analysis indicates that major is significant in determining the amount of debt incurred by undergraduate students. Production operations management is the comparison major (omitted variable) in the regression. Based on *t*-tests, special education, computer engineering, sociology, art history, and risk management and insurance all contributed significantly to higher debt levels of recent graduates at $\alpha=.05$ level (see Table 5). However, the reason for the high debt contribution is difficult to determine. Tuition for all students in the sample was the same except for nominal tuition increases instituted by the university during the study. Other direct costs of education—including fees, books, and supplies—may be unevenly distributed across majors, but these costs cannot explain the large differences in debt revealed in this study. Indirect costs of education, such as living expenses, transportation, and other personal expenditures may constitute a large portion of the differences across majors. It is possible that personal variables drive major selection and motivate indirect lifestyle expenditures, although more research is required to substantiate this assertion.

Gender

The data showed no significant difference in the borrowing behaviors of women versus men. This is in contrast to Johnes (1994) who found that United Kingdom (UK) women borrow significantly less than men. The gender differences in UK borrowing are explained by Johnes (1994) to be the result of lower

expected lifetime earnings attributed to interrupted careers, shorter working hours, career choices, and discrimination. In the current study, the gender coefficient of -681.32 for females (the male variable is omitted for the regression) is in the same direction as Johnes (1994) but was not significant at $\alpha=.05$. It is very conceivable that in some countries, cultural differences lead to differences in the borrowing practices of men and women, although this study did not find a significant difference.

Ethnicity

Ethnicity is found to be a significant predictor of student loan debt. Regression estimates show that Hispanic students have the highest ethnic debt coefficient, followed by Asian, White, African American, and Native American students, with foreign students being the comparison group (omitted variable). Of the ethnic groups, only Native American students have a negative debt coefficient, leading to lower overall student debt for this ethnic group. The significance of ethnic background in determining student loan debt points to ethnic differences in the availability of personal, family, employer, or scholarship and grant funds to finance education. Ethnic differences in debt may also depend on differences in the indirect costs of education, i.e., the amount spent for transportation and living expenses by different ethnic groups.

Income and Debt

Recently, the American Council on Education asserted that debt levels remain reasonable for most students who borrow (ACE, 2001). While data generally support the ACE (2001) assertion, student loan debt has shown a strong upward trend recently and is increasing the economic burden on graduates. It is important to determine which, if any, recent graduates are above lender-recommended debt levels and if the incomes earned after graduation can support the student loan burden. Table 6 analyzes the debt and excess debt burden by major for recent university graduates. Excess debt is the difference between debt at graduation and lender-recommended debt level (computed as the present value of an annuity). The following formula describes the computation of excess debt:

$$\text{Excess debt} = \text{Debt at graduation} - \sum_{k=1}^n \left(\frac{1}{1 + \frac{r}{m}} \right)^k a$$

where n is the number of payments (120), r is the nominal interest rate (7%), m is the number of compounding periods per year (12), k is the payment number (1-120), and a is the payment amount (8% of year 2 salary/12).

To minimize the effect of low first-year salaries in some majors, salaries from the second year of employment (see Table 2) are used to measure the ability of students to retire debts.

Most lenders allow a one-year deferment if requested. Thus, students may elect to defer payments until their second year of work. During a post-graduation deferment, interest continues to accrue and is capitalized to the loan balance when repay-

Table 6
Student Loan Debt and Debt in Excess of Lender-Recommended Levels
for Recent Graduates of a Southeastern University

Major	Student Loan Debt at Graduation			Excess Student Loan Debt at Graduation	
	Debt N	Median Debt Level	75 th Percentile Debt Level	Median Debt Level	75 th Percentile Debt Level*
Accounting	101	14,293	20,945	—	1,852
Art	45	17,247	25,230	—	6,137
Biology	53	14,759	21,694	—	2,601
Civil Engineering	25	18,784	21,197	—	2,104
Consumer Science and Education	30	11,888	24,641	—	5,548
Criminology and Criminal Justice	67	14,905	21,250	—	2,157
Electrical Engineering	18	14,703	22,340	—	3,247
English	119	16,009	21,594	—	2,501
Finance	81	12,045	18,643	—	—
History	57	14,918	25,456	—	6,363
Human Development and Learning	389	17,486	23,967	—	4,874
Individual Studies	73	17,911	25,160	—	6,067
Journalism	82	16,631	20,778	—	1,685
Logistics/Marketing	10	11,147	19,780	—	687
Management	62	15,746	22,630	—	3,537
Management Information Systems	120	13,816	18,474	—	—
Marketing Management	75	12,005	19,836	—	743
Mechanical Engineering	27	11,749	22,138	—	3,045
Nursing	143	15,790	22,766	—	3,673
Physical Education	7	20,085	25,305	992	6,212
Political Science	37	16,800	31,070	—	11,977
Psychology	137	15,694	21,069	—	1,976
Sales	14	9,097	15,686	—	—
Sociology	52	18,277	30,888	—	11,795
Special Education	24	20,184	29,246	1,091	10,153
Theatre or Communication	84	17,814	25,345	—	6,252

Source: Office of Institutional Research, University of Memphis

*Student loan debt minus the present value of a 10-year (120-month) annuity equals 8 percent of the median salary for the major, discounted at 7 percent.

ment resumes. In spite of the assumed deferment, interest has not been capitalized into the loan amounts shown in Table 6. The capitalization of interest would lead to larger excess debts than indicated in the table.

Excess debt amounts in Table 6 show that most of the recent baccalaureates whose debts are near the median are within maximum lender-recommended debt amounts. However, third quartile borrowers generally exceed lender-recommended borrowing levels. Among popular majors with the highest excess debt levels are political science, sociology, and special education. Borrowers in the upper quartile in these majors and others are likely to experience significant difficulties in student loan repayment after graduation and some will inevitably default, leading to possible wage and tax garnishments, denial of professional license, and credit damage.

Conclusion

The high debt level of recent postsecondary graduates is reason for concern. Clearly, salaries differ significantly across majors, leading to differences in the ability of graduates to repay their student loans. Most of the recent baccalaureates whose debt is near the median debt level are making student loan payments within 8 percent of gross salary as recommended by lenders. However, graduates in the upper debt quartile exceed lender-recommended debt levels by a significant margin in all but a few cases. Such high debt levels may impair graduates' post-college quality of life.

Student loans have been a windfall for the ideals of popular education. Student loans increase the number of students obtaining the benefits of college education while controlling the costs borne by taxpayers. However, students who do not control their student loan borrowing may find themselves financially disadvantaged after college, and bankruptcy laws make student loans difficult to discharge regardless of significant hardships. As college costs rise, many students have few alternatives to borrowing more to pay for education. Concerns over student loan repayment may cause future students to avoid intellectually rewarding majors with low vocational relevance.

It should be remembered that the data for this study represents one university. A broader sample, though difficult to obtain, would shed more light on the causes and effects of student debt.

This study points to a number of ways to control student loan debt. By far the most controllable factor influencing student loan debt is the number of semesters to graduation. Students who minimize their tenure at the university also tend to borrow less. Minimizing the number of semesters to earn a degree can be accomplished with academic preparation and planning. Students should be qualified to undertake an academic program before entering the university and should plan their academic schedules in advance to minimize delays in

graduation. Students who need additional preparation before undertaking a university degree program may wish to do so at a lower-cost institution (e.g., some two-year colleges) to avoid the higher costs of university study. This study also found that students with high university GPAs tend to accrue significantly less debt. Like timely graduation, a high GPA implies a high level of academic preparation and a consistent application of effort.

Differences in debt across majors and ethnic debt differences raise a number of questions that could not be answered in the current study: Why should one ethnic group, or students sharing a particular major, have significantly different student loan balances than other ethnic groups or university majors? Do limitations of family resources drive ethnic debt differences, or is borrowing driven by culture? Questions such as these remain to be answered in future studies.

References

- American Council on Education (2001). *ACE issue brief: Student borrowing in the 1990s*. Washington DC: Author. Retrieved March 30, 2004 from http://www.acenet.edu/resources/reports/student_borrow_90s.pdf
- Angle, J., & Wissmann, D. (1981). Gender, college major, and earnings. *Sociology of Education*, 54, 25-33.
- Baum, S. & O'Malley, M. (2003). *College on credit: How borrowers perceive their education debt*. Braintree, MA: Nellie Mae Corporation.
- Becker, G.S. (1975). *Human capital, a theoretical and empirical analysis with special reference to education* (2nd ed.). New York: National Bureau of Economic Research.
- Becker, G.S. & Chiswick, B. (1966). The economics of education: Education and the distribution of earnings. *American Economic Review*, 56(2), 358-369.
- Bilski, A. (1990, May/June). Student loans—what do they mean? *Credit World*, 78(5), 22-24.
- Brunner v. New York State Higher Education Services Corp., 831 F.2d 395 (2d Cir. 1987).
- Carnoy, M. & Marenbach, D. (1975). The return to schooling in the United States, 1939 to 1969. *Journal of Human Resources*, 10, 312-331.
- Cosgrove, J. & Prasso, S. (2001, October 8). Student defaults in terror's wake? *Business Week*, p. 12.
- Eckaus, R.S. (1973). *Estimating the returns to education: A disaggregated approach*. Berkeley: Carnegie Commission on Higher Education.
- Finnie, R. & Schwartz, S. (1996). *Student loans in Canada: An economic analysis of borrowing and repayment using the national graduate surveys* (W-96-3E). Quebec, Canada: Applied Research Branch.
- Freeman, R. (1975). Overinvestment in college training. *The Journal of Human Resources*, 10, 287-311.
- Groat, H., Chilson, D. & Neal, A. (1982). Sex stratification among three cohorts of recent university graduates. *Sociology and Social Research*, 66, 269-288.
- Jencks, C., Bartlett, S., Corcoran, M., Crouse, J., Eaglesfield, D., Jackson, G., et al. (1979). *Who gets ahead? The determinants of economic success in America*. New York: Basic Books.
- Johnes, G. (1994). The determinants of student loan take-up in the United Kingdom. *Applied Economics*, 26, 999-1006.

- King, T. & Frishberg, I. (2001). *Big loans bigger problems: A report on the sticker shock of student loans*. Washington D.C.: Public Interest Research Group, Retrieved March 31, 2004 from <http://www.pirg.org/highered/studentdebt/>
- Koch, J. (1972). Student choice of undergraduate major field of study and private internal rates of return. *Industrial and Labor Relations Review*, 26, 680-685.
- Leslie, L. & Brinkman P. (1986). Rates of return to higher education. In J.Smart (Ed.), *Higher Education: Handbook of Theory and Research: Vol. 2 (pp. 207-234)*. New York: Agathon.
- McMahon, W. & Wagner, A. (1981). Expected returns to investment in higher education. *Journal of Human Resources*, 16(2), 274-275.
- Pascarella, E.T. & Terenzini, P.T. (1991). *How college affects students*. Jossey-Bass: San Francisco.
- Reed, R., & Miller, H. (1970). Some determinants of the variation in earnings for college men. *Journal of Human Resources*, 5, 177-190.
- Seeborg, M. (1975). The effect of curricular choice on alumni income. *Journal of Behavioral Economics*, 7, 151-172.
- Smart, J.C. (1988). College influences on graduates' income levels. *Research in Higher Education*, 29, 41-59.
- Woo, J. (2002). Factors affecting the probability of default: Student loans in California. *Journal of Student Financial Aid*, 32(2), 5-23.