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Does Parental Income Determine the Effect of Loans on Students' Degree Attainment?

By Dongbin Kim

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Student borrowing has more than doubled in the past decade, increasing the importance of understanding how student borrowing affects degree attainment. This study examines the impact of borrowing on degree attainment rates of students who attended four-year colleges and universities during 1994-1999. The results show that an increase of \$1,000 has a significant positive impact on degree attainment. However, the influences of loans are not consistent across parental income levels. Loans are significant positive predictors for students of medium parental income but not for lower or higher parental income students.

The growing reliance on loans to pay for higher education has become particularly noticeable: loans comprise almost 60% of all student financial aid, in contrast to grants, which total 40% (The College Board, 2002). The original purpose of loans was to extend students' choices to more expensive colleges, in response to the shortage in federal grant aid. However, loans have become a popular means by which students pay for any form of postsecondary education.

Because the central objective of financial aid is to provide equal educational opportunity to students, and the majority of financial aid consists of loans, it is crucial to question whether loans have actually promoted educational opportunity. According to Eyermann (1999), equal educational opportunity can be achieved when students who have similar ability and motivation attain comparable outcomes, regardless of their financial situations.

While loans are an increasingly important factor in how students pursue their education, degree attainment has been considered one of the most important outcomes of higher education (Pascarella & Terenzini, 1991; St. John et al, 2000a). Particularly, attaining a bachelor's degree substantially affects students' future economic and social lives. According to a report from The College Board (1999), attaining a degree pays off in terms of post-collegiate income: those who have a bachelor's degree earned an average of \$41,738 while those with some college education (without a bachelor's degree) earned \$27,052 in constant dollars in 1997. The difference in annual income between college graduates and college dropouts was more than three times that between college dropouts and high school graduates.

The unemployment rate by educational attainment tells a similar story. A government report released in 2003 found that college graduates had an unemployment rate of 3.1%, com-

pared with 4.6% for college dropouts and 5.2% for high school graduates. (U.S. Bureau of Labor Statistics, 2003). Another study found that private social benefits, including improved health and life expectancy, improved quality of life for offspring, increased personal status, and increased time for hobbies and leisure activities were distributed unevenly depending on whether one has a college degree (The Institute for Higher Education Policy, 1998). Therefore, it is clear that earning a degree affects one's future economic and social life, regardless of the quality of education.

From the perspective of promoting equity, the importance of degree attainment cannot be overstated. Although it has been reported that the college enrollment rates for lower socioeconomic status (SES) students have been increasing, the disparities in college enrollment by students' SES are still apparent. Among the students who began in four-year institutions in 1994, 26% of those from the lowest SES quartile earned a bachelor's degree, versus 61% from the highest SES quartile (National Center for Education Statistics, 1996). Based on these trends, Mortenson (1991) has argued that low SES students have a harder time passing three "hurdles" on the way to attaining a bachelor's degree than high SES students: graduating from high school, going to college, and graduating from college. At each stage, students from lower SES fail at a higher rate than more affluent students.

Given the importance of degree attainment in promoting equity, as well as its social and economic benefits, there have been serious doubts raised about whether loans promote students' educational success. Some believe that students worried about their accumulated debt may drop out of school (The Institute for Higher Education Policy, 1998). Conversely, others argue that the profusion of college loans has created a culture in which loans are now one of the most feasible ways to pay for college, and that culture results in a positive association between loans and degree attainment (Choy, 1998; Eyermann, 1999).

Yet another argument focuses on the effect of loans on degree attainment differentiated by students' parental income levels (Braunstein et al, 1999), and argues that students with varying income levels react differently to the same amount of financial aid (Heller, 1996). Therefore, without considering the interaction between the amount of loans and students' characteristics (e.g., parental income), studies tend to simplify the complicated and entangled effects of loans on degree attainment.

To investigate the effects of loans on degree attainment, this study proposes three main questions:

- How do borrowers' degree attainment rates differ from those of non-borrowers?

Research Questions

- How do borrowers' degree attainment rates differ by the total amount of loans borrowed?
- How does the effect of loans on borrowers' degree attainment differ by parental income level?

According to Tinto (1993), the effects of the factors that are known to influence students' degree attainment cannot apply equally for each subgroup of students. In an attempt to discern the significant differences in the effect of loans on different parental income groups, this study will clarify the varying impacts of loan amounts on the degree attainment of students from different parental income groups.

Literature Review

Rates of degree attainment can be defined in two ways: an *institutional* rate of degree completion by students who earn a degree from the college or university they first attended; and a *system* rate of degree completion by students who earn a degree within the higher education system, including those who attended more than one college and those who returned after dropping out. This study uses the latter definition. According to Tinto (1993), the national college dropout rate has consistently hovered around 45% for more than 100 years. Recent data showed that 37% of the students who began their college education at four-year institutions in 1989-90 had left college without earning a degree by 1994 (NCES, 1996). Braxton (2000) referred to this phenomenon as a "puzzle," because it is unclear why so many students leave their institutions (p.1). What accounts for the situation that more than one-third of all students at four-year institutions drop out? Studies from an economic perspective consider financial aid to be the significant determinant in students' persistence and seek to clarify if financial aid provides an equal opportunity for financially needy students to persist in college (Somers, 1994; St. John et al, 2000b).

Previous studies (Eyermann, 1999; Somers, 1994; St. John et al, 1991) found that federal financial aid has a significant effect on promoting persistence. Using data from the early 1980s, St. John et al (1991) found that persistence decisions were more responsive to increases in aid (grants, loans, and work-study) than increases in tuition. In another study, Eyermann (1999), using a longitudinal study conducted in 1985 and follow-up surveys in 1989 and 1994, found that students who had any type of loan as freshmen were as likely to attain their bachelor's degrees as were those who did not borrow, even after controlling for all other factors. In this context, Jones and Moss (1994) argued that students who borrow money to pay for their education can feel "secure," because they have as much chance of graduating as students who do not borrow (p.10).

Conversely, a report from the Institute of Higher Education Policy (1995) asserted that the college dropout rate increased by 3% if loan amounts increased by \$1,000. The opposite was

found for grants: a \$1,000 increase in grants decreased the drop-out rate by 14%. In a different study, St. John et al (1992) used data from the 1987 National Postsecondary Student Aid Study (NPSAS) to find that loans had differential effects in public and private institutions: having loans was negatively related with within-year persistence in public four-year colleges, but had no significant impact on within-year persistence in private colleges. Specifically, for students in public four-year colleges, a \$100 increase in debt decreased the probability of within-year persistence by .06 percentage points, but for students in private four-year colleges, loans did not have a statistically significant impact on persistence.

Method

Data Source and Sample

This study uses data from the Freshman Survey in 1994, and the follow-up study (the College Student Survey), both of which were collected by the Higher Education Research Institute (HERI) at the University of California, Los Angeles. These surveys offer national longitudinal data for students who began college in 1994, and who were resurveyed four years later in 1998.¹ The total sample was 5,152 students who began their postsecondary education at four-year institutions in 1994. The sample consisted of 3,018 (58.6%) students who received loans for their undergraduate education and 2,134 (41.4%) students who did not. For descriptive purposes, non-borrowers as well as borrowers were included in the preliminary analysis. However, only the borrowers were included in the final statistical model.

Note that the data in the HERI surveys are slightly oversampled from highly selective and private four-year institutions. In addition, students in most proprietary, special vocational, or semi-professional institutions were not included in the surveys. Further, only the students who were full-time students when they were freshmen were included in the surveys, and thus the results of this study do not necessarily represent the characteristics of all first-time student borrowers at all four-year institutions.

As indicated earlier, since the late 1980s, borrowing has dramatically increased. Thus, the longitudinal data, which focus on students who began their postsecondary education in 1994, reflect the latest trend in the amount of money borrowed. In addition, the follow-up survey offers an accurate estimate of the total amount of undergraduate borrowing based on a question that asks students to report the total amount they borrowed for their undergraduate education.

¹ Given that college graduation rates are sometimes calculated based on six years of college education (e.g., federal graduation rates), it should be noted that degree attainment in this study referred to "degree attainment in four years."

Variables

The unit of analysis in this study was a student who entered a four-year institution in 1994. The dependent variable was a dichotomous measure of whether students received a bachelor's degree by 1998: 3,934 students received a degree and 1,218 students did not. Because the obtained degree could affect the total amount of loans, students who received a degree higher than bachelor's were excluded from the analysis. There were three categories of independent variables: individual background variables; college experience variables; and financial aid variables. Individual background variables included gender, race, mother's and father's education, parental income, and high school GPA. According to Astin et al (1996), four-year degree attainment rates for African-American students were significantly lower than those for all other racial/ethnic groups. Therefore, race in this study was divided into two categories: African-Americans and all others. To examine the differential effects of parental income and father's and mother's education on degree attainment, these variables were not combined as a single socioeconomic status measure.

College experience variables included attendance status (full- or part-time enrollment), college GPA, work experience, academic involvement during college, academic majors, and the characteristics of the college that students attended. Whether students attend a college full-time is important because it is an indicator of how seriously students take their education and can reflect students' financial situations. Previous studies have shown that students who attended college part time were more likely to drop out (Astin et al, 1996). Because there is no clear-cut criterion about the definition of full- and part-time status during all undergraduate periods, this study used students' full-time status when they were freshmen. In addition, students' undergraduate GPA was used as a college experience variable because previous research has consistently indicated the important effect of students' GPA on degree attainment.

Work experience during college was measured by three dummy variables: whether students had part-time jobs on campus; whether students had part-time jobs off campus; and whether students worked full time. Academic involvement was a composite measure of three academic activities: whether students discussed coursework with other students; worked on group projects in class; or studied with other students.

For the 1999-2000 academic year, there were significant differences in average tuition charged by public four-year colleges and universities (\$3,356), and private four-year college (\$15,380) (The College Board, 1999). Because college costs can influence the amount that students borrow and can be a factor in degree attainment, college tuition and fees in the 1994 academic year were included in the statistical model. In addition, institutional undergraduate admissions selectivity and control

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The probability of degree attainment, with special consideration of the effects of the total amount of loans, was examined by three sequential logistic regression models.

were also included in the analysis, because researchers have argued that whether students attended more selective institutions or attended private institutions often determines students' degree attainment rates (The Higher Education Research Institute, 1995; Adelman, 1999; McCormick, 1997).

The financial aid variable took two forms in this study. To address the first research question about whether there are significant differences in degree attainment rates by borrowing status, a dichotomous variable (borrowers versus non-borrowers) was used in a *t*-test. To examine the effect of borrowing on degree attainment after controlling for all individual characteristics and college experience variables, the actual loan amounts that students borrowed for their college education was used in a logistic regression.

Statistical Methods

To examine the effects that loans have on degree attainment, three analytical steps were conducted. First, the means of degree attainment rates by borrowers and non-borrowers were compared using a *t*-test. The analysis of covariance (ANCOVA) was then used to examine the means of degree attainment rates by borrowers and non-borrowers, after controlling for the effects of preexisting differences between the two groups. ANCOVA is a useful statistical technique in comparing group means when significant individual differences among groups already exist.

Second, the probability of degree attainment, with special consideration of the effects of the total amount of loans, was examined by three sequential logistic regression models: individual background variables were included in Model 1; college experience and institutional variables were added to Model 1; and the total amount of loans in intervals of \$1,000 was added to Model 2. The three sequential models made it possible to examine both the direct effects of the entered variables and the relationship between these variables with the successive variables (Hu and Hossler, 2000). Lastly, to examine the distinct effects of the total amount of loans on degree attainment by parental income, three sets of logistic regression were conducted for low (lowest third), medium (middle third), and high (highest third) parental income groups.

This study used logistic regression, which estimates how various factors influence the probability of an occurrence of a dichotomous outcome variable (whether students attained a bachelor's degree). In particular, logistic regression is an appropriate multivariate technique when the distribution of outcome variables is skewed. In this study, about four-fifths of the students attained a bachelor's degree. The coefficients for each variable in the logistic regressions were converted to Delta-*p* statistics, using a mathematical equation recommended by Peterson (1984). The Delta-*p* statistics identify the relationship between

a unit change in a predictor and the estimated percentage change in the outcome variable (Cabrera, 1994; Heller, 2000).

Limitations

There are several limitations in the data used in this study. Currently, a multi-institutional attendance pattern is a notable feature of college students' behavior in higher education institutions. However, because the data do not provide specific information about changes in the institutions that students attended, this study examined the effect of institutional factors that students attended first, assuming that the institutions students attended first probably had the greatest influence on students' degree attainment.

Second, given the different characteristics of various types of loans (such as interest rates or repayment periods), the effects on degree attainment may vary. However, the data do not include variables about specific types of loans and their individual amounts and thus the results of this study can show only the general effects of loans and the total amount borrowed.

In addition, the effect of loan amount on degree attainment is closely correlated with other types of financial aid (e.g., grants), which have their own effects on degree attainment. Therefore, by excluding other types of financial aid in the statistical model, this study may produce a biased (either upward or downward) estimate of the effect of loans (Dynarski, 1999). In examining the impact of loans, students' dependency status is important because it decides types of income—parental income for dependent students and personal income for independent students—and thus influences the maximum limit of loans that students can borrow (Hu and St. John, 2001). Therefore, without controlling for students' dependency status, it is difficult to generalize the findings of this study, because the different impacts of loans by students' SES can vary further by students' dependency status.

Results

Mean of Degree Attainment without Controlling for Individual Differences

To answer the first research question—how the degree attainment rate of borrowers differ from that of non-borrowers—mean differences in degree-attainment rates between the two groups were compared. Table 1 indicates that there was a significant difference in the rate of degree attainment between the two groups at the .001 level, revealing that non-borrowers (.68) had higher degree-attainment rates than borrowers (.61). In addition, significant mean differences were found at the .001 level on race, parental income, father's and mother's education, college tuition, institutional selectivity, institutional control, work experience, major (health sciences), and GPA.

Gender and high school academic achievement also showed significant mean differences by borrowing status at the .05 level. In other words, borrowers were more likely to be

female, to be African-American, to attend private institutions, to pay higher tuition, to major in health sciences, and to have work experiences (part-time job on campus, part-time job off campus, and full-time job).

On the other hand, students who had higher parental income, higher father's and mother's education, higher high school academic achievement, higher GPA, and attended higher selectivity institutions were more likely to be non-borrowers.

TABLE 1
Means of Individual Variables
by Borrowers and Non-Borrowers

Variable	Means of Variables		t-test
	Borrowers	Non-borrowers	
Background Variables			
Degree attainment	.61	.68	47.479***
Gender (female)	1.62	1.60	-2.113*
Race (African-American)	1.04	1.01	-7.158***
Parental income	1.88	2.41	38.091***
Father's education	5.38	6.32	25.725***
Mother's education	2.49	3.00	18.709***
HS academic achievement	6.50	6.56	2.073*
Institutional Characteristics			
Tuition	12.23	11.53	-6.769***
Control of institution (private)	1.80	1.71	-10.194***
Institutional selectivity	1028.66	1050.43	9.363***
Enrollment status (full-time)	1.9	1.9	-.451
Major (as compared to all other majors)			
Biological sciences	1.09	1.11	1.919
Business	1.17	1.18	.804
Education	1.08	1.07	-2.136
Engineering	1.05	1.06	1.754
Health sciences	1.05	1.03	-4.380***
Humanities	1.05	1.05	-.511
Art	1.03	1.03	-1.023
Physical sciences	1.04	1.04	1.016
Social sciences	1.14	1.13	-.656
Work Experiences (as compared to not working)			
Part-time off campus	1.63	1.54	-9.014***
Part-time on campus	1.72	1.48	-25.218***
Full-time	1.12	1.07	-8.381***
Academic involvement during college	7.70	7.66	-1.870
Average college grade	4.51	4.60	4.597***

N=10,176

Significant at .05 (*), .01 (**), and .001 (***)

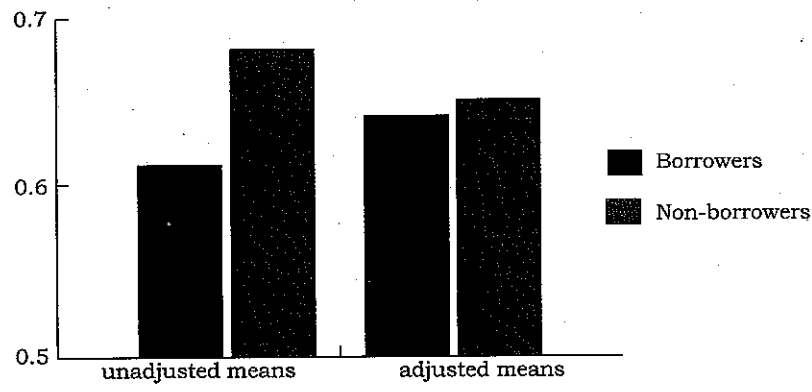
This preliminary finding, a higher degree-attainment rate for non-borrowers, seems to support the pessimistic argument that loans probably have a negative impact on students' degree attainment because borrowers may be worried

about their accumulated debt, and decide to drop out of school to avoid borrowing more money. From the *t*-test, however, it is not clear if the seemingly significant differences in degree attainment by borrowing status were truly the effect of loans. As can be seen from the differences in individual background and college experience variables by borrowers versus non-borrowers, the significant difference in degree attainment could have been caused by factors other than loans. To control for the possibility of preexisting differences between the two groups, an analysis of covariance (ANCOVA) was conducted.

Mean of Degree Attainment after Controlling for Preexisting Differences

In contrast to the significant differences in degree-attainment rate represented by unadjusted means from the *t*-test, adjusted means from ANCOVA showed that the adjusted degree attainment rate of .64 for borrowers was not statistically different from the .65 rate for non-borrowers. Borrowers were as likely to graduate from college as non-borrowers, after controlling for individual characteristics (see Figure).² The findings of ANCOVA analysis showed that the seemingly lower degree-attainment rate of borrowers was not a result of their borrowing, but more likely a result of their preexisting characteristics (e.g., lower parental education), which lowered the borrowers' degree-attainment rate. From the descriptive statistics, it became clear that borrowing is not detrimental in students' decisions to stay in college until they complete a degree.

FIGURE
Unadjusted Versus Adjusted Means of Degree Attainment
by Borrowers and Non-Borrowers



² Before conducting ANCOVA, a series of MANOVA were conducted to examine if there is any significant interaction between covariates (e.g., individual background variables) and the grouping variable (borrowers versus non-borrowers) on degree attainment. No significant interaction (except institutional control and tuition) was found. Thus, individual characteristics, except for institutional characteristic variables, were controlled in ANCOVA.

However, it is still not clear if there is any significant relationship between the total amount of loans and the probability of borrowers' degree attainment. Thus, a sequential logistic regression analysis, which included student characteristic and institutional variables, was conducted to answer the third research question: How do borrowers' degree-attainment rates differ by the total amount of loans borrowed?

The Effects of the Total Amount of Loans on Degree Attainment

Table 2 presents the results of the sequential logistic regression analysis, which reveals the specific effects of the amount of loans on degree attainment as well as the effects of other important individual and institutional variables. Each of the three models had statistically significant chi-square values (at the .001 level). Additionally, the increases in chi-square and the reduction in the -2 Log L statistic in each successive model showed that the addition of variables to the models increased the ability to predict the probability of degree attainment. The final model correctly predicted 74.3% of completing a bachelor's degree.

When the individual background variables were entered into Model 1, female, African-American, parental income, father's education, and high school academic achievement had significant effects on the likelihood of degree completion. For example, African-American students were 4.9% less likely than all other racial group students to attain a degree. Female students were 5.6% more likely to attain a degree than males. In addition, the higher the parental income, father's education, and high school academic achievement, the higher the probability of degree attainment at the .001 level.

However, as college experience and institutional variables were added to Model 2, the positive effects of being female, father's education, parental income, and the negative effect of being African-American, disappeared. For example, if African-American students have the same college experiences and attend the same institutions as other students, they are as likely to graduate from college as other students. This finding suggests that the lower degree-attainment rate for African-Americans is not because of their individual background characteristics (e.g., parental income), but because of the college experiences and factors of the institutions that African-American students attend.

On the other hand, high school academic achievement remained significant in Model 2, which means that, regardless of college experiences or institutional characteristics, high school academic achievement is a significant predictor in completing a degree. This finding is consistent with previous research (e.g., Adelman, 1999), which argues that one of the most important predictors in degree attainment is academic preparedness for college—i.e., high school academic achievement.

The higher the parental income, father's education, and high school academic achievement, the higher the probability of degree attainment.

TABLE 2
Probability of Degree Attainment for Borrowers

Variable	Model 1 Delta-p	Model 2 Delta-p	Model 3 Delta-p
Background Variables			
Gender (female)	.056***	.013	.028
Race (African-American)	-.049*	.053	.053
Parental income	.036***	.018	.011
Father's education	.016***	.010	.026***
Mother's education	.006	-.004	-.009
HS academic achievement	.057***	.017*	.014
Institutional Characteristics			
Tuition		.000	.001
Control of institution (private)		.046	.074
Institutional selectivity		.066***	.042***
Enrollment status (full-time)		.036	.068
Major (as compared to all other majors)			
Biology		.070*	.076
Business		-.016	-.044
Education		-.228***	-.194***
Engineering		-.314***	-.336***
Health sciences		-.140**	-.183**
Humanities		-.050	-.010
Art		-.183**	-.225**
Physical sciences		.002	.001
Social sciences		.059*	.057
Work Experiences (as compared to not working)			
Part-time, off-campus		-.094***	-.094**
Part-time, on-campus		.040*	.040
Full-time		-.265***	-.233***
Academic involvement during college		.037***	.030**
Average college grade		.089***	.096***
Amount of loans			.003**
-2 LOG L	5077.299	2361.257	1397.809
Df	6	24	25
χ^2	363.652***	401.864***	646.882***
Percent of correct predictions	76.9	75.5	74.3
Baseline $p=.64$			

*Significant at .05 **Significant at .01 ***Significant at .001

Meanwhile, institutional selectivity, work experiences, academic involvement during college, major (biology, education, engineering, health science, art, and social science), and GPA were significant predictors for degree attainment in Model 2. For example, if a student's major was biology or social science, the likelihood of degree attainment significantly increased by 7% and 6%, respectively, as compared to all other majors. The probability of degree attainment is significantly lower for

There is a negative relationship between the total amount of loans and father's education: the higher the father's education, the lower the loan amount.

students majoring in education, engineering, health science, and art. It is worth noting the significant effects of the work experience. While working part-time on campus increased the odds of completing a degree by about 4%, the probability of completing a degree fell by 9.4% for students who worked part-time off campus, and by about 26% for those who had full-time jobs. The higher the academic involvement, GPA, and institutional selectivity, the more likely it was that the students would earn their degree.

Adding the total amount of loans into Model 3 revealed that an increase of \$1,000 in the total amount borrowed was related to an approximately 0.3% increase in the probability that students would receive a degree. In addition, Model 3 found numerous significant suppressor effects.³ According to Astin (1993), suppressor effects occur if two independent variables are positively related to each other but have opposite effects on the dependent variable, or if the independent variables are negatively correlated with each other but have the same effect (both positive or negative) on the dependent variable.

First, the positive effect of father's education on degree attainment increased when the total amount of loans was controlled, meaning that there is a negative relationship between the total amount of loans and father's education: the higher the father's education, the lower the loan amount.

The amount of loans also acted as a suppressor for the college GPA: when the total amount of loans was entered in Model 3, the positive impact of GPA on degree attainment increased. That is, students who have higher GPAs were less likely to borrow larger amounts of loans. This result may be related to the criteria for merit-based scholarships, which are mainly focused on students' academic achievement (e.g., GPA).

Conversely, the negative effects of majoring in engineering, health sciences, or art in Model 2 increased when the loan amount included in the Model 3, indicating that the loan amount acted as a suppressor, were more likely to borrow than others. The positive effects of institutional selectivity and academic involvement and the negative impacts of working part time off campus, working full time while students, and education major remained as significant predictors for degree attainment.

³ A suppressor effect occurs when one variable increases the absolute value of the other independent variables' coefficients. For example, controlling for loans in Model 3 increased the negative impact of majoring in engineering on degree attainment (i.e., from -.314 to -.336), and loans acted as a suppressor for the effect of majoring engineering. A suppressor effect occurs if two independent variables are positively related to each other, but have opposite effects on the dependent variable or if the independent variables are negatively correlated with each other, but have the same effect (both positive or negative) on the dependent variable (Astin, 1993).

Effects of the Total Amount of Loans on Degree Attainment by Parental Income

The analysis of the effects of the total loan amount on degree attainment by parental income level (low, medium, and high) was conducted in three separate analyses (see Table 3). In the analyses, some distinct patterns by parental income level emerged. The impact of loan amount on degree attainment was significant only for medium parental income students, but not for high and low parental income groups: an increase of \$1,000

TABLE 3
Probability of Degree Attainment by Parental Income

Variable	Parental Income		
	Low	Medium	High
Background Variables			
Gender (female)	.003	.044	.061
Race (African-American)	.037	.093	-.001
Father's education	.047**	.020	.021
Mother's education	-.014	-.021	-.054
HS academic achievement	-.006	.032*	.010
Institutional Characteristics			
Tuition	.014*	-.004	-.005
Control of institution (private)	.010	.122*	.087
Institutional selectivity	.002	.004	.009**
Enrollment status (full-time)	.162*	.027	.024
Major (as compared to all other majors)			
Biology	.153	.060	.030
Business	-.073	-.047	-.013
Education	-.083	-.241**	-.570**
Engineering	-.311**	-.378***	-.442*
Health sciences	-.295*	-.145	-.122
Humanities	.144	-.148	-.014
Art	-.130	-.339***	-.099
Physical sciences	.035	.031	-.068
Social sciences	.036	.110*	-.026
Work experiences (as compared to not working)			
Part-time, off-campus	-.091	-.104*	-.100
Part-time, on-campus	.007	.027	.177**
Full-time	-.337***	-.211***	-.164*
Academic involvement during college	.070**	.030	-.022
Average college grade	.107***	.097***	.090***
Amount of loans	.002	.005*	.001
-2 LOG L	478.895	649.069	211.664
Df	24	24	24
X ²	138.039***	215.089***	96.167
Percent of correct predictions	72.6	74.8	78.1
Baseline <i>p</i>	.59	.66	.71

* Significant at .05 **Significant at .01 ***Significant at .001

in the total amount of money borrowed was related to a 0.5% increase in the probability that medium income students would attain a degree. This finding reflects the shift in federal financial aid policy—from focusing on the needs of lower-income students to ensuring college affordability of middle-income students by the use of loans (Heller, 2001)—and manifests that middle-income students take the most advantage of the existing loan programs. Middle-income students may rely more on loans than those from other income groups because middle-income students may be not eligible to receive need-based grants but are still in need of financial resources to pay for college (Lee, 1999). Therefore, a loan can be a convenient way of making up the difference for the middle-income students, which brings the positive effect of loans on degree attainment.

Conversely, no significant impact of loans on degree attainment was found for students from low- and high-income backgrounds. Previous research (St. John et al, 1992; St. John et al, 1994; Hu & St. John, 2001) has argued that the non-significant effect of financial aid variables probably means that the aid amounts awarded to students are just enough, so students who received aid are as likely to graduate from college as others who did not receive aid. For example, the non-significant effect of loans on low-income students' degree attainment means that if students from low-income families borrow, they are as likely to graduate from college as non-borrowers in the same parental income group. From this finding, it becomes clear that the effect of loans on degree attainment cannot be generalized without first considering parental income.

Several other variables have distinct effects on the degree attainment of different parental income groups. Father's education, enrollment status (full-time), and tuition were significant positive predictors for low parental income students' degree attainment. For students from middle-income families, high school academic achievement and attending private institutions significantly increased the probability of degree attainment. High parental income students were more likely to graduate from college if they attended higher-selectivity institutions. Different majors influence students' degree attainment positively or negatively, depending on students' parental income.

Further, having a part-time job off campus was a significant negative predictor on the probability of degree attainment for middle-income students. Working full time while a student was a significant negative predictor of degree attainment across parental income levels, while having a high GPA was a positive predictor across the three income groups. When students had worked full-time during college, the probability of degree attainment decreased by 33.7% for low-income students, 21% for medium-income students, and 16% for upper-income students. These results may be related to situational and emotional reasons for students' working. Lower parental income students may

The non-significant effect of loans on low-income students' degree attainment means that if students from low-income families borrow, they are as likely to graduate from college as non-borrowers in the same parental income group.

not have a choice but to work, while higher-income students may have a choice whether to work or not.

On the other hand, the positive impact of college GPA on degree attainment was greater for the students of low-income students than for the other parental income groups. When one unit of GPA increased (for example, from B to B⁺), the probability of degree attainment for low parental income students increased by 10.7% for low-income students, 9.7% for middle-income students, and a 9% for high-income students.

Conclusions and Policy Implications

This study investigated the relationship between the amount of loans and students' degree attainment at four-year colleges and universities. Given the uncertainty that large debt and subsequent repayment entail, it is important for financial aid policy makers to know what specific effects loans have on the rates at which students obtain degrees. Degree attainment is an important aspect of equal educational opportunity in higher education. To examine whether borrowing is positively or negatively associated with students' degree attainment, the means of degree attainment rates for borrowers and non-borrowers were compared after controlling for other factors that influence degree attainment. The results revealed that there was no significant difference in degree attainment between the two groups. One conclusion from this analysis is that loans are not detrimental in providing equal educational opportunity in terms of degree attainment.

The impact of the amount of loans on degree attainment for all borrowers was then examined in sequential logistic models. This analysis found that the amount of loans had a significant positive effect on degree attainment. A \$1,000 increase in the total amount of loans was associated with an increase of the likelihood of degree attainment by .03% at the .01 level of statistical significance. This is an encouraging finding for financial aid policy makers who support a loan-based financial aid policy, believing that loans are the way to achieve equal educational opportunity.

However, the significant positive effect of loans on degree attainment does not hold true for all students. Separate logistic regressions by parental income show that the total amount of money borrowed had different effects on degree attainment for low, medium, and high parental-income groups. An increase of \$1,000 in total loans brought a 0.5% increase in the probability that medium parental income students would attain a degree, but had no significant effects for low and high parental income group students. Therefore, it would be naïve for policy makers to say that more borrowing would lead to higher degree completion rates for all students.

Instead, it is important to take a close look at the distinctive effect of loans by students' parental income. Financial aid in higher education was created particularly to provide equal

At first glance, the non-significant effects of loans on low and high parental income students do not look like negative phenomena.

educational opportunity for those of similar academic ability and motivation but varying financial means. However, as financial aid policy has moved rapidly towards a loan-based system, serious concerns have been raised about the effects of loans from an equity perspective. Therefore, if loans encourage students to complete a degree, loans serve the goal of financial aid. But if loans discourage students from completing a degree, the policy of how loans are awarded and to whom should be re-examined.

At first glance, the non-significant effects of loans on low and high parental income students do not look like negative phenomena, because at least loans do not discourage (in other words, have negative effects on) the two groups' degree attainment. However, considering the consistent disparities in degree attainment rate by parental income – particularly the lower degree-attainment rate for low parental income students – it is crucial to note that loans have a positive effect on middle-income students' degree attainment but not on low-income students: middle-income students are more likely to complete a degree with an increase of \$1,000 in loans, in contrast to low-income students, who are not. Therefore, to allow low-income students to take full advantage of loans as they work to complete a degree, different approaches for distributing loans should be considered.

Several individual and institutional variables had significant positive or negative impacts on students' degree attainment, but again, the significant impacts varied by students' parental income. For low-income students, father's education, college tuition, enrollment status, academic involvement during college and GPA had significant positive impacts; by contrast, working full time and majoring in engineering or health sciences had negative impacts.

For the middle-income group, high school academic achievement, private institutions, social science major, and GPA had positive impacts as compared to the negative impact of working part-time off campus, working full-time, and majoring in education, engineering, or art.

High-income students were more likely to complete a degree if they attended more selective institutions, had higher college GPAs, and worked part-time on campus. However, they were less likely to graduate from college if they worked full time or majored in education or engineering. It is particularly important to note that majoring in engineering, working full time while students, and GPA were significant across all three groups: (1) the positive impact of GPA on degree attainment increased when parental income decreased; (2) the negative impact of majoring in engineering increased when the parental income increased; (3) the negative impact of working full time increased when the parental income decreased. Therefore, efforts to increase students' academic achievement in college (i.e., GPA) may provide

more benefits for lower-income students in their degree attainment. Also, efforts to reduce the number of students who work full time while in college can be beneficial, particularly for low-parental-income students. One such effort would be to devise financial aid programs that are particularly favorable for lower-income students, to help them focus on their studies by eliminating the need to work full time.

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APPENDIX
Variable Coding for the Degree-Attainment Model

Variables	Coding
Individual Background Variables	
Gender	0 = male, 1 = female
Race	0 = non African-American, 1 = African-American
Parental income	1 = low income (lowest third: \$39,999 or less), 2 = middle income (middle third: \$74,999 or less), 3 = high income (highest third: \$75,000 or more)
Father's education	Range: 1 = grammar school or less to 8 = graduate degree
Mother's education	Range: 1 = grammar school or less to 8 = graduate degree
High school academic achievement	1 = D to 8 = A or A+
Institutional Characteristics	
College tuition	Range: \$0 to \$21,475 (coded by every \$1,000)
Institutional selectivity	The average of SAT Math and Verbal scores of the entering freshmen, range: 715 to 1410 (coded by every 10)
Institutional control	0 = public, 1 = private
College Experience Variables	
Full-time	0 = no, 1 = full-time
Work part-time on campus	0 = no part-time on campus, 1 = part-time on campus
Work part-time off campus	0 = no part-time off campus, 1 = part-time off campus
Work full-time	0 = no full-time, 1 = full-time
Academic involvement	Range: 3 to 9 (three-item composite scale)
College GPA	Range: 1 = C- or less to 6 = A
Major (as compared to all other majors)	
Biology	0 = no, 1 = yes
Business	0 = no, 1 = yes
Education	0 = no, 1 = yes
Engineering	0 = no, 1 = yes
Health professional	0 = no, 1 = yes
Humanities	0 = no, 1 = yes
Art	0 = no, 1 = yes
Physical science	0 = no, 1 = yes
Social science	0 = no, 1 = yes
Financial Aid	
Total amount of loans	Range: \$1 to \$50,000 (coded by every \$1,000)