Journal of Economics and Finance • Volume 23 • Number 1 • Spring 1999 • Pages 45-55

Factors Affecting Student Retention Probabilities: A Case Study

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Abstract

A comprehensive model of retention based on Tinto's goal commitment and institutional commitment combined with financial considerations is evaluated for the case of an urban public university enrolling large numbers of non-traditional students. The model was evaluated using data from all freshman and sophomore students over the years 1989-1992. White and minority students were also analyzed separately to determine if there were different sensitivities to various enrollment factors. Academic and social integration factors were found to be the most significant factors in persistence in these years. Financial considerations were of less importance in the persistence decision. (*JEL* I21)

Introduction

There is a substantial body of literature that has developed over the years that utilizes a variety of enrollment models to study the factors that affect college enrollment. Substantial reviews of this literature may be found in Hearn and Longanecker (1985), Leslie and Brinkman (1987), and Becker (1990). The general consensus of these models is that enrollments are not very sensitive to changes in price. One emerging issue in the literature is the realization that enrollment has two major components—initial enrollment and continual enrollment or retention. Furthermore, there seems to be a growing recognition that retention models need to have a different focus with regard to the student-decision-making perspective. The initial enrollment decision is essentially a discrete process. The student has to decide to attend college, to which colleges to apply, and then, if accepted at more than one college, which college to attend. Once the student enrolls, that initial decision to attend a particular college is completed. However, once enrolled at a particular college, there is first the ongoing decision to continue in college in general, and second, the decision to continue at a particular college. The student retention decision is continually updated with the arrival of new information such as academic status, grades, and satisfaction with the social life or student peer group, i.e., information not present in the initial enrollment decision. In addition, the longer a student remains at a particular institution, the higher is the transaction cost of switching to a competing institution, since there is a higher probability of losing more credit hours the longer one stays at the original institution.

Thus, colleges and universities face a two-fold enrollment problem: first, getting students to enroll initially, and second, keeping those students enrolled. For major universities, with a surplus of applicants and high rates of retention, attrition may not be a major problem, if there is a waiting pool of applicants or transfer students to fill any positions that may become open. Retention may be an issue at those schools to the

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extent that a particular college or university is trying to expand the diversity of the student body, especially if that student body was historically closed to minority groups. In this case, the goal of the institution may not be retention in general, but rather to retain students from particular subsets of the student body.

Colleges and universities with a more open admission policy, and without a substantial waiting list of first-time applicants or transfers, may find that attrition is a more serious issue, since overall enrollment numbers drive financial support from the public sector. For this second group of institutions, retention is an important, perhaps even critical, issue to ensure their continual enrollment numbers and financial viability. In this case, retaining current students into a second and a third year of study and beyond, perhaps even to graduation, may be desired to maintain enrollment levels in general. Retention may serve to maintain enrollment levels, and to do it in a manner that may be cheaper than recruiting larger and larger numbers of new and perhaps even more academically marginal students who will also leave after a short period of time.

This paper focuses on the retention question by analyzing the marginal impacts that academic, social, and financial factors have on retention. The study involves all freshmen and sophomore students enrolled at a single, urban public university over a four-year period of time. Each underclass student was viewed initially and then viewed again after one year to determine if the student had returned or not. Since students are not placed on academic suspension within the time framework of the study—their first year and enrollment for the subsequent year—the data set is "rich" in that it includes both students who are not in academic trouble and students who are in academic trouble, but have not yet been involuntary suspended by the university. Students used in this study can return through three semesters without being suspended by the university. Students who are placed on warning or probation will be classified as "at-risk" students for this study.

As the rewards of a college education have increased over time, relative to the rewards from a high school education, as discussed by Bishop (1996) and Pryor and Schaffer (1997), one would expect the demand for college attendance to increase. This rightward shift of the demand curve would result in an increase in enrollment as well as an increase in price. However, over the years, there have also been substantial increases in the costs of producing a college education. These cost increases over the years have shifted the supply curve to the left and would lead to increases in price with subsequent decreases in enrollments, holding all other factors fixed. Since overall enrollment has increased, it appears that the positive enrollment impacts of the increases in demand have dominated the negative enrollment impact of the decreases in supply. This will be especially true if enrollments are not very sensitive to changes in tuition and fees, the explicit price to the student, as prior research seems to indicate.

There are a number of unresolved issues in the enrollment literature. One point of discussion within the enrollment literature relates to defining "price." Ageneral overall perspective clearly recognizes that tuition is only part of the price faced by the student. For many students, the price may be viewed as having two major components. The first component is the opportunity cost of the income forgone while attending college. This component may differ widely from student to student depending in part on the students'job skills. Student job skills may reflect the quality of their previous education, their ability to learn via on-the-job training, and their work experience. Students from a high school with poor peer pressure, in terms of learning, and minimal exposure to technology will have a different opportunity cost than students from a school with a higher degree of emphasis on learning and with a greater emphasis on technology. Students'ability to learn from the work experience may be influenced in part by their capacity to assimilate new ideas, which may be related to some measure of intellectual capacity, which items such as SAT scores attempt to measure. Older students, who have been in the workforce and already possess work experience and job skills, may face a different situation in terms of income forgone than new entrants with little work experience and minimal job-related skills.

The second component of the price faced by the students involves the explicit, out-of-pocket expenses incurred by the student. Included in this category would be items such as tuition and fees, books, and other directly related college expenses not included in the normal living pattern of those individuals not attending college. As will be discussed below, these direct expenses may be reduced through the avenue of financial aid.

There is also a clear recognition in our research that the explicit price to the student (tuition and fees) may be only marginally related to the cost of actually producing the college education. The cost of producing that education may be divided among taxpayers and income from university endowments, as well as the tuition and fees collected directly from the students. As various states have altered their spending priorities, this division or sharing of the cost has been changing. This is especially true for urban public universities,

where the cost-sharing picture may be further muddled as state support has decreased, which may have caused tuition increases, which may then be financed through increased use of federal dollars either in the form of grants or guaranteed loan programs. In this case, there has been a shifting of the costs from the state taxpayers to the federal taxpayers. This pattern may drive an additional wedge between the cost of producing the college education and the explicit price faced by the student.

Research efforts frequently focus on the explicit price (that is, tuition and fees) to the student, since that is the avenue by which institutional policy affects student enrollment directly. At this level, there are several different approaches within the literature. One approach utilizes a net price approach which nets all financial aid out of tuition and fees and, in essence, uses a single net price. This approach assumes that a dollar change in tuition is exactly equal to a dollar change in the financial aid package. The second approach treats financial aid factors as distinctly separate decision variables in the enrollment process. Under this second approach, tuition and financial aid variables are treated as separate entities in whatever statistical analysis is being performed. Within this second approach, there are two variations of this approach. The first variation nets scholarship and grant money from tuition and fees and treats only loans as a separate and distinct category. The second variation treats tuition and fees as one category and then treats scholarships, grants, and loans each as a separate and distinct category. A more detailed discussion of different definitions of price is found in the work of St. John and Starkey (1995).

Retention Model

Vincent Tinto (1975, 1982, 1987) formulated a student integration theory of persistence or retention based on the relationships between students and institutions. Tinto believed that retention involves two commitments on the part of the student. The first, and overriding, commitment is the goal commitment to obtain a college degree. The second, and perhaps weaker, commitment is the decision to obtain that degree at a particular institution, described as the institutional commitment. Overall, it is the combination of the student's goal commitment (to get a degree) and institutional commitment (to get the degree at this specific institution) that affects retention at a particular institution. Under this perspective, it is the strength of the match between the student's motivation and academic ability and the institution's social and academic characteristics that determines the probability that the student will finish at that college. The match of the student's academic goals and the institution's academic program is referred to as the degree of academic integration. The degree to which the student fits or meshes with the school's social and institutional framework is referred to as the student's degree of social integration. Presumably, the more comfortable the student feels in a particular social and institutional environment, the greater the degree of loyalty to that institution and hence the more likely the student is to continue at that institution rather than transferring to a different institution. This student fit may be enhanced by the extent to which a student actively participates in student life by joining clubs, or a fraternity or sorority, and by attendance at university athletic events, plays, or lectures.

A more comprehensive model would also consider the effects of various financial variables, such as (real) explicit costs, changes in these costs for the upcoming academic year, student loan amounts, work study programs, and so on. As such, the model would properly address the retention decision as a response to factors incorporated in human capital theory. We develop such a model, which evaluates the retention decision based on variables related to the student's degree of goal commitment-academic integration, institutional commitment-social integration, and financial status.[1]

Our basic findings suggest that despite all the concerns voiced regarding financial status, it is the degree of the student's academic integration that bears most heavily on retention.[2] The empirical model is discussed in the following section. Empirical results and discussion follow that section. The final section presents some concluding remarks.

[1] We isolate on retention rates for underclassmen for two reasons: (1) these are arguably the most critical years socially and academically, and (2) financial variables carry more weight, because changes in these costs must be compounded over a longer time horizon (e.g., changes in tuition may be less important to the junior or senior retention decision).

[2] Financial variables do have a statistically significant impact on retention, but the marginal impact is small relative to that for variables explaining the degree of academic integration.

Modeling Retention

Empirical studies of Tinto's theory[3] generally classify variables affecting retention into three categories: one category reflecting the individual's goal commitment (academic integration), a second category pertaining to institutional commitment (social integration), and a third category measuring financial status, which in this study includes real net cost, real changes in tuition, student loan amount, and work-study awards.[4]

An individual's goal commitment is difficult to quantify, because it may be related in part to factors affecting an individual's drive and motivation as well as the student's subjective valuation of the worth of education, which are difficult to measure. Goal commitment is probably related to a person's total environmental background, including parental values on education, sibling order, and peer-group pressures, as well as other factors that may influence the individual's drive and motivation. These factors all affect a student's preference patterns and hence his or her utility function. The student's perception as to the value of an education would include both the financial reward factor and the student's own sense of the worth or self-esteem from achieving another level of educational attainment. We study the student's degree of goal commitment or academic integration through the use of several proxies. These include the proportion of credit hours completed to hours attempted in each semester, cumulative grade point average, at-risk status, and enrollment status.[5] At-risk status is a dummy variable that takes the value of zero if the student is currently in good standing, and one otherwise (e.g., if the student is on probation or warning). Enrollment status refers to whether the student is a first-time college student, or a transfer, a new-to-program, a readmitted, or a continuing student.

Institutional commitment or social integration is also difficult to quantify. We use several social integration factors that may influence the social and cultural ties students have to a particular institution. These include marital status, part-time status, and evening enrollment status (commitment comes at a higher opportunity cost for these students). These factors may influence the degree to which the student perceives himself or herself to be a part of the student body or of the university community in the sense that the student body or university community is viewed at a traditional, four-year residential college where most students are in their late teens or early twenties and participate in an active social life centered around university activities. Being an older, married, part-time, or evening student in a commuter setting may make it difficult to develop a "sense of place" with the university and hence any degree of institutional loyalty or commitment to that particular institution. Students in these categories may not be inclined to participate in clubs or the Greek system and may be less inclined to attend university functions such as plays, athletic events, movies, etc.

An individual's financial status reflects a number of factors. Real net cost is a variable intended to measure the level of an individual student's real out-of-pocket costs. On the other hand, changes in real tuition measure increments in costs that are intended to capture the impact of the tuition dynamic on retention. Retention responds to both a level and dynamic; the latter assumes that rates of change of the financial variables, as well as absolute real net costs, are important in the retention decision. While real net cost is not independent of the change in tuition, a change in real net cost incorporates financial aid that varies from time period to time period and from student to student. We assume little danger of collinearity in these two price factors. This issue is substantially an empirical one, as significant collinearity would inflate the standard errors on one, if not both, coefficients, resulting in insignificant *t*-statistics. This was not the case, as both coefficients were significant in the empirical treatment. Students' loan amounts are treated separately, because students contract for this amount independently, based on individually perceived needs, to be repaid with interest after the student leaves college. Likewise, work-study programs are contracted for separately by the student and the institution, and hence are treated in a separate category.

The data base consisted of the entire set of freshmen and sophomore student records at Virginia Commonwealth University located in Richmond, Virginia, a large (22,000) urban public university with a

[3] Cabrera, Stampen, and Hansen (1990).

[4] Real net cost is tuition minus grants-in-aid adjusted annually for changes in the consumer price index.

[5] Though Manski and Wise (1983) conclude that SAT scores and likelihood of attendance are highly correlated, data on SAT scores are not available for all students in our data base; e.g., transfer students are not required to report SAT scores.

high proportion of working students and part-time students as well as substantial numbers of older and minority students.[6] The time period of study covers the years 1989-1992.[7] Variable definitions are presented in Table 1.

The dependent variable was constructed as follows. Student records were sorted by year. As such, the data consisted of multiple observations on each student through time (unless a student did not return for a second year of study). We were interested in those who were either freshmen or sophomores and enrolled or who did not re-enroll for a subsequent year of study. Given the number of part-time students at the university, a student can maintain freshman status for several semesters. We looked at the students only the first time they appeared in the data set and then again as to whether they appeared the following year or had dropped out. Because we desired to maintain independence among the observations, once student records had been entered in that fashion, they were no longer considered in subsequent years.

Consequently, we avoid assigning too much weight to students with multiple observations. The dependent variable takes a value of one if the student was either a freshman or a sophomore (whichever level was observed first)[8] and the student re-enrolled for the subsequent year. Thus, the freshman or sophomore student was retained for the study, and records at the time for which the variable equals unity were admitted into the sample. For students who did not re-enroll, the dependent variable takes the value zero, and these records are also admitted into the sample. Observations on the dependent variable for each eligible student record were then matched across time with information from each student's record concerning the level of tuition and the amount and type of any financial award which the student may have received (i.e., grants-in-aid, student loans, work study). The data records also included the change in the student's cumulative GPA observed at the close of the current semester, as well as information indicating the student's at-risk status and enrollment status at the start of the semester. The set of explanatory variables also included the ratio of earned to attempted credit hours observed at the end of the current semester[9] and dummy variables identifying race, marital status, part-time status, and evening enrollment.

The empirical model is a regression model involving a binary dependent variable. A logistic specification was used (although a probit specification would have yielded essentially the same results). The estimation method yields maximum likelihood estimates of the model's parameters.

TABLE 1. VARIABLE NAMES AND DEFINITIONS

Erst1-Erst4:	Enrollment status (1=transfer, 2=readmit, 3=continuing, 4=new to program)
GPA:	Change in cumulative GPA
At-risk:	Current academic status (1=probation or warning, 0=good standing)
Erratt:	Ratio of current semester hours earned to hours attempted
Rnetcost:	Current real net cost (tuition-grants) adjusted for inflation
Loans:	Current amount of student loans
Work:	Current amount of work study award
Rdtuit:	Real change in tuition from previous year
Single:	Marital status (1=single, 0=married)
Ethnw:	Race (1=white, 0=black)
Part:	Part-time status (1=part-time, 0=full-time)
Eve:	Evening or day student (1=evenings, 0=day)

[6] We dichotomize race into blacks and whites where white also includes a small number of Asian, Hispanic, and Native American students. Our aim is to assess differences in retention for black students relative to all others.

[7] The university did not keep complete financial aid records until 1989.

[8] Many students are observed first as sophomores because that was their class standing at the time the data were collected. Others transferred in or were readmitted as sophomores or perhaps received advanced placement. We observed these students'decisions to continue as sophomores or juniors. However, if a student was observed first as a freshman, then we considered only that student's decision to return as a freshman or sophomore and not the subsequent possibility that the student continued as a junior two years hence.

[9] This variable is intended to measure academic progress and is assumed to be an indicator of goal commitment.

TABLE 2: LOGIT ESTIMATES (*t*-statistics in parentheses)

Variables	University	Whites	Blacks
Constant	-0.567	-0.495	-0.886
	(-3.284)	(-2.486)	(-2.472)
Erst1	0.131	0.207	-0.118
	(2.509)	(3.455)	(-0.894)
Erst2	-0.403	-0.286	-0.859
	(-2.544)	(-1.554)	(-2.554)
Erst3	-0.058	0.045	-0.552
	(-0.722)	(0.474)	(-2.837)
Erst4	0.408	0.439	0.685
	(2.121)	(2.049)	(1.30)
GPA	0.495	0.520	0.549
	(7.198)	(6.348)	(3.956)
At-risk	-0.348	-0.409	-0.178
	(-5.404)	(-5.229)	(-1.370)
Erratt	2.023	2.067	1.981
	(14.559)	(12.353)	(7.029)
Rnetcost	-0.000135	-0.000116	-0.000185
	(-7.077)	(-4.449)	(-5.168)
Loans	-0.000	-0.000315	0.000041
	(-0.496)	(-2.117)	(1.638)
Work	0.000129	0.000080	0.000085
	(1.457)	(0.648)	(0.621)
Rdtuit	-0.01002	-0.00999	-0.0096
	(-49.473)	(-42.449)	(-20.119)
Single	0.533	0.453	0.803
	(5.797)	(4.245)	(3.742)
Ethnw	0.048		
	(0.873)		
Part	-0.512	-0.591	-0.096
	(-4.854)	(-4.645)	(-0.369)
Eve	-0.173	-0.122	-0.218
	(-1.248)	(-0.735)	(-0.746)
observations	12549	9329	2263
X^2	3795.01	2760.06	705.32
R^2	0.2384	0.2360	0.241
sensitivity	83.37	85.76	85.89
specificity	66.99	66.44	65.15

Note: See Table 1 for variable names and definitions. *Specificity* refers to the percentage of cases in which *y*=0 (attrition) is predicted correctly in the sample. *Sensitivity* measures the percentage of cases in which *y*=1 (retention) is predicted correctly.

Empirical Results

Results are presented in Table 2, whose columns are organized to facilitate comparing these findings for the entire student body and then for two major subsets of the student body. In this case, the student population was divided between whites and non-whites, given the urban mission of the university and numerous attempts to increase minority group participation in the higher education process. What follows is an attempt to summarize the results and highlight the important contrasts.

Because the logistic regression function is nonlinear in the parameters, estimated coefficients do not have the usual linear least squares interpretation; i.e., they do not measure the change in the probability of success (retention) given a one-unit change in the regressors. Rather, coefficients measure the linear relationship between the regressors and the logarithm of the odds ratio:

$$\log(\hat{P}_i / (1 - \hat{P}_i)) = \sum_i \hat{\beta}_i x_{i,}$$

which, upon solving for the estimated probability of success (P_i), yields

$$\hat{P}_i = \exp\sum \hat{\beta}_i x_i / (1 + \exp\sum \hat{\beta}_i x_i)$$

indicating that the probability of retention (attrition) depends not only upon the magnitude and sign of the estimated coefficient, but the magnitude of the regressor as well. In general, retention is monotonically increasing in these magnitudes but in a nonlinear way. If the regressors are continuous, then there is, in principle, an infinity of solutions for P_i. It is common practice, therefore, to establish a benchmark probability, one based upon some reasonable set of values for the regressors, and then to estimate changes in this probability conditional on small changes in the regressors. For example, from Table 2 we establish that the retention probability for a single, full-time, daytime black student, who has completed all attempted hours of credit (*Erratt* = 1.0) at real net cost equal to $5,000, with a GPA of 2.5, and is enrolled as a first-time student (the intercept) but has no loans, work study, or academic probation, and to whom no changes in real tuition cost has occurred, is 70.1 percent. But should this student be on academic probation (*Risk* = 1) with enrollment status indicating that he or she was readmitted (*Erst*2 = 1) to the university, then this probability falls to approximately 56.7 percent. Diminish this student's progress rating so that only half the hours attempted are completed, and this probability falls precipitously to about 24 percent. The same benchmarks for white students are, respectively, 73.3 percent, 67.2 percent, and 50.4 percent. Clearly, a student's progress toward a degree (*Erratt*) has a much larger impact on black retention.

The odds ratio is the proportion of the probability of success to that of failure. From the first equation in this section, it is clear that this logarithm is linear in both the coefficients and the explanatory variables. In general, the greater the absolute size of the coefficient, the greater the effect the regressor has on the logarithm of the odds ratio. Hence the greater, too, the impact on the probability of success. Negative and positive values therefore work in opposite directions; negative coefficients reduce the value of the log-odds ratio, which decreases the probability of success.

In a similar fashion, retention probabilities and their sensitivities can be established for many such combinations of characteristics. Of particular interest are those probabilities pertaining to racial differences for various risk categories which offer deeper insight into how factors such as transfer status, readmission, or academic probation affect retention differently for black students.

We begin the discussion on each column of Table 2 with a synopsis of the results pertaining to the overall degree of academic integration (goal commitment). This is followed by a discussion of various qualitative characteristics (part-time, evening, marital status, race, and gender) which proxy the extent of student social integration (institutional commitment). We conclude with a discussion of the financial variables. As noted earlier, the data set is "rich" in that no student has been involuntarily removed by the university in the time dimension of the study. A number of the students are on warning or probation, but the time period before academic suspension is imposed has not been reached for the students in the current data set. However, there may be students who were previously dismissed for academic reasons and have returned to the university.

General Results

Results for the entire university are shown in the second column of Table 2. Judging from the measures of specificity and sensitivity, the model appears to predict quite well.[10] In terms of academic integration as it relates to goal commitment, the variables *Erst*1-*Erst*4 are dummy variables indicating enrollment status (corresponding to transfer, readmitted, continuing, and new-to-program, respectively). Otherwise, enrollment status refers to first-time students (these were the majority), captured here by the regression constant (i.e., the omitted dummy variable). Thus, the coefficients on enrollment status measure the degree to which students who fit these categories differ from those measured by the constant (*ceteris paribus*). Overall, only readmitted students are consistently less likely to return ($ß$ = -0.403, t = -2.544).

Positive changes in a student's cumulative GPA contribute to retention ($ß$ = 0.495, t = 7.198), as does progress through the program, measured by *Erratt*, the proportion of earned to attempted credit hours ($ß$ = 2.023, t = 14.559). On the other hand, if a student is academically at-risk, this at-risk status contributes to attrition ($ß$ = -0.348, t = -5.404). In sum, *Erratt* contributes most to retention, followed by changes in the student's GPA. These two factors indicate that the student is making progress toward a degree, and is doing so in a timely and consistent manner.

With regard to institutional commitment, there are a number of factors that may reflect or influence the student's degree of social integration into the university setting. Arguably, part-time, evening, and married students are less integrated into the social fabric of the university. Part-time as well as evening students may be on campus for a small number of hours, basically going to class and then leaving the campus without participation in traditional campus activities, ranging from the Greek system to use of facilities such as the campus library, the student union, and the whole variety of locations where students traditionally interact with each other. Hence, these students may have less social integration into the student body and a lower degree of institutional commitment. Married students'lives may be centered around the family unit in terms of their social structure, and these students may also experience less social integration to a particular institution. Thus, single students are more likely to continue ($ß$ = 0.533, t = 5.797). Part-time ($ß$ = -0.512, t = -4.854) and evening students ($ß$ = -0.173, t = -1.248) are less likely to do the same, although for the evening students the result was not statistically significant.

On the financial side, real net cost ($ß$ = -0.000135, t = -7.077) and changes in real tuition ($ß$ = -0.01002, t = -49.473) both decrease the likelihood of retention.[11] Loans and work-study programs apparently have no statistically significant influence.

The sizes of these coefficients roughly indicate their relative contributions to the likelihood of attrition or retention. Clearly, academic progress as measured by the ratio of earned to attempted credit hours, changes in GPA, the student's newness to the program, and avoidance of falling into the at-risk status of being placed on academic probation or warning contributes most to retention. Being single also contributes to retention. Part-time, readmitted, or evening students are more likely to leave. These students may lack social integration into the university structure since their life is more likely to be centered around work or family life, in contrast to a full-time student who is not working at all or working only part-time, and thus has more time and freedom to participate in university activities. Finally, financial status is important but relatively less important to student retention than academic progress.

Differences in Race

To ascertain whether anything significant can be concluded regarding differential response rates to the various factors by different subsets of the population, the data were separated by race, and the model was then re-estimated for both cases. These results are reported in columns 3 and 4 in Table 2. Regarding the rel-

[10] Specificity refers to the percentage of cases in which y=0 (attrition) is predicted correctly in the sample. Sensitivity measures the percentage of cases in which y=1 (retention) is predicted correctly.

[11] The data on these variables are measured in thousands of $. Thus a $1,000 increase in, say, real net cost reduces the log-odds ratio by (1,000 x 0.000135) = 0.135.

ative impact of goal commitment, it is clear from these results that while enrollment status is a significant factor relating to black retention, it is related to different factors relative to white retention. This much can be seen from a comparison of the *t*-statistics across columns 3 and 4 for the variables *Erst*1-*Erst*4.[12]

For black students, the significant status factors are being a readmitted or continuing student (compared to a first-time student). Being in either the readmitted or continuing student category contributes to attrition for non-white students, while neither transfer nor new-to-program status has any significant impact on the retention or attrition of non-white students. For black students, attrition appears not to be sensitive to the academically at-risk classification ($ß$ = -0.178, t = -1.37). One possible explanation is that black students may be more persistent in the face of adversity. This may reflect a difference in opportunity cost as evidenced by the fact that these students are also incurring more debt while they maintain their status as students. Furthermore, if indeed black students stay longer in the institution when in academic trouble, this may help suggest why, when they are readmitted, they are more likely to leave again.

For those black students who are slower to leave the institution because of academic issues, their academic potential or ability may be such that, even upon returning, they quickly fall into academic difficulty again. The picture that emerges is that black students stay longer, despite warning signs of academic trouble; they compile more debt as they stay in the institution; and then, after they return, they are more likely to leave again. This may be an issue for institutions trying to diversify into the minority community, especially if the institution is accepting "special standing" students disproportionately from that minority community. If indeed these students are weaker, then to nurture them to graduation may require special programs, not only in terms of initial enrollment, but also if these students leave for academic reasons and return later to try again. Recruiting students into a university as special students and not providing them an ongoing academic support system does not appear to benefit the student or the institution and may simply leave the student deeper in debt and hence less likely to repay student loans.

For white students, the significant factors are transfer status and new-to-program status (as opposed to readmitted status); both of these variables contribute to retention, not attrition. However, for white students, attrition is more sensitive to being an academically at-risk student ($ß$ = -0.409, t = -5.229). The picture that emerges in this case is that white students are more likely to leave in the face of academic difficulty prior to the time that the university places them on suspension. Since white students accumulate less debt, this may also reflect a difference in the opportunity cost to these students. In addition, white students who transfer in from other institutions, such as the community college system, are more likely to continue as students.

As anticipated, both subsets of the student population respond positively to increases in GPA and *Erratt*. Doing well, as measured by completing course work (that is, making progress toward a degree) and by doing well in that course work, leads to retention. While this result is not surprising, it does have some implications for institutional policy. One alternative is to admit better students who are more likely to succeed. Another alternative is to focus institutional policy, in terms of retention, on a better advising system. A system that allows students, especially marginal students, to take a reduced course load each semester may increase their chances of success. Being academically successful appears to be the major key to retention and may well lead to additional success for students, including progress on to graduation.

With regard to the factors used to proxy institutional commitment or social integration, being single has a positive impact on retention for both black and white students. Being a part-time student is not a statistically significant factor for black students. For white students, being a part-time student is a statistically significant factor and does lead to greater attrition. For both subsets of the user population, being a day or evening student was not a statistically significant factor.

Both groups respond negatively to increases in real net costs as well as to increases in real tuition. Retention among white students is negatively related to student loan amounts. For black students, the relationship of student loans to retention is positive, although weakly so. This result may be due to the possibility that financial constraints force black students to borrow more than white students. As a result, black

[12] These are, respectively, transfers, readmitted students, continuing students, and students new to a program, the last of which refers to students who have just committed to (enrolled in or were accepted to) a particular course of study. All others (i.e., the intercept in the regression) are first-time students, regarding their enrollment status.

students have a tendency to compile more debt.[13] However, greater access to loans does enable black students to stay in school longer relative to the white students.

Conclusions

This study analyzes the empirical relationship between retention and various factors which reflect students'levels of goal commitment-academic integration and institutional commitment-social integration into university life, as well as financial factors related to retention. The data base consists of individual student records on freshmen and sophomores at a single, public urban university over the 1989-1992 period. The major results suggest that academic progress, as measured by (1) GPA, (2) falling into an academic at-risk classification, and (3) the ratio of credit hours earned to those attempted, drives the attrition/retention decision. The degree of academic integration, as measured by enrollment status (transfers, readmitted students, new students, and new-to-program students), is the next most important variable. Financial variables such as real net costs (tuition grants) and real changes in tuition are significant factors as well, but weaker in their combined influence.

There are also some distinct differences across racial subgroups of the population. For black students, being a continuing student or a readmitted student to the university has a negative impact on retention. For whites, transfer status actually raises the probability of retention. Single marital status was found to be positively related to retention for both black and white students. Being a part-time student contributes to attrition for white students, but not for black students.

In sum, the results offer empirical support regarding the importance of the degree of academic and social integration on undergraduate student retention. Financial considerations appear to be minor in importance. Though we make no attempt here to generalize our results to other public urban institutions of higher learning, we see no reason to suggest that the university used in this study is atypical of other urban universities with a broad enrollment mission that serve a large number of non-traditional, predominately commuter, students.

In terms of institutional policy regarding retention, these results have some interesting implications. One relatively obvious alternative is to admit better students, who will be more likely to do well and hence stay in school. For urban public institutions with a generous admission policy, that approach may not be very feasible, given the tie of enrollment numbers to state financial support. Given that constraint, such institutions may want to abandon the fiction of a four-year program for all students. Institutions may want to consider the development of an explicit five-year program and restrict students to a 12-credit-hour enrollment plan, unless the student can demonstrate a superior background prior to enrollment or until the student demonstrates superior academic performance such as at least a 2.5 or better grade-point average. Rather than restricting a small percentage of new students to a restricted course load, this approach suggests to start from that limitation for the vast majority of students, until they prove they can combine their academic work load with their work life. Only those students admitted into an honors program or who have clearly demonstrated that they are superior students would be allowed to take more than 12 credit hours the first year. This would allow students more time to study per class, since they would have four rather than five classes. It would also force students to do better in those classes in order to avoid losing financial aid by dropping a class and hence falling below a full-time student status.

Despite all the rhetoric concerning financial aid issues, it appears that the main determinant of retention is doing well and making academic progress. If students do well academically, they usually manage to stay in school. External public policy may affect the distribution of resources and financial aid. Institutional policy may be more successful at retention of students if policy focuses more on increasing the academic success of students, including students who stepped out and have subsequently returned to the university.

[13] Indeed, in 1992, the average student loan amount was $2,372 for blacks versus $1,296 for whites.

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