

# Undergraduate Borrowing and Its Effects on Plans to Attend Graduate School Prior to and After the 1992 Higher Education Act Amendments

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*As student loan indebtedness has more than doubled in the past decade, it has become important to examine the effects of undergraduate debt on graduate school attendance. The significant increase in student borrowing can be attributed primarily to the passage of the Higher Education Amendments of 1992, which increased federal student loan limits and expanded eligibility in student loan programs. To measure the effects of the increased undergraduate borrowing on graduate school attendance, this study compared graduate school plans of students who attended colleges and universities between 1985-1989 (before the Amendments) and 1994-1998 (after the Amendments). The results indicated a slight negative effect of borrowing on students' plans to attend graduate schools prior to the 1992 Amendments. By contrast, the students who attended school after the 1992 Amendments showed significant positive effects of borrowing, particularly for middle-income students. If middle-income students borrowed money, they were more likely to plan to attend graduate school than students from high-income families with loans.*

**I**n 2005, nearly 69% of high school graduates were enrolled in colleges and universities in the following fall semester (U.S. Bureau of Labor Statistics, 2006). As the college enrollment rate for high school students has reached a historical high since 1959, some wonder if the trends in undergraduate enrollment will translate to the graduate arena. Therefore, just as the pipeline of effects that lead a person to attend college have been studied, it is important to examine the factors that may affect graduate school attendance. Specifically, what are the effects of undergraduate student loans on a student's attendance in graduate school and have those effects changed over time?

Student loans, initially only 18% of total financial aid in 1976-77, grew to 58% of all aid in 1996-97. In 2003-04, loans constituted 56% of aid, remaining the most common type of aid (The Education Resources Institute, 1998; The College Board, 2004). This explosion in student borrowing can be attributed primarily to the passage of the Higher Education Amendments of 1992, which created the Federal Unsubsidized Stafford Loan and Federal Direct Unsubsidized Loan programs and increased loan limits to meet the continual rise in the cost of attending higher education. By expanding eligibility, the unsubsidized

Stafford and Direct Loans dramatically increased the amounts students could borrow, as well as the number of borrowers, including students from middle- and upper-income families (The Education Resources Institute, 1998). For example, of full-time, full-year dependent undergraduates, 30% had borrowed in 1989-90 but 45% had borrowed in 1999-2000 (National Center for Education Statistics, 2005). The average loan amount borrowed per full-time equivalent (FTE) increased by 200%, from \$1,957 in 1989-90 to \$5,840 in 1999-2000, in constant 2003 dollars (The College Board, 2004). As the number of borrowers and the amounts borrowed have increased, it is pertinent to examine how this undergraduate borrowing may have affected graduate school attendance. At this point, however, only a very small body of literature addresses the relationship between financial aid and graduate school attendance (Heller, 2001). Therefore, it seems appropriate to examine the effects of loan debt on graduate school attendance, particularly as borrowing has become a primary financing tool for today's college students (NCES, 2005; Heller, 2001; Baum & O'Malley, 2003).

## **Literature Review**

In higher education, the role of financial aid has been framed in terms of access to higher education (i.e., whether to enroll in college) and choice (i.e., which type of college to attend). However, theorists such as Rawls (1971) and Le Grand (1982) have argued that equity cannot be realized until one examines the final outcomes. Eyermann (1999) supported their argument, saying that equity can only be achieved when students who have similar ability and motivation attain comparable outcomes, regardless of their financial situations. Therefore, assessing equity demands that one looks at longer-term outcomes, including graduate school attendance.

As financial aid policy has moved rapidly toward a loan-based system, it is important that higher education researchers examine the ramifications of this method of funding from an equity viewpoint. For example, if loans encourage graduate school enrollment, then they could be serving a valuable purpose in meeting the goal of equal access. However, if loans serve as a deterrent to graduate enrollment, particularly for at-risk or under-represented students, then the current loan-based financial aid policy needs to be reexamined.

In general, studies on graduate school participation have not focused on financial aid. Of the few that have, findings indicate that student background and collegiate factors other than aid play a more significant role. These same findings indicate that there is little association between the amount of debt and the decision of students to continue their education (Heller, 2001; Schapiro, O'Malley, & Litten, 1991; Weiler, 1994; Millett, 1999). Focusing on students who received a bachelor's degree in the 1992-93 academic year, Heller (2001) examined the relationship between undergraduate indebtedness and a students'

decisions to attend graduate school. In contrast to the significant effects of degree aspirations, major, and college GPA on graduate school enrollment, this study found little impact of undergraduate borrowing. Although the insignificant relationship between loans and graduate school enrollment (i.e., loans do not necessarily hamper a student's decision to attend graduate school) supports the current loan-based financial aid policy, Heller concluded that the student sample in the study had attended college before the Higher Education Amendments of 1992, and thus the study may not reveal the direct impact of the current loan-based aid policy on graduate school enrollment.

Schapiro et al. (1991), in their examination of the relationship between debt and plans to attend graduate school in the fields of arts and sciences, found that while gender and ethnicity were significantly related to graduate school attendance, debt was not. However, their data, collected by the Consortium on Financing of Higher Education (COFHE) Senior Survey, were exclusively drawn from students at elite colleges and universities who are members of the COFHE. COFHE is an institutionally supported organization of thirty-one private colleges and universities including Brown University, Columbia University, Harvard University, Michigan Institute of Technology, Princeton University, Stanford University, and others. Higher proportions of upper-income students with higher academic ability attend these elite institutions. If, as previous research suggests, student college outcomes are mitigated by socioeconomic status (SES) level and high school academic experiences, then this choice of data set reduces the opportunity to determine the effects of loans on lower SES levels.

Using 1980 High School and Beyond data from the National Center for Education Statistics (NCES), Weiler (1994) found that undergraduate debt had no association with the decision of a college graduate to attend graduate school. This study controlled for SES background characteristics as well as degree aspirations, ability, and major. Although seniors who planned to attend graduate school had smaller debts than those who were only working toward a baccalaureate degree, the multivariate analysis did not find any significant effect of debt on the decision to attend graduate school.

Weiler (1994) noted that debt levels may relate more to intentions than to actual enrollment in graduate school. He speculated that future plans play a minimal role at the times the student borrows as an undergraduate, and only gradually come into play as the student considers options of successively higher levels of debt required by graduate school. This study, however, also focused on the students who borrowed between 1980 and 1984, the early stages of the shift from grants to loans. Therefore, the effects of loans from this study do not necessarily reflect the possible differences after the Higher Education Amendments of 1992.

Millett (1999) performed a logistic regression analysis using Baccalaureate and Beyond data from NCES to determine the odds of attending graduate school. Debt was not found to be a significant factor. However, the study failed to control for students' early aspirations and motivations as well as their career intentions.

## **Research Questions**

This study investigates the plans to attend graduate school from two separate college cohorts. The first cohort attended colleges and universities between 1985 and 1989, prior to the expansion of loans. The second cohort attended colleges and universities between 1994 and 1998, after the passage of the Higher Education Amendments of 1992. Research questions raised in the study are as follows:

1. Is the total amount of student loans borrowed as an undergraduate related to students' plans to attend graduate school?
2. Is there any significant difference in the factors that influence students' plans to attend graduate school before and after the 1992 Higher Education Amendments, with a particular focus on the effect of the total amount of loans?

## **Methodology**

### *Data Source*

This study used longitudinal data collected by the Cooperative Institutional Research Program (CIRP) of the Higher Education Research Institute (HERI) at the University of California at Los Angeles. The student survey data sets were collected at two time points: at the time of college entry and four years later. Students at all institutions of higher education listed in the Fall Enrollment Files of the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS) were the targeted population for the CIRP survey. Given that the comprehensive longitudinal database offers a unique set of student and family background characteristics, college environmental variables, and post-collegiate outcomes, the data allow comprehensive examination of the effects of college loans in this study.

Two data sets were used for this study. The first sample consisted of students who were surveyed originally as freshmen in 1985 and again in 1989. The second sample consisted of students who were surveyed as freshman in 1994 and resurveyed in 1998. The follow-up surveys of each group, conducted four years after college entry, provided information about students' plans to attend graduate school and the amount of loans borrowed during their undergraduate years.

In 1985, 280,000 college students from 546 institutions participated in the CIRP Freshman survey (Astin et al., 1985). Of those, a randomly selected subsample of 86,000 students was requested for the follow-up survey in 1989. With a response

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rate of 28.8%, the follow-up survey resulted in a total response of 24,847 students from 309 institutions (Astin, 1993).

The 1994 CIRP freshmen survey included 237,777 first-year students from 461 colleges and universities. Using a similar stratified random sampling, the 1998 follow-up survey produced a total response of 16,078 students from 154 colleges and universities. In both 1989 and 1998, the surveys were conducted for randomly-selected students who had responded to the freshman survey, regardless of the students' college enrollment status (e.g., whether they enrolled in the same school in their fourth year as their first enrolled or whether or not the students left the institutions temporarily or permanently).

Participation bias relating to CIRP sampling techniques included institutional selectivity, type, and control, as well as students' individual characteristics including race and gender. Participation bias was adjusted using the CIRP stratification scheme (Astin et al., 1994).

Whether students start their postsecondary education in four-year or two-year institutions influences students' college experiences and various college outcome measures, including persistence rates, bachelor's degree completion rates, or graduate school enrollment rates. For example, only about 20% of the students who first attended public 2-year institutions attained bachelor's degrees or were still enrolled pursuing bachelor's degrees six years after college entry, in contrast to the 70% of the students who started at 4-year institutions (NCES, 2003). Therefore, to limit any possible confounding factors that influence the amount of loans borrowed and plans to attend graduate school, this study focused exclusively on the students who began their postsecondary education at four-year institutions in 1985 and in 1994. Additionally, this study only examined traditional college-age students, students who did not delay college entry, and students with no missing responses for the predictors in both of the freshman and follow-up surveys.

Thus, the selected sample used for this study was 7,588 students for the first cohort and 5,234 students for the second cohort. Among the first cohort group, 1,535 students (20%) planned to attend graduate school and 6,053 (80%) did not. For the second cohort, 1,114 students (21%) planned to attend graduate school and 4,120 students (79%) did not.

#### *Variables*

The key independent variable was the amount of loan debt accumulated during the four years of undergraduate study, as measured in 1989 and in 1998. To obtain an accurate estimate of student undergraduate borrowing, the follow-up survey in 1998 asked students to report the total amount of student loans they had borrowed for their undergraduate education. The 1989 survey, however, did not ask students to report their total amount of undergraduate loans. To acquire an estimate for the amount



of loans in 1989, a new variable was computed based on student responses in 1985 (see Appendix for details). The loan amount measure was a continuous variable, coded by every \$1,000.

Individual characteristic variables included parental income, student race/ethnicity, mother's and father's level of education, high school academic achievements (as measured by the high school grade point average), and degree aspirations as a freshman. According to Kim (2003), student socio-economic status (SES) has non-linear effects on student degree attainment. The probability of degree attainment for low-SES students was 24.7%, which was significantly lower than 60% for high-SES students. Although the negative tendency was less serious, the probability of middle-SES students completing a degree was 38%, which was 22% lower than that of the reference students, who were high-SES.

Therefore, to examine the possible non-linear effects of income on graduate school attendance, parental income was divided into three levels based on a frequency distribution: low-income (\$0-\$29,999), middle-income (\$30,000-\$59,999), and high-income (\$60,000 or higher) for the 1985-89 cohort and low-income (\$0-\$29,999), middle-income (\$30,000-\$74,999) and high-income (\$75,000 or higher) for the 1994-98 cohort.

In addition, to test the possible distinct effects of loans on graduate school attendance by parental income, the analysis included interaction terms between the amount of loans and income. Mothers' and fathers' education levels were used as separate variables to examine any distinct effects of parental education levels on students' graduate school plans.

High school GPA and degree aspirations were used as pre-college experience variables, which determine students' college experiences and thus influence their plans to attend graduate school. College major and college GPA were included as college experience variables. College major is an important variable because it often determines students' exposure to graduate education and inclination to pursue further education. A NCES study (1996) using Baccalaureate and Beyond Longitudinal data indicates that college graduates who majored in the arts and sciences were 9% more likely to enroll in further education than those who majored in fields such as business, management, or education. The college GPA was dichotomous indicator based on a four-point scale with grades of "B- or less," "B," "B+ or A-," being compared to the reference group of "A or A+."

Lastly, institutional characteristics, college tuition, and undergraduate admission selectivity (as measured by the average SAT verbal and math scores of the entering freshmen for the institution), were included in the statistical analysis.

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### Statistical Analysis

Two logistic regression analyses were conducted to examine the effect of loan indebtedness on the decision to attend graduate school for the 1985-1989 cohort and the 1994-1998 cohort. Logistic regression is an appropriate multivariate technique when the outcome variable is dichotomous. In particular, when the distribution of the outcome variable is highly skewed and cannot satisfy the normality assumption of ordinary least square regression, logistic regression is an appropriate technique. In this study, about one-fifth of the students in both cohorts planned to attend graduate school, while four-fifths of students did not (Kleinbaum, Kupper & Muller, 1988). The  $B$  coefficients for each variable in the logistic regressions were converted to Delta- $p$  statistics, using a mathematical equation recommended by Peterson (1985):

$$\Delta p = \frac{e^{L_1}}{1 + e^{L_1}} - p \quad (p = \text{"estimated population means" in Table 1})$$

$$L_1 = Ln \frac{p}{1 - p} + b \quad (b = \text{regression coefficient})$$

$$\Delta p = p^*(1 - 0)^*e(b) - 1 / 1 + p^*e(b) - 1$$

The Delta- $p$  statistics identify the relationship between a unit change in a predictor and the estimated percentage change in the outcome variable (Peterson, 1985; Cabrera, 1994). For example, Delta- $p$  statistics of .05 indicate that a unit change in the predictor indicates a 5% increase in the probability of students' plans to attend graduate school.

### Limitations

One significant limitation of this study is that the follow-up surveys were conducted four years after the students' college entry and they did not provide information on students' *actual* enrollment in graduate school but included their *plans* to attend graduate school. Although not all students who plan to attend graduate school actually enroll in graduate school, additional analysis presents a strong correlation between students' plans to attend graduate school and their actual attendance. The first cohort that entered colleges and universities in 1985 was resurveyed in 1994, 10 years after their first college entry. This follow-up data offered a variable on students' actual graduate school enrollment for the first cohort. The second cohort, for 1994-98, did not have a second follow-up survey, and thus it was not possible to use the actual graduate school enrollment for the study. Of the students who *planned to attend* graduate school in 1989 ( $N = 1,503$ ) however, 93.5% (1,406) *actually attended* graduate school by 1994, indicating a strong correlation of .423 at the .001 significance level.

A second limitation is that the loan amounts used in the study were students' self-reported measures. Students' recollections of the amounts borrowed for their undergraduate years are not always accurate, thus the loan amount might be overestimated or underestimated by students' tendencies in answering the survey. Additionally, the loan amount in the study included all types of loans available through federal, state, institutional, and private loan programs, and parental borrowing through the Parental Loans for Undergraduate Students (PLUS) program. Although it is important to consider the type of loans that students borrowed for their undergraduate education, because of the different payment plans and interest rates for each type of loans, this study cannot show the impact of specific types of loans on students' plans to attend graduate school.

## Results

### *Results for the 1985-89 Cohort*

The table on page 13 presents the Delta- $p$  statistics for the predictors that have a statistically significant relationship with students' plans to attend graduate school. The second column in the table presents the results of the logistic regression model for the 1985-1989 cohort. In terms of model fit, 68% of all students entered in the model were correctly classified. The goodness-of-fit statistics show that the model fits the data well, and is statistically significant ( $df = 35$ , chi-square = 207.601) at the  $p < .001$  level.

The 1989 loan debt variable did not have a statistically significant effect on students' plans to attend graduate school and the non-significant effect of loan debt was consistent across students' parental income. This finding confirms previous research, which indicates that there is no significant (or marginal) impact of loans on graduate school attendance for the students who attended colleges and universities before the Higher Education Amendments of 1992 (e.g., Heller, 2001; Baum & Saunders, 1998; Weiler, 1994).

By contrast, various student background characteristics and college experience variables had significant relationships with students' plans for graduate school attendance. Race/ethnicity was a significant predictor of students' plans to attend graduate school: Asian students were 18% more likely to plan to attend graduate school than their White, non-Hispanic counterparts. Research has continuously shown that Asian students tend to have higher college enrollment rates, persistence rates, and graduate school attendance rates than other racial/ethnic groups (e.g., NCES, 2005; Perna, 2004).

Parental income or father's and mother's education was not a significant predictor of planning to attend graduate school. However, students with a high school GPA of B+ or A- were significantly less likely to plan to attend graduate school than their counterparts with high school GPAs of A or A+. Students with college GPAs of B- or lower and with a B average were 11% and



**Table**  
**Delta-*p* Statistics of Borrowers Planning to Attend Graduate School,**  
**by Cohort Groups**

Variable	1985-89 cohort	1994-1998 cohort
Race (reference: White)		
African American		
Asian	.18**	.09**
Latino		
Parental income (reference: High income)		
Low Parental Income		-.08*
Middle Parental Income		-.09**
Father's education (reference: Some graduate education or graduate degree)		
High school degree or less		
Some college education or college degree		
Mother's education (reference: Some graduate education or graduate degree)		
High school degree or less		
Some college education or college degree		
High school GPA (reference: A or A+)		
B or lower		
B+ or A-	-.05**	-.03*
Degree aspirations as a freshman (reference: Professional degrees such as MD or JD)		
Bachelor degree	-.13***	-.19***
Master or doctorate degree	-.10***	-.12***
College GPA (reference: A or A+)		
B- or less	-.11***	-.16***
B	-.06*	-.12***
A- or B+		-.08***
College tuition (reference: High tuition)		
Low tuition		
Middle tuition		
College selectivity (reference: High-top third)		
Low (bottom third)		
Middle (middle third)		.05*
College major (reference: Other majors)		
Biological science	.20***	.10**
Business	-.11***	
Education	-.10**	
Engineering		
English		
Health professional	.11*	.09**
History/Political science	.10*	
Humanities		
Fine arts		
Math/Statistics		
Physical science	.25***	.16**
Social science		
Amount of loans (\$thousands)		
Loan for high parental income		
Loan for middle parental income		.004*
Loan for low parental income		
Estimated population means (percent planned to attend graduate school)	20%	21%
Chi-square	207.601***	477.528***
Percent of cases properly classified	68%	81%

*Note.* Only the variables that had statistically significant relationship with students' plans to attend graduate school are presented.  
\*  $p < .05$  level, \*\*  $p < .01$  level, \*\*\*  $p < .001$

6%, respectively, less likely to plan to attend graduate school than their counterparts who had a college GPA of A or A+. There was no significant difference in the probability of planning to attend graduate school between students with GPAs of B+ or A- and those with A or A+.

The degree aspirations as freshmen were another significant predictor. Students who had low degree aspirations as freshmen (bachelor's degree) were 13% less likely to plan to attend graduate school than students who had high degree aspirations (professional degrees such as medicine or law). Students with master's or doctoral degree aspirations were 10% less likely to plan to attend graduate school than their counterparts who had professional degree aspirations.

Students' major was also a statistically significant predictor. Those who majored in biological sciences, the health professions, history/political sciences and physical sciences were significantly more likely to plan to attend graduate school than students whose major was in other subjects. In particular, students whose majors were biological and physical sciences were 20% and 25%, respectively, more likely to attend graduate school than students of other majors. Students majoring in business or education were least likely to plan to attend graduate school.

#### *Results for the 1994-98 Cohort*

The third column in the table presents the results of the second cohort logistic regression analysis. In terms of model fit, overall 81% of the students entered in the logistic regression model were correctly classified. The goodness-of-fit statistics show that the model fits the data well, and is also statistically significant ( $df = 35$ , chi-square = 477.528) at the  $p < .001$  level. The logistic regression that predicts the likelihood of graduate school attendance in 1998 revealed a different story from that of 1985-1989 cohort. In contrast to the non-significant effect of the 1989 loan debt on graduate school attendance, the 1998 loan debt was a significant positive predictor on graduate school attendance, particularly for middle-income students. For the students from low- and high- income groups, borrowing did not appear to be a factor for their plans to attend a graduate school. However, for middle-income students, borrowing had a slightly positive effect (0.4%) on plans to attend graduate school. This finding supports Eyermann's (1999) argument that the profusion of college loans after the 1992 Amendments might have created a culture in which loans are now one of the most feasible ways to pay for college. Given that the Higher Education Amendments of 1992 introduced unsubsidized loans, which have mainly targeted middle-income families, the small but significant positive association between borrowing and planning to attend graduate school for middle-income undergraduates clearly reflects the current emphasis in loan policy.

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Parental income was also a significant predictor of students' plans to attend graduate school: students from low- or middle-income families were 8% to 9% less likely to plan to attend graduate school than their counterparts whose parental income was high.

Similar to the 1985-89 cohort, students with high school GPAs of A- or below were less likely to plan to attend graduate school than students whose high school GPAs were A or A+.

The strong effects of degree aspirations for the 1985-89 cohort were even larger for the 1994-98 cohort. College GPA remained as a positive predictor of graduate school planning. The higher the college GPA, the more likely it is that the student plans to attend graduate school.

Majoring in biological science, the health professions, and physical science also continued to have strong positive associations with students' plans to attend graduate school. However, the negative effects of majoring in business and education in 1985-89 have disappeared in the 1994-98 cohort.

## **Discussion**

### *Are Loans Promoting Equity?*

Increased borrowing over the past decade has led some to question the effects of loan debt on graduate and professional school attendance, with particular emphasis on the possible differences in the effects seen prior to and after the Higher Education Amendments of 1992. For the students who borrowed between 1985 and 1989, before the 1992 Amendments, loan debt appears to have had no significant effect on graduate school attendance. Although it was anticipated that increased borrowing after the passage of the Higher Education Amendments of 1992 would have acted as a deterrent to graduate school attendance for those who borrowed between 1994 and 1998, there were no significant effects of loans on the plans to attend graduate school for the students of low- and high-income families. This indicates that borrowing does not hamper the plans to attend graduate school for low- and high-income students. Meanwhile, this study found a small but statistically significant positive effect of loans on the middle-income students' graduate school attendance. In other words, loans in the 1994-98 cohort data (after the 1992 Amendments) appear to play an active positive role in students' plans to attend graduate school only for middle-income students.

Given that nearly 60% of aid is now being delivered as student loans and borrowing has become commonplace (The College Board, 2004), these results are understandable. Increased college costs combined with an expanded loan program mean that more students are eligible to borrow. Whereas borrowing used to be relatively infrequent before the 1992 Amendments, today it is the primary option for paying educational costs for most students. Despite the significant increase in undergraduate debt that some students may have accumulated, their

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aspirations for graduate school appear to have remained high because borrowing is now the norm. Additionally, with the types of aid available and the high cost of college, today's students may be left with little choice but to borrow. Changes in economic or other conditions faced by students may also have contributed to these results. The 2002 National Student Loan Survey (NASLS) conducted by Nellie Mae showed that over 70% of the college students said that loans were very or extremely important for them to continue their education after high school (Baum & O'Malley, 2003). In particular, the percentage of students who said that loans were a major factor in their decision not to go to graduate school has significantly decreased from 69% in 1997 to 42% in 2002. Therefore, as borrowing has become more commonplace, loans seem to be a viable method of helping students pay for college without discouraging further education.

The same trend in borrowing habits transcends to the general attitudes toward debt in today's society. As common as student loan borrowing has become, the NASLS showed that credit card use is even more pervasive, with 83% of undergraduate students having at least one such card (Baum & O'Malley, 2003). This survey also revealed that while most students use credit cards responsibly and do not accumulate large amounts of credit card debt, senior students at four-year institutions have an average of \$20,202 in combined education loan and credit card balances; 16% of the debt is credit card debt. The widespread acceptance of borrowing through credit cards may contribute to an overall relaxed attitude about student loan borrowing as well.

With significant increases in college enrollment, particularly from the students of low-income families, and with the stagnation of financial support for higher education from the federal and state governments, finding successful ways to financially support students' educational aspirations has become a crucial issue in higher education today. In this context, there has been much controversy over the relative fairness of loans versus grants (Woodhall, 1992). Those who favor student loans argue that because loan repayments can be used to finance future students, loans are a more efficient way to provide financial aid. Some also argue that loans are more equitable than grants because they are eventually paid back by those who benefit from the increased education, while grants are gifts to college-going students with no guarantee of repayment to society. Another argument in favor of loans is that funding through grants represents an unfair benefit for those who will reap higher incomes in the future.

What is unclear is how well students will be able to handle the combined undergraduate and graduate school debt. Obviously, post-collegiate income will be a strong determinant and students with lower post-collegiate income may find repayment

difficult. Graduate and professional school borrowing has also accelerated dramatically since 1992, with more than a million graduate and professional students now borrowing nearly \$8 billion per year (The Educational Resources Institute, 1996). According to a recent data from NCES (2002), 30.4% of graduate and first-professional students received loans, with an average amount of \$14,486 in 1999-2000. For this reason, researchers should look to the combined effects of undergraduate and graduate school borrowing.

The NCES report indicates that average accumulative debt levels are especially high for students attending professional schools in medicine, dentistry, and law (\$48,742), compared with \$33,055 for doctoral students. The report also indicates that underrepresented minority students are the groups most likely to borrow at the graduate and professional level. Graduate school degree recipients who choose lower-paying, public service-oriented jobs may have the most difficult time repaying their loans. However, for some borrowers who leave school with very high amounts of student loan debt, federally authorized flexible payment plans and loan consolidation options could make repayment easier. These new options, expanded with the Higher Education Amendments of 1992, may explain why loan defaults have been decreasing while borrowing has been increasing.

Additionally, interest rates on loans have fallen dramatically since 1996, thus lowering the borrowers' monthly loan payments. Therefore, a long-term view is important when examining the effects of student loan debt with a particular attention to the differences by the type of graduate degrees. For example, the effects of undergraduate and graduate borrowing for students in the second cohort of this study must take into consideration master's-level (2000 graduates), MD degrees (2002 and beyond if one considers residency), and PhDs (2005 graduates) as these groups move into repayment status.

Despite that educational loans for students have increased significantly over the past decade, it appears that choices to attend graduate/professional schools and attain higher-level degrees have not been constrained by rising debt. And yet, in spite of this good news, student loan debt should continue to be monitored, especially as current graduate students complete their education and begin entering repayment with an increased student loan debt.

#### *What Matters in Students' Plans to Attend Graduate School?*

In the analysis from the second cohort, loans had a positive association with middle-income students' plans to attend graduate school but no significant positive or negative relationship with the plans of low- and high-income students. However, these findings are based on a statistical model that assumes all other predictors in the model are the same. In reality, all other things

but loans cannot be the same. For example, there are several predictors that had more significant associations with students' graduate school attendance than loans. Degree aspirations as freshmen and college GPA were consistently significant predictors in graduate school plans for both cohort groups and the effects were even larger for the second cohort than the first cohort. These findings confirm previous research regarding the importance of degree aspirations and college GPA on graduate school attendance (Heller, 2001; Millett, 2003; Walpole, 2003). Generally, lower-income students or underrepresented minority students tend to have lower degree aspirations and lower GPAs. With the argument that graduate school attendance should be considered one phase of the educational pipeline, Perna (2004) emphasized the importance of cultural and social capital and academic achievement to understand the graduate school attendance of different racial/ethnic groups.

Graduate school attendance significantly influences students' future life opportunities, including career choices, annual earnings, unemployment rates, and other non-monetary benefits (U.S. Census Bureau, 2004). As policy makers emphasize the importance of the pipeline from high school to college, it is also critical to consider strategies to encourage students' aspirations for post-baccalaureate education and to improve their academic performance in college, particularly for underrepresented minority or lower-income populations.

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**Appendix**  
**Variable Coding for the 1985-1989 and 1994-1998 Data Sets**

Variable	Coding
Race (reference group: White)	
Black	Coded 0 = non-Black, 1=Black
Asian	Coded 0 = non-Asian, 1 = Asian
Latino	Coded 0 = non-Latino, 1 = Latino
Family income for 1985-89 cohort (reference group: High: \$60,000 or higher)	
Low income	\$30,000 or less
Middle income	\$59,999 or less
Family income for 1994-98 cohort (reference group: High: \$75,000 or higher)	
Low income	\$30,000 or less
Middle income	\$74,999 or less
Father's education (reference group: Some graduate or graduate degree)	
Low father's education	Less than some college education
Middle father's education	Some college or college degree
Mother's education (reference group: Some graduate or graduate degree)	
Low mother's education	Less than some college education
Middle mother's education	Some college or college degree
High school GPA (reference group: A or A+)	
Low high school GPA	B or lower
Middle high school GPA	B+ or A-
Degree aspirations as a freshman (reference group: Professional degrees such as MD, JD)	
Bachelor degree	Coded 1 = bachelor's degree
Master or doctorate degree	Coded 1 = master's or doctorate degree
College GPA (reference group: A or A+)	
B- or less	Coded 1 = B- or less
B	Coded 1 = B
B+ or A-	Coded 1 = B+ or A-
College tuition (compare to High tuition: higher than \$5,700)	
Low tuition	\$1,550 or less
Middle tuition	\$5,700 or less
College selectivity (compare to High selectivity: 1,120 or higher SAT verbal and math of entering freshmen)	
Low selectivity (bottom third)	Coded 1 = lower than 1,011
Middle selectivity (middle third)	Coded 1 = lower than 1,120
College major (reference group: Other major)	
Biological science	Coded 0 = no, 1 = yes
Business	Coded 0 = no, 1 = yes
Education	Coded 0 = no, 1 = yes
Engineering	Coded 0 = no, 1 = yes
English	Coded 0 = no, 1 = yes
Health professional	Coded 0 = no, 1 = yes
History/Political science	Coded 0 = no, 1 = yes
Humanities	Coded 0 = no, 1 = yes
Fine arts	Coded 0 = no, 1 = yes
Math/Statistics	Coded 0 = no, 1 = yes
Physical science	Coded 0 = no, 1 = yes
Social science	Coded 0 = no, 1 = yes

<b>Variable</b>	<b>Coding</b>
Student's 1989 loan debt*	Coded by \$1,000 increments
Student's 1998 loan debt	Coded by \$1,000 increments
Graduate school plan	Coded 0 = no, 1 = yes

\**Note.* Although the follow-up survey for the first cohort (1985-89) did not provide an accurate amount of loans that students borrowed for their undergraduate education, the second follow-up survey (1994) included a variable on the total amount of loans that students took out for their education, including undergraduate and graduate schools. Therefore, for the students who did not attend graduate school, it was assumed that the total amount of loan that student reported in 1994 was used only for their undergraduate education. For the students who attended graduate school, their total amounts of loan were calculated by multiplying the amount of loan in 1985 as freshmen by 3.137, because the average accumulated loans for those who did not go to graduate school were 3.137 times their freshman loans.