

Degree Attainment of Undergraduate Student Borrowers in Four-Year Institutions: A Multilevel Analysis

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Recent research on loan effects on student borrowers has focused on pre-college and post-college behavior, neglecting the loan effects during the within-college period. This study integrated the student retention models and financial nexus model to investigate the effects of different kinds of financial aid on degree attainment of undergraduates in 4-year institutions. The author employed multilevel analysis to examine the effects of loans and grants in within-institution, between-institutions, and comprehensive models, and found that grants were a better financial means than loans in assisting students to receive a degree.

In the past two decades, the federal government has dramatically changed its financial aid policy, moving from offering grants and loans to offering predominantly loans (Hearn, 1998). The number of undergraduate recipients of federal loans grew by 125%, and the average amount increased by 70% after adjusting for inflation, during the past 10 years (The College Board, 2004). Loans have become an essential means to enhance college access. Researchers have extensively examined the pre-college behavior of college choice and access (Burdman, 2005; Campaigne & Hossler, 1998; Davies & Lea, 1995; Keane, 2002; King & Bannon, 2002; Paulsen & St. John, 2002) and the post-college behavior of occupational choice, graduate school enrollment, and quality of life after graduation (Heller, 2001; Monks, 2000; Volkwein & Cabrera, 1998). However, only a limited number of studies have evaluated the educational outcomes of student borrowers (Paulsen & St. John, 1997, 2002) and even fewer have compared the effects of different types of financial aid on student degree attainment.

Moreover, students' perceptions of institutional environments have long been acknowledged as an important factor when students make decisions. The perceptions of students at a single institution may cluster at the institutional level. Therefore, two levels of variances in students' perceptions need to be considered in an empirical analysis: between-institution variances, and within-institution variances. Little prior research has investigated how different types of financial aid affect student degree attainment according to these two levels of variance; the goal of this study was to identify the individual- and institution-level predictors of student baccalaureate degree attainment and time to degree.

Theoretical Framework

Related Literature

The current study integrates the student retention models (Bean, 1980, 1983, 1990; Tinto, 1987) and the financial nexus model (Paulsen & St. John, 2002) as the major framework for explaining the effects of different types of financial aid on baccalaureate degree attainment. Tinto's student interactionist model revealed that interaction and integration with the institutional environment played the determinant role in a student's persistence or withdrawal decision. Students enter institutions with experiences and beliefs through which they filter the perceptions of the institutional environment. Their personal characteristics and family socioeconomic backgrounds influence their interactions with peers, faculty, administrators, and the climate of the institution, which finally lead to their persistence or voluntary withdrawal decisions. Students' personal characteristics and their family socioeconomic backgrounds, therefore, are the most important factors influencing the educational outcomes of students.

Tinto's (1987) model highlighted individual-level variables affecting students' commitment to institutions. Nonetheless, Cabrera, Castaneda, Nora, & Hengstler (1992) asserted that Bean's (1980, 1983) student attrition model could enhance Tinto's model by identifying the importance of institution-level variables in the student departure process. Bean (1980, 1983) focused on the interaction process of students in a single institution and postulated that institution-level constructs, including development, instrumental communication, integration, and campus organizations, had positive influences on students' satisfaction with institutions and could reduce the possibility of dropout. Bean (1990) refined his prior research by including student background variables as important influences on student dropout.

However, due to the relatively lower tuition and fees at the time, neither Tinto (1987) nor Bean (1980, 1983, 1990) considered financial variables important enough to affect degree attainment. Under the financial pressure caused by the increasing tuition and fees in the last two decades, students' educational outcomes can no longer be free of financial influences. In particular, because the federal financial aid policy has shifted from using grants to using loans as the primary means to support higher education, loans may have become a significant influence on college students' educational attainment. Hence, current investigation of the relationship between financial aid and degree attainment integrates the financial nexus model introduced by Paulsen and St. John (1997) with the retention model.

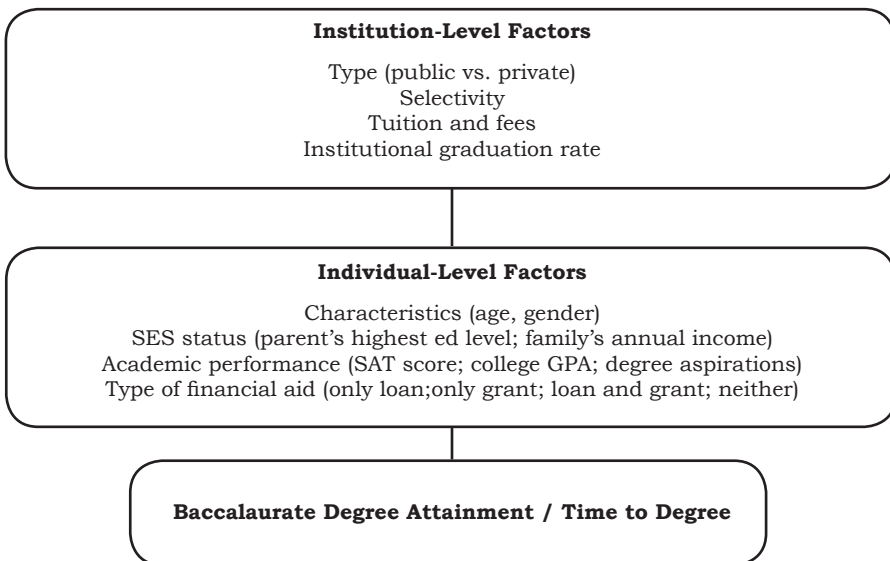
The essence of the financial nexus model relies on the "interactions between students' prematriculation expectations about financial factors that influence choice, their postmatriculation financial experiences, and the way this interaction influences the persistence decision" (Paulsen & St. John, 1997, p. 68). In

the case where the prematriculation expectation of tuition and fees, living costs, and financial aid does not match the postmatriculation experience of these financial factors, students may decide to withdraw from their institutions. If students choose to stay under such conditions, they may manage the cost of college education and/or adjust their postmatriculation perception of the financial factors.

Conceptual Framework

Figure 1 presents the conceptual framework that guided the current study and which draws on the student retention models and the financial nexus model. The framework shows effects of certain factors at both individual and institution levels and different types and combinations of financial aid on two measures of degree attainment. The institution-level factors (i.e., type, selectivity, graduation rate, and tuition and fees) indicate institutional environments that may influence students’ departure decisions. Paulsen and St. John (1997, 2002) found that students in private colleges were more likely to perceive the value of financial aid to their persistence decision than their counterparts in public colleges. Therefore, the institutional type can be identified as a general factor in the institutional environment. Selectivity indicates the screening power of institutions and controls the academic capability of incoming students. Additionally, the graduation rate in prior years represents the general probability for students to complete their degree in the institutions. These two variables indicate the academic environment of the institutions. Finally, because the tuition and fees reflect the financial

Figure 1
Influences on Degree Attainment of Undegraduate Borrowers



demands of attending the institutions, they became the fourth variable at the institutional level.

At the individual level, the framework identifies personal characteristics, socioeconomic background, academic capability, and types and combinations of financial aid as explanatory constructs. According to Tinto (1987) and Bean (1980, 1983), student personal characteristics and socioeconomic background significantly influence students' departure decisions by modifying their interactions with institutions. Hence, including student age, gender, annual family income, and parents' highest educational level in the framework for the current study incorporates student personal characteristics and socioeconomic background.

Academic performance, especially grades, is closely associated with persistence and degree attainment. Bean (1981, 1983, 1990) asserted that grades and academic development were assumed to be the most conspicuous form of reward, directly influencing student satisfaction. Thus, the current study uses college performance indicated by GPA to indicate the academic capability of individual students. Moreover, the SAT score was used as a measure of the high school performance of the individual students before they entered the institutions. Additionally, Heller (2001) found that the variables showing the most significant effects on graduate school enrollment were the highest degree expected and the chosen major of the students. Even though Heller emphasized the loan effects on graduate school enrollment, his research findings informed this study by identifying an influential factor as one type of educational outcome.

The focal variables in the framework are four forms of financial aid: only loans, only grants, grants and loans, and neither grants nor loans. Because a large portion of students receive multiple types of financial aid concurrently, the effects of various financial aid on degree attainment are interwoven and complex. These four forms of financial aid can be used to distinguish and compare the effects of different types or combinations of financial aid on degree attainment.

Method

Data

The analytical sample of the current study was drawn from the Beginning Postsecondary Student Longitudinal Study (BPS: 96/01) survey. The BPS: 96/01 is a national representative dataset following a cohort of students starting their postsecondary education in the 1995–1996 academic year (AY). In order to control the influence of institution-level factors, the analytical sample only included non-transfer undergraduates in 4-year institutions.

Variables

The current study used baccalaureate degree attainment within 6 years and the total time to degree as the dependent variables to measure the educational outcomes. Degree attainment (1 = yes,

0 = no) was defined according to whether the students received a baccalaureate degree before AY 2001. Time to degree was a continuous variable referring to the total enrolled months until the students received their degree. Students who failed to receive the degree were not included in the analysis of the time to degree.

The independent variables consisted of four variables at the institution level and four constructs at the individual level. Institution-level variables included type of institutions (1 = public, 0 = private), selectivity (1 = least selective to 3 = very selective), the graduate rate in AY 1995–1996 (continuous), and the tuition and fees in AY 1995–1996 (in hundreds, continuous).

The individual-level constructs comprised student personal characteristics, socioeconomic background, academic performance, and type of financial aid. Student personal characteristics included gender (1 = male, 0 = female) and age (measured by the end of 1995, continuous). Student socioeconomic background was indicated by the variables of family annual income (in thousands, continuous) and the parents' highest educational level (1 = did not complete high school to 3 = some postsecondary education or more). Academic performance was measured by the SAT score (continuous), college accumulative GPA (1 to 7, where 1 = mostly Cs, 2.24 or below, and 7 = mostly As, 3.75 or above) and the highest academic degree aspired to (1 = the baccalaureate degree to 5 = doctoral or professional degree). Type of financial aid included four groups based on the types of financial aid students received during their college years: received only loans (students who received more than \$1 in loans from the federal government but did not receive any amount in grants), received only grants (students who received more than \$1 in grants from the federal government, state government, or institutions but did not receive any amount in loans from the federal government), received both loans and grants (students who received more than \$1 in grants and more than \$1 in loans), and received no loans or grants (students who received no grants and no loans). The federal loans included Perkins loans, subsidized and unsubsidized Stafford loans, and Parent Loans for Undergraduate Students (PLUS). Students who received financial aid from private providers were not considered.

Results

Descriptive Statistics

Table 1 presents the descriptive statistics of the variables in the current study. More than half of the students obtained a baccalaureate degree within 6 years. The average total enrolled months to degree was 43. The average age of the students was around 20 when they enrolled. More than half of the students were female, came from families with an annual income of around \$60,000, and had at least one parent who held a degree more advanced than a high school diploma. The average SAT score of the students was 968, and the average cumulative college GPA

Table 1
Descriptive Analysis and Correlations Among Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Degree	-																
2 Time to degree	-0.00	-															
3 Age	-0.08**	-0.04*	-														
4 Male	-0.08**	-0.01	0.09**	-													
5 Parent's education	0.09**	-0.08**	-0.07**	0.02	-												
6 Income	0.09**	-0.04*	-0.06**	0.01	0.23**	-											
7 SAT	0.16**	-0.21**	-0.13**	0.14**	0.25**	0.20**	-										
8 Aspiration	-0.03	0.09**	-0.04	-0.06**	-0.01	-0.01	-0.03	-									
9 GPA	0.33**	-0.13**	-0.01	-0.17**	0.07**	0.09**	0.32**	0.01	-								
10 Public	-0.14**	0.21**	0.09**	-0.06**	-0.05**	-0.1**	-0.27**	0.07**	-0.12**	-							
11 Selectivity	0.18**	-0.12**	-0.1**	0.07**	0.16**	0.19**	0.50**	0.07**	0.09**	-0.26**	-						
12 Tuition and fees	0.19**	-0.22**	-0.12**	0.07**	0.11**	0.17**	0.4**	-0.06**	0.14**	-0.84**	0.43**	-					
13 Institutional graduation rate	0.24**	-0.17**	-0.14**	0.09**	0.17**	0.22**	0.53**	0.01	0.11**	-0.43**	0.78**	0.6**	-				
14 Only loans	-0.08**	-0.03	0.02	0.03	0.03	0.04*	-0.10**	-0.01	-0.13**	0.13**	-0.04*	-0.1**	-0.05*	-			
15 Only grants	0.08**	-0.06**	-0.01	-0.01	0.06**	0.08**	0.13**	-0.02	0.2**	0.07**	-0.02	-0.1**	-0.08**	-0.16**	-		
16 Loans and grants	-0.03	0.09**	-0.00	-0.01	-0.16**	-0.27**	-0.06**	0.03	-0.06**	-0.18**	-0.01	0.15**	0.03	-0.34**	-0.56**	-	
17 None	0.01	-0.03	-0.00	-0.00	0.13**	0.26**	0.01	-0.01	-0.05*	0.08**	0.06**	-0.02	0.08**	-0.14**	-0.23**	-0.47	-
Mean	0.54	43.12	20.36	0.42	2.62	59.19	967.27	2.85	5.39	0.59	1.81	65.74	55.71	0.09	0.24	0.49	0.18
SD	0.50	8.96	6	0.49	0.57	55.86	219.89	0.89	0.98	0.49	0.90	60.51	20.19	0.29	0.42	0.50	0.39
Minimum	0	5	16	0	1	0	420	1	1	0	1	0.5	2	0	0	0	0
Maximum	1	77	73	1	3	1000	1550	5	7	1	3	340.4	96	1	1	1	1

* $p < .05$. ** $p < .01$.

was mostly B's (2.75–3.24). About 60% of the students attended public institutions. The institutions on average charged \$6,600 for tuition and fees, and granted baccalaureate degrees to more than half of students (56%) in AY 1995–1996.

Students' degree attainment was positively associated with their parents' highest educational level, annual family income, SAT score, college cumulative GPA, selectivity, tuition and fees, and institutional graduation rate, but was negatively correlated with age. Female students were less likely to obtain a baccalaureate degree within 6 years than male students. Students in private institutions were more likely to obtain a degree than their peers in public institutions. In addition, receiving only loans appeared to decrease the possibility of degree attainment, whereas receiving only grants seemed to lead to a higher possibility of degree attainment. The correlation of receiving other financial aid with degree attainment was unclear.

Time to degree was measured by the total enrolled months until the student received the degree. Students who were older, whose parents had a higher educational level, who came from wealthier families, who had obtained a better SAT score and a higher college GPA, and who attended private, selective, and more expensive institutions with a higher graduation rate were likely to have obtained a degree sooner. Additionally, students who used only grants to finance their college education spent a shorter time obtaining the degree. However, students who used both grants and loans to finance their college education spent a longer time in college before degree attainment. Receiving only loans or no financial aid at all showed no significant correlation with time to degree.

Degree Attainment

The hierarchical linear model (HLM) enables examination of the relationship between the types of financial aid and degree attainment. Table 2 presents the results of three HLMs examining the contribution of individual- and institution-level factors. The first model assessed the within-school contribution of individual-level factors to degree attainment. Students who used grants as the only means to finance their college education were nearly 50% more likely to obtain their degree than students who used only loans. The odds of degree completion for students who received both grants and loans were more than 50% higher than students using only loans. The relationship between students who received neither loans nor grants and students using only loans was not clear.

Older male students were less likely to obtain a degree; an additional year of age decreased the likelihood of degree attainment by 20%. Male students were 20% less likely to receive a degree than female students. The highest educational level of the parents appeared to be positively associated with the odds of degree completion. Even though annual family income and the SAT score showed a positive relationship with the likelihood

Students who used grants as the only means to finance their college education were nearly 50% more likely to obtain their degree than students who used only loans.

of degree completion, the magnitude of these effects seemed trivial.

As one might expect, academic aspirations increased the possibility of degree completion: Students who aspired to an advanced degree had a 35% higher prospect of receiving a degree. The college cumulative GPA was the most conspicuous individual-level factor in predicting degree completion. Students who obtained a one-level-higher GPA were 1.4 times more likely to complete a baccalaureate degree.

Table 2
Baccalaureate Degree Attainment Explained by
Within-College and Between-College Variables (Odds Ratio)

	Model 1 (Within-College)	Model 2 (Between-College)	Model 3 (Both)
Slope Terms			
Only grants	1.458* (0.296)	2.714*** (0.451)	1.870** (0.462)
Loans and grants	1.539** (0.270)	1.668*** (0.245)	1.162 (0.241)
Neither grants nor loans	1.243 (0.256)	1.443** (0.240)	1.326 (0.322)
Age of student	0.792*** (0.055)	-	0.853* (0.070)
Male	0.816* (0.089)	-	0.761** (0.100)
Parent's highest education level	1.274** (0.137)	-	1.297** (0.167)
Family income	1.004*** (0.001)	-	1.001 (0.001)
SAT score	1.001** (0.000)	-	1.000*** (0.001)
Degree aspiration	1.345*** (0.129)	-	0.802** (0.085)
College GPA	2.370*** (0.149)	-	2.576*** (0.197)
Intercept Terms			
Public institution	-	2.644*** (0.533)	1.629* (0.483)
Selectivity	-	1.028 (0.105)	0.974 (0.129)
Tuition and fees	-	1.013*** (0.105)	1.008*** (0.003)
Institutional graduation rate	-	1.036*** (0.006)	1.034*** (0.007)
Number of observations	3,455	3,416	2,443
Number of groups	458	285	269

Note. Does not include "only loans" category. Standard errors in parentheses
* $p < .10$. ** $p < .05$. *** $p < .01$.

Model 2 in Table 2 assesses the extent to which the degree completion could be explained by the institution-level factors. Attending a public institution increased the possibility of degree completion by 1.6. The amount of tuition and fees and the graduation rate in AY 1995–1996 demonstrated positive effects, although the magnitude of the effects was too small to be important. Selectivity of institutions showed no effects.

Model 3 in Table 2 presents the results of the full hierarchical model, which considered within-college and between-college variations at the same time. Students who received only grants were 0.9 more likely to obtain a degree than students relying on loans. The difference in the odds of degree completion between students relying on loans and students who received both grants and loans or received nothing disappeared. Younger female students were slightly more likely to obtain a degree. The more advanced education the parents had, the greater the possibility of a student's degree completion. Interestingly, academic aspirations now showed negative effects on degree completion; students aspiring to more advanced degrees were 20% less likely to complete their baccalaureate.

College GPA consistently demonstrated significantly positive effects on degree attainment. A one-level-higher GPA increased the odds of degree completion by 1.6 times. Students who attended public institutions were 60% more likely to obtain a degree than their peers attending private institutions. Finally, the positive effects that tuition and fees and graduation rate had on degree completion remained significant, but small.

Time to Degree

Table 3 presents the impact of individual- and institution-level factors on time to baccalaureate degree attainment. Students who failed to receive the degree within 6 years were not included in this analysis. Following a similar procedure of analysis of degree attainment, Model 1 examined the contribution of individual-level factors to the time to degree. The types of financial aid did not show significant effects on time to degree. Male students spent half a month longer obtaining a degree on average than female students. Students who had a higher SAT score received a degree slightly sooner. Students who aspired to a more advanced degree remained 1 more month in college in receiving their baccalaureate degree. Students with a one-level-higher college GPA spent 1 month less obtaining their degree.

Model 2 assessed the effect that the institution-level factors had on time to degree. Students who received only grants spent nearly 2 months less than the students who received only loans in completing their degree. Students in public institutions needed 2 more months on average to obtain a degree than their counterparts in private institutions. Additionally, attending institutions with a higher graduation rate resulted in a slightly shorter time to degree.

Students who attended public institutions were 60% more likely to obtain a degree than their peers attending private institutions.

Table 3
Months to Baccalaureate Degree
Explained by Within-College and Between-College Variables (Odds Ratio)

	Model 1 (Within-College)	Model 2 (Between-College)	Model 3 (Both)
Slope Terms			
Only grants	0.558 (0.519)	-1.793*** (0.594)	-0.071 (0.624)
Loans and grants	0.753 (0.476)	0.126 (0.552)	1.224** (0.575)
Neither loans no grants	0.452 (0.541)	-0.118 (0.609)	0.563 (0.638)
Age	-0.293 (0.211)	-	-0.253 (0.251)
Male	0.533** (0.255)	-	0.480 (0.308)
Parent's highest education level	-0.398 (0.280)	-	-0.547 (0.345)
Family income	0.001 (0.002)	-	0.004* (0.002)
SAT score	-0.005*** (0.001)	-	-0.004*** (0.001)
Degree aspiration	1.099*** (0.240)	-	0.783*** (0.269)
College GPA	-1.336*** (0.157)	-	-1.553*** (0.191)
Intercept Terms			
Public	-	2.367*** (0.707)	2.390*** (0.694)
Selectivity	-	0.188 (0.364)	0.314 (0.337)
Tuition and fees	-	-0.008 (0.005)	-0.006 (0.005)
Institutional graduation rate	-	-0.075*** (0.020)	-0.062*** (0.019)
Number of observations	2,851	2,496	2,032
Number of groups	396	271	259

Note. Does not include “only loans” category. Standard errors in parentheses
* $p < .10$. ** $p < .05$. *** $p < .01$.

Model 3 in Table 3 shows the full model of multilevel analysis. The difference in time to degree among students receiving only grants or only loans disappeared. Students who received both grants and loans remained more than 1 month longer on average than students who received only loans to obtain a degree. Students who aspired to a more advanced degree spent a longer time on degree completion. The baccalaureate degree took 1½ months less on average for students with a higher GPA. Students who attended public institutions remained more than

2 months longer in college until degree completion than those in private institutions. In addition, annual family income, SAT score, and institutional graduation rates also showed significant effects on time to degree, although the magnitude of the effects of these variables was very small.

Discussion

The present study investigated the effects of different kinds of financial aid packages on the degree attainment of undergraduates in 4-year institutions. Compared to students who received only loans, students who received only grants had a higher prospect of receiving a degree; students who received both loans and grants needed more months to complete the degree. Such results indicate that loans might not be as effective as grants for assisting undergraduate students in receiving a degree. Loans in combination with grants can provide opportunities for more students to enter and complete a college education, but they might not exert as positive an influence on students in regard to baccalaureate degree attainment as do grants. Government policy makers, therefore, should consider the different effects that loans and grants exert on students when making or modifying policies for financial aid in higher education.

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