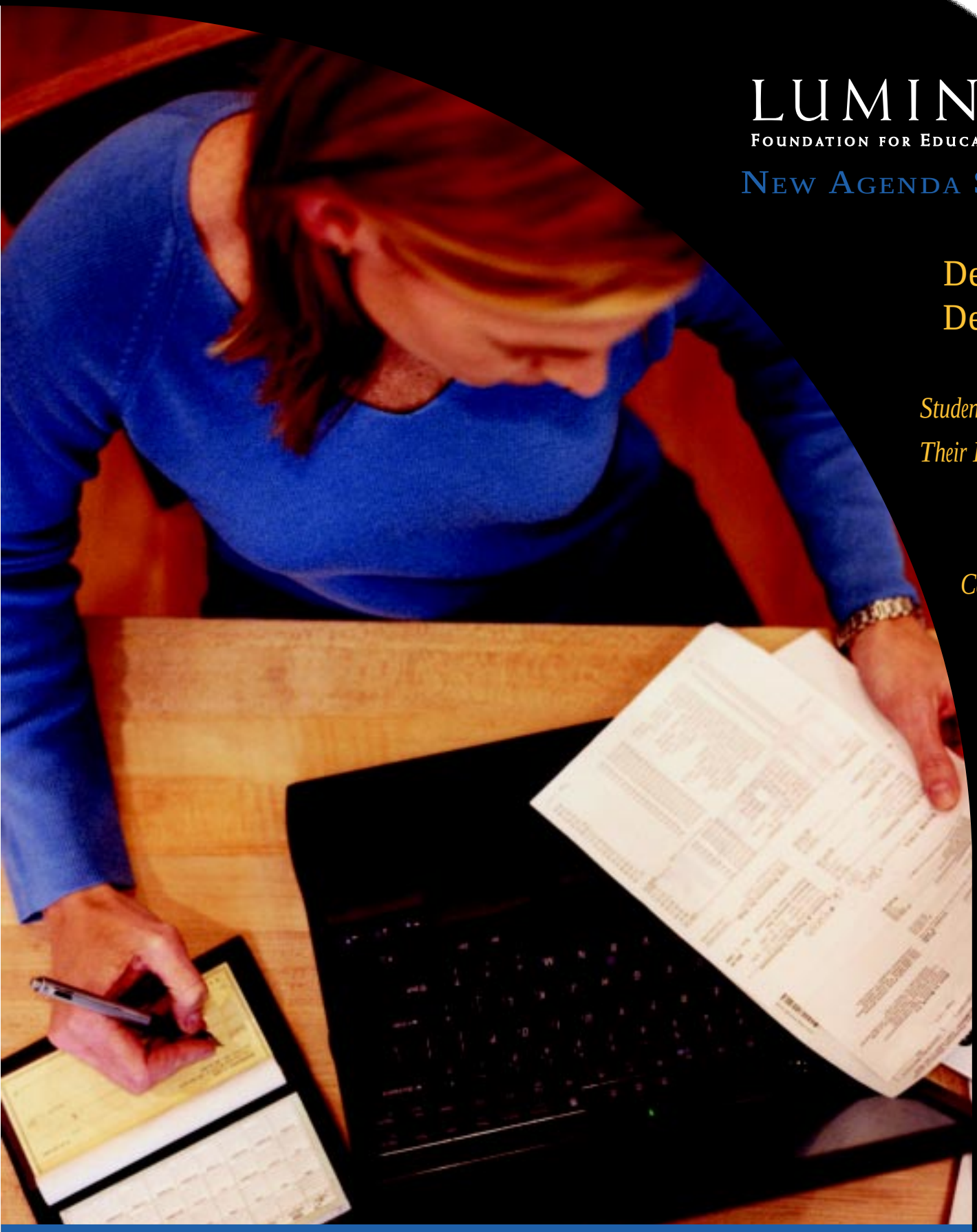

LUMINA FOUNDATION FOR EDUCATION

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Debts and Decisions:

Student Loans and Their Relationship to Graduate School and Career Choice

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Executive summary

Student loans have become an important source of student financial assistance in the United States, supplanting grants as the primary student funding mechanism. Over the last two decades the average annual amount borrowed by students has more than doubled, while the average grant aid per student has increased only 26 percent. Policymakers and other observers of higher education have raised concerns about the volume of loans taken out by students, and about the rising debt burden that results.

This report examines the relationship between the amount of loans students take out during their undergraduate years and the decisions they make regarding careers and enrollment in graduate school. It uses data from the Baccalaureate and Beyond survey of approximately 11,000 students who completed their baccalaureate education in the 1992-1993 academic year. This survey, conducted for the U.S. Department of Education, is a rich source of information on how students financed their undergraduate education and their career and graduate school status one and four years after graduation. The size of its sample allows the researcher to estimate the post-baccalaureate decisions and status of the more than 1 million students who attained a bachelor's degree that year.

The racial profile of the graduating class of 1993 did not mirror the enrollment of all students in four-year colleges and universities that year. While African-Americans, Hispanics and Native Americans represented 18 percent of all undergraduates in these institutions, they made up only 12 percent of the graduating class. The most popular major of students of all races in the class was business and management, with almost one-quarter of the graduates majoring in this field. The social and behavioral sciences (15 percent) and education (13 percent) were the next most popular fields.

The racial profile of the graduating class of 1993 did not mirror the enrollment of all students.

Fifty percent of all graduates borrowed to finance their undergraduate education, with the average loan balance upon graduation being approximately $10,100. African-American, Hispanic and Native American students were more likely to have borrowed as undergraduates, as were students from lower-income families and students who were independent of their parents or guardians. Students who had attended proprietary (for-profit) schools were

most likely to borrow, and students who had attended private nonprofit institutions were more likely to have borrowed than were students who had attended public institutions. While the tuition price of the institution did not influence *whether* students borrowed for college, it was related to *how much* students borrowed, with the amount borrowed increasing as the school's tuition level increased. For those who did not enroll in graduate school, the average individual had 80 percent of her loan balance outstanding approximately one year after graduation. Three years later, only 38 percent of the loan balance was outstanding.

Thirty percent of the class of 1993 had enrolled in graduate school at some point by the time the 1997 follow-up survey was conducted. Most had attended while continuing to work at least part-time outside of university employment. Students who had majored in science or mathematics as undergraduates were the group most likely to have enrolled in graduate school. Borrowing for graduate school tended to greatly increase the student loan balances. By four years after graduation, the average loan balance for individuals who had borrowed at both levels increased to almost $25,000, with the average balances increasing to as high as $57,000 for those students enrolled in a first professional degree.

Using annual salary as the basis, most groups had student loan repayment ratios that exceeded the 8 percent benchmark.

Bank lending guidelines frequently recommend that student loan borrowers limit their payments to no more than 8 percent of their monthly income. The loan-repayment experiences of the graduates were examined and compared with this benchmark. Two measures of income were used in this analysis: annual salary from the primary job, and total household income. Using annual salary as the basis, most groups had student loan repayment ratios that exceeded the 8 percent benchmark in 1994, one year after graduation. By three years later, however, the average loan burden ratio had dropped below the benchmark for almost all groups. Using total household income (which includes the income of others living in the household, as well as unearned income) as the basis, most groups had repayment burden ratios that were below the 8 percent threshold in both survey years.

Research has identified a wide range of factors that influence a student's decision to enroll in graduate school. To disentangle the effects of each of these determinants, a multivariate analysis was conducted that examined their joint effect on graduate school enrollment. The study finds that students' undergraduate academic characteristics, including their overall degree expectations, major and grade point average, were most influential in predicting whether an individual would enroll in graduate school. Undergraduate borrowing, while a predictor of graduate school enrollment (with higher levels of borrowing related to a decreased likelihood of enrolling), had little impact compared to these other factors.

This report is limited in that it examines a cohort of graduates who were undergraduates before the large increase in loan limits authorized under the 1992 amendments to the Higher Education Act. Undergraduate borrowing has continued to grow since these changes. Whether this increased borrowing is affecting decisions regarding graduate school enrollment is a topic that bears further examination.

Introduction

Student loans have become an important source of student financial assistance in the United States. Twenty years ago, approximately 41 percent of all student aid dollars came in the form of loans, with 55 percent provided as grants (College Board, 2000).[1] By the 1999-2000 school year, loans accounted for 59 percent of the more than $64 billion in student aid awarded, and grants represented 40 percent. This shift from grants toward loans in financial aid packages has significantly increased the average amount of loan aid awarded per student. Data from the College Board indicate that the average annual loan aid per equivalent full-time student (measured in constant 1999 dollars) rose from $1,540 in 1980 to $3,772 in 1999, an increase of 145 percent. The average grant aid per student increased only 26 percent during the same period.

Policy-makers and other observers of higher education have raised concerns about the volume of loans taken out by students, along with the resulting debt burden. A number of reports have examined how student loan volume has grown in recent years.[2] Scholars have examined the effect of loans and other forms of financial aid on students' decisions on whether to enroll in college and what type of institution to attend.[3] There has been little research, however, on the relationship between undergraduate student loan debt and students' career and graduate school decisions. This report attempts to fill that void.

Following this introduction, the report begins with a description of the data sources and methodology used for the analyses in this study, along with a brief statistical portrait of the graduating class of 1993. The third section provides a descriptive analysis of the level of loans graduating students held as they completed their baccalaureate education. This analysis will compare students with different characteristics, as well as students attending different types of institutions. Section IV examines students' post-baccalaureate career and graduate school choices.

The following section examines how loan volume varies for students choosing different post-college paths, including a comparison of those who chose to enter the work force with those who continued their education in graduate school. Section VI looks at student loan repayment patterns, relating those to benchmarks used in the banking industry to determine reasonable loan burden limits.

Section VII provides a multivariate analysis that examines how a number of factors, including the volume of student loans, jointly influence individuals' decisions regarding graduate school. The final section provides some concluding thoughts.

I. Data sources, research methodology and a portrait of the Class of 1993

Data sources and research methodology

The data used in this study are from a survey of graduating college students. The survey was conducted for the National Center for Education Statistics (NCES), a unit of the U.S. Department of Education that collects data and conducts research on all levels of education. The survey data used in this study are from the Baccalaureate and Beyond Longitudinal Study (B&B). This study tracked approximately 11,000 students who graduated with bachelor's degrees in the 1992-1993 academic year. The students were surveyed in their final year of college, one year after graduation (1994), and four years after graduation (1997).[4] Information about academic experiences in college, along with financial aid and other related data, were collected from each student in the survey, as was information about their background characteristics, pre-college experiences, etc. In each of the follow-up surveys, students were asked about their employment experiences, graduate school enrollment, and other questions about their standard of living.

The B&B survey is a nationally representative sample of the approximately 1.2 million graduating baccalaureate students in the 1992-1993 school year.[5] The survey used a stratified sampling scheme to represent the types of institutions students graduated from that year as well as the distribution of student majors. Sample weights are provided in the survey which allow the researcher to estimate the value of the variables for the national population using the 11,000 students in the B&B sample. The analyses conducted in this study used a subset of the B&B survey that includes the 9,274 students who responded to both follow-up surveys.

The data provided in this study were calculated using the B&B restricted-use data files provided by NCES (National Center for Education Statistics, 1996, 2000a). The sample weights and cluster and stratification schema were used in the calculation of standard errors for the estimates.[6] Cases where the number of observations in the sample was too small to produce reliable estimates are indicated with a dash in the relevant cell of the table.

Portrait of the Class of 1993

Before delving into the student loan experiences of the graduating class of 1993, I present here a brief description of that class. Of the approximately 1.2 million students who attained bachelor's degrees that year, 55 percent were

Table 1: Gender and racial profile of the Class of 1993

Racial Group	Racial Group Gender Distribution		Racial Group as Percentage of Total:	
	Male	Female	Graduates	Undergraduates in 4-year Institutions*
Native American	–	–	0.6%	0.7%
Asian-American/Pacific Islander	54.2%	45.8%	4.6%	4.8%
African-American	33.3%	66.7%	6.1%	10.0%
Hispanic	40.1%	59.9%	5.0%	7.0%
White	46.2%	53.8%	83.7%	77.5%
Total – All Races	45.4%	54.6%	100.0%	100.0%

*Source: Quantum Research Corporation (2000)

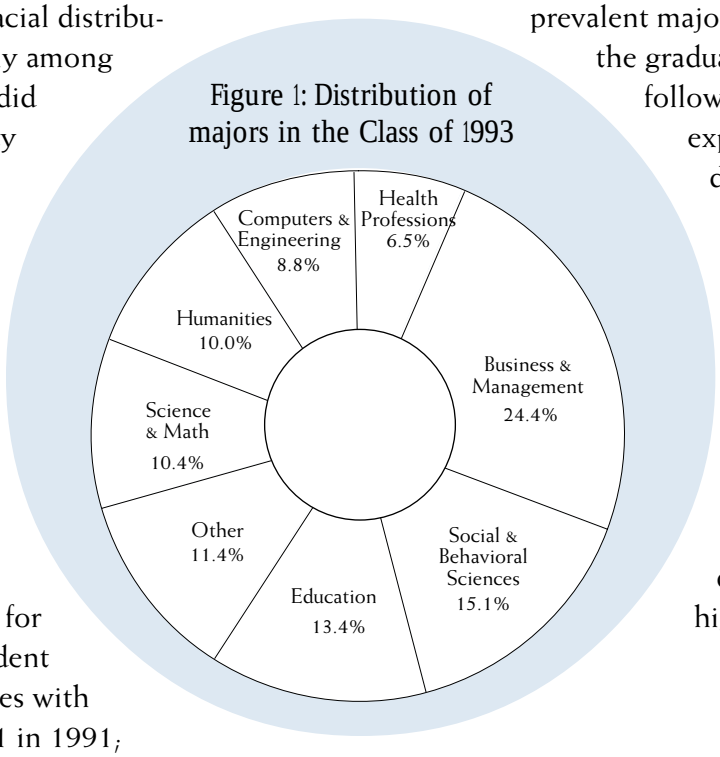
female, mirroring the percentage of undergraduates enrolled in colleges and universities in the nation that year (NCES, 2000b Table 190). Table 1 shows the gender and racial distribution of the graduates. Only among Asian-American students did men represent the majority of graduates. Whites represented a disproportionately large share of the graduates relative to the enrollment of undergraduates in these institutions.

Fifty-nine percent of the graduates were dependent students while still in college, reliant on their parents or guardians for financial support.[7] Dependent students came from families with a mean income of $65,621 in 1991; independent students themselves had a mean income of $23,012. As a point of reference, the mean family income nationally in 1991 for families with two or more children under the age of 18 was $40,500 (United States Bureau of the Census, 2000b). Thus, the graduating college students in 1991 (at least those who were still dependents of their parents) came from families with incomes substantially higher than the national average.

Public institutions produced 67 percent of the graduates, while private nonprofit colleges and universities graduated 32 percent of the total (the remainder graduated from private, for-profit institutions). Fifty-six percent of the students graduated from doctoral-granting institutions. The average tuition price paid by all students in the 1992-1993 academic year was $4,403, and the total cost of attendance (including tuition, room and board or off-campus living expenses, books, commuting, child care to attend classes, etc.) was $11,400.

Figure 1 shows the distribution of majors among the graduates. Degrees in business and management accounted for almost a quarter of all the bachelor's degrees granted in 1993. Social sciences and education were the next most prevalent majors. Only 16 percent of the graduates reported in the 1994 follow-up interviews that they expected a bachelor's degree to be the highest degree they earned in their lifetime. Sixty percent expected a master's to be their highest degree, 6 percent expected to earn a first professional degree, and 18 percent expected a doctorate to be their highest degree attained.[8]

Figure 1: Distribution of majors in the Class of 1993



II. Loan levels and repayment patterns of graduating students in 1993

Loan levels

Half of all graduating seniors in 1993 borrowed to pay for their education. The percentage who borrowed varied across a number of student and institutional characteristics, however. Table 2 on the next page summarizes the borrowing rates for students with differing characteristics, along with the mean amount borrowed for those who did borrow to finance their undergraduate education. The amounts shown represent borrowing from all sources and constitute the sum of all the borrowing during their undergraduate years. The typical student who borrowed incurred an average debt of more than $10,100. This average is influenced

Table 2: Borrowing profile of the Class of 1993 — student background characteristics

Category/Group	Percentage Who Borrowed	Mean Amount Borrowed for Students Who Borrowed
All students	50%	$10,142
Gender		
Male	50	10,385
Female	49	9,938
Race	***	†††
Native American	65	10,665
Asian-American	43	11,614
African-American	64	9,218
Hispanic	60	7,789
White	48	10,325
Dependency	***	
Dependent	43	10,622
Independent	59	9,650
Income quintiles – dependent students	***	†
Lower income	69	10,271
Lower-middle income	52	9,272
Middle income	35	10,555
Upper-middle income	35	12,065
Upper income	23	12,754
Income quintiles – independent students	***	††
Lower income	68	11,320
Lower-middle income	69	9,501
Middle income	61	9,475
Upper-middle income	56	8,908
Upper income	42	8,469

Pearson Chi^2 test of group differences for % who borrowed: * = p≤.05, ** = p≤.01, *** = p≤.001
Wald test of diffrences within category for mean amount borrowed: † = p≤.05, †† = p≤.01, ††† = p≤.001

somewhat by a number of students with large debt amounts. Approximately 5,000 graduates nationally incurred borrowing of $50,000 or more from all sources (including friends, family, institutional loan programs and private loan programs) for their undergraduate education. The largest reported undergraduate amount borrowed was $120,000.

Native American, African-American and Hispanic students were all more likely to borrow to finance their undergraduate education than were white and Asian-American students.[9] For African-Americans and Hispanics, however, the average amount borrowed was lower than for the other racial groups. While independent students were more likely to have borrowed than were dependent students, there was no statistically significant difference between the average amount borrowed by the two groups.

To examine the borrowing patterns of students from different income groups, dependent students were divided into quintiles based on their parents' income. Independent students were similarly divided into quintiles based on their own income (and that of the spouse, if any).[10] For dependent students, the percentage of students who borrowed decreased as one moves up the income scale. While more than two-thirds of lower-income students borrowed during their under-

graduate years, less than one-quarter of upper-income students did. Higher-income students who did borrow tended to borrow more for college, however.

Among independent students, a similar relationship was revealed by examining the percentage who borrowed. Poorer independent students borrowed more for college than did those with higher incomes. The average amount borrowed showed the reverse pattern, however, from the dependent students. Not only were the poorer independent students more likely to borrow, but they also borrowed more money on average than did higher-income independent students.

Table 3 presents similar information based on the characteristics of the institutions the students attended, along with the students' academic attributes. Students in private institutions were more likely to borrow than those attending public institutions, with those in proprietary schools having the highest borrowing rate. The average

Table 3: Borrowing profile of the Class of 1993 – institutional and student academic characteristics

Category/Group	Percentage Who Borrowed	Mean Amount Borrowed for Students Who Borrowed
Institution Type	**	†††
Public, non-doctoral granting	49%	$ 7,959
Public, doctoral granting	45	9,032
Private, non-doctoral granting	57	11,932
Private, doctoral granting	50	14,166
Private, for-profit	68	12,722
Tuition Quintile[1]		†††
Lowest tuition	46	8,030
Low-middle tuition	48	8,644
Middle tuition	50	8,886
Upper-middle tuition	52	9,863
Highest tuition	52	14,802
Highest Degree Expectation of Student	**	
Bachelor's	45	9,954
Master's	50	9,905
First professional	48	11,119
Doctorate	53	10,600
Major	*	†††
Humanities	48	9,682
Social & behavioral sciences	47	9,526
Science & math	50	9,855
Computers & engineering	56	10,084
Education	53	9,900
Business & management	46	10,442
Health professions	55	12,220
Other	50	9,892

Pearson Chi^2 test of group differences for % who borrowed: * = p≤.05, ** = p≤.01, *** = p≤.001
Wald test of diffrences within category for mean amount borrowed: † = p≤.05, †† = p≤.01, ††† = p≤.001
[1]The percentage of students who borrowed and mean amounts were similar when the total cost of attendance quintile was substituted for the tuition quintile.

amounts borrowed were also higher in private institutions. Within each sector (public vs. private), students in doctoral-granting institutions were less likely to borrow, but had higher loan amounts.

Interestingly enough, the tuition that the student paid in the last year as an undergraduate appears to have only a very small relationship with the decision to borrow to finance undergraduate education. Students in the most expensive institutions borrowed for college at a rate only six percentage points greater than those in the least expensive institutions, but the differences among the borrowing rates of the five groups were not statistically significant.[11] There were differences in the average amount borrowed, however, with students attending more expensive institutions having higher total loan amounts.

Students who hoped to earn a professional or doctoral degree had higher average loan levels.

Small differences were evident in the borrowing rates and amounts borrowed for students with different postsecondary degree expectations. Students who expected to attain an advanced degree after completion of their bachelor's degree were more likely to borrow during their undergraduate years. Students who ultimately hoped to earn a first professional or doctoral degree also had higher average loan levels (though the differences among the groups were not statistically different from zero).

There were also differences in the borrowing rates of students who chose different undergraduate majors. Students majoring in computers and engineering, health professions and education had the highest borrowing rates; students in business and management and the social and behavioral sciences were least likely to borrow. Students in the health professions had the highest average amount borrowed during their undergraduate years, followed by students in business and management programs. Students in the social and behavioral sciences had the lowest average loan levels.

Student loan repayment patterns

Understanding the loan level of graduating students is not enough to get a picture of how student loan debt may affect their post-graduate lives. The student loan level can affect a student's ability to obtain other types of loans, such as home mortgages and car loans. Higher loan levels may also influence students to take jobs with higher pay rather than jobs that fit their other interests or needs. Thus, it is also important to examine the rates at which students repay the student loans from their undergraduate years.

Table 4 shows the loan-repayment rates for students who did not attend a graduate degree program after attaining their baccalaureate degree. For these students, the average debt level at graduation was $10,111. The average loan balance in the first follow-up survey was $7,340, dropping to $4,640 by the second survey three years later. The average student had 80 percent of her loans still outstanding one year after graduation, and 38 percent four years after graduation.[12]

The timing of the follow-up surveys is important to note, as students were asked their outstanding loan balances at the time the survey was completed. The graduates were surveyed via telephone; for the first follow-up, surveys began June 15, 1994, and continued for 16 weeks. More than 90 percent of the interviews were completed by the 11th week. Because most of the federal loan programs give students a six-month deferral period after graduation, most students had been repaying their loans for less than one year at the time they completed the first follow-up survey. For the second follow-up, interviewing began April 8, 1997, and also continued for 16 weeks. Once again, more than 90 percent of the interviews were completed by the 11th week. For more informa-

Table 4: Loan-repayment rates for students not enrolling in graduate school

Category/Group	Amount Borrowed	Loan Balance 1994	Loan Balance 1997	Percentage of Loan Outstanding 1994	Percentage of Loan Outstanding 1997
All students	$10,111	$7,340	$4,640	80%	38%
Race					†
Native American	–	–	–	–	–
Asian-American	12,341	7,434	5,149	69	33
African-American	9,440	6,903	5,706	76	49
Hispanic	7,978	6,323	4,173	82	37
White	10,247	7,443	4,525	80	37
Dependency Status (1992-1993)					
Dependent	10,650	7,282	4,496	81	37
Independent	9,608	7,395	4,775	78	40
Income quintiles – dependent students		†††	†††	††	†††
Lower income	10,390	8,635	5,517	90	46
Lower-middle income	9,639	7,030	3,912	90	33
Middle income	10,176	6,595	4,357	73	37
Upper-middle income	10,953	6,118	3,905	68	31
Upper income	14,523	6,243	3,801	64	25
Income quintiles – independent students	††	†††	†††	†††	†††
Lower income	11,543	9,416	6,241	89	47
Lower-middle income	9,443	8,073	5,117	90	43
Middle income	9,859	7,044	4,732	70	40
Upper-middle income	8,795	6,307	3,952	73	37
Upper income	7,840	5,392	3,300	64	28

– Sample too small for reliable estimate.
Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

tion on the follow-up survey timing and procedures, see Green, et al. (1996, 1999).

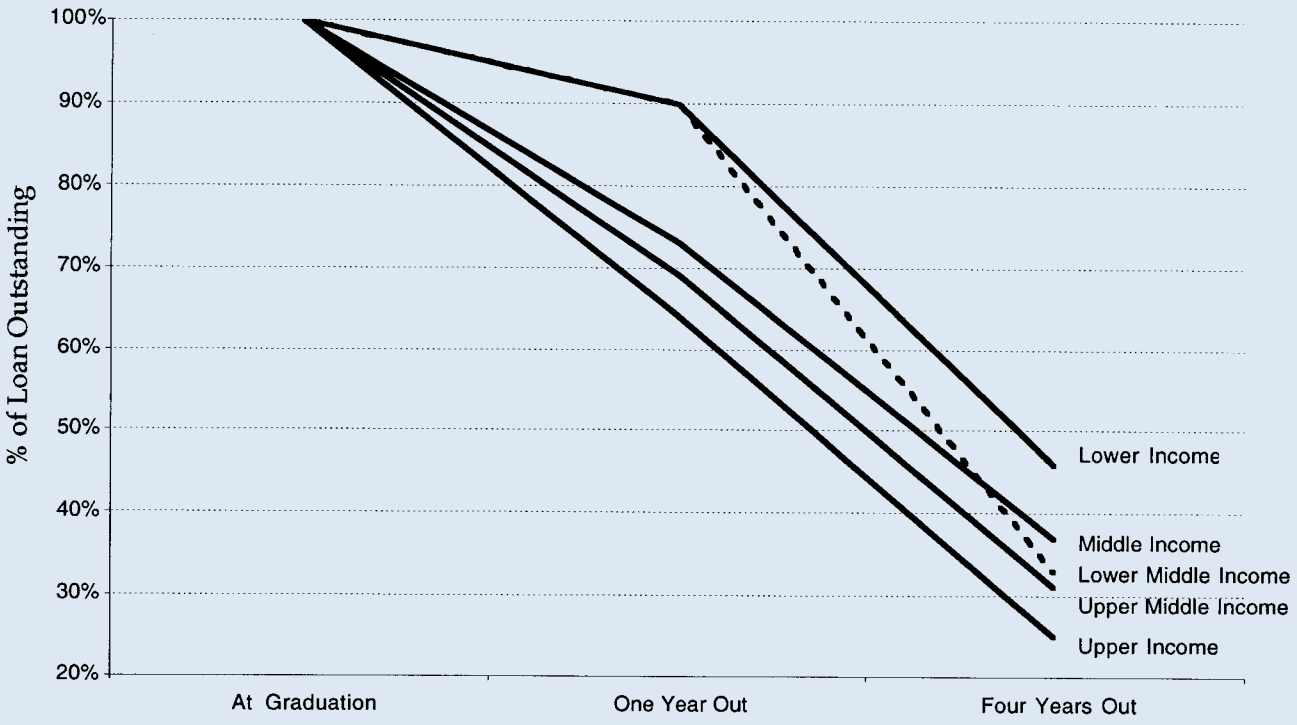
It is important to consider the type of loans the student took out while an undergraduate. For example, federal subsidized Stafford loans have a grace period of six months following graduation before the first payment is due. Thus, students who graduated in the spring of 1993 may have been in repayment for less than six months before they were interviewed in the follow-up survey.

An interesting finding in this analysis is the loan-repayment patterns of dependent students from different income groups. Note that the differences in the amounts borrowed across the five groups are not statistically different from zero, yet the differences in the loan balances in 1994 and 1997 are different. This finding indicates that, while dependent students from different income groups had similar loan balances upon graduation, their repayment patterns were different. The differences in these patterns can be seen in Figure 2 on the next page. Lower- and lower-middle-income students still had 90 percent of their loan balances outstanding at the first follow-up survey, while the other three groups had reduced their balances to a range of 64 percent to 73 percent of the original balances. By four years after graduation, the poorest students

had repaid a little over half of their loan balances, while the other groups had repaid from approximately two-thirds to three-quarters of the original loan balances. One possible reason for these differences, as best as can be ascertained from the data in the Baccalaureate and Beyond survey, is that graduates from lower-income families were more likely to have had some of their loan repayments deferred (for other than graduate school attendance) than were graduates from the wealthier groups.

For students who did not borrow during graduate school, average student loan debt upon graduation from the baccalaureate program was $9,171. This compares with a loan balance of $10,111 for students who did not enroll in a graduate program (Table 4), though the difference between the two groups is not statistically significant. These students had about three-quarters of their undergraduate loan balance outstanding in 1994, and about one-third in 1997 — a repayment rate similar to that of students not

Figure 2: Outstanding loan balance for dependent students, by income group



Approximately 30 percent of the 1993 graduates enrolled in a graduate degree program at some point by the time of the 1997 follow-up survey. Fifty-one percent of these students borrowed to finance their graduate studies (approximately the same percentage as borrowed during their undergraduate years). Table 5 shows the loan-repayment patterns of students who enrolled in a graduate degree program by the time of the 1997 survey.

attending graduate school. From these data, it appears that attending graduate school did not have a major impact on the rate at which students repaid their undergraduate loans (at least for those not borrowing in graduate school), even though attending graduate school allows students to defer payments on loans obtained through most of the federal student loan programs.

A student who borrowed in graduate school but not as an undergraduate (Panel II of Table 5)

Table 5: Loan-repayment rates for students enrolling in graduate school

Category/Group	Undergraduate Borrowing	Total Graduate Borrowing		Percentage of Total Loans Outstanding[1]	
		As of 1994	As of 1997	1994	1997
I. Students Borrowing as Undergraduates Only					
All students	$9,171	$0	$0	77%	35%
Highest Degree Enrollment					
Master's	9,192	0	0	78	34
1st Professional	–	–	–	–	–
Doctorate	9,261	0	0	65	40
Highest Degree Earned					
Master's	10,052	0	0	76	36
1st Professional	–	–	–	–	–
Doctorate	–	–	–	–	–
II. Students Borrowing in Graduate School Only					
All students	$0	$10,076	$25,281	See note in text	82%
Highest Degree Enrollment		†††	†††		†
Master's	0	6,661	14,120		77
1st Professional	0	17,444	48,861		88
Doctorate	0	9,046	29,360		88
Highest Degree Earned		†††	†††		†
Master's	0	6,765	16,645		79
1st Professional	0	21,872	53,670		88
Doctorate	–	–	–		–
III. Students Borrowing at Both Levels					
All students	$10,606	$10,104	$24,663	67%	64%
Highest Degree Enrollment		†††	†††	†††	
Master's	10,415	7,424	14,485	69	60
1st Professional	11,817	18,561	56,894	55	74
Doctorate	9,653	11,208	33,342	70	68
Highest Degree Earned		†††	†††	†††	
Master's	10,713	7,749	16,925	65	61
1st Professional	12,744	22,409	61,614	40	75
Doctorate	–	–	–	–	–

[1]Undergraduate and graduate loans combined.
– Sample too small for reliable estimate.
Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

borrowed an average of $10,076 as of 1994. For these students, it is safe to assume that virtually all of their loans were still outstanding at the time of the 1994 survey. By 1997, their borrowing had increased to an average of more than $25,000, and 82 percent of their loan amount was still outstanding. The portion of the loans outstanding for this group is much higher than for students who did not borrow for graduate school. This is not surprising since these students had fewer years in which they were repaying their loans than did students who borrowed during their undergraduate years. In addition, the annual loan limits in the federal loan programs are higher for students in graduate school than for undergraduates.

Students in first professional and doctoral programs incurred the largest debt level and had repaid the least by 1997.

Students enrolled in first professional and doctoral programs incurred the largest debt level and had repaid the least by 1997. The same pattern is true for students who had attained a first professional degree by 1997: They had much higher borrowing and lower loan-repayment rates than students in master's programs. (There were not enough students who had completed a doctoral degree by 1997 to prepare a reliable estimate of their loan balances and repayment patterns.)

Students who borrowed to finance both undergraduate and graduate degrees (Panel III of Table 5) incurred graduate debt that was similar on average to the levels incurred by students with no undergraduate borrowing. Differences are observable, however, when you examine the type of program in which the student was enrolled. Students in first professional and doctoral programs were likely to incur additional graduate debt if they had borrowed as undergraduates.

III. Post-baccalaureate job and graduate school choices

Graduate school enrollment and labor force participation

In this section, I examine the choices graduating students made with respect to their jobs and post-baccalaureate education. The Baccalaureate and Beyond survey provides the opportunity to examine these choices at two points in time: approximately one year after graduation, and four years after completing the baccalaureate degree.

To examine first the choice between graduate school and entering the labor force, the graduating seniors were divided into four categories:

- Those who were enrolled in graduate school and not working (outside of school-related employment).
- Those who were both enrolled and working.
- Those who were working and not enrolled in school.
- Those who were neither enrolled in school nor working.

"Graduate school" as used here indicates a graduate degree program. Individuals who were enrolled in post-baccalaureate certificate or licensure programs that did not lead to a graduate degree are counted as not enrolled in graduate school. Approximately 30 percent of all 1992-1993 baccalaureate completers enrolled in a graduate degree program at some point by the time of the 1997 follow-up survey.

Table 6 shows the graduate school enrollment and work status in April 1994 for respondents with different characteristics. One year after graduation, approximately 76 percent of the students entered the work force and were not attending graduate school. Eighteen percent of the students were enrolled in graduate school, including 7 percent who attended school and were not working, and 11 percent who were both in school and in the

Table 6: Graduate school and work status in April 1994

Category/Group	% of Category Total	Percentage of Group: School Only	School and Work	Work Only	No School or Work
All Students	100%	7%	11%	76%	6%
Gender**					
Male	45	8	11	76	6
Female	55	6	12	75	7
Race***					
Native American	–	–	–	–	–
Asian-American	5	10	9	73	8
African-American	6	5	12	72	11
Hispanic	5	6	14	69	11
White	84	7	11	77	6
Dependency as Undergraduate***					
Dependent Students	59	8	12	74	5
Independent Students	41	4	10	78	8
Undergraduate Major***					
Humanities	10	7	13	71	8
Social & behavioral sciences	15	9	13	72	7
Science & math	10	16	16	59	9
Computers & engineering	9	7	11	76	6
Education	13	6	14	76	5
Business & management	25	3	8	85	5
Health professions	7	6	12	76	6
Other	11	5	8	81	6

– Sample too small for reliable estimate.
Totals may not sum to 100 percent due to rounding.
Pearson Chi^2 test of group differences for row categories: * = p≤.05, ** = p≤.01, *** = p≤.001

labor force. Six percent of the students were neither in school nor employed.

The racial and gender distributions of students attending graduate school were very close to the averages for all students. From 17 percent to 20 percent of each racial and gender group were enrolled in graduate school (either solely or in combination with working) in April 1994. Asian-Americans, who represented 5 percent of all graduating seniors nationally, were most likely to be enrolled in graduate school without working, while African-Americans and Hispanics were most likely to be neither working nor in graduate school at that point. Students who were dependents of their parents during their undergraduate years were more likely to be enrolled in graduate school in April of 1994 than were students who were independent.

Students who majored in sciences or mathematics were most likely to be enrolled in graduate school, with almost one-third of the students enrolled (and evenly divided between those working and not). Social and behavioral science majors were the second most likely group to be enrolled in graduate school, with 22 percent enrolled. Business students were least likely to be enrolled in graduate school approximately one year after completing their baccalaureate degrees.

Table 7 provides the same information for students at the point of the second follow-up survey in 1997. The overall patterns of enrollment and labor force participation are similar to those of the earlier survey. Approximately 18 percent of the students were enrolled in graduate school, the same proportion as in the earlier survey.[13] In this survey, however, students who were enrolled in graduate school were more likely to be working in addition (while the difference from 1994 was small, it was statistically significant). Asian-Americans were still more likely to be enrolled in school without working than were students from the other groups.

As in the earlier survey, students who had majored in science or mathematics were most likely to be enrolled in graduate school in April 1997. Almost one-third of these graduates were enrolled in post-baccalaureate education four years later.

Not shown in Tables 6 and 7 are the proportions of students who were enrolled in graduate school in both surveys. Nine percent of Asian-Americans were enrolled in graduate school (either solely or in combination with work) in both years, compared with 4 percent of African-Americans, 7 percent of Hispanics and 5 percent of whites. Among both men and women, approximately 5

Table 7: Graduate school and work status in April 1997

Category/Group	% of Category Total	Percentage of Group: School Only	School and Work	Work Only	No School or Work
All Students	100%	5%	13%	76%	6%
Gender**					
Male	45	5	12	79	4
Female	55	4	14	74	8
Race***					
Native American	–	–	–	–	–
Asian-American	4	10	12	70	8
African-American	6	5	11	78	5
Hispanic	5	6	15	71	9
White	84	4	13	77	6
Dependency as Undergraduate***					
Dependent Students	59	7	13	75	5
Independent Students	41	2	13	78	7
Undergraduate Major***					
Humanities	10	5	15	72	8
Social & behavioral sciences	15	7	16	70	7
Science & math	10	15	16	62	7
Computers & engineering	9	3	13	82	2
Education	13	2	20	71	7
Business & management	25	2	8	85	5
Health professions	7	3	10	79	7
Other	11	3	9	82	6

– Sample too small for reliable estimate.
Totals may not sum to 100 percent due to rounding.
Pearson Chi^2 test of group differences for row categories: * = $p \leq .05$, ** = $p \leq .01$, *** = $p \leq .001$

Table 8: Occupational choice of employed participants in April 1994

Category/Group	% in labor force	Percentage of Category: Professional	Other White Collar	Blue Collar	Clerical	Technical	Other
All Students	87%	35%	28%	10%	19%	3%	5%
Gender***							
Male	87	29	34	14	14	3	6
Female	87	39	23	7	23	3	5
Race***							
Native American	–	–	–	–	–	–	–
Asian-American	82	31	35	5	22	4	2
African-American	84	28	25	9	32	4	3
Hispanic	83	40	25	8	22	2	3
White	88	35	28	11	17	3	6
Dependency as Undergraduate***							
Dependent Students	86	31	29	11	21	3	6
Independent Students	87	40	27	10	16	3	4
Undergraduate Major***							
Humanities	84	25	24	13	21	2	17
Social & Behav. Sciences	85	26	33	13	24	2	3
Science & math	75	35	19	14	19	11	3
Computers & Engin.	87	57	16	9	10	5	2
Education	90	64	12	7	13	1	3
Business & management	93	21	44	6	25	1	3
Health professions	88	73	9	5	7	6	0
Other	89	15	35	20	13	5	12

– Sample too small for reliable estimate.
Totals may not sum to 100 percent due to rounding.
Pearson Chi² test of group differences for row categories: * = p≤.05, ** = p≤.01, *** = p≤.001

percent were enrolled in graduate school in both periods. It is not surprising that science and math majors (14 percent) were most likely to be enrolled in graduate school both years, far exceeding the other majors which ranged from 2 percent (business majors) to 7 percent (education majors).

Occupational choice

As noted above, approximately 88 percent of students who graduated from college in the 1992-1993 academic year were in the labor force both one and four years after graduation. For this group, there are differences in the types of jobs they held.

Table 8 summarizes the occupational choices of students who were working in April 1994.[14] Overall, 63 percent of the graduates who were employed were working in professional or other white-collar positions, and 32 percent were employed in blue-collar, clerical or technical positions. African-Americans were least likely to be employed in professional or white-collar positions, and most likely to be employed in other types of jobs. Those who majored in education and the health professions were most likely to be em-

ployed in professional positions. Business and management majors were most likely to be employed in other white-collar jobs.

Table 9 summarizes the occupational choices of employed participants as of April 1997. The proportion of all survey respondents employed in professional or white-collar occupations increased from 63 percent in 1994 to 79 percent in 1997. African-Americans had the largest rise in the share of professional or white-collar jobs, increasing from 53 percent in 1994 to 77 percent in 1997. While the differences in the distributions among the races in 1994 were significantly different from zero, this was no longer true in 1997, indicating that the occupational patterns among the races were not distinguishable from one another in the latter period. There still were differences in 1997, however, between the genders, between dependent and independent students, and among students with different majors. The shift away from blue-collar, clerical and technical positions toward professional and white-collar jobs occurred for every group.

Table 9: Occupational choice of employed participants in April 1997

		Percentage of Category:					
Category/Group	% in labor force	Professional	Other White Collar	Blue Collar	Clerical	Technical	Other
All Students	89%	39%	40%	7%	7%	4%	4%
Gender***							
Male	91	34	41	11	4	5	4
Female	88	42	38	4	9	4	3
Race***							
Native American	–	–	–	–	–	–	–
Asian-American	82	43	39	4	5	4	5
African-American	89	39	38	7	9	6	2
Hispanic	86	42	36	6	8	5	2
White	90	38	40	7	6	4	4
Dependency as Undergraduate***							
Dependent Students	88	37	41	6	7	4	4
Independent Students	91	41	37	9	6	4	3
Undergraduate Major***							
Humanities	87	34	38	6	9	3	10
Social & Behav. Sciences	86	36	43	7	8	3	2
Science & math	78	45	24	9	8	12	3
Computers & Engin.	85	64	19	7	2	7	1
Education	91	68	16	4	6	3	3
Business & management	93	14	67	8	7	2	3
Health professions	89	65	20	3	2	8	2
Other	91	27	43	13	8	4	4

– Sample too small for reliable estimate.
Totals may not sum to 100 percent due to rounding.
Pearson Chi^2 test of group differences for row categories: * = p≤.05, ** = p≤.01, *** = p≤.001

IV. Loan levels of students making different post-baccalaureate choices

Is there a relationship between borrowing patterns and the choices students make after completing their bachelor's degrees? This section addresses this question by examining the borrowing patterns of students who made different graduate school and occupational choices as of April 1994 and April 1997.

Table 10 presents the borrowing patterns for students in April 1994. Students who were enrolled in graduate school on that date, and not working, were least likely to have taken out student loans as undergraduates. Only 40 percent of these students borrowed as undergraduates, compared with approximately half of the students in the other post-baccalaureate schooling and work categories. There was no statistically significant difference in the amount of undergraduate loans with which students graduated. Once graduate borrowing is included in the students' loan levels, however, there are differences. Students who were solely enrolled in graduate school in April 1994 had the highest combined borrowing, totaling almost $20,000, or 83 percent greater than their undergraduate borrowing. The combined borrowing by students who were both enrolled in graduate school and working increased by 36 percent over their undergraduate borrowing.

There were no significant differences in the undergraduate borrowing rates and loan levels for students with different occupations in April 1994. All had borrowing rates within three percentage points of the average rate of 50 percent, and the range of borrowing amounts was within 2 percent of the average for all students ($10,210).[15] In addition, the combined undergraduate and graduate borrowing patterns were similar for students in all types of occupations.

The borrowing patterns as of three years later are shown in Table 11 on the next page. Again,

Table 10: Borrowing rates and loan levels by graduate school and occupational status, April 1994

Category	% Borrowing as Undergraduates	Total Undergraduate Borrowing[1]	Total Undergraduate and Graduate Borrowing[1]
Graduate School and Work Status	**		†††
Graduate school only	40%	$10,704	$19,640
Graduate school and work	48	9,753	13,309
Work only	50	10,198	10,292
No school or work	51	9,491	9,625
All students	50	10,130	11,081
Occupational Choice			
Professional	52	10,243	10,644
Other white collar	47	10,352	10,662
Blue collar	50	10,399	10,797
Clerical	50	9,908	11,096
Technical	53	9,964	10,573
Other	51	10,133	10,493
All students	50	10,210	10,740

[1]For students who borrowed as undergraduates
Pearson Chi[2] test of group differences: * = p≤.05, ** = p≤.01, *** = p≤.001
Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

Table 11: Borrowing rates and loan levels by graduate school and occupational status, April 1997

Category	% Borrowing as Undergraduates	Total Undergraduate Borrowing[1]	Total Undergraduate and Graduate Borrowing[1]	Outstanding Loan Balance
Graduate School and Work Status	**		†††	†††
Graduate school only	39%	$10,537	$44,644	$36,041
Graduate school and work	51	9,363	16,375	10,234
Work only	50	10,322	12,162	6,025
No school or work	48	9,659	13,558	8,104
All students	49	10,163	14,010	7,847
Occupational Choice	**		†	†
Professional	53	10,199	14,340	7,925
Other white collar	47	10,149	12,461	6,405
Blue collar	51	10,468	12,775	6,805
Clerical	51	9,503	12,824	7,949
Technical	47	10,947	17,563	9,739
Other	44	9,344	11,579	7,078
All students	50	10,158	13,468	7,314

[1]For students who borrowed as undergraduates
Pearson Chi[2] test of group differences: * = p≤.05, ** = p≤.01, *** = p≤.001
Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

students who were enrolled in graduate school and not working in April 1997 were the least likely to have borrowed as undergraduates. The key difference from the first follow-up survey is the increased level of combined undergraduate and graduate borrowing, a logical finding since students had three more years to be enrolled in graduate school and incur debt. Students who were enrolled in graduate school and were not working in April 1997 had an average combined borrowing level of almost $45,000, more than four times greater than their undergraduate borrowing alone. Students who were both working and enrolled in graduate school increased their undergraduate loan level by 75 percent through graduate borrowing.

Table 11 also shows the outstanding loan balance for each group in 1997. Students enrolled in graduate school had paid off approximately 20 percent of their combined borrowing by that point, indicating that they had made some progress on reducing their debt levels even though they were not working at the time of the follow-up survey. For all students, approximately 56 percent of the total student loan borrowing was still outstanding as of 1997.

In contrast to the situation at the time of the first follow-up survey, students in different careers did have varying loan volumes. While their undergraduate borrowing patterns were similar (the differences among the categories were not statistically different from zero), students who had technical jobs in 1997 had by far the highest combined undergraduate and graduate borrowing. These students had an average total loan amount of $17,563, or 30 percent above the average total borrowing of $13,468 for all students. Approximately 55 percent of their total borrowing was still outstanding. Students in professional jobs had the next highest combined borrowing level.

V. Student loan repayment burden

An important concern regarding student loans is not just the total loan balance with which students graduate from college, but how much difficulty they have repaying them. "Difficulty" is generally measured by examining the relationship between the loan payments and an individual's income. Patricia Scherschel (2000), in a recent USA Group Foundation report on student loan indebtedness, noted that:

Lenders frequently recommend that borrowers limit their monthly student loan payments to no more than 8 percent of their pre-tax monthly incomes. Although arbitrary, this guideline helps ensure that monthly installments remain a manageable share of household budgets (p. 7).

The 8 percent standard will be used as the benchmark in this section, where I examine the relationship between graduates' student loan payments and their income ("loan burden").

The B&B survey contains a number of different income measures. Detailed information is available on the annual salary of the job held by the respondent at the time each of the follow-up surveys was conducted. Respondents were also asked to provide information on their total income from all sources (earned and unearned) in the year prior to the follow-up survey. In addition, for those with spouses, information about the spouse's income, spouse's student loan payments (if any), and total household income was collected.

Student loan repayment as a proportion of annual salary

The respondent's annual salary at his or her primary job is the first measure used to analyze the loan-repayment burden. Approximately 88 percent of the survey respondents in 1994 were working full-time (at least 30 hours per week). In order to get a picture of the loan burden for the typical full-time worker, this analysis is restricted to those individuals who reported that they were working full-time in 1994. Table 12 presents the loan burden information for 1994, and is also restricted to those individuals who reported that they were making student loan payments.[16]

The average annual salary of the respondents who were repaying student loans in 1994 was $24,774, and they made an average of $1,646 in student loan payments.[17] The average student loan burden was 8.2 percent, just above the 8 percent benchmark used in the banking industry.[18] Table 12 on the next page also shows the salary, loan payment and loan burden information for different categories of individuals. Many of these had loan burden rates higher than the 8 percent benchmark. For example, individuals who had attended private doctoral-granting universities (which generally have the highest tuition rates of all higher education institutions) had an average loan burden of 10 percent. While they had average salaries that statistically were no different from those of all respondents, their average loan repayment was 34 percent greater, thus leading to the higher loan burden ratio. Respondents who had majored in the humanities, on the other hand, had loan payments that were only marginally larger than average, but had salaries that were well below the average, leading to their loan burden ratio of 10.4 percent. There were no significant differences in either the salaries or the loan payments among students from different racial groups.[19]

Among individuals who were working in different occupations, there was no statistically significant difference in their average loan payments. There were large differences in their

salaries, however, ranging from those working in professional positions (with an average salary of almost $29,000) to those working in clerical and blue-collar positions at just above $20,000 per year. The salary differentials led to differences in loan burden, with those in clerical positions having the largest burden (9.7 percent).

Table 13 presents the same measures from the 1997 follow-up survey. While the average annual student loan payment increased 16 percent to $1,913 (driven primarily by increased student loan debt incurred by those individuals who attended graduate school during the ensuing three years), the average salary increased 36 percent.[20] These two changes together cut the average loan burden ratio 1.6 percentage points, to 6.6 percent in 1997. As can be seen in Table 13, every category of individual (with the exception of those individuals who had majored in the humanities) had loan burdens below the 8 percent banking industry benchmark. In addition, the average loan burden decreased for every group with the exception of Hispanics, whose 0.1 percentage point increase in loan burden ratio was not statistically significant.

Table 12: Annual salary loan burden for full-time workers, 1994

Category	Annual Student Loan Payments	Annual Salary at April Job	Loan Burden
All Respondents	$1,646	$24,774	8.2%
Gender		††	††
Male	1,690	28,299	7.7
Female	1,609	21,741	8.6
Race			
Asian-American	1,801	22,707	8.5
African-American	1,611	21,482	8.5
Hispanic	1,431	23,763	6.9
White	1,659	25,206	8.2
Institution Type	†††		†††
Public, non-doctoral	1,380	21,866	7.7
Public, doctoral	1,507	25,634	7.2
Private, non-doctoral	1,845	23,943	9.5
Private, doctoral	2,202	25,298	10.0
Undergraduate Major	†††	†††	†††
Humanities	1,768	20,650	10.4
Social & behavioral sciences	1,532	20,374	8.6
Science & math	1,549	21,274	8.5
Computers & engineering	1,772	29,142	6.7
Education	1,582	23,038	9.1
Business & management	1,596	25,588	7.5
Health professions	2,075	30,807	7.8
Other	1,539	27,843	8.0
Occupation		†††	††
Professional	1,729	28,841	7.8
Other white collar	1,593	23,869	7.9
Blue collar	1,655	20,171	9.3
Clerical	1,602	20,152	9.7
Technical	1,618	22,777	7.4
Other	1,513	21,263	8.1

Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

One interesting finding from Table 13 is the average salaries for individuals who attended different types of institutions. One year after graduation, the salaries among those who had attended the four types were not statistically different. However, by 1997 there were differences: Those who attended doctoral-granting universities had higher salaries than those who attended either type of non-doctoral-granting school, and those who attended private doctoral-

granting universities had the highest salaries among the four types. Respondents who had attended these institutions saw an increase in their average salaries of more than 50 percent in the three years. Individuals who had majored in computer or engineering fields as undergraduates also saw an increase in their average salaries exceeding 50 percent during this period.

In order to examine the impact that graduate school attendance had on student loan burden, I conducted the same analysis for those individuals who had been enrolled in a graduate degree program at any point prior to April 1997. Table 14 on the next page presents the analysis for these survey respondents, who represented approximately 15 percent of all individuals working full-time at that point. There was no large difference in the salaries earned by these individuals (as compared with students who had not attended graduate school). It is likely that many, if not most,

Table 13: Annual salary loan burden for full-time workers, 1997

Category	Annual Student Loan Payments	Annual Salary at April Job	Loan Burden	Change in Loan Burden From 1994
All Respondents	$1,913	$33,718	6.6%	(1.6%)
Gender		†††	††	
Male	1,925	37,649	6.1	(1.6)
Female	1,902	30,186	7.1	(1.5)
Race		†		
Asian-American	2,460	38,194	6.7	(1.8)
African-American	1,945	29,657	7.5	(1.0)
Hispanic	1,951	34,505	7.0	0.1
White	1,891	33,885	6.5	(1.7)
Institution Type	†††	††	††	
Public, non-doctoral	1,611	31,064	6.2	(1.5)
Public, doctoral	1,856	34,218	6.3	(0.9)
Private, non-doctoral	1,994	31,887	7.5	(2.0)
Private, doctoral	2,348	38,893	7.0	(3.0)
Undergraduate Major	†††	†††	†††	
Humanities	2,017	28,653	8.1	(2.3)
Social & behavioral sciences	1,931	32,281	7.1	(1.5)
Science & math	1,997	31,416	7.3	(1.2)
Computers & engineering	2,035	44,563	5.1	(1.6)
Education	1,728	26,590	7.5	(1.6)
Business & management	1,741	34,997	5.8	(1.7)
Health professions	2,301	38,815	6.5	(1.3)
Other	1,972	34,886	6.5	(1.5)
Occupation		†††		
Professional	2,052	33,583	6.9	(0.9)
Other white collar	1,799	35,077	6.2	(1.7)
Blue collar	1,966	35,919	6.6	(2.7)
Clerical	1,740	24,793	7.8	(1.9)
Technical	1,834	31,787	7.0	(0.4)
Other	1,656	29,567	6.3	(1.8)

Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

of them had had too little time to realize much of financial benefits that accrue to graduate education. In addition, their salary growth may have been slowed by the time they had spent out of the labor force while attending graduate school. The students who had attended graduate school had average loan payments 32 percent greater than all full-time workers in the 1997 follow-up survey, however. Thus, their loan burden ratios were 2.1 percentage points greater. The increases in the loan payments and loan burden ratios were due to the additional debt incurred in graduate school.

Student loan repayment as a proportion of household income

Annual salary is only one measure of an individual's ability to repay a student loan. Some individuals have additional sources of income, such as unearned income (including interest and dividends), bonuses, second jobs, or income from spouses, partners or other household members. The B&B follow-up surveys asked the respondents to report their total household income in the calendar year prior to the survey year (1993 for the

Table 14: Annual salary loan burden for full-time workers who attended graduate school, 1997

Category	Annual Student Loan Payments	Annual Salary at April Job	Loan Burden	Change in Loan Burden From 1994
All Respondents	$2,525	$33,359	8.7%	2.1%
Gender		††		
Male	2,622	36,709	8.6	2.5
Female	2,445	30,585	8.8	1.7
Institution Type	††	†		
Public, non-doctoral	2,191	30,973	8.5	2.3
Public, doctoral	2,457	33,242	8.5	2.2
Private, non-doctoral	2,641	33,357	9.4	1.9
Private, doctoral	2,919	36,918	8.5	1.5
Undergraduate Major	†††	†††	†††	
Humanities	2,765	29,662	11.1	3.0
Social & behavioral sciences	2,739	32,505	9.3	2.2
Science & math	2,749	30,319	10.2	2.9
Computers & engineering	2,238	46,769	5.1	0.0
Education	1,876	26,588	8.0	0.5
Business & management	2,618	37,723	8.5	2.7
Health professions	2,340	37,561	6.7	0.2
Other	3,220	34,717	9.7	3.2
Occupation				
Professional	2,704	33,462	8.8	1.9
Other white collar	2,241	33,573	8.3	2.1
Blue collar	–	–	–	
Clerical	–	–	–	
Technical	–	–	–	
Other	–	–	–	

Note: Includes individuals who enrolled in a graduate degree program at any time before April 1997.
– Sample too small for reliable estimate.
Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

first follow-up; 1996 for the second follow-up). In order to estimate loan burden ratios for the two follow-up survey years, the respondents' total household incomes from the prior years were inflated by the amount of the annual increase in median household income nationally each year.[21] In addition, if the individual reported that a spouse or partner lived in the home, the spouse's or partner's student loan payments were included in the calculation of the loan burden ratio.

Table 15 presents the household income, student loan payment and loan burden information for 1994. Average household income in 1994 was about one-third higher than respondents' annual salaries the same year, with student loan payments approximately the same.[22] The effect of adding in other (non-salary) income, along with spousal/partner income, is to reduce the loan burden for most groups below the 8 percent benchmark. However, students who had attended private colleges and universities still had loan burdens at or above the benchmark, as did students in blue-collar and clerical occupations.

Table 15: Household income loan burden for full-time workers, 1994

Category	Annual Student Loan Payments	Household Income	Loan Burden
All Respondents	$1,645	$33,070	6.8%
Gender			
Male	1,685	34,962	6.7
Female	1,613	31,407	7.0
Race		†††	
Asian-American	1,812	25,786	7.9
African-American	1,627	26,678	7.0
Hispanic	1,401	31,791	5.6
White	1,658	33,914	6.9
Institution Type	†††		†††
Public, non-doctoral	1,368	31,114	6.0
Public, doctoral	1,518	34,319	6.0
Private, non-doctoral	1,834	31,819	8.1
Private, doctoral	2,196	31,205	9.1
Undergraduate Major	†††	†††	†††
Humanities	1,770	27,816	8.9
Social & behavioral sciences	1,524	26,654	7.3
Science & math	1,541	26,208	7.3
Computers & engineering	1,784	35,008	6.1
Education	1,573	34,598	7.0
Business & management	1,611	35,512	6.4
Health professions	2,069	44,136	5.8
Other	1,522	33,801	6.6
Occupation		†††	††
Professional	1,728	38,584	6.3
Other white collar	1,585	33,058	6.6
Blue collar	1,660	26,590	8.3
Clerical	1,613	26,619	8.1
Technical	1,613	32,995	6.2
Other	1,508	26,108	7.1

Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

By three years later (Table 16 on the next page), the loan burden for every group (as a proportion of household income) had dropped below the 8 percent benchmark. Rising incomes helped reduce the overall loan burden to an average of 5.1 percent, a decrease of 1.7 percentage points from the level three years earlier. Of particular note is the average household income for the various groups. As a point of reference, the mean household income in 1997 was $45,099 for

Table 16: Household income loan burden for full-time workers, 1997

Category	Annual Student Loan Payments	Household Income	Loan Burden	Change in Loan Burden From 1994
All Respondents	$1,951	$48,626	5.1%	(1.7%)
Gender				
Male	2,030	48,902	5.1	(1.6)
Female	1,882	48,371	5.0	(2.0)
Race		†††	††	
Asian-American	2,486	58,572	5.1	(2.8)
African-American	1,966	39,415	6.0	(1.0)
Hispanic	2,083	46,584	5.4	(0.2)
White	1,928	49,179	5.0	(1.9)
Institution Type	†††		†††	
Public, non-doctoral	1,593	47,259	4.2	(1.8)
Public, doctoral	1,974	50,295	5.0	(1.0)
Private, non-doctoral	1,924	45,795	5.4	(2.7)
Private, doctoral	2,368	48,953	5.9	(3.2)
Undergraduate Major	††	†††	††	
Humanities	1,920	42,820	6.3	(2.6)
Social & behavioral sciences	1,907	44,379	5.5	(1.8)
Science & math	2,048	42,007	6.2	(1.1)
Computers & engineering	2,498	56,463	4.5	(1.6)
Education	1,697	43,864	5.0	(2.0)
Business & management	1,752	50,138	4.4	(2.0)
Health professions	2,288	65,445	4.2	(1.6)
Other	1,971	48,670	5.1	(1.5)
Occupation		†††		
Professional	2,149	49,456	5.1	(1.2)
Other white collar	1,776	50,246	4.8	(1.8)
Blue collar	1,887	49,782	4.7	(3.6)
Clerical	1,972	38,205	6.5	(1.6)
Technical	1,885	48,640	5.1	(1.1)
Other	1,714	33,497	6.2	(0.9)

Wald test of differences within category: † = p≤.05, †† = p≤.01, ††† = p≤.001

households headed by someone 25 to 34 years old (United States Bureau of the Census, 2000a). The average for students in this sample as a whole, and for most of the subgroups, was in excess of the national average, even though most of the graduates were at the low end of the age range.

The comparison of loan-repayment amounts as a proportion of annual salary and household income tells an important story about student loan burden. Much of the discussion about student loan burdens is in the context of graduates' salaries.

When household income is used as the measure of ability to pay, some groups had repayment ratios below the 8 percent benchmark one year after completion of their baccalaureate degree, while some were still above that level. Four years after graduation, however, all groups examined in this analysis had reduced their loan burdens to below 8 percent of household income.

VI. Joint determinants of graduate school enrollment

The previous sections of this report have described how individual student or institutional characteristics are related to undergraduate borrowing, graduate school and labor market participation and loan repayment levels. The relationship between a single factor and these outcomes, however, tells only part of the story. To better examine this relationship, this section analyzes a number of these factors in combination with one another.

The power of this type of multivariate analysis is that it allows the reader to understand the relationship between a single factor and an outcome of interest, *controlling for a number of other characteristics*. For example, Tables 6 and 7 in Section III demonstrated that there were differences in the rates at which individuals from different racial groups enrolled in graduate school. But are those relationships a factor solely or even primarily of race, or is there some confounding factor, such as the majors chosen or the types of undergraduate institutions attended by students of different races?

The analyses in this section use logistic regression, an appropriate multivariate technique when the outcome is dichotomous in nature.[23] The outcome is whether or not a student had enrolled in a graduate degree program by the time of the 1994 or 1997 surveys (one year and four years, respectively, after attaining the bachelor's degree). As in ordinary least squares regression, standard logistic analysis assumes that the observations in the sample are independent of one another. The data in this study do not meet this restriction, however, because of the sampling scheme in the Baccalaureate and Beyond survey. Institutions were sampled first, and then within institution, a stratified random sample of students was selected. To account for this, the logistic regression models were fit using Huber/White estimators of variance, which allow observations that are not independent of one another (Huber, 1967; White, 1980, 1982). The sample weights in the B&B surveys were also used in the analysis.

Other multivariate studies and literature reviews of graduate school enrollment have identified a number of variables that may help predict whether a student enrolls in graduate school.[24] Most of these variables fall into the following categories: background characteristics of the student; characteristics of the undergraduate institution attended; undergraduate academic aptitude, interests and expectations of the student; and post-baccalaureate socioeconomic factors. To these variables will be added the undergraduate student-loan-borrowing levels.

The logistic regression models used in this study were fit by sequentially entering the groups of variables in blocks. Table 17 on the next two pages presents the means and distributions of the variables used in the models predicting graduate school enrollment by 1994 and 1997.[25]

The effect of each predictor on the outcome (graduate school enrollment) is expressed as a Delta-*p* statistic, recommended by Cabrera (1994) and Petersen (1985) as a method for expressing the relationship between a unit change in a predictor and the estimated percentage change in the outcome. For example, a Delta-*p* value of 0.025 indicates that a one-unit change in the predictor is related to a 2.5 percentage-point increase in the likelihood that a student would enroll in graduate school. The Delta-*p* statistic is shown in each table only for those variables that were statistically significant at a level of $p \leq .10$. Table 18 on Page 28 shows the Delta-*p* statistics for the models of graduate degree program enrollment by the time of the 1994 survey. (The logistic regression coefficients and standard errors can be found in Appendix A.1.)

By the spring of 1994, 16.4 percent of the individuals who had completed a baccalaureate degree in the 1992-1993 academic year had enrolled in a graduate degree program. The results

Table 17: Estimated population means and distributions, 1994 and 1997

Variable	1994 Survey		1997 Survey	
	Mean Distribution	Standard Error	Mean or Distribution	Standard Error
Outcome – percent enrolling in graduate school	16.4%	0.8	29.8%	1.4
1. Student background characteristics				
Sex				
Female*	54.5%	1.5	54.5%	1.5
Male	45.5%	1.5	45.5%	1.5
Race				
Native American	0.6%	0.1	0.6%	0.1
Asian-American	4.0%	0.5	4.0%	0.5
African-American	6.1%	0.5	6.2%	0.5
Hispanic	4.9%	0.4	4.9%	0.4
White*	84.4%	0.7	84.4%	0.7
Dependency				
Independent	40.6%	2.2	40.6%	2.2
Dependent*	59.4%	2.2	59.4%	2.2
Income quintile				
Lower income	19.7%	0.7	19.7%	0.7
Lower-middle income*	20.9%	1.1	20.8%	1.1
Middle income	19.3%	0.9	19.2%	0.9
Upper-middle income	19.9%	0.9	20.0%	0.9
Upper income	20.3%	1.3	20.3%	1.3
Age as of 12/31/92	25.11	0.3	25.10	0.3
Highest parental educational level				
High school graduate or less	25.0%	1.4	25.0%	1.4
Some college	22.8%	0.8	22.8%	0.8
Bachelor's degree	25.2%	0.8	25.2%	0.8
Post-baccalaureate enrollment*	27.0%	1.4	27.0%	1.4
2. Undergraduate institution characteristics				
Sector				
Public non-doctoral granting	23.9%	11.4	24.0%	11.4
Public doctoral granting*	44.2%	13.9	44.0%	13.8
Private non-doctoral granting	18.5%	8.5	18.5%	8.5
Private doctoral granting	13.4%	7.2	13.5%	7.2
Tuition ($ thousands)	$4.38	0.8	$4.40	0.8

Table 17: Estimated population means and distributions, 1994 and 1997, continued

Variable	1994 Survey		1997 Survey	
	Mean Distribution	Standard Error	Mean or Distribution	Standard Error
3. Undergraduate academic characteristics				
Highest degree expected				
Bachelor's/post-bachelor's certificate	16.3%	0.7	6.3%	0.7
Master's/MBA*	59.8%	1.2	60.0%	1.2
First professional	6.1%	0.8	6.1%	0.8
Doctoral	17.8%	1.0	17.7%	1.0
Major				
Humanities	9.5%	0.7	9.4%	0.7
Social & behavioral sciences	15.4%	1.1	15.4%	1.2
Science & math	10.6%	0.7	10.6%	0.7
Computers & engineering	8.7%	1.3	8.7%	1.3
Education	13.7%	1.2	13.7%	1.2
Business & management*	24.3%	4.6	24.5%	4.6
Health professions	6.6%	0.9	6.6%	0.9
Other	11.3%	1.0	11.2%	1.0
Grade point average (0-4 scale)	3.17	0.02	3.17	0.02
4. Post-baccalaureate socioeconomic factors				
Marital status				
Not married*	71.4%	1.5	52.6%	1.6
Married	28.6%	1.5	47.4%	1.6
Number of children				
Zero*	81.2%	1.8	71.3%	2.1
One	7.8%	0.7	13.6%	0.9
Two or more	11.1%	1.3	15.2%	1.4
5. Undergraduate borrowing				
Total undergraduate borrowing ($ thousands)	$4.98	0.3	$4.98	0.3

* Referent category

Note: The population means and distributions were estimated using the B&B sample weights. Individual categories may not sum to 100 percent due to rounding.

Table 18: Models of graduate school enrollment by 1994 (Delta-*p*)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Dependency					
Independent	-0.070***	-0.064***	-0.068***	-0.058***	-0.056***
Income quintile					
Lower income	0.032*	0.031~			
Age as of 12/31/92	0.003*	0.004**	0.004***	0.004*	0.004*
Highest parental educational level					
High school graduate or less	-0.054***	-0.048***			
Some college	-0.033*	-0.025~			
Bachelor's degree	-0.049***	-0.046***			
Sector					
Public non-doctoral granting			-0.029*	-0.028*	-0.029*
Private non-doctoral granting		-0.060*	-0.053*	-0.051*	-0.050*
Tuition ($ thousands)		0.006**			
Highest degree expectation					
Bachelor's/post-bachelor's certificate			-0.155***	-0.155***	-0.155***
First professional			0.298***	0.296***	0.297***
Doctoral			0.276***	0.274***	0.276***
Major					
Social & behavioral sciences			0.056*	0.056~	0.055~
Science & math			0.119***	0.121***	0.121***
Computers & engineering			0.072*	0.075*	0.075*
Education			0.080**	0.085**	0.085**
Grade point average			0.145***	0.149***	0.146***
Marital status					
Married				-0.034*	-0.035*
Number of children					
One				-0.035~	-0.034~
Total borrowing ($ thousands)					-0.001~
Number of observations	8,124	8,124	8,124	8,124	8,124
Estimated population size	1,029,626	1,029,626	1,029,626	1,029,626	1,029,626
Estimated population mean					
(% enrolling in graduate school)	16.4%	16.4%	16.4%	16.4%	16.4%
Chi^2 test from previous model	–	51.4***	1138.4***	17.0***	3.2~
% of cases properly classified	82.0%	82.0%	82.8%	82.7%	82.9%

~ p≤.10, *p≤.05, **p≤.01, ***p≤.001

Note: Only those variables that were significantly different from zero at a level of p≤.10 are shown.

of the fully specified model (Model 5) indicate that, controlling for all other factors in the model, the level of undergraduate borrowing is only marginally related to whether individuals enrolled in graduate school by the time of the 1994 survey. A $1,000 increase in the amount borrowed as an undergraduate is related to only a 0.1 percent decrease in the predicted probability of enrolling in graduate school. In fact, adding the level of students' undergraduate borrowing to all the other factors (moving from Model 4 to Model 5) only marginally improved the fit of the model. The fully specified model correctly predicted the 1994 graduate school enrollment status of 83 percent of the individuals in the B&B sample.[26]

The most influential factor was a student's degree expectations. Students who reported that the highest degree they expected to earn was a bachelor's degree or some form of post-baccalaureate certificate had a predicted graduate school enrollment 16 percentage points lower than those who expected to earn a master's degree or MBA (the referent group). Students who expected to earn a first professional or doctoral degree had a predicted graduate school enrollment that was 30 and 28 points higher, respectively, than those expecting to earn a master's or MBA. This finding is not surprising; by the time students complete their baccalaureate education, they generally have a good sense of their aptitude for and interest in graduate education.

Undergraduate major and academic performance also were predictors of graduate school enrollment. Students who majored in science fields or mathematics as undergraduates were 12 percentage points more likely to enroll in graduate school by 1994 than were business majors (the referent group), controlling for the other factors in the model. Students in education and in computers and engineering were also more likely to enroll in graduate school. Undergraduate grades were an indicator of the likelihood of graduate school enrollment: Every one-point increase in GPA (i.e., from a B to an A) was related to an increase of 15 percentage points in the likelihood of attending a graduate degree program, all other things being equal.

Another factor related to graduate school enrollment was a student's dependency status as an undergraduate. Independent students were approximately six percentage points less likely to enroll in graduate school by 1994. Age also was related to enrollment; the effect was small, however, with every five years related to an increase of two percentage points in the probability of enrolling in graduate school. Other student and family background characteristics were not important in predicting graduate school enrollment, however, controlling for the additional factors included in the fully specified model. Neither students' race, income level nor the education level of their parents was related to graduate school enrollment at a rate that was statistically different from zero.

Students who had attended non-doctoral granting institutions (both public and private) were also less likely to have enrolled in graduate school, controlling for other factors. Students who were married at the time of the 1994 survey were four percentage points less likely to have enrolled in graduate school than students who were not married.

Table 19 on Page 30 presents the results of the models of graduate school enrollment by 1997 (the logistic regression coefficients and standard errors can be found in Appendix A.2). By the time of that survey, almost 30 percent of all 1992-1993 baccalaureate recipients nationally had enrolled in a graduate degree program at some point during the preceding four years. Many of the same factors that were influential in predicting graduate school enrollment by 1994 were similarly related to enrollment by 1997. A student's degree expectations and major as an undergraduate were still the most important predictors of graduate enrollment, with the patterns similar to the earlier survey. Undergraduate GPA was still a strong predictor of enrollment, with every one-point increase related to an increase of almost 19 points in the predicted probability of enrolling in graduate school.

Table 19: Models of graduate school enrollment by 1997 (Delta-*p*)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Dependency					
Independent	-0.086***	-0.070***	-0.076***	-0.063***	-0.060***
Race					
Asian-American	0.066~				
African-American	0.048~	0.059*			
Income quintile					
Upper income	0.032~				
Age as of 12/31/92		0.003~	0.004*	0.005*	0.005*
Highest parental educational level					
High school graduate or less	-0.111***	-0.100***	-0.059***	-0.054**	-0.052**
Some college	-0.082***	-0.069***	-0.031~	-0.028~	
Bachelor's degree	-0.087***	-0.081***	-0.041*	-0.040*	-0.038*
Sector					
Public non-doctoral granting			-0.046*		
Private non-doctoral granting			-0.051~		
Tuition ($ thousands)		0.011***	0.005~		0.005~
Highest degree expectation					
Bachelor's/post-bachelor's certificate			-0.271***	-0.271***	-0.271***
First professional			0.380***	0.378***	0.380***
Doctoral			0.309***	0.308***	0.310***
Major					
Humanities			0.101*	0.099*	0.098*
Social & behavioral sciences			0.129***	0.128***	0.126***
Science & math			0.205***	0.204***	0.203***
Computers & engineering			0.134**	0.133**	0.134**
Education			0.166***	0.171***	0.171***
Health professions			0.067*	0.069*	0.072*
Grade point average			0.187***	0.190***	0.187***
Number of children					
One				-0.042*	-0.040*
Two or more				-0.051**	-0.049*
Total borrowing ($ thousands)					-0.002*
Number of observations	8,211	8,211	8,211	8,211	8,211
Estimated population size	1,039,848	1,039,848	1,039,848	1,039,848	1,039,848
Estimated population mean (% enrolling in graduate school)	29.8%	29.8%	29.8%	29.8%	29.8%
Chi^2 test from previous model	–	84.4***	1727.9***	12.29**	8.09**
% of cases properly classified	67.7%	67.7%	74.5%	74.5%	74.7%

~ p≤.10, *p≤.05, **p≤.01, ***p≤.001

Note: Only those variables that were significantly different from zero at a level of p≤.10 are shown.

Undergraduate borrowing still had only a very small relationship to enrollment in graduate school. Every $1,000 increase in borrowing as an undergraduate was related to only a 0.2 percentage point decrease in the likelihood of enrolling in graduate school. While this effect appears to be twice the size of the relationship exhibited two years earlier, it remained statistically insignificant. In contrast to the earlier models, the type of institution attended as an undergraduate was no longer a predictor of graduate school enrollment by 1997.

As in the previous models, students who were independents as undergraduates were six percentage points less likely to have enrolled in graduate school by 1997, and age was still positively related to graduate school enrollment. There was a relationship between the educational level of individuals' parents and the probability of enrolling in a graduate degree program, with those whose parents had not attended any post-baccalaureate education to be less likely to enroll than those whose parents had experienced some form of graduate education. Individuals who had one or more children at the time of the 1997 survey were four to five percentage points less likely to have enrolled in graduate school than were individuals with no children.

These models of graduate school enrollment had slightly less predictive validity than the 1994 models. The fully specified model accurately predicted the graduate school enrollment decisions of 75 percent of the individuals in the sample. This lower predictive power probably indicates that other factors that are unmeasured in these models were more influential on graduate school enrollment four years after completion of the baccalaureate degree as compared with their influence on graduate school enrollment only one year out.

Table 20: Changes to loan limits for undergraduate students in the 1992 Reauthorization of the Higher Education Act

Category	1992-1993 AY Limits			Limits After 1992-1993 AY		
	Sub. Stafford	Unsub. Stafford	Total	Sub. Stafford	Unsub. Stafford	Total
Dependent students						
Freshmen	$ 2,625	$ 0	$ 2,625	$ 2,625	2,625	2,625
Sophomores	2,625	0	2,625	3,500	3,500	3,500
Other undergraduates	4,000	0	4,000	5,500	5,500	5,500
Cumulative total	17,250	0	17,250	23,000	23,000	23,000
Independent students						
Freshmen	2,625	4,000	6,625	2,625	4,000	6,625
Sophomores	2,625	4,000	6,625	3,500	4,000	7,500
Other undergraduates	4,000	4,000	8,000	5,500	5,000	10,500
Cumulative total	17,250	20,000	37,250	23,000	23,000	46,000
Parent Loans for Undergraduate Students						
All years			4,000			No limit

Source: Berkner and Bobbitt (2000); "The Higher Education Amendments of 1992" (1992); and Redd (1994)

VII. Conclusions

As noted earlier, policy-makers and others have raised concerns about the shift from grants to loans to finance postsecondary education. Because higher education has proven over the last two decades to enhance an individual's economic position, loans may be a valuable tool for providing the necessary funds to students who otherwise cannot afford to attend college.[27] But loans may be problematic if they hamper the ability (or desire) of students to continue their education beyond the bachelor's degree.

This report has analyzed the relationship between undergraduate borrowing and a number of characteristics of students and the institutions they attend. Approximately half of all undergraduates who completed their bachelor's degrees in the 1992-1993 academic year borrowed to finance their education, and the average amount borrowed was just over $10,000. The level of undergraduate borrowing differed among students with different backgrounds and academic characteristics and among those attending different types of institutions. The graduate school entry rates and occupational choices of these students also varied.

Undergraduate borrowing appears to have little impact on whether students attend graduate school.

Despite these differences, the multivariate analysis shows that undergraduate borrowing appears to have little impact on whether students attend graduate school. Students' academic characteristics — in particular, their degree expectations, choice of major and classroom performance (as measured by grades) — were the most influential factors in predicting graduate school enrollment both within one year and four years of completion of the baccalaureate degree. These findings are consistent with a recent study completed for the U.S. Department of Education (Choy, 2000). Even though certain categories of individuals had loan-repayment burdens exceeding 8 percent of their annual salaries (as shown in Tables 12 and 13), this had little apparent impact on their decisions to attend graduate school.

These findings bode well for those who believe that the shift from grants to loans is an appropriate policy response to the increasing private returns to higher education. There is an important caveat that should be noted, however: The students in the sample analyzed here attended college before the large increase in borrowing limits under the federal loan programs enacted as part of the 1992 Reauthorization of the Higher Education Act. The changes in the borrowing limits made to the major loan programs in the 1992 amendments are shown in Table 20 on the previous page. In addition to the increase in the borrowing limits, the 1992 amendments also liberalized the needs analysis methodology and opened the federal loan programs to more borrowers.

The 1992 changes have resulted in increases in both the percentage of undergraduates who borrowed and the average amount borrowed each year. Redd (1994) demonstrated an immediate impact in loan amounts among borrowers in Pennsylvania, with the average amount borrowed increasing 24 percent in the first year after the increase in the loan limits. Berkner and Bobbitt (2000) examined the borrowing patterns of undergraduates in three academic years. Between the 1989-90 and 1992-93 academic years (before the loan changes), the percentage of undergraduates who borrowed did not change, and the average amount borrowed increased 20 percent. In contrast, between 1992-93 and 1995-96 (periods before and after the changes), the proportion of students borrowing in the federal programs increased 34 percent, and the average amount borrowed increased 27 percent.

The evidence is clear that students are borrowing more. Undergraduate borrowing does not appear to have affected the graduate school enrollment decisions of students who completed their baccalaureate degrees before the change in the loan programs went into effect. But no one yet knows whether increased borrowing will push students' cumulative undergraduate debt levels to a point that *does* affect decisions regarding graduate school. The best way for researchers to address this question is to replicate studies like this one with later cohorts of students, especially those who spent their entire undergraduate careers under the increased loan limits.

In addition, it should be noted that the results presented here represent national averages; they certainly cannot be used to predict the behavior of a specific individual or small group. While the national figures indicate that the volume of undergraduate borrowing has not discouraged graduate school attendance, loan volume and repayment burden still may be concerns for some individuals. Policy-makers and others should take note of this before concluding that there is no downside to relying on loans for financing undergraduate education. ■

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Notes

1 The remaining aid was provided through the federal College Work Study program. These loan totals do not include consumer loans provided by other than the federal or state governments or higher education institutions.

2 See for example Baum and Saunders (1998); Nellie Mae (1997); Scherschel and Behymer (1997); and Scherschel (1998, 2000).

3 For reviews of the research on the relationship between financial aid and college enrollment over the past three decades, see Heller (1997); Jackson and Weathersby (1975); and Leslie and Brinkman (1988).

4 For more information on the Baccalaureate and Beyond survey, see Green et al. (1996) and Green, Myers, Veldman and Pedlow (1999).

5 The year "1993" will be used throughout this report to designate the year in which the students received their bachelor's degrees. The sample includes students who received their degrees anytime between July 1, 1992 and June 30, 1993.

6 Standard errors for the estimates provided in the bivariate tables in this report are available from the author.

7 In calculating federal financial aid eligibility, an undergraduate student is considered independent if he or she meets one or more of the following criteria: 1) 24 years or older; 2) a military veteran; 3) an orphan or ward of the court; 4) has legal dependents other than a spouse; 5) married and not claimed on parents' tax returns; or 6) self-sufficient and not claimed on parents' tax returns for at least two years prior.

8 Master's degrees include MA, MS, MBA, and MFA degrees. First professional degrees include chiropractic, dentistry, medicine, law, optometry, osteopathic medicine, pharmacy, podiatry, veterinary medicine and theology (Green et al., 1999).

9 The official racial terms used by the Department of Education in the B&B survey are: White, non-Hispanic; Black, Non-Hispanic; Hispanic; Asian or Pacific Islander; American Indian/Alaskan Native; and Other. The category of "Other" is not included in this analysis because of the small number of students included in the sample.

10 The income quintiles were created based on the reported 1991 calendar-year income of all students in the B&B file (both borrowers and non-borrowers) and are as follows:

Quintile	Income Range – Dependent Students	Income Range – Independent Students
Lower income	Below $33,569	Below $5,038
Lower-middle income	$33,569 to $50,000	$5,038 to $11,246
Middle income	$50,001 to $60,311	$11,247 to $22,500
Upper-middle income	$60,312 to $80,481	$22,501 to $38,000
Upper income	Above $80,481	Above $38,000

As noted earlier, overall mean family income for families with two or more children under the age of 18 nationally was $40,500 in 1991 (this was equivalent to $48,469 in 1998 dollars).

11 The tuition and total cost of attendance quintiles are as follows:

Quintile	Tuition Range	Total Cost of Attendance Range
Lowest	Below $1,044	Below $5,135
Lower middle	$1,044 to $1,920	$5,135 to $8,431
Middle	$1,921 to $3,073	$8,432 to $11,854
Upper middle	$3,074 to $7,716	$11,855 to $17,085
Highest	Above $7,716	Above $17,085

12 The careful reader will note that $7,340 (the average outstanding loan balance in 1994) is approximately 73 percent of the average amount borrowed, not 80 percent. The percentage of loans outstanding was calculated by figuring the percentage of loans outstanding for each person in the sample and then taking the weighted mean of that figure.

13 Table 7 presents the graduate school and work status of the survey respondents at a single point in time. Approximately 30 percent of the respondents reported that they had been enrolled in a graduate degree program at *some* time between receiving their bachelor's degree and April 1997.

14 These categories were recoded from a broader set of categories reported in the surveys. The 1994 survey had 29 categories of jobs, and the 1997 survey had 39 job categories. As much as possible, I tried to keep the summary categories consistent across the two years. Details of how the variables were recoded are available from the author.

15 The averages for all students in the two categories (graduate school enrollment and occupational choice) are different because the subsamples of students are slightly different. Some students in the B&B dataset were missing information about their graduate school status and/or occupational choice in the April 1994 follow-up.

16 The analysis does not include individuals who were in deferral status on their loans for any reason; it includes only those who were in active repayment status.

17 To understand how these salaries compare to the typical full-time worker with a bachelor's degree that year, the following mean earnings figures from 1994 are available from the Census Bureau (United States Bureau of the Census, 1996):

Age Group	Males	Females
18 to 24 years old	$21,823	$22,573
25 to 29 years old	32,736	27,850

18 The average loan burden was calculated by dividing each individual's annual student loan payments by his or her annual salary and then taking the mean of these ratios. A small number of the survey respondents who had clearly erroneous data or outlying data that would heavily influence the results were removed from the analysis.

19 There were not enough Native Americans in the B&B sample to reliably estimate salary or loan-payment information for that group.

20 All the loan-repayment and salary figures are presented in current dollars. As a basis of comparison, the Consumer Price Index increased 8.3 percent from 1994 to 1997 (National Center for Education Statistics, 2000b, Table 38).

21 Median household income increased 3.27 percent from 1993 to 1994, and 4.26 percent from 1996 to 1997 (United States Bureau of the Census, 2000c).

22 The average student loan payment for any category in Table 15 may be different from that shown in Table 12 because of the addition of the spouse/partner loan payments, as well as small differences in the samples used (some respondents had valid salary information but not household income data, and vice versa). There were a very small number of individuals who reported that they were married *and* their spouses were repaying student loans, so spousal loan repayment appears to have had little effect on loan burdens. Because the spousal loan-repayment data were reported by the respondent, there is the possibility that the repayment amounts for spouses were not accurately reported.

23 For more information about the application of logistic regression, see Cabrera (1994) and Kleinbaum, Kupper, and Muller (1988).

24 For example, see Ekstrom, Goertz, Pollack, and Rock (1991); Fox (1992); Joyner (1998); and Weiler (1994).

25 For some of the variables, the means or distributions are slightly different in the two models because the observations with missing values differ between the two samples.

26 Alternative specifications of the amount of undergraduate borrowing were also modeled, including a dichotomous variable for whether the individual borrowed or not, as well as a categorical variable (i.e., no borrowing, $0 to $5,000, $5,000 to $10,000, etc.). The results were consistent with the findings here, that the level of undergraduate borrowing had an impact on the predicted probability of enrolling in graduate school that was only marginally statistically different from zero.

27 See, for example, Averett and Burton (1996); Grogger and Eide (1995); Heller (2001); and Levy and Murnane (1992) for more about the rising college wage premium and its impact on college enrollment.

Appendix

Appendix A.1: Logistic regression coefficients and standard errors for Table 18

		Model 1		Model 2		Model 3		Model 4		Model 5	
		Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE
Sex	male	0.105	0.087	0.095	0.088	0.179	0.120	0.178	0.122	0.180	0.12
Race	Native American	-0.166	0.593	-0.156	0.615	-0.205	0.491	-0.201	0.495	-0.186	0.49
	Asian American	0.120	0.163	0.049	0.157	-0.166	0.161	-0.170	0.157	-0.175	0.15
	African American	0.097	0.110	0.149	0.108	-0.051	0.145	-0.060	0.143	-0.065	0.14
	Hispanic	0.118	0.199	0.134	0.199	0.014	0.220	0.012	0.225	0.007	0.22
Dependency	independent	-0.639	0.087	-0.566	0.100	-0.615	0.089	-0.502	0.103	-0.487	0.10
Income quintile	lowest	0.220	0.098	0.211	0.105	0.148	0.112	0.145	0.111	0.157	0.11
	middle	-0.050	0.095	-0.059	0.099	-0.037	0.096	-0.014	0.099	-0.024	0.09
	fourth	0.121	0.119	0.091	0.118	0.103	0.117	0.128	0.120	0.115	0.12
	highest	0.224	0.119	0.176	0.114	0.149	0.114	0.188	0.121	0.165	0.12
Parental education	HS grad or less	-0.467	0.096	-0.400	0.096	-0.105	0.101	-0.090	0.097	-0.082	0.09
	some college	-0.267	0.101	-0.195	0.107	0.063	0.107	0.072	0.107	0.087	0.10
	bachelor's	-0.411	0.089	-0.382	0.088	-0.138	0.093	-0.129	0.095	-0.125	0.09
Age as of 12/31/92		0.019	0.008	0.026	0.008	0.032	0.009	0.027	0.011	0.027	0.01
Undergrad. sector	public non-doctoral granting			-0.247	0.167	-0.230	0.101	-0.225	0.094	-0.229	0.09
	private non-doctoral granting			-0.523	0.240	-0.457	0.175	-0.437	0.169	-0.424	0.16
	private doctoral granting			-0.169	0.189	-0.163	0.120	-0.159	0.118	-0.147	0.11
Undergrad. tuition ($ thousands)				0.046	0.013	0.016	0.013	0.012	0.013	0.014	0.01
Highest degree expectation	bachelor's					-3.138	0.407	-3.123	0.407	-3.128	0.40
	1st professional					1.476	0.093	1.469	0.095	1.472	0.09
	doctorate					1.387	0.078	1.382	0.075	1.388	0.07
Undergrad. major	humanities					0.261	0.193	0.263	0.194	0.259	0.19
	social & behav. sciences					0.363	0.180	0.361	0.181	0.357	0.18
	science & math					0.699	0.179	0.707	0.178	0.706	0.17
	computers & engin.					0.452	0.224	0.472	0.225	0.473	0.22
	education					0.498	0.174	0.524	0.176	0.524	0.17
	health professions					0.221	0.193	0.236	0.191	0.246	0.19
	other					0.123	0.195	0.126	0.194	0.121	0.19
Undergrad. GPA						0.824	0.082	0.842	0.082	0.831	0.08
Marital status	married							-0.274	0.115	-0.280	0.11
Number of children	one							-0.284	0.147	-0.269	0.14
	two or more							0.226	0.179	0.239	0.17
Total undergrad. borrowing ($ thousands)										-0.008	0.00
Constant		-1.769	0.217	-2.033	0.224	-5.558	0.279	-5.481	0.302	-5.422	0.30

Appendix A.2: Logistic regression coefficients and standard errors for Table 19

		Model 1		Model 2		Model 3		Model 4		Model 5	
		Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE	Logistic reg. coeff	SE
Sex	male	0.019	0.059	0.013	0.057	0.134	0.079	0.123	0.080	0.126	0.08
Race	Native American	-0.260	0.474	-0.225	0.499	-0.363	0.439	-0.335	0.447	-0.318	0.44
	Asian American	0.299	0.163	0.249	0.156	0.107	0.148	0.095	0.147	0.086	0.14
	African American	0.222	0.127	0.267	0.123	0.102	0.160	0.116	0.156	0.110	0.15
	Hispanic	0.256	0.182	0.283	0.182	0.231	0.196	0.235	0.199	0.229	0.19
Dependency	independent	-0.457	0.070	-0.362	0.080	-0.397	0.082	-0.323	0.086	-0.305	0.08
Income quintile	lowest	0.049	0.071	0.023	0.081	-0.065	0.102	-0.068	0.101	-0.053	0.10
	middle	-0.126	0.110	-0.135	0.113	-0.121	0.117	-0.109	0.120	-0.122	0.11
	fourth	0.092	0.096	0.046	0.092	0.068	0.105	0.088	0.103	0.072	0.10
	highest	0.150	0.088	0.082	0.081	0.061	0.090	0.092	0.093	0.061	0.09
Parental education	HS grad or less	-0.610	0.081	-0.542	0.081	-0.300	0.088	-0.274	0.086	-0.263	0.08
	some college	-0.433	0.080	-0.359	0.077	-0.153	0.083	-0.140	0.082	-0.121	0.08
	bachelor's	-0.460	0.083	-0.427	0.082	-0.206	0.092	-0.197	0.091	-0.191	0.09
Age as of 12/31/92		0.007	0.007	0.014	0.007	0.017	0.007	0.022	0.008	0.022	0.00
Undergrad. sector	public non-doctoral granting			-0.226	0.182	-0.231	0.090	-0.226	0.091	-0.231	0.09
	private non-doctoral granting			-0.349	0.210	-0.256	0.141	-0.229	0.141	-0.214	0.13
	private doctoral granting			-0.153	0.158	-0.137	0.105	-0.115	0.106	-0.102	0.10
Undergrad. tuition ($ thousands)				0.053	0.009	0.023	0.011	0.019	0.012	0.022	0.01
Highest degree expectation	bachelor's					-2.727	0.187	-2.720	0.187	-2.727	0.18
	1st professional					1.602	0.120	1.594	0.118	1.602	0.11
	doctorate					1.291	0.055	1.289	0.054	1.298	0.05
Undergrad. major	humanities					0.448	0.191	0.439	0.189	0.433	0.19
	social & behav. sciences					0.561	0.137	0.558	0.136	0.551	0.13
	science & math					0.869	0.127	0.866	0.126	0.862	0.12
	computers & engin.					0.583	0.174	0.581	0.177	0.582	0.17
	education					0.714	0.120	0.732	0.118	0.732	0.12
	health professions					0.304	0.130	0.310	0.128	0.325	0.12
	other					0.229	0.154	0.223	0.151	0.216	0.15
Undergrad. GPA						0.797	0.071	0.809	0.070	0.795	0.07
Marital status	married							-0.063	0.065	-0.067	0.06
Number of children	one							-0.209	0.099	-0.199	0.09
	two or more							-0.256	0.092	-0.245	0.09
Total undergrad. borrowing ($ thousands)										-0.011	0.00
Constant		-0.583	0.208	-0.898	0.209	-4.238	0.237	-4.331	0.250	-4.262	0.25

About the author

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Donald E. Heller is an assistant professor of education in the Center for the Study of Higher and Postsecondary Education at the University of Michigan. He teaches and conducts research on issues relating to higher education economics, public policy and finance, as well as academic and administrative uses of technology in higher education. The primary focus of his work is on issues of access and choice in postsecondary education, examining the factors and policies that help to determine whether individuals attend college, and what types of higher education institutions they attend. His research has been published in *The Journal of Higher Education*, *The Review of Higher Education*, *The Journal of Student Financial Aid* and *The Review of African American Education*. He is the editor of *The States and Public Higher Education Policy: Affordability, Access, and Accountability* (Johns Hopkins University Press, 2001). Heller earned a doctorate in higher education from the Harvard Graduate School of Education (HGSE) and also holds a master's degree in administration, planning and social policy from HGSE and a bachelor's degree in economics and political science from Tufts University. Before his academic career, he spent a decade as an information technology manager at the Massachusetts Institute of Technology.

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