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Financial Aid, Persistence, and Degree Completion in Masters Degree Programs

By *Jing Luan and Robert H. Fenske*

This article provides an overview of the research findings from a longitudinal study conducted at a large urban university on student financial aid, persistence, and degree completion of masters degree students. The purpose of the study was to determine how the types and amounts of student financial aid, along with students' demographic and academic characteristics, are related to masters degree completion. Data were analyzed for a large cohort of masters degree students over a four-year period beginning in Fall, 1985 and ending in Summer, 1989.

The 1983 National Commission on Student Financial Assistance focused on support for graduate students in its report entitled "Signs of Trouble and Erosion: A Report on Graduate Education." John Brademas, chair of the Commission's Graduate Education Subcommittee, later pointed out that the Commission's highest priority recommendation was to ensure and expand financial support for the nation's graduate students. Such support was urged in the form of fellowships, scholarships, assistantships, work-study funds and loans (1984). Ver Steeg observed that many graduate students "have little or no financial support" and that heavy "personal financial sacrifices" take their toll in many ways, including discontinuance of program. He concluded that "providing sufficient financial support is assuredly one way to encourage the best and brightest to pursue graduate study and a career of research (1984, p. 23)."

As is well known, support for graduate students in the form of federally funded student aid has failed to increase significantly since the Commission's report. Neither the 1986 nor the 1992 Reauthorization of the Higher Education Act included significant increases in funding for this purpose.

Review of Research Literature

Financial aid has consistently been shown to influence persistence. Terkla (1985) found that, after controlling for all other variables, about 57% of undergraduate students receiving aid completed their degrees compared to about 44% of nonrecipients. In her study, students named financial difficulties as second only to academic problems in a list of reasons for withdrawing from college. She concluded that students who received financial assistance were significantly more likely to persist and complete their degree program.

Terkla's findings were consistent both with studies in the late 1960's and with more recent ones in the late 1980's. Both Bayer (1968) and Panos and Astin (1968) reported that financial reasons ranked high in importance for both male and female dropouts. In general, women received less institutional support, such as assistantships and fellowships, than men. Women were more likely to specialize in the non-

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scientific fields, and these fields typically have less graduate student aid available. They were less likely than men to receive tuition remission (41% vs. 53%), teaching assistantships (32% vs. 44%), and research assistantships (19% vs. 30%), although the same proportion of women as men received institutional fellowships (20%). Women were nearly four times more likely than men to hold part-time non-academic jobs (50% vs. 13%), and somewhat more likely to borrow (21% vs. 17%). These discrepancies reflect, in part, women's typical choice of fields (non-science), degree programs (professional masters), and institutions (non-doctoral), all of which are less likely to involve tuition remission and research assistantships (Berkner and Lee, 1989).

In addition to gender differences in graduate program persistence and completion, Fenske and Gregory (1994) reported that national statistics on degree attainment over the period from 1976 to 1989 show that while under-represented minorities (African-Americans, Hispanic-Americans, and Native Americans) increased their share of bachelor's degrees very slightly (0.05%), they actually lost ground compared to others in the attainment of masters degrees (-0.12%) and doctorates (-0.03%). Williamson and Fenske (1994) found that Mexican-American and Native American women in doctoral programs experienced more financial difficulty than men, and that women reported such difficulties as more influential on their need to borrow and their tendency to consider dropping out.

Gillingham, Seneca, and Taussig (1991) in a study at Rutgers University, found that the length of time to complete the doctoral degree was related to the type of remunerated work done by the students. Not surprisingly, they found that “academic” work such as a fellowship or a teaching or research assistantship was related to a shorter time-to-degree than nonacademic work performed to merely provide income. In a similar study at UCLA, Abedi and Benkin (1987) surveyed 4,255 doctorate recipients from 1976 to 1985 to predict time-to-degree from a wide range of personal, academic, and financial variables. They found that the source of financial support was “the most important variable” in predicting the total time to doctorate. More specifically, doctoral students who supported themselves mainly through off-campus employment tended to take significantly longer than students with on-campus employment such as teaching or research assistantships.

Graduate assistantships are an important means of funding graduate students in most fields. Graduate and professional education is diverse in types of degrees, kinds of programs, and students served. Of the more than 1.3 million post-baccalaureate students enrolled in the fall of 1986, about 77% were students in traditional, nonprofessional fields and 23% were students seeking their first professional degree (Korb, 1989). Most support for professional students is in the form of loans rather than assistantships. Students in law and medicine, for example, rarely serve as teaching assistants or research assistants because, among other things, the highly structured nature of their programs does not allow the time (Garet, 1982). Garet's findings were consistent with a study by Wabnick and Goggin (1981) which found

that humanities students have significantly lower debt levels than law and medical school students.

Korb and others (1989) found that 57% of all post-baccalaureate students enrolled in the fall of 1986 received financial aid during the 1986-87 school year. Nearly three-quarters of the first-professional and doctoral students received financial aid. Full-time first-professional and doctoral students received higher amounts of financial aid (both received, on the average, about \$10,700) than full-time masters degree students (\$7,805).

In graduate programs in the humanities and social sciences, the primary sources of financial support tend to be university fellowships and teaching assistantships which often provide far less than the total cost of attendance. Such assistantships are combined with extensive borrowing, part-time employment, and personal or family resources. There is also a high degree of inequality among disciplines. Students in some programs are supported at adequate levels while others face financial pressures throughout their programs. For example, in the "hard" sciences and engineering, support across the student population is more consistent and covers more of the cost of attendance compared to support in the humanities and social sciences. Science and engineering students rely to a large extent on employment in funded research projects, teaching assistantships, and a combination of public and private fellowship programs (Anderson & Sanderson, 1982).

Literature on student aid in graduate education is scarce. Longitudinal and systematic studies on the relationship between graduate degree completion and the variables of financial aid, academic information, and demographic characteristics are extremely rare. Froomkin (1983) discovered little data that might be useful to guide policy makers in formulating new financial aid policies for pre-doctoral students. He found that the last large-scale study of patterns of student financial support for graduate education was conducted in 1965. Anderson and Sanderson (1982) conducted two national studies which dealt directly with graduate student issues. Their studies are comprehensive but inconclusive; consequently, specific financial aid research issues still remain unresolved at national, state, and even institutional levels. The scarcity of research on such issues was also reported by scholars such as Murdock (1987), Herndon (1984), and Hauptman (1986). This study seeks to help fill this void by examining the financial assistance of masters degree students at a large, urban research university.

Research Design and Methodology

A comprehensive literature review did not reveal a longitudinal study of financial aid in education with progress toward graduate degree completion as the dependent variable. Longitudinal research findings may help the administration of graduate education in such areas as recruitment, retention, and placement. "By linking financial aid information to such student data as demographic characteristics and curricular achievement, many important observations with significant policy implications can be identified." (Porter, Gregory & Fenske, 1990, p.2). Certain topics, such as retention, are desperately in need of longitudinal designs (Malaney, 1987b). To conduct an effective study, it is necessary

to measure persistence over a period of time longer than just one semester, one year, or even two years (Murdock, 1987).

A research model on student financial aid is strengthened by viewing the cohort under study dichotomously—aided vs. non-aided. Stampen and Cabrera (1986) revealed that non-aided undergraduate students have substantially higher average parental incomes, though aided and non-aided students share similar demographic and academic performance characteristics. These authors postulate that if the only difference between aided and non-aided students is the availability of personal or family financial resources with which to pay college attendance costs, then it is reasonable to assume that aid would reduce financial reasons for dropping out of college. Thus, if this assumption is accurate, the attrition rates of aided students would be expected to be neither higher nor lower but similar to those of non-aided students. Stampen and Cabrera did find that aided students seemed slightly less likely to drop out than non-aided students. However, this pattern was not significant either in statistical or absolute terms (Stampen and Cabrera, 1986).

“Financial aid has consistently been shown to influence persistence.”

The present study used a longitudinal database pertaining to masters students (U.S. citizens only) who initially enrolled full-time in the graduate school at Arizona State University (ASU) beginning in the fall of 1985. This cohort was analyzed in every academic term (including summer sessions) for four years, ending in the summer of 1989. As a research site, ASU offers the ideal advantage of a comprehensive longitudinal database. Permission was obtained from the Office of Institutional Analysis at ASU to retrieve data from three large-scale databases, namely, student financial aid, student academic records, and payroll. Due to the complexity and differences in data layout in the three databases, especially the financial aid database, substantial effort was necessary to sort out the pertinent data elements from dozens of other variables and verify the distribution of each variable.

Variables Selected for the Study

Financial aid variables examined in the study include fellowships, scholarships, assistantships, Stafford loans, Perkins loans, and tuition waivers. Amount of financial aid is included for each variable by academic term. Graduate students are generally ineligible for need-based aid (such as Pell Grants); therefore, most aid in this study is regarded as non-need-based. The exception is loans. Both Stafford and Perkins loans were need-based throughout the period of this study. However, as is shown later, loans account for a small portion of total aid. Only one-third of the cohort receive support from family, and most of this was from spouses, not parents.

Demographic variables include gender, age, level of family contribution, and residency status (in-state vs. out-of-state). Levels of family support are stratified into the following four levels: \$0; <\$5,000; \$5,000-\$10,000; and \$10,000+. Residency status refers to a student's original status in the first year of his or her study (a student may become a resident after one year, according to ASU's policy).

Academic variables include degree type (professional vs. research), major and graduation date. Research literature has repeatedly stressed the difference between professional and research degree students in their selection of majors and their student financial aid patterns. Therefore, degree types are treated as an important variable for analysis. Professional degree type includes the following four areas: business, education, engineering and nursing. Engineering includes aerospace engineering, chemical engineering, electrical engineering, and industrial and construction engineering. Research degree type includes the following three areas: humanities, including such fields as English, literature, fine arts, music, and theater; natural sciences, including agriculture, biology, botany, and zoology; and social sciences, including communications, mathematics, geology, political science, and other similar fields.

“Student financial aid is positively associated with masters degree students’ progress toward degree completion.”

Research Questions

This study attempts to answer the following research questions:

1. What is the amount and type of student financial aid in this cohort of masters degree students according to students’ gender, type of degree (research or professional), major, and level of family contribution?
2. How do masters students (categorized as completers, persisters, stopouts, and dropouts) vary in their progress toward degree completion over four years according to type and amount of financial aid?
3. How does the relationship between student financial aid variables and demographic and academic variables affect degree completion?
4. Does the combination of variables significantly related to degree completion differ between aided and non-aided students?
5. Does the relationship between student financial aid variables and demographic and academic variables affect degree completion differently for research degree vs. professional degree students?

Definition of the Dependent Variable

In this study, the dependent variable is defined in two forms: progress toward degree completion; and graduation or non-graduation. In his study of undergraduate persistence at four year colleges and universities, Porter (1990) designated four categories: completers, persisters, stopouts, and dropouts. This study adopted these categories as the elements within the dependent variable for research questions one and two as follows:

Dropouts—masters degree students who enrolled in the fall of 1985 and left at some point without returning within the study period;

Completers—masters degree students who progressed and obtained their first graduate degree within the study period;

Persisters—masters degree students who did not complete their degree but who maintained continuous enrollment through the entire period of the study;

Stopouts—masters degree students who enrolled in the fall of 1985, and left for one or two semesters, and returned before the summer semester of 1989 to resume their enrollment. Students may have been a stopout more than once. Stopouts are a subset of either the completers or the persisters groups.

For research questions three through five, the dependent variable is dichotomously defined as degree completion or non-completion.

Statistical Methodology

Variables were examined for utility in the analyses, and those that yielded non-significant output were eliminated using stepwise regression analysis. Ott and Markewich (1985) demonstrated that stepwise regression is useful for exploratory analysis when a large number of independent variables are thought to be related to a dependent variable.

This study assigned the level of statistical significance at .05. Variables were entered one by one, with the most significant term being selected first by the computer. Each significant variable reduces the residual Chi-square, which is the amount of information not explained by the regression model. The process stops when no other variables are found to be statistically significant. This produces a summary of the variables significant in relation to the dependent (outcome) variable. The model uses maximum likelihood as the method of estimation. Maximum likelihood estimates further analyze the direction and degree of impact of each of the significant independent variables.

Logistic regression analyses are used in this study to further describe the relationship of the variables and are also employed to make predictions. For example, logistic analyses are utilized to estimate the influence of independent variables on probability of degree completion for a group of students.

Findings

Descriptive Analysis of the Data (Research Questions 1-2)

There were 472 students in the study cohort within the four-year study period. Two hundred ninety-five of these completed their degrees, forty one of whom persisted through the last semester studied but had not yet graduated, and 136 of whom dropped out of their programs and did not return within the study period. Thirty-eight of the students were stopouts who either completed their degree or were still persisting by the end of the study; thus, stopouts are included in either category in the following tables where they are not shown separately.

The analysis showed that it takes about three academic years for an average completer to obtain a masters degree at ASU, even though sizable numbers of students started receiving their degree in the third semester.

Impact of Aid

In this study, student financial aid is positively associated with masters degree students' progress toward degree completion. Nearly all (92%) of this cohort received waivers of in-state registration fees and/or non-resident tuition for at least one academic term. In addition to waivers, a total of 329 (or 70%) received at least one form of aid such as

scholarship, fellowship, assistantship or loan. Of these 329 students, over two-thirds (68%) graduated by the summer of 1989. However, less than half of the 143 students who received only waivers or no aid at all graduated within the study period.

Gender and Aid

Slightly fewer females received aid than males (67.3% vs. 71.9%), but graduated at a much lower rate than males (61.8% vs. 78.2%). This difference was evidently related to major. Education is the largest single major in the study, and has the second largest noncompletion rate (after engineering), largely because public school teachers often take one or two courses per year over an extended period of time. As mentioned earlier, the study cohort included only those enrolled full-time in the fall semester, 1985; however, some of the students did not enroll full-time in the subsequent semesters. Time to degree completion analyses are discussed below.

Younger students have a higher graduation rate, and most of the students in the youngest group started their graduate study immediately after their undergraduate degree. Table 2 shows that the five age sub-

TABLE 1
Student Financial Aid (Other than Waiver) Distribution
By Gender

	With Aid	%	Without Aid	%
Gender				
Male	152	71.9%	74	28.0%
Female	177	67.3%	69	32.8%
Total	329	70.0%	143	30.0%

TABLE 2
Degree Completion by Gender, Degree,
Family Support and Age

Variable Name	Completer	%	Non-completer	%
Gender				
Male	143	64.3%	92	35.7%
Female	152	55.9	85	44.1
Degree				
Professional	202	69.9	87	30.1
Research	93	50.1	90	49.9
Family Support \$0	192	59.3	132	40.7
<\$5,000	62	71.3	25	28.7
\$5,000-10,000	35	67.3	17	32.7
\$10,000+	6	66.7	3	33.3
Age				
20-25	159	64.4	88	35.6
26-30	70	63.3	40	36.7
31-35	39	63.9	22	36.1
36-40	14	50.0	14	50.0
41+	13	50.0	13	50.0

groups have a dichotomous distribution of completion rates. Students under the age of 36 share a similar graduation rate (between 63.3% and 64.4%) while exactly half of both older groups graduated. Table 2 also reveals that professional degree students graduate at a rate nearly 20% higher than research degree students (69.9% vs. 50.1%). Financial support from spouse or other family members is related to a somewhat higher graduation rate: only 59.3% of those without such support graduated compared to a range of 66.7% to 71.3% among those with family support.

Confirming Matchett's observation in 1988, engineering majors in this study have a low rate of graduation. As shown in Table 3, less than half (46.7%) of engineering majors graduated. Both nursing and natural sciences majors graduated at a rate exceeding 80%. All other majors ranged from 61.2% to 66.0% in their graduation rate.

Students majoring in natural sciences, humanities, business, education, and social sciences share a similar financial pattern. As shown in Table 4, students in these majors received most of their financial aid in the form of scholarships, assistantships, and waivers, rather than loans. Conversely, engineering students were unable to obtain as much scholarship aid as students in other majors. Similar to nursing majors, engineers tended to borrow rather than receive large amounts of non-loan funds.

TABLE 3
Degree Completion by Major

Major	Completer	%	Non-Completer	%
Business	45	61.2	29	38.8
Education	23	61.5	27	38.5
Engineering	37	46.7	24	53.3
Humanities	53	66.0	27	34.0
Natural Sciences	25	80.5	8	19.5
Nursing	9	82.4	3	17.5
Social Sciences	104	64.0	58	36.0

TABLE 4
Average Amount of Scholarships, Assistantships, Waivers, Stafford Loans, Perkins Loans by Major (1985-1989)

	Scholarship	Assistantship	Waiver	Stafford	Perkins
Business	\$1,239	\$1,984	\$3,589	\$1,857	\$511
Education	1,593	3,189	4,971	234	451
Engineering	960	4,655	5,744	3,150	0
Humanities	2,160	4,789	5,964	2,601	271
Natural Sciences	1,544	3,057	4,837	2,084	423
Nursing	904	985	2,877	3,245	0
Social Sciences	1,960	4,293	5,640	2,451	569
Average Student	\$1,656	\$3,774	\$5,197	\$2,453	\$398

TABLE 5
Percent of Students Aided by Four Levels of Family Support

	N	Scholarship %	Assistantship %	Waiver %	Loan %
\$0	312	80.2%	74.6%	94.3%	85.8%
<\$5,000	90	89.0	62.3	91.1	81.8
\$5,000-\$10,000	58	79.5	39.0	94.8	65.1
\$10,000+	12	92.2	22.5	13.6	72.1

TABLE 6
Percentage of Aided Professional Degree Students and Research Degree Students

	Professional		Research	
	N	%	N	%
Scholarships	206	77.0%	125	82.0%
Assistantship	83	29.0	104	57.0
Waiver	268	94.0	167	91.0
Stafford	150	52.0	121	66.0
Perkins	42	15.0	29	16.0

Assistantships and scholarships are typically merit-based rather than need-based. As shown in Table 5, the percentage of aid awarded tended to decrease as family support level increased. This tendency may reflect some attention given to student financial need, even though there is no systematic means testing involved. However, Table 5 also shows that scholarships are awarded without relation to family support level. Waivers were received by nearly all students except for the twelve students with over \$10,000 family support. Loan distribution was dichotomized, with over 80% of the two lowest levels receiving loans, compared to 65.1% and 72.1% for the next two higher levels, respectively. This distribution is consistent with the fact that loans were need-based throughout the period of this study.

Financial Aid Distribution by Degree Type

As shown in Table 6, research degree students secured scholarships and assistantships at a higher rate than professional students. Most students received more than one type of aid, and most of the aid was in the form of waivers, scholarships and assistantships. Non-loan awards (scholarship, assistantship, and waiver) exceeded loans by almost four times. Most students took out Stafford rather than Perkins loans. On the average, professional degree students borrowed more Stafford and Perkins loans than research degree students.

Progress Toward Degree

Dropouts occurred in a wave pattern (Table 7). Eight percent dropped out before the second semester—the first wave. There was only one student who dropped out in the second semester (Spring, 1986). Thirty-five students (15.8% of the cohort) dropped out before the fall semester

TABLE 7
Progress toward Degree Completion & Persistence Rates of the 1985 Cohort—
Cumulative Percentages by Semester (12 Semesters)

Semester	Completers	%	Dropouts	%	Persisters	%	Stopout*	%
1	0	0.0	38	8.1	420	89.0	13	2.7
2	5	1.3	1	8.3	414	87.7	0	0.0
3	20	5.5	35	15.7	360	76.3	9	1.9
4	31	12.1	20	19.9	304	64.4	8	1.7
5	64	25.4	5	20.1	243	51.5	0	0.0
6	29	31.6	19	25.9	195	41.3	5	1.1
7	56	43.4	8	26.7	129	27.3	3	0.6
8	32	50.2	0	26.7	103	21.8	0	0.0
9	12	52.8	10	28.8	90	19.1	0	0.0
10	17	56.4	0	28.8	75	15.9	0	0.0
11	19	60.4	0	28.8	65	13.8	0	0.0
12	10	62.5	0	28.8	41	8.7	0	0.0
Summary	295	62.5	136	28.8	41	8.7	38	8.0

*A subset of the Completers and Persisters groups.

of 1986—the second wave. By the sixth semester, one quarter of the students in the cohort were dropouts. Almost a third of the cohort had dropped out by the seventh semester. The proportion of stopouts seemed to follow the pattern of dropouts. Thirteen of the 38 stopouts occurred in the second semester, but all stopouts by definition returned within the study period as either completers or persisters.

The reduction in persisters was a gradual process. In the ninth semester, 90 students (19%) were persisters; from then on, the percentage dropped 3 to 5 percentage points each semester in the last academic term (Summer, 1989). There were still 41 students (8.7%) persisting.

Degree Completion and Financial Aid

As shown in Table 8, assistantships appeared to be the most significant and consistent variable in degree completion. The average percent of completers receiving assistantships was 42.1%, and the range was from 31.2% to 52.0%. On the average, a little over one-quarter of the completers received scholarships and about the same proportion took out Stafford loans. Perkins loans were utilized in only three of the semesters.

Logistic Regression Analysis of the Data (Research Questions 3-5)

Multivariate analysis considers the residual interactions of all independent variables. A useful multivariate method is logistic regression analysis, particularly when, as in the present study, the independent variables include a mixture of interval (as in dollars of student aid), ordinal (as in levels of family support) and nominal (as in gender) data. The logistic procedure regresses each independent variable singly and jointly against the dependent variable and yields a standardized increment or decrement value for each relationship. Results of the logistic regression analysis used in this study are presented in the following section.

Variables Significant for Degree Completion of the Entire Cohort

From the logistic analysis conducted on the entire cohort, five variables were found to be significant at the .05 level of probability. They are

TABLE 8
Financial Aid Distribution of Completers by Semester

Semester*	N	Scholarship	Assistantship	Waiver	Loans
2	5	20.0	45.0	0.0	0.0
3	20	25.0	52.0	50.0	15.5
4	31	35.4	34.2	45.2	28.6
5	64	52.4	46.7	23.8	41.4
6	29	10.3	38.1	51.7	10.3
7	56	12.5	35.7	16.1	7.1
8	32	25.1	43.1	21.9	0.0
9	12	15.0	40.2	41.7	0.0
10	17	11.8	31.2	23.5	0.0
11	19	15.0	40.6	0.0	0.0
12	10	36.0	45.3	45.5	0.0
Average		25.3	42.1	27.6	19.4

*Financial aid data not available for first semester.

TABLE 9
Summary of Logistic Regression Functions for the Entire Cohort: Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-square
Intercept	1	0.0904	0.1300	0.4839
Residency	1	0.3679	0.1087	11.4605
Professional Degree	1	0.5014	0.1162	18.6134
Engineering	1	-0.6170	0.2198	7.8802
Assistantship	1	0.0009	0.0002	18.9395
Scholarship	1	0.0002	0.0001	4.6770

professional degree, assistantships, Arizona residency, major, and scholarship. (Note that waivers were not included in the logistic analysis because over 90% of the cohort received them. Such prevalence of waivers would distort analysis of other aid variables if they were included.)

Four of the five variables have a positive direct impact on students' degree completion: professional degree, Arizona residency, assistantships, and scholarships.

Professional degree has the largest parameter estimator at .5014. Arizona residency has a positive parameter estimator of .3679. An engineering major has a negative parameter estimate of -.6170, as compared to the standardized mean of all majors. Assistantships have a parameter estimator of .0009. Compared with scholarships, assistantships are slightly less effective for degree completion when analyzed for the entire cohort. The computed difference is interpreted as follows: with the addition of every dollar in scholarship, the parameter estimator will increase by .0002. With the addition of every dollar in assistantship, the parameter estimator will increase by .0009. Therefore, scholarships have a slightly higher degree of impact than assistantships for students in the entire cohort.

TABLE 10
Summary of Logistic Regression Functions for Students With Aid: Analyses of Maximum Likelihood Estimate

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-square
Intercept	1	0.0388	0.1452	0.0715
Gender	1	-0.2820	0.1071	6.9359
Residency	1	0.3868	0.1144	11.4390
Degree	1	0.5412	0.1176	21.1853
Education	1	-0.5113	0.2350	4.7324
Assistantship	1	0.0001	0.0002	16.6797
Stafford Loan	1	0.0006	0.0003	4.5066

TABLE 11
Summary of Logistic Regression Functions for Students Without Aid: Analysis of Maximum Likelihood Estimate

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-square
Intercept	1	0.0463	0.0963	0.0834
Engineering	1	-0.9404	0.1302	3.7101

Variables Significant for Degree Completion of Aided Students

Analyses of data in relation to students with aid revealed that six variables (professional degree, Arizona residency, Stafford loans, assistantships, gender, and education major) are significant at the 0.05 level (see Table 10).

The parameter estimators are as follows: for Arizona residency, .3868; for professional degree, .5412; for assistantships, 0.0001; and for Stafford loans, .0006. It is obvious that professional degree students have a higher probability of completing than research degree students.

Stafford loans were found to be positively related to students' degree completion. An estimator value of .0006 means that, with the addition of every dollar borrowed, the probability of degree completion for students aided by other forms of aid will increase by .0006.

Gender and a major in education negatively impacted the chances of aided students' degree completion. Females are especially disadvantaged (parameter estimator is -.2820). For a male student, the value reverses to .2820. A major in education gives the largest negative impact computed for any independent variable (parameter estimator is -.5113).

Variables Significant for Degree Completion for Students Without Aid

For students who received no aid (neither loans nor non-loans), only the variable of an engineering major is found to be of significance (see Table 11). As with previous analyses, the direction of influence from the engineering major is negative (-0.9404).

TABLE 12
Summary of Logistic Regression Functions for Professional Degree Students: Analysis of Maximum Likelihood Estimate

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-square
Intercept	1	0.3496	0.1650	4.4899
Assistant	1	0.0002	0.0006	10.0367
Stafford	1	0.0001	0.0001	5.0520

TABLE 13
Summary of Logistic Regression Functions for Research Degree Students: Analysis of Maximum Likelihood Estimate

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-square
Intercept	1	-0.1502	0.2247	0.4468
Arizona Res	1	0.6121	0.1760	12.1027
Assistantship	1	0.0001	0.0001	10.5191

Variables Significant toward Degree Completion of Professional Degree Students

When professional degree students were analyzed separately, assistantships and Stafford loans were found to be significant variables. Assistantships have a parameter estimator of .0002, twice as high as Stafford loans (.0001). The relevant statistics are shown in Table 12.

Variables Significant for Research Degree Students' Degree Completion

For research degree students, the model selected assistantship and residency as significant. The results are shown in Table 13. Analysis of maximum likelihood produced estimates for the two variables as follows: Arizona residency has a parameter estimator of .6121, and assistantship has a parameter of .0001 (see Table 13).

Wald Chi-squares for both Arizona residency and assistantships are highly significant values in relation to the dependent variable of degree completion.

Summary

This study is an attempt to examine the basic demographic, academic, and financial aid issues surrounding masters degree student persistence and degree completion at a large urban university with a large graduate program. Analyses were carried out for the variables available from databases at Arizona State University. The four-year longitudinal database was invaluable in conducting such a study. Obtaining useful data information from a well-organized longitudinal database is a solid first step in conducting meaningful research studies on graduate students.

This study validated certain observations made by scholars regarding the loan borrowing patterns of masters degree students and degree

choice as associated with gender, as well as graduate degree completion rate of majors such as engineering and education. This study found:

1. Students with a low level of family support received scholarships at a higher rate and became teaching/research assistants at a lower rate;
2. Younger students had a higher graduation rate;
3. Degree completion and persistence patterns followed a recurring and consistent "wave";
4. Research degree students obtained more assistantships than professional degree students;
5. Assistantships generally appeared to play an important role in degree completion;
6. Scholarships did not show a particular pattern linked to degree completion;
7. For the entire cohort, professional degree, in-state residency, and assistantships were shown to have a positive impact on degree completion; and
8. For those students who were aided, Stafford loans were found to be positively related to students' degree completion.

Attitudinal and qualitative data elements should be considered for collection in developing future databases. Comparative studies conducted between at least two universities with similar settings would further validate findings. Issues such as the length of time necessary for certain majors to graduate and an acceptable dropout rate will also benefit from such studies.

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