Measuring Determinants of Student Return vs. Transfer vs. Stopout vs. Dropout: A First-to-Second Year Analysis of New Freshmen

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Abstract

Measuring the impact of selected determinants on new freshmen retention has been a focus of education research for some time. Looking at student demographics, high school preparation, college experience, and financial aid offers, the study examines the impact of each area on second-year retention at a moderately selective public university. Retention is measured on the basis of a student's probability to re-enroll, transfer out, stop out, or drop out. The most significant positive impact on re-enrollment is associated with financial aid offers, particularly scholarships and less so loan offers. A superior level of high school preparation increases the odds of not returning when no financial aid is being offered. Other findings indicate that higher parental income, concurrent enrollment at another college, successful completion of first-year math, and higher first-semester grades all positively impact re-enrollment and lower the probability of transfer, stop out, or drop out. Minority students with low first-semester grades are more likely to transfer, while Caucasian and Asian American students with high grades are more likely to return. Residing outside the local area raises the odds of not returning. Class size and the difficulty of registering in a class do not affect a student's chance for re-enrollment. Likewise, on-campus employment does not weigh in as a significant factor. How well a student performs academically vis-à-vis his/her class peers might be an influential factor for those doing well in their first semester; however, given inconsistency across examined models, a longitudinal analysis is needed to validate the statistical impact on retention beyond first-year students.

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Introduction

Student retention has been the focus of research on higher education for some time, not least due to efforts to establish a benchmark indicator of institutional performance and to gain a better understanding of enrollment-driven revenue streams. Early studies laid the theoretical foundation for scholarly inquiry into the host of factors that influence student enrollment persistence and degree completion (e.g., Spady, 1971; Tinto, 1975; Bean, 1980, 1985; Pascarella & Terenzini, 1980; Astin, 1984; Billson & Brooks-Terry, 1987). Attention centered on interactive and causal links between student background, educational and institutional commitment, and academic and social integration. More recent analyses on student retention focus increasingly on the financial aspect of college attendance (e.g., Long, 1998; DesJardins, Ahlburg, McCall, 2002; Hu & St. John, 2001; Braunstein, McGrath, Pescatrice, 2001; Somers, 1995; Fenske, Porter, DuBrock, 1999). While financial aid looms ever larger in the enrollment calculus of students, the directional impact of aid on enrollment is not always consistent among institutional studies (Somers, 1995; Perna, 1997). This is due not only to institutional differences (e.g., admissions requirements, student demographics, location etc.), but also the result of differences in model specification when estimating the impact of individual factors on enrollment behavior.

Typically, retention models examine a set of determinants that reflect a student's demographic background, both high school and college experience, and financial aid status. To the extent that inclusion of factors in each cluster is often guided by data availability, in addition to theoretical considerations and model fit, there is a lack of coherent methodology governing retention analysis. While this study does not address the relative merit of one approach vis-à-vis another, it examines student retention beyond the dichotomous 'return vs. non-return' context that dominates research by disaggregating the latter outcome into transfer, stopout, and dropout events.

In conjunction with a more extensive set of financial aid indicators being analyzed compared to previous studies, this analysis concentrates on the relative impact of each determinant across the multiple enrollment outcomes. Moreover, the impact of financial aid is examined on the basis of aid offered, a limitation in previous studies (Hollomon, 2003; St. John, Hu, 2001; Somers, 1995; Long, 1998; DuBrock, Fenske, 2000; Bettinger, 2002), which use money already awarded or received. This usually forces the analysis to impute money offered to students who departed, as actual offers made are no longer on record (St. John, Hu, Weber, 2001). Clearly, the effect of financial aid on re-enrollment is more accurately measured on the basis of money offered, that is, *prior* to a student's acceptance of an award, which signifies commitment and therefore biases the decision to re-enroll.

Also, the model controls for parent income via two data sources in an attempt to minimize the number of missing cases. Imputing parent income based on federal aid applications, as generally done, may lead to overestimating the number of students from high-income backgrounds. Students who do not apply for federal aid may not necessarily be from high-income parents on the assumption they could not qualify. As a recent U.S. Department of Education study points out, many parents, particularly with lower incomes, know little about financial aid options (Potter, 2003).

Since this study is part of a larger effort to support institutional enrollment management and resource allocation, design variables are included in the analysis that are typically not present in other studies (e.g., class size, registration difficulty, peer challenge), but that might be of interest to other institutions with similar mission, enrollment growth and/or capacity challenges.

Central Focus of the Inquiry

Significant demographic changes in the state's college-going population, strategic planning goals to enhance institutional quality, and a statewide mission to expand access to higher education make a better understanding of student enrollment behavior imperative. To this end, the study examines the influence of student background, high school preparation, college experience, and financial aid offers on second-year enrollment of new freshmen. Particular attention is paid to the impact of different types of financial aid offered since the introduction of the state-funded Millennium scholarship program (comparable to the Hope scholarship in Georgia)[1]. The Millennium program has catalyzed new freshmen enrollment and has been the key factor in the state's expanding college-going

population. Thus, its impact on new freshmen retention is of considerable interest to both institutional management and state policymakers. Given the saliency of financial aid in the decision to enroll or not, the influence of student aid is measured in terms of packages offered, contribution by financial source, and dollar amount effect (price response).

Research Approach

The effect of student background (age, gender, ethnicity, residency, parent income), high school preparation (composite index), college experience (on-campus living/employment, credit load, GPA, math requirement in major, 1st year math grade, remedial course enrollment, peer challenge, class selection), and financial aid offers (by package, source, amount) on second-year (subsequent fall semester) enrollment is measured using new freshmen who entered in the fall semesters between 1996 and 2002. Two considerations necessitated that the analysis proceed along two separate models: The first one includes student cohorts since fall 2000, when the state-funded Millennium scholarship program was introduced. In this model, the 2nd year enrollment outcome includes re-enrollment (return), non-returnees who transferred within two semesters following initial enrollment, and dropouts who did not return and were not identified as transferring to another institution within two semesters. Stopout behavior is not examined due to the short observation period.

Second, to accommodate both the inclusion of multiple cohorts and to ensure observation of a consistent period to stopout, dropout, or transfer for each cohort, another model uses student fall cohorts from 1996 through 1999, thus controlling for the difference in Millennium scholarship eligibility. The enrollment outcome for this model uses a seven-semester timeframe to identify students transferring out and further breaks out stopout students, those returning within seven semesters and who did not transfer to another institution during that length of time.

Statistical Method

To measure the impact of selected determinants on the enrollment outcome, multinomial (or polytomous) logistic regression is employed. Logistic regression is an established method in retention studies for it handles both categorical and continuous predictor variables, which do not have to exhibit linearity and homogeneity of variance vis-à-vis the outcome variable (Adelman, 1999; Gillespie & Noble, 1992; Cabrera, 1994; Cohen et al., 2003).

However, for logistic regression to yield stable and reliable measures across all examined variables, the presence of multicollinearity among determinants, data outliers, and insufficient cases across the outcome variable was tested. Though all observed standard errors were within acceptable limits given the number of covariates, an asymptotic correlation matrix of predictor variables was examined to strengthen confidence in the reliability of coefficients. To identify statistical outliers in terms of a) predictor variable value, b) discrepancy between the predicted and observed outcome (enrollment status), and c) influence on either individual predictor coefficient or the overall model, the following diagnostic statistics were checked: the centered leverage value, Mahalanobis distance, the studentized residual, Cook's D, and DFBetas. Results from repeated binary logistic regression (with re-enrollment as the reference outcome) yielded a few visual outliers above proposed cutoff values (as per Cohen et al., 2003) in terms of centered leverage and Mahalanobis distance. Similarly, Cook's D generated a few cases with visual separation, though well within cutoff limits; no outliers were observed in terms of residuals. Removal of outliers effected only changes in coefficients past the first decimal place and had minimal impact on the remaining model deviance and model fit indicators (Nagelkerke R^2, Hosmer-Lemeshow, percent of cases correctly predicted).[2] All predictor variables were crosstabulated with the enrollment outcome categories to ensure adequate cell frequencies. In a few instances, variables were reconstructed, as described in the model specification section, to bolster cell frequencies. Though no consistent guidelines exist governing a minimum observation-to-predictor ratio, the latter for both models in this study is in the mid-range compared to recently reviewed logistic regression studies (Peng et al., 2002).

The effect of each determinant is illustrated via the odds ratio (or inverse odds ratio where the logit coefficient is negative) to indicate how much the odds of not re-enrolling (i.e., transferring, stopping out, or dropping out; or re-enrolling when inverse) are *multiplied* as a result of an incremental unit change in the determinant (DesJardins, 1999). Since most determinants are of categorical nature, the effect of being in one category vis-à-vis the reference category is measured. Where the determinant is a continuous metric (e.g., aid dollars offered), the scale is identified. Odds ratios are multiplicative, hence the effect of a multiple unit change is exponential. The remaining

deviation chi-square value (-2Log likelihood), the pseudo R^2, the overall percent of cases correctly predicted, and the improvement over the null model are all furnished to assess model fit. Odds ratios of statistical significance (α =< 5%) are highlighted in reference Table 3 and 4.

Data Sources and Model Specification

Four sources were tapped to generate the data file: the institutional student information system (SIS), which contains student demographic, academic, and financial aid data; the institution's payroll system for student on-campus employment data; ACT's Student Profile Section (SPS) for parent income data of ACT-tested students; and the National Student Clearinghouse (NSC) to identify transfer-out students. The NSC identified 99.8 percent of all cases in model 1 and 99.9 percent of all cases in model 2, leaving a total of 17 unidentified cases out of 4498 records submitted. The following defines the variables used:

- Student age references up-to-18-year olds right out of high school against students 19 years and older. This categorization separates those delaying college-entry after high school, since few non-traditional students are found in the new freshmen class.
- Ethnicity combines African American, Hispanic, and Native American students, which together constitute a small proportion of each entering cohort in order to stabilize the coefficient. Asian Americans were found to be no different from Caucasian students in the preliminary bivariate analysis and combining them helps model parsimony.
- Residency uses the institution's primary capture area, which is the regional five county area surrounding Reno, Nevada, as the reference category and compares it to other in-state and 'Good Neighbor' students. The latter enjoy preferential tuition and are primarily from adjacent California counties. Out-of-state students make up the third category, as these students pay a significantly higher tuition rate.
- Parent income is grouped into upper, middle, and bottom thirds and adds a 'missing' category for those students without federal aid application data in SIS and without data from the ACT SPS. Complementing SIS data with ACT data helps minimize the number of cases missing. ACT categorical income data are combined to reflect the larger aggregation in the design variable, thereby reducing potential errors of misclassification associated with unadjusted income. Research on student self-reported data confirms an accuracy of 72 to 98 percent depending on the data item (Laing, Sawyer, Noble, 1987).
- The high school preparation index follows Adelman's "Academic Resources" composite variable (1999): high school GPA and ACT Combined test score make up a weighted index based on the respective odds ratio for each component in a bivariate logistic regression with the enrollment outcome; the weight is then multiplied by the quintile score associated with each raw score. SAT scores were converted for students without an ACT record (using the ACT, ETS and CEEB National Concordance Study, 1997).
- On campus living indicates whether a student resided in on-campus dormitories. The institution does not require on-campus living for new freshmen (this variable is omitted in the second model due to incomplete data).
- Enrolled at another institution indicates whether a student was concurrently enrolled at another post-secondary institution, in this case principally two community colleges in the local area.
- Credit load identifies students taking at least one regular course beyond the minimum required to maintain full-time status and thus eligibility for most financial aid offered.
- Calculus 1 requirement tests for those students whose major requires the passing of a Calculus 1 math course (excluding Calculus for Business majors), which ties into the finding that pre-college math preparation has the strongest continuing influence on post-secondary persistence among all high school curriculum experiences (Adelman, 1999). A higher-level math requirement is also a shortcut in identifying students in the physical and natural sciences.
- Passed 1st year math indicates whether a student completed a first-year math course with a grade of 'C' or better or enrolled in higher-level math courses, which require a minimum placement score.
- Peer challenge variable groups students into three categories based on the difference between their first-semester GPA and the average grade awarded in classes attended by a given student. Thus, an individual's grades are compared to the average grades of his/her peers. A weak challenge indicates the student on

average received higher grades than his/her classmates; a strong challenge exists when peers, on average, received higher grades.

- The class selection variable measures the average size of classes enrolled in, grouped into greater/smaller than 48 (ca. the midpoint), and whether the student attempted to enroll in a class that was full at the time of the registration attempt (the student may have successfully enrolled at a later time). Both class size and class availability is of mounting concern, as the institution is experiencing rapid enrollment growth, largely driven by Millennium-supported new freshmen. (This variable is not included in the second model due to lack of data)
- Campus employment indicates whether a student worked on campus during the first semester, either through federal or state-funded work-study or through campus employment services.
- Aid packages offered group students by type of financial aid offered; offers are grouped by the most frequent combinations to stabilize coefficients. Packages typically consist of grants that are non-repayable and not tied to service or employment, grants-in-aid that pay a specified portion of tuition and fees, scholarships that are non-repayable and merit-based, and both subsidized and unsubsidized loans that are repayable. Initially, financial aid packages offered were grouped into six categories to measure the effect of a range of possible offerings on enrollment persistence. The marginal percentage of students receiving some of these offers was rather small, however (see Table 9a). As a result, aid types were collapsed to form three categories: no aid offers; offers including either loans, grants, or work study, or a combination of these three types of funds together with a scholarship; and scholarship-only offers.
- Aid offered by source measures the impact of institutional aid versus federal/state aid as well as aid tied to specific eligibility requirements (e.g., Pell grants, Millennium scholarships).
- Aid amounts offered are re-scaled to measure the effect of a $1,000 increment and are inflation-adjusted (1996 base year) based on the Consumer Price Index and institutional tuition increases during the observation period. The adjustment is weighted on the proportional contribution of tuition to the estimated total expenses as reported by the institution to the federal government (IPEDS).

The software used dictates coding of the reference category in design variables. SPSS uses the highest coded category as reference. Iteration settings for likelihood convergence are set for the most stringent criteria.[3] Interaction terms are analyzed when yielding additional findings.

Variables tested but not entered into the model due to statistical insignificance and/or of marginal theoretical importance include: pre-major status for undeclared students in their first semester; percent of incomplete or withdrawal (I/W) grades received in the first semester; the difference between first semester tuition charges incurred and total aid received for that semester; campus dining plan subscription; transferred advanced placement (AP) credits; average weekly hours of campus employment; educational aspiration; and the local area unemployment rate.

Pre-major students receive special counseling to ensure proper program guidance, and they have lately been of special interest to the institution. Pre-major status did not affect the odds of re-enrollment when controlling for other factors in the model. The percent of incomplete and withdrawal grades had no impact on first-semester students, since the cumulative effect is limited at that point. The charges-minus-aid-received amount is exploratory; it is a step in the calculation of unmet need, which will be incorporated in a future model. The campus dining variable did not add to the model, as campus dining is chosen largely by students living on-campus (a factor controlled for). Similarly, AP credits had an insignificant impact in the presence of the selected variables. Also, average weekly hours of campus employment did not add to the model. ACT-based educational aspiration data were highly skewed in favor of students aiming for completion of an undergraduate or graduate degree; data compression at the high end of the scale left little variation for analysis beyond the impression that tested students tend to over-project their educational plans. The local-area unemployment rate, as quarterly reported, did not exhibit a significant effect in the models and thus was omitted as a determinant. Further research is needed to ascertain the importance of the local job market on student persistence. The number of area jobs filled by students, and adjusted for seasonal variation and enrollment growth, is perhaps a better indicator, as traditional students are unlikely to be captured in employment statistics.

Limitation

The tested models do not include social and academic integration variables identified in other retention studies as important determinants. For example, student interaction with faculty and peers is know to have a salutary effect on

persistence (Astin, 1984). Similarly, the degree of institutional support during initial outreach, recruitment, assessment, and program selection that impact a student's sense of affiliation and loyalty promote continued enrollment (Billson & Brooks-Terry, 1987).[4] Second, the lack of off-campus employment information could potentially represent important uncontrolled variance, as students' enrollment choices are likely to covary with outside job commitments. Availability of this information may help validate the true effect of on-campus employment, as discussed in the findings. Third, determination of transfer, stopout, and dropout status is a function of the right-censored observation period; accordingly, inferences about each enrollment outcome can only be stated in the context of the defined period. Fourth, financial aid offered captures only offers processed through the institution's financial aid system. Offers from benefactors connected directly to the student are not included in the aid offered variable. This does not bias the variable per se, as defined by the packaging options, but would do so when considering the impact of *total* aid offered beyond that which is processed by the institution's financial aid office. Fifth, both the ethnicity and the parent income variable contain a category of missing cases. While this is of negligible importance in the former case with only 4 percent of cases missing, inferences on the effect of parent income must take into account that 24 percent of cases could not be assigned to the used scale. While a fair proportion of the missing cases indeed might belong to the highest income category, this study does not make the implicit assumption that a missing case is automatically a high-income case. Lastly, new freshmen retention has been measured in other studies both *within* and *between* academic years. With three-fourths of non-returnees in this study having departed between academic years, the within-year framework was deemed less appropriate. More importantly, the effect of aid offered can only be captured adequately on a year-to-year basis due to the aid application timeframe and the annual award formula.

Descriptive Summary of the Data

Varsity athletes as well as part-time, foreign, and not officially admitted students are excluded. Given the statistical method used, listwise deletion of 229 cases left 5,261 students in the examined population (96 percent of all students) for the first model; after listwise deletion of 148 cases, 4,298 students (97 percent of all students) remained in the second model.

Trends in the data reveal several important differences between fall 1996-99 new freshmen (model 2) and those who entered in fall terms 2000-02 (model 1): Financial aid measures are based on a different aid package distribution. While almost 56 percent of students in the nineties had no aid offer, that proportion dropped to less than 31 percent, on average, since 2000. This change was precipitated by the introduction of the Millennium program, as the proportion of students with scholarship-only offers rose from 19 percent in the early cohorts to 47 percent for those since 2000 (see Tables 1 and 2). Meanwhile, the proportion of students with loan offers dropped from 23.5 percent to 17.6 percent, with grant offers holding steady at 14 percent. Contrary to the national trend, both the average size of loans offered and the percent of students applying for them went down thanks to the statewide availability of Millennium scholarships.

Other longitudinal trends indicate a 7 percent rise in the proportion of in-state students from outside the local region (i.e., rural areas and Las Vegas), a drop in first-semester concurrent enrollment at other institutions, a 7 percent drop in the proportion of students declaring a major that requires higher-level math, and an almost 10 percent rise in the proportion of students taking remedial English. The modest growth in remedial math enrollment is likely due to unmet demand, as students failed to register in classes that were already full.[5]

Findings for the First Model (Fall 2000-02 cohorts)

As presented in the Table 1, almost 11 percent of students chose to transfer within one year, while almost 13 percent did not return. Individual fall term cohort size grew steadily between 2000 and 2002 largely due to the state-funded Millennium scholarship program.

<u>Demographic Background:</u>
Men are less likely to transfer than women, though no gender difference exists on the odds of dropping out. Ethnic minority students (other than Asian Americans) are more likely to transfer compared to Caucasian/Asian American students; but they do not differ in their probability of dropping out. The difference in transfer odds does not set in until financial aid offers are taken into account, which other studies associate with a lack of sufficient support to

those students (Somers, 1995; Hu, St. John, 2001). However, further investigation confirms that minority students who are significantly more likely to transfer are those with first-semester GPAs in the bottom third (the ethnicity/grades interaction term showing an odds ratio of 1.6 at the 0.44 significance level). Conversely, Caucasian/Asian American students in the top third GPA group have double the odds of returning (interaction term with a 2.3 *inverse* odds ratio of dropping out at the 0.002 significance level; no other significance was found). Thus, grades are a significant modifier in determining the odds of persisting for a given ethnic group. The proximity of community colleges and the portability of Millennium aid within the state might contribute to the ease of transfer for these students, assuming they maintain all aid eligibility requirements.

The odds of not returning also rise for students who reside outside the local area. Both transfer and non-return are more likely associated with in-state students from more distant counties. Out-of-state students are more likely to transfer, but show no difference in their odds to drop out compared to local students (no interaction with college grades was observed).

The most consistent significant influence among demographic determinants is associated with parent income. The odds of re-enrolling are about twice as high for students from higher income backgrounds. Since parental income has a high correlation with years of formal education[6], this result is supported by a recent study on the attrition of first-generation students, which were 71 percent more likely to drop out compared to students with a college-educated parent (Ishitani, 2003).

High School Preparation:

In contrast to the positive effect that first semester grades have on re-enrollment for the top third, a higher level of high school preparation raises the odds of not returning. Those in the top third are twice as likely to transfer or drop out, while those in the middle third are about 40 percent more likely to leave compared to the bottom third. This suggests that academically better students are more difficult to retain, since the high school preparatory index reflects on the cumulative academic preparation, whereas new freshmen grades are only a first indicator of potential success. The fact that financial support *positively* impacts the retention of the best prepared high school graduates (interaction with financial aid offered shows significant *inverse* odds of 2.1 in transferring and 7.8 in dropping out) indicates, however, that *more* aid directed at these students might help keep them on campus.

Offering more aid to these students might be a tenuous proposition, as they were offered five times the amount of institutional aid compared to the bottom third, while the amount of scholarship aid offered was three times larger than for the least prepared students (see Tables 5a and 5b). Thus, the institution might not have enough room to expand assistance to the best prepared. Striking a judicious balance in aid allocation might be particularly difficult at a time when the institution strives to expand recruitment of students from lower-income background.

Since students are admitted under a liberal admissions policy, the hope was that the peer challenge variable might be a significant effect modifier. But the absence of any significant interaction with that variable, as discussed below, requires further inquiry. Examining peer challenge in subsequent years might yield a more significant effect, as students take on more difficult courses at the upper division level. The future inclusion of new freshmen survey data also might yield a better understanding of the dynamics at work.

College Experience:

Living on-campus, concurrent enrollment at another college, majoring an a field requiring high-level math, and receiving a passing grade in a first-year math all significantly improve the odds of returning. The concurrent enrollment and first-year math effects are particularly noteworthy: The positive retention effect concurrent enrollment has is a likely indicator of a student's educational commitment. Being able to enroll at multiple institutions may offer students the kind of class scheduling flexibility and course choices that are of growing importance in their effort to balance school with work and to progress towards a degree. The more consumer-oriented behavior of students in making education choices suggests--at least in this case--that simultaneous enrollment at other local area colleges has a complementary, rather than substitutive, effect on retention. As the institution copes with the rapid growth in new freshmen enrollment, the expanded schedule choices of retention-enhancing concurrent enrollment should be factored in, both at the enrollment management level and at the student counseling level.

Perhaps a similar measure of student commitment is reflected in the inverse odds ratios associated with transferring or dropping out after passing a first-year math course during the initial semester. The readiness to take on, and pass, required subject matter that is both difficult and less popular (for many students) turned out to be a consistently salient indicator during model development. This supports Adelman's conclusion that the level of high school math preparation is the single most important curricular experience in predicting both postsecondary

retention and degree completion (Adelman, 1999). By extension, it is less surprising that students enrolled in remedial math are almost twice as likely to transfer. The good news is that 75 percent of transfer-out students go to other in-state institutions, most enrolling at community colleges that provide an alternate route to a four-year degree (see Table 6). The fact that enrolling in remedial English is not associated with greater odds of transferring or dropping out underlines the importance of helping students through the math gateway.

Achieving good grades also contributes to persistence, as the inverse odds ratios on transferring or dropping out for the top third students show. They are about twice as likely to re-enroll compared to the bottom third. This was also true for the middle third *before* controlling for aid offered. While the average size of class enrolled in and the difficulty of class registration had no impact, students with no strong peer challenge showed a tendency to transfer, but not to dropout. However, the statistical significance across the variable levels renders the effect inconclusive.

A more definitive lack of significance is associated with campus employment. The positive influence on retention a campus job might have (e.g., due to social/academic integration) is not supported by the model. Not withstanding better control over aspects of campus integration, any other employment effect (e.g., economic or time away from studying) is likely not unique to these students, as many students work off campus. Being largely a commuter campus, integrative effects associated with on-campus activities might be outweighed by social integration occurring off campus (e.g., the prevalence of student employment in the town's casino industry with its many entertainment activities). The cohort effect for fall 2001 students might be due to entry of large numbers of Millennium-supported students, some of whom, motivated by free tuition or under parental pressure, were ill prepared for university life and thus may have transferred to a community college.

Financial Aid:

The important role aid offers play in the re-enrollment decision of students is apparent from the high inverse odds ratios on both transferring and dropping out. Clearly, aid offered generates the strongest incentive to re-enroll in the context of the factors accounted for here.

The inclusion of offered aid into the model had several important effects on the before-and-after role of the other determinants. First, parent income weighs in positively on re-enrollment only *after* aid offers are accounted for. Given that key indicators of academic preparation and college performance are accounted for, this suggests that students from higher income backgrounds benefit from factors that promote enrollment persistence other than financial support. The parental level of education is a likely explanation as are other attributes of higher income families that encourage a focus on education. Similarly, the level of high school preparation is significant only when controlling for aid offered. As discussed above, more aid to the better-prepared students does improve their return odds--but at what cost? At a liberal admissions institution allocating more resources to those more likely to leave may not be warranted if it reduces assistance to those with fewer college-going options and, given sufficient academic support, more likely to stay. Since the institution's strategic plan calls for both greater access and higher academic quality, the tradeoff associated with this issue merits policy-level attention.

Looking at the price-response effect of aid offered, $1,000 in scholarship support more than doubles the odds of returning compared to loan money. On the other hand, a student with a loan offer, whether subsidized or not, is more likely to come back than a student receiving no aid offer at all. Conversely, the effect of a $1,000 grant offer does not influence a student's re-enrollment decision. These differential effects are, perhaps, not surprising. Scholarships carry greater prestige and, when offered by the institution, are not portable--factors that draw students back to re-enroll. Loans carry an obligation of repayment and are likely taken on only after some considered decision to commit to education. This is reflected also in the inverse odds of dropping out associated with subsidized versus unsubsidized loan dollars offered. Subsidized offers have a greater positive impact, since continuous enrollment defers payback (unlike unsubsidized loans). That difference is not observed for the odds in transferring, where the consequence of impending payback does not exist. In comparison, grants are 'no-string' offers with little consequence for departing students. The amount of grant money may also be insufficient to affect retention, as concluded in a recent research review (St. John, 2000). The marginal impact of grant money is unlikely to change as long as the shift in federal aid from grants to loans is not reversed.

Another way of measuring the effect of aid dollars offered is to look at the source of it. Table 3 shows that a $1,000 offer in federal/state-funded aid increases the odds of persisting more so than does an institutional offer. Again, there is the payback obligation effect associated with most federal/state aid. Since institutional aid is generally more limited (roughly 2.5 times as many federal/state-funded offers are made), it underscores the importance of making public-funded aid available to extend the propensity for re-enrollment.

Shifting the focus on eligibility criteria governing aid offers, one notices the stronger positive impact of merit-based scholarship aid vis-à-vis need-based aid. Again, given model control of all the other determinants, this is an

important finding to illustrate the salutary effect of scholarships versus other types of aid. As most scholarships are now offered through the state-funded Millennium program, measuring its effect on retention is of both institutional and public interest. As Table 3 shows, Millennium scholarship offers dramatically increase the odds of not transferring or dropping out. That the impact on the former event is stronger than on the latter lends comfort to those concerned with students transferring to other institutions. The comparatively stronger effect of Millennium offers versus other scholarships is also confirmed in the tabled odds ratios. Finally, the model tested the effect of a Pell grant offer. Though not as strong as the Millennium effect, Pell offers to low-income students do improve the odds of re-enrollment.

Findings for the Second Model (Fall 1996-99 cohorts)

Results from this model must be compared to those from the previous model in the context of the following differences: For one, the on-campus living and the class selection variables are not included here due to lack of data. Second, this model measures the odds of non-return within a longer timeframe (7 semesters vs. 2) and adds stopout to the re-enrollment outcomes.

Since the impact of the Millennium scholarship program that was introduced in fall 2000 looms large and is of policy interest, results from the second model are presented in the context of informing the findings from the first model. The financial aid section looks only at the package type impact in view of the overall changes associated with the onset of the Millennium program.

Demographic Background:

As in the first model, ethnic minority students are more likely to transfer than Caucasian/Asian American students, but show no difference in their likelihood to drop out or stop out. The latter event, which is not measured in the first model, is more likely to happen to older students and men. Availability of off-campus employment data might shed light on this result, as some high school graduates may have entered the workforce after graduation, which may lead to sporadic college attendance. Residing outside the local area increases the odds of dropping out or transferring, as it does in the first model; but it does not influence the odds of stopping out. Like the first model, higher parent income has the most consistent impact, reducing the odds of dropping out, transferring, or stopping out.

High School Preparation:

A significant difference from the first model is the fact that the level of academic preparation out of high school does *not* alter a student's next-year enrollment choice. Thus, the problem of losing the better-prepared students is a more recent one, coinciding with the start of Millennium-driven enrollment growth. However, the 2000-02 new freshmen that entered on a Millennium scholarship on average scored higher on the ACT and enjoy better high school grades than those without Millennium support (mean ACT 22.57 vs. 21.92, $t = 6.49$ significant; GPA 3.42 vs. 3.11, $t = 21.76$ sign.). More importantly, compared to returnees, the 2000-02 new freshmen who transferred or did not return scored slightly lower on the ACT, entered with a slightly lower high school GPA, and ended up with decidedly lower first-semester grades, whether they were Millennium students or not. An equally telling picture emerges when comparing both aid offers and first-semester financial aid of returnees versus those who transferred or dropped out. Differences in first semester aid received are minor, but differences in the amount of aid offered for the second year are substantially higher for students who returned--again, regardless of their Millennium status (see Tables 7a/b). Similarly, the concern that the best-prepared students are transferring to an out-of-state institution, despite Millennium assistance, is not supported in terms of ACT scores. While Millennium-supported out-of-state transfers had the highest average ACT, the difference is not statistically significant compared to re-enrolled Millennium students (see Table 8). Clearly, Millennium aid has had a positive effect on the academic preparation of new freshmen, in addition to having helped raise the in-state college-going rate by 10 percent since its inception. The fact that better-prepared students are more likely to depart may be due to factors other than those examined here. Stretching the transfer observation period beyond two semesters, as applied in the first model, might yield further insight based on the institutions selected by transfer-out students.

College Experience:

The effect of concurrent enrollment mirrors results from the first model, further supporting the finding that students enrolled at other local colleges are more likely to persist. Also, concurrent enrollment does not appear to lead to

stopout on the assumption that enrollment at the other institution might lead to temporary withdrawal. Choosing a math-intensive major had no influence on next-year enrollment outcomes. Math requirement in the major did improve the odds of returning in the first model and, thus, indicates the growing importance of that variable.[7] No differences in the directional impact of passing a first-year math course are observed in the models. Successfully completing first-year math as a new freshman endures as a positive factor in student persistence, and it increased the odds of not stopping out for students in the second model. Similarly enduring is the positive impact of good first-semester grades, which are associated also with greater odds of not stopping out. Performing comparably to one's classmates, as measured in peer challenge, reduced the odds of dropping out or transferring for students in the second model. Not being over or under-challenged may indeed strengthen a student's feeling of being in the 'right place'. However, since results from the first model are inconclusive, the peer challenge effect needs to be further tested to confirm its value in explaining retention. In contrast to more recent new freshmen, those who entered between 1996 and 1999 were more likely to transfer if employed on campus. Since campus employment showed no impact for the past three years (as per model 1), analysis of the influence of an on-campus job needs to proceed with the addition of off-campus employment data and inclusion of other campus integration indicators.

Financial Aid:

In contrast to more recently enrolled new freshmen, those having entered between 1996 and 1999 were not as strongly influenced by aid offers in their decision to re-enroll. The comparative impact of scholarship-only offers to other types of packages rose markedly for recent students (in the first model), where scholarship-only offers have a similar impact on the odds of re-enrollment as do other, mostly combined, aid offers. This change is due largely to the availability of Millennium scholarships that are designed to cover the entire tuition of a full-time student. The need for multiple-source offers is thus mitigated.

Conclusion and Implications

Insights gleaned from institutional-based retention studies may not support inferences on the enrollment behavior of students in general, as alluded to in the introduction. Results from this study reflect on new freshmen at a public university with a liberal admissions policy in a medium-size urban area. The two models tested reveal the following:

Ethnic minority students, other than Asian Americans, have greater odds in transferring to another institution compared to Caucasian/Asian American students. The odds of doing so changed little between more recent freshmen (2000-02) and those entering between 1996 and 1999. However, those transferring are more likely to be minority students with low first-semester grades. Also, indications are that the amount of aid offered might be insufficient to prevent these students from transferring. Minority students are no more likely to drop out or stop out than Caucasian/Asian American students.

While out-of-state students are more likely to transfer, in-state students who are not from the local area (e.g., Las Vegas residents) have almost 4 times the odds of transferring and about 1.5 times the odds of dropping out compared to local residents. Though the Millennium scholarship helped attract new students from outside the local area, such students are still more likely to transfer compared to local residents.

A consistently significant influence on retention is associated with parent income. On average, students from higher income backgrounds have 1.7 times the odds of re-enrolling than those from parents in the bottom third of the income scale. In view of the other findings in this study, parent income likely reflects the influence of the level of parental education and other attributes of higher income parents that encourage education and that are conducive to student persistence. This finding underlines the importance of measuring the effectiveness of support programs for first-generation students (e.g., TRIO), a task to be undertaken in a future study.

The fact that academically better prepared high school graduates are twice as likely to transfer or drop out must be of some concern amid efforts by the institution to enhance its academic reputation. While augmenting aid offered to these students might boost their retention, redirection of institutional resources may compromise assistance to lesser qualified students with fewer educational options. As the institution focuses on both academic quality and student access in its strategic plan, the issue of retaining good students illustrates the difficulty of balancing both. Also, the problem of losing better-prepared students coincides with the dramatic expansion of state-funded scholarship support through the Millennium program. Though its effect on the *average* level of preparation of new freshmen has been positive, the finding that better prepared high school graduates are more likely to depart *since* the program started is of some concern. As the new freshmen class grew by 50 percent since the start of the

Millennium program, some students might have enrolled driven more by free tuition than by a considered commitment to education. The Millennium scholarship was also introduced at a time of rapid economic slowdown, thereby offering some high school graduates, who perhaps intended to enter the workforce, an option they would not have considered otherwise.

Simultaneous enrollment at other local colleges almost doubles the odds of not dropping out and underscores the importance of complementary choices to students who seek class-scheduling flexibility to balance work with college attendance and/or speed up progress towards a degree. College experiences that similarly promote retention of new freshmen include the successful completion of a first-year math course and receiving good grades. Passing a gateway math course during the first semester more that doubles the odds of returning and seemingly supports the conclusion that the level of math preparation in high school is the single most important curricular experience to prepare students for college. The finding that students who major in math-intensive disciplines are more likely to persist, while those in remedial math are more likely to transfer (mostly to community colleges), solidifies the belief that a student's math experience is central to first-year college progress.

Of all the factors examined, financial aid exhibited the strongest positive influence on student re-enrollment, and one that has grown over the years. The significant role financial aid plays in a student's re-enrollment decision is readily apparent from Table 9a/b. Introduction of the state-funded Millennium program in fall 2000 significantly expanded scholarships available to in-state students and magnified the importance of merit-based aid in retaining new freshmen. A given amount of scholarship money more than doubles the odds of re-enrollment compared to the effect of loan money. Still, a $1,000 loan, whether subsidized or not, significantly improves the odds of return compared to having no aid offer at all. But a $1,000 grant offer does not impact the decision to re-enroll. The prestige attached to a scholarship offer, the payback obligation that comes with assuming a loan, and the fact that neither of these attributes are typically associated with a grant largely explain the differential impact of each type of aid. As federal financial aid has shifted gradually from grants to loans, the former may no longer have a pronounced impact on retention when measuring the simultaneous effect of other aid offered, as concluded in this study. Results also show that student enrollment behavior responds to the advantage of a subsidized versus unsubsidized loan offer, that a Millennium scholarship has a greater impact than other types of scholarships, and that Pell grants do improve persistence of low-income students--though grant money in general does not, as previously stated.

Notes

[1]The Millennium scholarship is available to state residents who graduated with a 'B' (3.0) average from a state high school between 2000 and 2004 (raised to a 3.1 and 3.25 average, respectively, for 2005/6 and 2007 and later graduates); the scholarship dollar value awarded per term is determined on a per-credit basis; the lifetime total maximum limit is $10,000; and students must maintain a 'C' average (to be raised for future applicants) and carry at least 12 credit hours per term. (See http://millennium.state.nv.us/)

[2] E.g., removal of 43 cases based on Mahalanobis distance in the re-enrollment vs. transfer model changed the -2Log likelihood from 2075 to 2104, the Nagelkerke R^2 from .537 to .540, with no meaningful change in the Hosmer-Lemeshow significance level, and no change in the % cases correctly predicted. Detailed diagnostic results may be obtained from the author.

[3] These are in most cases the default settings in SPSS, version 11.5, the statistical package used. This maximizes the power of the algorithm to seek likelihood convergence.

[4] Unfortunately, this type of information usually is only obtained through systematic surveys, which engender other measurement problems. However, a follow-up sample study will include survey-based data to address the stated limitation.

[5] An internal analysis (PBA, 2-27-03) revealed that, on average, the rate of successful enrollment in remedial courses for students that tried to enroll in classes that were already full dropped from 5.6 percent for fall '97 through '99 cohorts to 2 percent for subsequent fall terms; the average number of remedial English classes offered during fall terms was 23, while the number of remedial math classes was 10.

[6] A correlation of 0.95 was calculated using 2003 Census Bureau statistics. U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-60, various years.

[7] The positive effect math-intensive majors have on retention has also been demonstrated in Fenske, Porter, DuBrock (1999).

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Table 1: New Freshmen, Fall Terms 2000-02 (Model 1)

Descriptive Summary		N	Percentage	Mean
Enrollment Year 2	Transfer within 2 Semesters	569	10.8%	
	No	680	12.9%	
	Yes	4,012	76.3%	
Age 19 or older	yes	505	9.6%	
	no	4,756	90.4%	
Gender	male	2,272	43.2%	
	female	2,989	56.8%	
Ethnicity	Unknown	231	4.4%	
	African/Hispanic/Native Am	591	11.2%	
	Caucasian/Asian	4,439	84.4%	
Residency	Out of state	403	7.7%	
	Other NV & Good N.	2,069	39.3%	
	Reno Area	2,789	53.0%	
Parent Income	Missing	1,280	24.3%	
	30-72%tile	1,564	29.7%	
	Top 28%	1,119	21.3%	
	Bottom 30%	1,298	24.7%	
HS Preparatory Index	Top 33%	1,782	33.9%	
	33-67%tile	1,814	34.5%	
	Bottom 32%	1,665	31.6%	
Living On Campus	yes	2,711	51.5%	
	no	2,550	48.5%	
Concurrent Enrollment at Other Institution	yes	353	6.7%	
	no	4,908	93.3%	
Credit Load	> 14 credits	2,534	48.2%	
	<=14 Credits	2,727	51.8%	
Calculus 1 Required in Major	yes	1,237	23.5%	
	no	4,024	76.5%	
Passed 1st Year Math	yes	4,357	82.8%	
	no	904	17.2%	
Enrolled in Remedial English	yes	1,309	24.9%	
	no	3,952	75.1%	
Enrolled in Remedial Math	yes	649	12.3%	
	no	4,612	87.7%	
1st Semester GPA	> 3.33	1,758	33.4%	
	2.51 - 3.33	1,856	35.3%	
	<= 2.5	1,647	31.3%	
Peer Challenge	weak	1,561	29.7%	
	neutral	1,754	33.3%	
	strong	1,946	37.0%	
Class Selection	Big and Full	1,617	30.7%	
	Small and Open	2,330	44.3%	
	Big or Full	523	9.9%	
Campus Work (incl.WS)	yes	2,408	45.8%	
	no	548	10.4%	
Aid Package Offered	Scholarship only	2,487	47.3%	
	Loan/Grant/S'ship/WS comb	1,157	22.0%	
	No aid	1,617	30.7%	
Aid Dollars Offered (1996 adjusted)	Scholarship	3,499		2,496
	Grants	759		3,188
	Loans - subsidized	555		2,565
	Loans - unsubsidized	372		4,646
	Institutional	1,409		2,293
	Federal/State	3,571		2,959
	Millennium	3,268		1,772
	Pell	534		2,096
Cohort	Fall 00	1,662	31.6%	
	Fall 01	1,720	32.7%	
	Fall 02	1,879	35.7%	
Valid Cases		5,261	96.0%	
Missing		229	4.0%	
Total		5,490	100.0%	

Table 2: New Freshmen, Fall Terms 1996-99 (Model 2)

Descriptive Summary		N	Percentage	Mean
Enrollment Year 2	Dropout	291	6.8%	
	Stopout within 7 Semesters	169	3.9%	
	Transfer within 7 Semesters	526	12.2%	
	Yes	3,312	77.1%	
Age 19 or older	yes	464	10.8%	
	no	3,834	89.2%	
Gender	male	1,928	44.9%	
	female	2,370	55.1%	
Ethnicity	Unknown	193	4.5%	
	African/Hispanic/Native Am	401	9.3%	
	Caucasian/Asian	3,704	86.2%	
Residency	Out of state	380	8.8%	
	Other NV & Good N.	1,370	31.9%	
	Reno Area	2,548	59.3%	
Parent Income	Missing	1,006	23.4%	
	30-72%tile	1,284	29.9%	
	Top 28%	867	20.2%	
	Bottom 30%	1,141	26.5%	
HS Preparatory Index	Top 33%	1,517	35.3%	
	33-67%tile	1,346	31.3%	
	Bottom 32%	1,435	33.4%	
Concurrent Enrollment at Other Institution	yes	440	10.2%	
	no	3,858	89.8%	
Credit Load	> 14 credits	2,002	46.6%	
	<= 14 Credits	2,296	53.4%	
Calculus 1 Required in Major	yes	1,300	30.2%	
	no	2,998	69.8%	
Passed 1st Year Math	yes	3,467	80.7%	
	no	831	19.3%	
Enrolled in Remedial English	yes	676	15.7%	
	no	3,622	84.3%	
Enrolled in Remedial Math	yes	644	15.0%	
	no	3,654	85.0%	
1st Semester GPA	> 3.33	1,349	31.4%	
	2.51 - 3.33	1,548	36.0%	
	<= 2.5	1,401	32.6%	
Peer Challenge	weak	1,270	29.5%	
	neutral	1,388	32.3%	
	strong	1,640	38.2%	
Campus Work (incl.WS)	yes	626	14.6%	
	no	3,672	85.4%	
Aid Package Offered	Scholarship only	833	19.4%	
	Loan/Grant/S'ship/WS comb	1,065	24.8%	
	No aid	2,400	55.8%	
Aid Dollars Offered (1996 adjusted)	Scholarship	1,376		2,623
	Grants	602		2,909
	Loans - subsidized	594		2,774
	Loans - unsubsidized	416		5,115
	Institutional	1,424		2,667
	Federal/State	959		5,238
	Pell	406		1,786
Cohort	Fall 96	981	22.8%	
	Fall 97	992	23.1%	
	Fall 98	1,063	24.7%	
	Fall 99	1,262	29.4%	
Valid Cases		4,298	97.0%	
Missing		148	3.0%	
Total		4,446	100.0%	

Table 3: Logistic Regression Parameter Estimates for Model 1 (New Freshmen Fall Terms 2000-02)

				Transfer				Dropout			
				B	Std. Error	Sig.	Log Odds Ratio[a]	B	Std. Error	Sig.	Log Odds Ratio[a]
		Intercept		0.475	0.231	0.040		1.452	0.208	0.000	
Demographics	Age 19 or older	yes		-0.295	0.186	0.114	-1.343	-0.212	0.165	0.197	-1.237
		no	ref								
	Gender	male		-0.476	0.121	0.000	**-1.610**	-0.180	0.109	0.097	-1.198
		female	ref								
	Ethnicity	Unknown		-0.057	0.268	0.832	-1.059	-0.146	0.247	0.553	-1.157
		African/Hisp./Native Am		0.407	0.167	0.015	**1.503**	0.223	0.157	0.156	1.250
		Caucasian/Asian Am.	ref								
	Residency	Out of state		0.453	0.199	0.023	**1.573**	-0.102	0.190	0.593	-1.107
		Other NV & Good N.		1.379	0.142	0.000	**3.970**	0.318	0.127	0.012	**1.374**
		Reno Area	ref								
	Parent Income	Missing		-0.639	0.170	0.000	**-1.894**	-0.964	0.152	0.000	**-2.622**
		30-72%tile		-0.529	0.165	0.001	**-1.697**	-0.551	0.143	0.000	**-1.736**
		Top 28%		-0.472	0.179	0.008	**-1.603**	-0.841	0.163	0.000	**-2.318**
		Bottom 30%	ref								
High School	Preparation Index	Top 33%		0.727	0.179	0.000	**2.070**	0.871	0.163	0.000	**2.389**
		33-67%tile		0.323	0.139	0.021	**1.381**	0.343	0.127	0.007	**1.409**
		Bottom 32%	ref								
College Experience	On Campus Living	yes		-0.270	0.134	0.044	**-1.310**	-0.546	0.122	0.000	**-1.726**
		no	ref								
	Campus Employment	yes		0.240	0.193	0.215	1.271	0.178	0.184	0.332	1.195
		no	ref								
	Concurrent Enrollment	yes		-2.827	0.725	0.000	**-16.903**	-0.521	0.258	0.043	**-1.683**
		no	ref								
	Credit Load	> 14 credits		-0.189	0.116	0.104	-1.208	-0.258	0.106	0.015	**-1.294**
		14 Credits or less	ref								
	Calculus 1	yes		-0.344	0.152	0.024	**-1.410**	-0.335	0.136	0.013	**-1.398**
	Required in Major	no	ref								
	Passed 1st Year Math	yes		-0.920	0.134	0.000	**-2.511**	-0.784	0.121	0.000	**-2.190**
		no	ref								
	Enrolled in Remedial English	yes		-0.303	0.138	0.028	**-1.354**	-0.115	0.124	0.356	-1.121
		no	ref								
	Enrolled in Remedial Math	yes		0.334	0.161	0.038	**1.397**	0.288	0.149	0.053	1.334
		no	ref								
	1st Semester GPA	> 3.33		-0.609	0.277	0.028	**-1.839**	-0.841	0.257	0.001	**-2.318**
		2.51 - 3.33		-0.358	0.197	0.070	-1.430	-0.262	0.168	0.118	-1.299
		<= 2.5	ref								
	Peer Challenge	weak		0.396	0.261	0.130	1.485	-0.190	0.236	0.422	-1.209
		neutral		0.407	0.192	0.034	**1.502**	-0.178	0.166	0.284	-1.195
		strong	ref								
	Class Selection	Big and Full		0.031	0.118	0.795	0.970	-0.059	0.108	0.582	-1.061
		Small and Open		0.348	0.202	0.084	0.706	0.164	0.182	0.367	1.179
		Big or Full	ref								
	Cohort	Fall 00		-0.002	0.140	0.988	-1.002	0.083	0.123	0.501	1.087
		Fall 01		0.381	0.131	0.004	**0.683**	0.153	0.122	0.210	1.166
		Fall 02	ref								
Financial Aid	Package Offered	Scholarship only		-3.732	0.174	0.000	**-41.768**	-3.015	0.139	0.000	**-20.386**
		Loan/Grant/S'ship/WS comb		-3.872	0.220	0.000	**-48.016**	-3.261	0.187	0.000	**-26.082**
		No aid	ref								
	Derived separately:										
	Amount Offered (response per $1,000)	Scholarships		-1.798	0.092	0.000	**-6.020**	-1.479	0.074	0.000	**-4.385**
		Grants		-0.037	0.064	0.564	-1.037	-0.040	0.057	0.486	-1.040
		Loans - subsidized		-0.838	0.157	0.000	**-2.309**	-0.745	0.133	0.000	**-2.105**
		Loans - unsubsidized		-1.016	0.285	0.000	**-2.762**	-0.458	0.117	0.000	**-1.582**
	By Source	Institutional		-0.266	0.081	0.001	**-1.303**	-0.201	0.075	0.007	**-1.222**
		Federal/State		-1.175	0.069	0.000	**-3.236**	-0.944	0.058	0.000	**-2.570**
	By Eligibility	Need-based		-0.219	0.040	0.000	**-1.240**	-0.214	0.037	0.000	**-1.230**
		Merit-based		-1.568	0.099	0.000	**-4.800**	-1.253	0.082	0.000	**-3.500**
		Millennium		-4.158	0.202	0.000	**-62.500**	-3.079	0.136	0.000	**-21.800**
		Pell		-1.388	0.242	0.000	**-4.010**	-1.013	0.202	0.000	**-2.750**
	By Scholarship Type	Millennium		-2.550	0.139	0.000	**-12.800**	-2.004	0.095	0.000	**-7.400**
		Other Merit		-0.432	0.099	0.000	**-1.540**	-0.304	0.086	0.000	**-1.350**

[a]<= 5% significance bolded

Model Fit (incl. Aid Pckg Offered):

	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	7,423			
Final	4,970	2,453	58	0

Nagelkerke R^2 0.49

Model Accuracy:

	Predicted			
Observed	Transfer	Dropout	Return	% correct
Transfer	233	124	212	40.9
Dropout	121	246	313	36.2
Return	104	121	3787	94.4
Overall %	8.7	9.3	82	81.1

33% improvement over 'proportional by chance'
6.4% improvement over 'maximum by chance' (return)

Table 4: Logistic Regression Parameter Estimates for Model 2 (New Freshmen Fall Terms 1996-99)

			Drop Out				Stop Out				Transfer			
			B	Std. Error	Sig.	Log Odds Ratio[a]	B	Std. Error	Sig.	Log Odds Ratio[a]	B	Std. Error	Sig.	Log Odds Ratio[a]
		Intercept	-0.361	0.249	0.146		-1.178	0.309	0.000		0.021	0.204	0.916	
	Age 19 +	yes	0.140	0.198	0.479	1.150	0.513	0.222	0.021	**1.670**	0.137	0.160	0.391	1.147
D		no	ref				ref				ref			
e	Gender	male	-0.032	0.140	0.820	-1.032	0.345	0.172	0.044	**1.412**	-0.051	0.112	0.648	-1.053
m		female	ref				ref				ref			
o	Ethnicity	Unknown	0.384	0.301	0.202	1.468	0.416	0.347	0.231	1.515	0.334	0.242	0.167	1.397
g		African/Hisp./Native Am	0.378	0.220	0.086	1.460	-0.105	0.321	0.744	-1.111	0.362	0.179	0.043	**1.436**
r		Caucasian/Asian	ref				ref				ref			
a	Residency	Out of state	0.569	0.224	0.011	**1.767**	-0.321	0.347	0.355	-1.378	1.263	0.166	0.000	**3.537**
p		Other NV & Good N.	0.269	0.150	0.073	1.309	-0.376	0.198	0.057	-1.456	0.949	0.117	0.000	**2.584**
h		Reno Area	ref				ref				ref			
i	Parent Income	Missing	-0.719	0.178	0.000	**-2.052**	-0.665	0.245	0.007	**-1.945**	-0.475	0.159	0.003	**-1.607**
c		30-72%tile	-0.835	0.180	0.000	**-2.305**	-0.530	0.225	0.019	**-1.700**	-0.308	0.151	0.041	**-1.361**
s		Top 28%	-1.405	0.232	0.000	**-4.076**	-0.369	0.242	0.128	-1.446	-0.541	0.172	0.002	**-1.718**
		Bottom 30%	ref				ref				ref			
		Top 33%	0.215	0.210	0.304	1.240	0.355	0.242	0.143	1.426	-0.095	0.164	0.562	-1.100
High School	Preparation Index	33-67%tile	0.102	0.163	0.529	1.108	0.012	0.209	0.953	1.013	-0.188	0.132	0.154	-1.206
		Bottom 32%	ref				ref				ref			
	Campus Employment	yes	-0.144	0.238	0.545	-1.155	0.224	0.242	0.354	1.251	0.321	0.163	0.049	**1.378**
		no	ref				ref				ref			
	Concurrent Enrollment	yes	-1.105	0.326	0.001	**-3.020**	0.299	0.237	0.206	1.349	-2.575	0.464	0.000	**-13.127**
C		no	ref				ref				ref			
o	Credit Load	> 14 credits	-0.164	0.142	0.249	-1.178	-0.048	0.170	0.778	-1.049	-0.136	0.113	0.226	-1.146
l		14 Credits or less	ref				ref				ref			
l	Calculus 1 Required in Major	yes	0.222	0.154	0.149	1.249	0.160	0.187	0.394	1.173	0.064	0.126	0.612	1.066
e		no	ref				ref				ref			
g	Passed 1st Year Math	yes	-1.045	0.156	0.000	**-2.845**	-0.932	0.193	0.000	**-2.539**	-1.059	0.126	0.000	**-2.883**
e		no	ref				ref				ref			
	Enrolled in Remedial English	yes	0.032	0.177	0.858	1.032	-0.125	0.241	0.603	-1.134	-0.136	0.147	0.354	-1.146
E		no	ref				ref				ref			
x	Enrolled in Remedial Math	yes	0.373	0.195	0.056	1.452	-0.003	0.277	0.990	-1.003	0.165	0.160	0.302	1.179
p		no	ref				ref				ref			
e	1st Semester PA	> 3.33	-1.133	0.337	0.001	**-3.104**	-0.783	0.378	0.038	**-2.188**	-0.386	0.255	0.130	-1.472
r		2.51 - 3.33	-0.849	0.215	0.000	**-2.338**	-0.613	0.258	0.018	**-1.845**	-0.515	0.165	0.002	**-1.674**
i		<= 2.5	ref				ref				ref			
e	Peer Challenge	weak	0.132	0.308	0.669	1.141	0.065	0.356	0.856	1.067	-0.398	0.239	0.096	-1.488
n		neutral	-0.457	0.221	0.039	**-1.579**	0.006	0.255	0.982	1.006	-0.778	0.174	0.000	**-2.176**
c		strong	ref				ref				ref			
e	Cohort	Fall 96	0.397	0.194	0.041	**1.487**	-0.354	0.230	0.124	-1.425	-0.059	0.154	0.700	-1.061
		Fall 97	0.581	0.190	0.002	**1.787**	-0.056	0.218	0.797	-1.058	0.137	0.150	0.363	1.146
		Fall 98	0.331	0.192	0.084	1.392	-0.280	0.222	0.207	-1.323	0.244	0.142	0.086	1.276
		Fall 99	ref				ref				ref			
		Scholarship only	-1.307	0.248	0.000	**-3.693**	-1.057	0.287	0.000	**-2.878**	-1.689	0.214	0.000	**-5.416**
Financial Aid	Package Offered	Loan/Grant/S'ship/WS combinations	-2.673	0.309	0.000	**-14.484**	-1.246	0.256	0.000	**-3.475**	-2.308	0.203	0.000	**-10.055**
		No aid	ref				ref				ref			

[a]<= 5% significance bolded

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	6,407.168			
Final	5,188.294	1,218.874	81	0.000
Nagelkerke R^2	0.315			
% Correctly predicted	78.3%			

Table 5a: Scholarhip Amount Offered by High School Level of Preparation ($1K), Fall 2000-02 New Freshmen

	HS Prep Index	N	Subset for alpha = .05		
			1	2	3
Scheffe [a,b]	Bottom 32%	1728	.8114		
	33-67%tile	1863		1.3927	
	Top 33%	1807			2.5081
	Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 1797.617.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 5b: Institutional Aid Amount Offered by High School Level of Preparation ($1K), Fall 2000-02 New Freshmen

	HS Prep Index	N	Subset for alpha = .05		
			1	2	3
Scheffe [a,b]	Bottom 32%	1728	.2285		
	33-67%tile	1863		.3696	
	Top 33%	1807			1.1421
	Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 1797.617.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

T able 6: Top 10 Transfer Destinations of New Freshmen from Fall 2000-02

* In-state institution	Frequency	% of all transfers	Cumulative %
TRUCKEE MEADOWS COMMUNITY COLLEGE*	178	28.8	28.8
UNIVERSITY OF NEVADA LAS VEGAS*	166	26.9	55.7
COMMUNITY COLLEGE OF SOUTHERN NEVADA*	95	15.4	71.0
SIERRA COLLEGE*	14	2.3	73.3
GREAT BASIN COLLEGE*	12	1.9	75.2
UNIVERSITY OF ALASKA, ANCHORAGE	12	1.9	77.2
ORANGE COAST COLLEGE	4	0.6	77.8
UNIVERSITY OF MONTANA	4	0.6	78.5
BRIGHAM YOUNG UNIVERSITY	3	0.5	79.0
OREGON STATE UNIVERSITY	3	0.5	79.4
Total	618	100.0	

Table 7a: Fall 2000-02 New Freshmen Millennium vs. Non-Millennium Students by 2nd Year Enrollment
Enrollment

1st Semester Millennium Status		Enrollment Year 2							
		Transfer within 1		No		Yes		Total(a)	
		N	Mean	N	Mean	N	Mean	N	Mean
Not on Milli $	All Aid Offered ($1K)	175	0.55	203	0.57	761	3.30	1,139	2.39
	Aid Received ($1K)	175	1.67	203	1.54	761	1.82	1,139	1.75
	Institutional ($1K)	175	0.15	203	0.12	761	0.74	1,139	0.54
	ACTC	161	21.26	184	21.52	711	22.19	1,056	21.93
	HSGPA	172	3.07	202	2.98	757	3.15	1,131	3.11
	1st Sem GPA	161	2.18	189	1.73	759	2.72	1,109	2.47
On Milli $	All Aid Offered ($1K)	443	0.58	534	0.74	3,374	4.04	4,351	3.28
	Aid Received ($1K)	443	2.24	534	2.15	3,374	2.27	4,351	2.25
	Institutional ($1K)	443	0.19	534	0.19	3,374	0.87	4,351	0.72
	ACTC	430	22.13	519	22.05	3,309	22.94	4,258	22.75
	HSGPA	443	3.31	534	3.32	3,372	3.44	4,349	3.42
	1st Sem GPA	426	2.42	510	2.13	3,362	3.07	4,298	2.89
Total	All Aid Offered ($1K)	618	0.57	737	0.69	4,135	3.90	5,490	3.10
	Aid Received ($1K)	618	2.08	737	1.98	4,135	2.18	5,490	2.15
	Institutional ($1K)	618	0.18	737	0.17	4,135	0.85	5,490	0.68
	ACTC	591	21.89	703	21.91	4,020	22.81	5,314	22.59
	HSGPA	615	3.24	736	3.23	4,129	3.39	5,480	3.35
	1st Sem GPA	587	2.35	699	2.02	4,121	3.01	5,407	2.81

Source: SIS, ACT; PBA:sbh

a. Total N based on casewise inclusion; thus, N is slightly higher than Model 1 N.

Table 7b: Fall 2000-02 New Freshmen 2nd Year Transfer-Out Students by Transfer Destination
Transfer Destination and Millennium Status

Transfer Destination		New Freshmen Milli Fall 00-02					
		Not on Milli $		On Milli $		Total(a)	
		N	Mean	N	Mean	N	Mean
Out of State	All Aid Offered ($1K)	100	0.75	65	1.31	165	0.97
	Aid Received ($1K)	100	1.80	65	2.14	165	1.94
	Institutional ($1K)	100	0.18	65	0.50	165	0.31
	ACTC	89	22.18	65	23.42	154	22.70
	HSGPA	98	3.21	65	3.43	163	3.30
	1st Sem GPA	89	2.53	63	2.72	152	2.61
In State	All Aid Offered ($1K)	75	0.29	378	0.46	453	0.43
	Aid Received ($1K)	75	1.49	378	2.26	453	2.13
	Institutional ($1K)	75	0.11	378	0.14	453	0.13
	ACTC	72	20.13	365	21.90	437	21.61
	HSGPA	74	2.88	378	3.29	452	3.22
	1st Sem GPA	72	1.75	363	2.37	435	2.26
Total	All Aid Offered ($1K)	175	0.55	443	0.58	618	0.57
	Aid Received ($1K)	175	1.67	443	2.24	618	2.08
	Institutional ($1K)	175	0.15	443	0.19	618	0.18
	ACTC	161	21.26	430	22.13	591	21.89
	HSGPA	172	3.07	443	3.31	615	3.24
	1st Sem GPA	161	2.18	426	2.42	587	2.35

Source: SIS, ACT; PBA:sbh

a. Total N based on casewise inclusion; thus, N is slightly higher than Model 1 N.

Table 8: ACT Combined Scores of Fall 2000-02 New Freshmen Millennium Students by 2nd Year Enrollment

	2nd Year Enrollment	N	Subset for alpha = .05	
			1	2
Scheffe [a,b]	In State transfer	365	21.8986	
	Dropped out	519	22.0482	
	Returned	3309	22.9441	22.9441
	Out of State transfer	65		23.4154
	Sig.		.064	.687

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 196.528.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Table 9a: New Freshmen from Fall 2000-02, Financial Aid by 2nd Year Enrollment Outcome

Count

		Enrollment Year 2			
		Transfer within 1 Year	No	Yes	Total
Aid Packages Offered	Loan/Grant/Schol.	2	7	234	243
	Other Aid (eg WS)	12	8	113	133
	Loan and/or Grant	16	22	194	232
	Scholarship only	52	100	2424	2576
	Grant/Schol'ship	4	8	264	276
	Loan/Schol'ship	1	5	298	304
	No aid	531	587	608	1726
Total		618	737	4135	5490

Tabel 9b: Chi-Square Tests for Table 9a Data

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2207.552 [a]	12	.000
Likelihood Ratio	2203.234	12	.000
Linear-by-Linear Association	1332.318	1	.000
N of Valid Cases	5490		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.97.