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

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Abstract

To more accurately reflect student attributes and enrollment patterns of today's freshmen, and to account for the impact of a new state-funded scholarship, this study expands the set of variables typically found in retention studies by putting greater focus on first-year academic performance, concurrent enrollment, financial aid support, and second-year transfer-out versus dropout/stopout behavior. Using multi-year cohorts at a public research university with a liberal undergraduate admissions policy, results confirm the importance of including first-year math experience, level of academic challenge in major, concurrent enrollment, and second-year financial aid offers when measuring freshmen retention. The positive impact of a large-scale scholarship program in widening access and evening out retention across income background must be balanced against findings that show academic performance and readiness to take on and pass difficult subject matter to be more important in explaining new freshmen dropout and transfer-out during both first and second semesters. Similarly, examining the influence of changing financial aid support between the first and second semester yields additional insight into why students progress to the second year. Specifically, middle-income students with greater levels of unmet need face an elevated departure risk, while academically well-prepared freshmen with unmet need are more likely to transfer to other institutions.

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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 (Spady, 1971; Tinto, 1975; Bean, 1980, 1985; Astin, 1984; Pascarella & Terenzini, 1980; Pascarella, Terenzini, & Wolfle, 1986; Billson & Brooks-Terry, 1987). Attention centered on interactive and causal links between student background, educational and institutional commitment, and academic and social integration. These studies gave rise to validation analyses that focused on identifying constructs with the best set of complementary variables to maximize model explanation (Cabrera et al., 1992; Cabrera, Nora, & Castaneda, 1993; Braxton, Sullivan, and Johnson, 1997), while others concentrated on the impact of specific factors on retention, such as assimilation courses (Hendel, 2001; Sidle & McReynolds, 1999), selected program major (St. John et al. 2004; Mau, 2003), admission status (Laden, Matranga, & Peltier, 1999), student ethnicity and gender (Grandy, 1998; Leppel, 2002), classroom-based learning experiences (Tinto, 1997; Braxton, Milem, & Sullivan, 2000), institutional support services (Lau, 2003), intention to leave (Okun, Benin, & Brandt-Williams, 1996), academic and social integration (Beil, Reisen, & Zea, 1999), and pre-collegiate academic preparation (Cambiano, Denny, & De Vore, 2000). Though most studies examine retention at the first-to-second year stage, when students typically depart, the growing use of survival analysis

and event history modeling is expanding the focus of student retention beyond the freshmen year (Murtaugh, Burns, & Schuster, 1999; Ishitani & DesJardins, 2002; DesJardins, 2003).

Retention analysis is also increasingly centered on the role financial support plays in college attendance (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 (Hebel, 2004; Sanoff, 2004; Clabaugh, 2004; Horn & Peter, 2003), the directional impact of aid on enrollment is not always consistent among institutional studies (e.g., 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 variations in model specification.

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 no uniform methodology governing retention analysis. While this study does not examine the relative merit of one approach vis-à-vis another, the model presented here does address three areas in the retention scholarship deemed underdeveloped. Reflecting on Braxton's *Reworking the Student Departure Puzzle* (2000), which provides an overview of the principal schools of thought on student retention, it is worth noting that the theories presented largely conceptualize student departure from the vantage point of the institution—either a student is retained or not--thereby ignoring transfer to another institution, a growing trend among many students. For example, over a third of all 1992 high school graduates who earned a bachelor's degree by 2000 did so at an institution other than the one of first attendance, while over 73 percent of those who started at a 4-year institution, and

who graduated from the institution of first attendance, also enrolled at another institution (Adelman, 2004). This number is up from 40 percent in 1970 (Fiske, 2004). The phenomenon of students "swirling" in and out of different institutions, commonly associated with community colleges, has become a defining feature in the enrollment choices for most students (Borden, 2004). Yet, this growing trend is not adequately accounted for in the retention literature, which treats subsequent student enrollment as a dichotomous yes/no event. Porter (2002) did present a model measuring the multiple enrollment choices associated with transfer versus stopout, but without simultaneously measuring the impact of concurrent enrollment and without controlling for the range of financial aid options students increasingly avail themselves of.

A second concern is the treatment of financial aid as covariates in retention models. Integrative approaches to measuring the direct effect of financial aid in conjunction with cognitive, affective, and economic variables (e.g., family income) have overcome some of the limitations of early studies that focused primarily on the equalization effect of aid for low-income students (Braxton, 2000). However, financial aid is captured on the basis of current-year awards *received*, without considering the inducement effect of subsequent-year *offers* (Hollomon, 2003; St. John & Hu, 2001; Somers, 1995; Long, 1998; DuBrock & Fenske, 2000; Bettinger, 2002). Another problem arises when financial support for students who departed is imputed for a given term based on full-year awards (St. John, Hu, & Weber, 2001; St. John, Hu, & Tuttle, 2000). Clearly, the effect of financial aid on re-enrollment is more accurately measured on the basis of money actually received by individual term during the academic year—allowing for comparison of the initial fall cohort with the spring returnees—while also taking into account second-year offers. Unlike money already received, offers measure more directly the inducement effect on future enrollment. Though there is some bias associated with self-

selection, not all aid is offered in response to an application, not all applications result in awards, nor does an offer ensure enrollment.

The third issue is the adequacy of retention models steeped in, or derived from, the interactionalist theories of student departure, most prominently those by Tinto (1975, 1987) and Bean (1982). Developed over twenty years ago based on academically and socio-economically more homogeneous, full-time cohorts, these models continue to enjoy "near-paradigmatic status" (Braxton, Milem, & Sullivan, 2000), even though new freshmen today increasingly hail from first-generation, low-income, and ethnically diverse backgrounds (IHEP, 2004; Mortenson, 2003). More importantly, they are less prepared to take on college-level courses, a development driven in part by the rise in open-access institutions (particularly at the 2-year level) and the "college-for-all" culture permeating high-school counseling of graduating seniors (Rosenbaum, 2001). As Rosenbaum in *Beyond College For All* (2001) stresses, "College preparation, not college attendance, is the real achievement."

Greene and Foster (2003) found that a mere 32 percent of high school graduates are qualified to enter 4-year colleges. This translates into high rates of college-level remediation, which strongly correlates with a student's chance to ever finish college. National data from the 1992 college-going high school graduates show that dropouts are over four times more likely to enroll in remedial reading than degree completers—a ratio twice as high compared to the 1982 cohort. A similar trend occurred in remedial math, underlining the growing importance of remedial enrollment in identifying students at risk of dropping out (Adelman, 2004). Of course, the fact that high school preparation is key in understanding the retention *puzzle* is not new. Five years ago Adelman (1999) pinpointed the curricular experience in high school—namely taking a math course beyond Algebra II—that dramatically improves persistence in college. The capacity to

persist, however, is compromised for 35 percent of high school graduates who fail to meet basic math skills—the rate of deficiency being particularly pronounced for African Americans (69 percent) and Hispanics (56 percent)—according to the 2000 national report card on math comprehension (Haycock, 2002).

Thus, it is important that retention models sufficiently measure the curricular gateways to persistence at the college level that are typical extensions of key hurdles students go through in high school. From what we learned in *Answers in the Toolbox* (Adelman, 1999), it is no surprise that the three most likely courses students fail in college are all in the area of math; likewise, the four most likely courses students repeat or withdraw from are all math related (Adelman, 2004). Yet, none of the seminal studies, nor any referenced here, measure specific course-taking experiences at the college level that relate to Adelman's findings, while controlling for the other predictor clusters as listed above. For example, the Tinto and Bean models measure academic performance solely based on first-year GPA, while centering the analysis on student survey responses designed to measure institutional fit, social integration, commitment, and other student impressions. These are dimensions worth examining, but they scarcely capture the impact of underpreparedness in core subject requirements. Centering the analytical focus more around curricular experiences that are known to correlate strongly with persistence and degree completion is particularly important at a time when one in four college freshmen takes a remedial math course (Haycock, 2002).

Central Focus of the Inquiry

To address the three areas considered underdeveloped in the scholarship—1) student transfer and concurrent attendance; 2) fall versus spring financial support and subsequent-year *offers*; and 3) key freshmen course challenges—the model presented here disaggregates non-returnees

into those stopping/dropping out versus those transferring out, while controlling for simultaneous attendance at other post-secondary institutions. Also, the model measures the impact of financial aid based on term-specific receipt, controlling for intra-year (fall-to-spring) departure and second-year offers. At the same time, a greater range of financial aid indicators is included than commonly found in comparable studies in order to illuminate the impact of a recently introduced state-funded scholarship, the Millennium program.

Millennium aid is available to state residents who graduated with a 'B' average from a state high school in 2000 or later; the scholarship dollar value awarded per term is determined on a per-credit basis; the lifetime total maximum limit is $10,000; and a student must maintain a 'C' average (to be raised for future applicants) and carry at least 12 credit hours per term.[1] Based on data from an institution that experienced significant enrollment growth since the introduction of the Millennium scholarship program in 2000, its effect on retention is of particular interest to verify whether the program's positive impact on the state's college-going rate (which rose by 10 percent since 2000) extends beyond freshmen enrollment, and whether the program is successful in keeping the state's best high school graduates from transferring to out-of-state institutions. Also, the study tries to ascertain the scholarship's effect on improving the retention of remedial students, a segment that has grown 50 percent statewide since 1999, and over 40 percent at the institution on which the study is based (UCCSN, 2004).

Aid indicators are measured while controlling for remaining or unmet financial need, thereby identifying more accurately the effect of support to students with demonstrated need (the Pell grant and subsidized loans), and institutional leverage via internal funds to retain good students.

Student propensity to be at-risk due to insufficient academic preparation is measured via inclusion of remedial course enrollments, first-year math performance, and identification of a

math-intensive program major. A separate variable measures a student's *relative* academic success vis-à-vis his or her classmates (referred to as the 'peer challenge') to establish a more direct academic integration indicator.

The set of first-year college experience variables also includes a measure of a student's exposure to large classes or classes in high demand that are difficult to enroll in. This helps answer whether there is a negative effect on retention due to rapid enrollment growth. Both main and interaction effects among variables are identified where significant, while stressing differences in effect size across enrollment outcomes.

Research Approach

Given the saliency of measuring the impact of financial aid on retention, the study follows recommended model specifications from previous research (St. John, 2000; 1992), but with an expanded focus to address the issues above. Accordingly, the model incorporates student demographics (age, gender, ethnicity, residency, parent income), high school preparation (composite index), college experience (on-campus living and employment, credit load, GPA, math requirement in major, first-year math grade, remedial course enrollment, peer challenge score, class selection, use of recreation facilities), and financial aid status (by package, eligibility-type, source, amount, remaining need, second-year offers). Second-year (subsequent fall semester) enrollment, stopout/dropout, and transfer are measured within two semesters following the initial enrollment term based on new freshmen that entered fall semesters between 1996 and 2002. To capture the 'Millennium' effect, cohorts from 2000 through 2002 are used for most of the analysis, which includes both a fall and spring model to identify effects associated with intra-year retention and second-year aid offers. A pre-2000 model based on 1996 through 1999 cohorts is referred to only when discussing the impact of the Millennium

scholarship. The enrollment outcome for this model identifies 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 variables 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-a-vis the outcome variable (Menard, 2001; Hosmer & Lemeshow, 2000; Gillespie & Noble, 1992; Cabrera, 1994). Since the latter has several nonordered categories, a polytomous logit model is used, an approach which has yielded robust results in prior educational choice studies (Weiler, 1987). Though a path analytical approach offers greater control over direct and indirect effects of sequentially ordered variables, the method chosen here provides a basis for potential prediction analysis, while still furnishing an explanation of enrollment outcomes at both the main and second-order effect level.

To ensure the analysis yields stable and reliable measures across all examined variables, the presence of multicollinearity, data outliers, and insufficient cases across the outcome variable was tested. Collinearity diagnostics were performed on both fall and spring-retained cohorts, each showing acceptable variance inflation factors, condition indices and associated values across the variance decomposition matrix, according to established criteria (Belsley, 1991; Pedhazur, 1997; Cohen et al., 2003). 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, the studentized residual, Mahalanobis distance, 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 (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 some 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 all models in this study is in the mid-range based on 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-a-vis the reference category is measured. Where the determinant is a continuous metric (e.g., aid dollars received), the scale is identified. Odds ratios are multiplicative, hence the effect of a multiple unit change is exponential. Significant interaction terms are also listed, *if* statistically significant. The remaining deviation chi-square value (-2Log likelihood), the pseudo R^2, and the overall percent of cases correctly predicted are furnished to measure model fit. Relative fit indicators based on Akaike's Information Criterion (AIC) and the likelihood ratio test are furnished for model

comparison. Odds ratios of statistical significance (α =< 5%) are highlighted in the tables listing parameter estimates. Design variables use the highest coded category as reference, while iteration settings for likelihood convergence are set for the most stringent criteria.[3]

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 to identify transfer-out students. The following defines the variables used:

- Student age references 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 adult 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, thereby stabilizing 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, 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 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 and without data from the

ACT SPS. Complementing SIS data with ACT data helps minimize the number of cases missing, while still allowing for identification of independent students with their income via the federal aid application (FAFSA) of which there were few. 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 (1999) "Academic Resources" composite variable: high school GPA and ACT composite 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. Given the institution's liberal admission standard, index scores are grouped to account for a possible curve-linear effect between academic preparation and retention.
- 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 pre-Millennium model due to incomplete 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.
- Use of recreation facilities identifies those students who paid for semester-length access and are assumed to have used the facilities.

- Concurrently enrolled indicates whether a student attended simultaneously another post-secondary institution, in this case mostly two community colleges in the local area.
- Credit load identifies students taking at least one regular course beyond the minimum number required to maintain full-time status.
- Major requires Calculus 1 identifies students who selected a math-intensive program that requires the passing of a Calculus 1 course (excluding Calculus for Business majors).
- Passed first-year math confirms whether a student completed a first-year math course with a grade of 'C' or better or enrolled in a higher-level math course, which requires a minimum placement score.
- Took remedial math or English separates those students who enrolled in a high-school level course during the fall or spring semester.
- Semester GPA assigns students into three equal-size groupings to control for potential curve-linear effects associated with soaring grades; GPA is cumulative for the spring-returning cohort.
- Peer challenge groups students into three approximately equal-size categories based on the difference between their first-semester GPA and the average grade awarded in classes attended. A weak challenge indicates a student on average received higher grades than his/her classmates, the opposite being the case for a strong challenge.
- First-semester class selection measures the average size of classes enrolled in, grouped into greater or smaller than 48 (ca. the median), 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). This variable is not included in the pre-Millennium model due to insufficient data.

- Financial aid packages received for the fall semester separates students who had only a Millennium scholarship from those who received additional gift aid and those who had non-gift aid in their package. This arrangement helps isolate the Millennium impact and classifies students into those with gift aid only versus those incurring debt through loans (few students engage in college work-study). Spring semester packages for the spring-reenrolled cohort collapses recipients of non-gift aid with those having received no aid at all. Since only a handful of spring returnees went without any aid, this group served as the reference category.
- Financial aid offered for the second year separates Millennium offers from non-Millennium offers and packages with loans or work-study.
- Additional financial aid variables include price-response indicators based on $1,000 received across types of aid, source of aid (institutional versus federal/state), Millennium-eligibility status from fall to spring, and remaining first-year need (by grouped level and per $1,000) based on the processed FAFSA; all dollar amounts are inflation adjusted 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 to the federal government (IPEDS).

Variables tested but not entered into the model due to statistical insignificance include: pre-major status for undeclared students in their first semester; percent of incomplete or withdrawal (I/W) grades; campus dining plan subscription; 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. Similarly, no significant effect was associated with grouping declared major by college (e.g., arts versus business etc). The percent of incomplete and withdrawal grades had no impact, as the cumulative effect is limited in the first year. 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, though it was deemed important to measure the effect of on-campus employment in general. 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 overproject 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. The number of area jobs filled by students, and adjusted for seasonal variation and enrollment growth, may perhaps be a better indicator, as traditional students are unlikely to be captured in employment statistics.

Limitation

The tested models are decidedly more focused on student academic preparation and integration with lesser emphasis on social and institutional fit as found in other studies (e.g., Astin 1984; Billson & Brooks-Terry, 1987). Typically, these studies are based on inferential results from institutional samples (e.g., Cabrera, Nora, Castaneda, 1993; Cabrera et al., 1992; Beil, Reisen, & Zea, 1999). In contrast, the findings here are population-based (within the

context of the selected years) from an institution with a high proportion of commuter students where social life is situated primarily off campus. This may limit the transferability of lessons learned to other settings. However, adding considerations from the previous section, the shift in analytical focus is considered warranted.

Another issue is the lack of off-campus employment information that may potentially represent uncontrolled variance, if students' enrollment choices covary with outside job commitments. Availability of this information may help validate the true effect of on-campus employment. Third, determination of transfer, dropout, and stopout status is a function of the right-censored observation period; accordingly, results associated with each enrollment outcome can only be stated in the context of the defined period. Fourth, financial aid captures only amounts processed through the institution's financial aid system. Those from benefactors connected directly to the student and not routed through the institution are not included; they likely represent a negligible part of aid received, according the institution's financial aid office. Also, some caution must be exercised in interpreting results associated with second-year aid offers due to self-selection bias and the fact that aid continues to be offered after the defined observation period that captures offers made through mid-August. Fifth, the category of missing cases for the parent income variable, containing 24 percent of cases, likely contains students from higher income backgrounds, as they did not apply for need-based aid. This is a reasonable assumption (St. John, Hu, & Weber, 2001), though it is possible that lower-income students are included in that group.

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 (96

percent) students in the examined population for the 2000-2002 fall semester Millennium-year cohorts; 4,671 (96 percent) for the spring-enrolled cohorts; and 4,298 (97 percent) for the 1996-1999 pre-Millennium cohorts.

Trends in the data reveal several important differences between fall 1996-99 new freshmen and those who entered in fall terms 2000-2002: Financial aid measures are based on a different aid package distribution. While almost 56 percent of students in the nineties had no aid, that proportion dropped to less than 11 percent, on average, since 2000. This change was precipitated by the introduction of the Millennium program, as the proportion of students on scholarships rose from 19 percent to almost 70 percent (see Tables 1 and 2). This shift helped reduce the proportion of students on other types of aid and the amount received from these sources. The substitution effect gained with Millennium support also extended to students relying on campus employment, as their proportion of all students dropped by 4 percent. Other longitudinal trends indicate a 7 percent rise in the proportion of in-state students from outside the local area (i.e., rural areas and Las Vegas), 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.[4]

Average retention after introduction of the Millennium program dropped slightly, suggesting that the scholarship did not improve persistence at the institution, though it widened access as the number of new enrollees soared by 50 percent since 1999. The seven-semester transfer rate for the 1996-99 cohorts is only slightly higher than for the two-semester-based 2000-2002 cohorts, indicating that most transfer students re-enroll somewhere else within one year.

Comparing the spring-returnees with the initial fall cohorts (Tables 1 and 3), one notices a consistent decrease in the proportion of remedial students and a comparable increase of students passing first-year math or declaring a math-intensive major. At the same time, the proportion of students receiving only a Millennium scholarship and no other aid soared by 10 percent to where close to 50 percent of all spring returnees were supported exclusively by Millennium dollars. Still, 18 percent of those on Millennium support in the fall lost the scholarship at the end of the semester due to insufficient GPA and/or credit hours. Almost 62 percent of spring returnees received a second-year Millennium offer by the end of the summer. The effect of these offers and variables on second-year enrollment is now further examined in the multivariate context.

Findings for Fall 2000-2002 Cohorts and Spring Returnees

Findings

Almost 11 percent of fall students chose to transfer within one year, the majority after re-enrolling in the spring, while almost 13 percent dropped out, again the majority in the spring. Individual fall term cohort size grew steadily between 2000 and 2002 largely due to the state-funded Millennium scholarship program. The following discussion is based on results from Tables 4 through 7.

Demographic Background

Among the tested demographic attributes, a student's residency is the only variable that weighs in on whether the student chooses to drop out or transfer. While out-of-state students face twice the odds of dropping out and close to five times the odds of transferring, in-state students from outside the local area face similar transfer odds, but lower odds to drop out. The heightened departure risk for these students does not depend on their financial aid status, as results from the reduced model show. On the other hand, once they persist into the next

semester, out-of-state students are no more likely to leave than local students, and in-state students from outside the local area are only more likely to transfer.

Men are less likely to transfer than women, though no gender difference exists on the odds of dropping out. Parental income weighs in for students who persisted into the second semester, with those from middle and upper income backgrounds facing lower dropout odds, though their transfer odds are no different from lower-income students. During the first semester, middle-income students with greater levels of unmet need face twice the risk of dropping out, while those from upper and lower-incomes remain unaffected. Factoring in unmet need modifies the propensity of income as a retention determinant, underscoring the importance of considering a student's outstanding financial obligation.

Indeed, the presence of remaining need raises the odds of dropping out or transferring, regardless of the type and amount of aid received, while financing via unsubsidized loans—a typical middle income choice—raises the dropout risk both during the first and second semester. Although financial aid helps equalize departure odds in the first semester (except for middle income students with higher levels of remaining need), it does not overcome the effect of parent income in the second semester. Income has a very high correlation with years of formal education,[5] and coupled with higher socioeconomic status enhancing focus on education (Cabrera & La Nasa, 2001), the effect of greater social and cultural capital at the higher income strata cannot be cancelled out with aid alone.

Contrasting the results from the 2000-2002 cohorts with those from the 1996-99 cohorts, one notices that the initial leveling of odds associated with parent income coincides with the significant expansion of available aid in the wake of the Millennium scholarship introduction. Having tied first-semester eligibility to a reasonably achievable high school GPA of 3.0—the

average high school GPA for new freshmen being 3.37—the great majority of in-state high school graduates qualifies for the scholarship, as confirmed by the steady rise over the past three years in the college-going rate of in-state high school graduates (UCCSN, 2004) and the rising proportion of entering freshmen with Millennium support. Though the higher departure odds of non-local students since the beginning of the Millennium program cannot be directly tied to it, as the reduced model without aid shows, the significant increase in the proportion of non-local in-state students since 2000 may have created more of a critical mass of students considering other enrollment options.

High School Preparation

In addition to broadening college access for the state's high school graduates, the Millennium scholarship was established to promote academic excellence and to encourage the state's best students to enroll and persist at in-state colleges and universities. The following results are particularly pertinent as they shed light on how well the institution that attracts, on average, the best prepared students in the state is able to retain them (UCCSN, 2004). In contrast to the 1996-99 new freshmen, the top third of students that entered since the start of the Millennium program are more likely to drop out, facing odds that are about 40 percent greater than those in the bottom third based on level of academic preparation. That propensity for the better prepared to drop out prior to the second year doubles after they re-enroll in the spring. The spring re-enrolled also are more likely to transfer, with the better prepared facing almost twice the odds to do so compared to less prepared students. Assuming enrollment in the spring, even average prepared students, those in the middle third, have dropout and transfer odds that are 70 percent and 50 percent (respectively) greater compared to the less prepared.

The increase in propensity among the better prepared to depart after completing the first year may hint at two problems: Millennium-driven expansion of the new freshmen class includes better prepared students who take advantage of the free tuition that comes with the new scholarship only to transfer out after one or two years. Descriptive data show that some of the best seek out enrollment options outside the state (see Table 8). Secondly, some of the better prepared students may leave due to insufficient institutional support. For example, better prepared students with unmet need are more likely to transfer out compared to the less prepared whose needs are met (see Table 6, Model M).

Both issues raise the question of how best to allocate available aid to promote access without compromising retention and academic preparation in the process. For example, students who lost Millennium eligibility had on average significantly lower ACT scores and first-semester GPAs compared to those who maintained eligibility or never received the scholarship (see Table 9). More importantly, the ones who lost eligibility entered with higher high school grades compared to non-Millennium students that had higher standard test scores. Thus, the Millennium program also attracts underprepared students—as one out of five lost eligibility—and tends to promote grade inflation in the high schools. This perhaps foreseeable consequence combined with inadequate institutional aid awards (that are based heavily on unweighted high school grades) may create a situation that is not sufficiently conducive to retention of academically well prepared students. While the Millennium program helped expand the college-going rate of high school graduates in the state, indications are it may contribute to the departure of greater numbers of well-prepared students at the state's flagship university. As the *average* level of academic preparation declined with the arrival of the state-funded scholarship—average new freshmen ACT Composite, first-semester GPA, and second-semester GPA dropped by 1.45,

0.40, and 0.17 points, respectively, since 1999), the institution faces the challenge of keeping its best students.

College Experience

Living on-campus, use of recreation facilities, concurrent enrollment at another college, taking a greater credit load, majoring an a field requiring high-level math, passing a first-year math course or being placed in a higher-level math course, receiving better grades, and doing at least as well as one's classmates all statistically improve the odds of second-year retention. The same is true for students returning in the spring, except that the positive impact of grades on retention occurs only for those with a cumulative GPA in the top quartile (> 3.47). For the most part, these are the same variables that reduce the odds of transferring out. Notably stronger is the effect of concurrent enrollment in keeping students from transferring out, and taking remedial English reduces the odds of transferring out during the first semester. The college experience results of the Millennium cohorts are comparable to the pre-Millennium cohorts, except that being in need of math remediation has emerged as a dropout and transfer-out risk. Conversely, students selecting math-intensive majors have more favorable second-year return odds, particularly once they persist into the spring semester, compared to pre-Millennium cohorts that were not impacted by the math-intensity of the major.

These results confirm that the great increase in available aid due to the Millennium program has not diminished the role of academic performance and integration (the latter measured via peer challenge) in determining student retention. Both grades and relative performance vis-à-vis other classmates are strong factors in the first semester, though they are less significant once the student makes it into the second term. In contrast, a student's math experience has enduring significance for the full year, indicating that even once re-enrolled in the spring a student's math

performance continues to affect his or her probability to return for the second year. The same is true for the level of math intensity in the selected major. This underlines the importance of including specific curricular hurdles in identifying at-risk students. The readiness to take on, and pass, required subject matter—for virtually any major, as is the case with math—that is both difficult and less popular (for most students) showed up early in the analysis as a likely factor weighing on retention. A simple cross tabulation confirmed that students who took no math at all, either in fall or spring, were five times less likely to return in the second year. Further demonstrating the relevance of math as an at-risk indicator is the disparate impact of remedial math versus remedial English. Remedial math raising odds to both dropout and transfer-out, while remedial English actually improving odds *not* to transfer out. Unlike math, deficiency in English is more likely due to the soaring number of non-native speakers entering higher education, not simply a lack of sufficient preparation in high school.

While living on campus and taking at least 14 credit hours had an expected positive impact on retention—the former measuring social integration, the latter indicating student commitment—use of recreation facilities and concurrent enrollment are not widely used factors in retention studies. Results suggest that recreation has an initial impact—helping students get together—but one that apparently wears out. Concurrent enrollment, on the other hand, affects both first and second term enrollees, with a distinctly greater impact on reducing the odds of transferring out. A significant factor also in the enrollment behavior of the 1996-99 cohorts, concurrent enrollment may be another way to measure 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 colleges has a complementary, rather than substitutive, effect on retention. This may explain the rather dramatic effect on transfer-out versus dropout, as students look for added choices—not to disengage from education.

Financial Aid

The impact of financial aid on retention has been magnified with the advent of the Millennium scholarship, as students from lower-income backgrounds no longer face increased dropout odds during the first semester as they did before the scholarship was introduced. However, this equalization effect does not carry over into the second semester, with upper-income students facing reduced dropout odds compared to those from middle and lower incomes. As discussed in the demographics section, the financially induced risk of increased departure may not be the same for all students. Controlling for remaining need across income groups suggests that middle-income students with greater amounts of outstanding first-year need are the ones affected by insufficient support. Conversely, there was no significant interaction effect for lower-income students across all possible combinations of financial aid indicators; thus, support for these students appears to be sufficient as their retention odds are not negatively impacted.

Results based on package type show that loans or work study increase a student's odds to transfer by 50 percent, a comparable impact to the one for pre-Millennium students. But loans and work study have no effect on dropout, which appears to be due to the addition of Millennium dollars received, as packages with loans/work study did raise the dropout odds for pre-Millennium students. The positive effect of Millennium support is particularly strong for students who persisted into the spring term. At that point, a Millennium scholarship by itself appears to be more effective in retaining students than a combination of scholarships or packages

with loans and/or work study, whether second-year offers are factored in or not (see Table 7, Model J). Being able to count on one, comparatively reliable source of support, which covers the entire tuition, may be a distinct advantage to students who like to avoid having to rely on multiple, less certain funding sources that involve a greater amount of application paperwork. As much as the Millennium scholarship helps students stay enrolled, losing it due to insufficient grades or credit load raises the dropout and transfer-out odds beyond the level of non-Millennium students. While the latter face 1.5 times the dropout odds compared to Millennium students who retain scholarship eligibility, those losing eligibility incur 2.5 times the dropout odds (see Table 6, Model D).

Using the spring cohorts allows the incorporation of second-year offered aid into the model and its effect on other predictors. Controlling for second-year offers enhances the impact of Millennium support and confirms the significant influence aid offers have on second-year retention (see Table 7, Model K). Though some caution must be exercised in interpreting effect size (as previously discussed), the fact that every type of package offered appears to improve retention, both on the dropout and transfer side, is indicative of the strong inducement financial *offers* have on student enrollment. This connection has been well examined on the recruitment side (St. John, 2000; Braunstein, McGrath, & Pescatrice, 1999), but not in the retention context. The importance of including offered aid in the analysis is underlined by the notable improvement in model fit and prediction accuracy.

Looking at the price-response effect of $1,000 in first-semester aid received, three types of aid have a significant effect on retention in relation to students without aid. Unsubsidized loans slightly increase the dropout odds; the same amount of Millennium money raises the transfer-out odds by a greater margin; while $1,000 in other types of scholarships reduces the transfer-out

odds by a somewhat smaller degree (see Table 6, Model B). Factoring in remaining need alters the effect size of the price response to these three aid types only minimally (see Table 6, Model E). The effect of $1,000 in remaining need is very consistent—whether the price response to different types of aid is included or not—raising the dropout and transfer-out odds around seven to ten percent (see Table 6, Model E, F, G). Unsubsidized loans are equally significant for spring-retained cohorts, having an identical effect size on dropout. Price response to Millennium dollars is different in the second term, reducing the odds of dropout with no effect on transfer-out (see Table 7, Model I). Lastly, examining price response by source of aid, institutional aid, which occurs mostly in form of grants and scholarships, reduces the odds of transferring out. In contrast, state and federal aid slightly heightens the odds of both types of departure (see Table 6, Model C).

In all, the price response findings are more or less in line with expectations: Unsubsidized loans are typically the last resort for students in need and constitute an immediate payback burden for students—forcing some students to give up school for work. The same is likely true for those faced with remaining need after aid has been accounted for. While the portability of Millennium aid facilitates transfer within the state, affording some students the desired option to live away from home (or conversely to return home), other scholarships are all merit-based and awarded mostly through the institution. The prestige as well as lack of portability associated with institutional scholarships promotes enrollment loyalty; in contrast, portable state and federal aid facilitates departure.

Discussion

Results from this study reflect on new freshmen at a largely commuter campus of a public land-grant university with a liberal admissions policy in a medium-size urban area. Comparing

findings with those from previous studies is designed to find some congruence on specific parameter effects, notwithstanding differences in population or sample attributes, model specification, and methodological approach. Conclusions are centered on informing retention-enhancing activities at the institution from which data are drawn.

Among demographic attributes, the finding that out-of-area residency reduces retention is supported by DuBrock and Fenske (2000), but not McGrath and Braunstein (1997). The latter also showed gender to be of no consequence on retention, unlike Somers (1995) who found women to depart at a greater rate than men, as is the case in this study. Corroboration of income background results is more difficult to establish as most other studies did not test second-term returnees per se, which is a key factor in this study. Still, the findings in Hu and St. John (2001), Paulsen and St. John (2002), Cofers and Somers (1998), and Leppel (2002) that low-income or first-generation students (Ishitani, 2003) are more likely at risk of dropping out tend to support the results for second-term returnees here. Bresciani and Carson (2002) as well as McPherson and Schapiro (1990) support the finding here that remaining need has a negative effect on retention. Paulsen and St. John (2002) also lend support to the conclusion here that adding loans to an aid package worsens a student's chance of return depending on income background. Their results apply only to low-income students, compared to middle-income students in this study. The larger finding that receiving aid in the first term has no impact on return is echoed in St. John (2000) and Braunstein, McGrath, and Pescatrice (2002). The conclusion that aid equalizes the return odds for all is conditioned, however, by results from the spring returnees that show upper-income students facing smaller odds of dropping out compared to those from lower incomes. Cambiano, Denny, and De Vore (2000) confirm the importance of high school preparation in bolstering freshmen retention, while Leppel (2002), Tinto (1997), Cabrera, Nora,

and Castaneda (1993), Perna (1997), and Hu and St. John (2001) all parallel the results here on college grades as a strong predictor of student persistence. The lower departure rate among low-income and minority students who major in physical sciences as concluded in a study by Fenske, Porter, and DuBrock (1999), and, conversely, the higher dropout risk of Caucasians majoring in the less math-intensive social sciences as reported in St. John, Hu, Simmons, Carter, and Weber (2004) helps support the finding in this study that students selecting math-intensive majors are more likely to persist. The positive effect associated with using recreational facilities is supported by Belch, Gebel, and Maas (2001).

Variables in the tested models that show no significant relationship to second-year enrollment behavior of new freshmen since the introduction of the Millennium scholarship include student age, ethnicity (race), campus employment, class size, and the difficulty of getting into a class. Age has had an inconsistent impact on retention (McGrath & Braunstein, 1997; Somers, 1995). The absence of any significance in this study is instructive only insofar as delaying entry into college after graduating from high school does not appear to be a risk factor. Both main and interaction effects across all variables in the model produce no significance along student ethnicity, which dovetails with findings in most of the cited studies. Similarly, campus employment does not weigh in on retention, a conclusion also arrived at by Beeson and Wessel (2002). Since campus employment did diminish the dropout risk for pre-Millennium students, availability of the scholarship seemingly evened out the retention risk for the non-employed. Certainly, introduction of the Millennium scholarship coincides with a lessened need for campus work, as the proportion of students employed on campus dropped by over 4 percent. This economic argument may have to be supported by confirming absence of any academic or social integration effect due to on-campus employment. Finally, results on the effect of average class

size and class enrollment difficulty help confirm that soaring new freshmen enrollment has not led to student-teacher ratios or insufficient class scheduling that might negatively affect student retention.

Conclusions

Results from this investigation are important to theory development—having addressed three areas considered underdeveloped in retention modeling—and of practical significance to the institution from which the data are drawn. On the theoretical side, the call for measuring more directly specific curricular requirements that strongly correlate with student persistence finds consistent support in this study, both in terms of overall model fit and individual parameter significance. Next to the college GPA, a student's performance in a first-year math course is the strongest retention predictor for new freshmen in their first semester. Even more important than overall grades is the math performance in the second semester, as it lowers a student's chance to both dropout *or* transfer out. The criticality of academic preparation in that area is further underlined by the greater dropout and transfer risk of remedial math students. In contrast, the need for remediation in English does not jeopardize retention, which supports Adelman's (1999) finding that the level of math comprehension attained in high school is the single most important preparatory factor for student success at the post-secondary level.

The inclusion of an indicator tracking simultaneous enrollment at other college-level institutions, coupled with measuring its effect on both dropout and transfer-out, further illuminates new freshmen enrollment behavior, particularly as it relates to swirling. Results confirm that concurrent enrollment at another institution cuts the dropout risk by half and reduces the transfer-out risk multifold during the first and second semester. Concurrent enrollment affected the pre-Millennium cohorts in largely the same way, which may well

indicate the importance of complementary choices to students who seek class scheduling flexibility in order to balance work with college and/or speed up progress towards a degree. This explanation seems reasonable, considering that 75 percent of students at 4-year institutions are working, while 40 percent are concurrently enrolled (Gardner, McClenney, & Terenzini, 2004). Knowing which courses students are concurrently enrolled in may help substantiate the view that student enrollment decisions are increasingly guided by consumeristic considerations—emphasizing choice, mobility, low cost, and speed.

Greater focus on financial aid beyond first-semester awards received and isolation of Millennium scholarship effects have yielded additional insights into how economics shapes new freshmen persistence into the second year. Results show that the equalization effect of financial support for students in the first semester does not endure into the second semester. And once a student persists into the second term, the prospect of support for the second year has a decidedly stronger effect on retention than first-year aid received. Also, the type of aid received matters more in the second term than it does in the first, as spring-returnees who depend solely on the state-funded Millennium scholarship are twice as likely to return compared to students with combined aid packages. Conversely, students on loans or work study are more likely to transfer out after the first semester compared to those receiving no aid at all. The dropout risk is particularly pronounced for middle-income students with a greater amount of unmet need. Similarly, students who take out unsubsidized loans—for the first or second semester—face an elevated dropout risk. Immediate-payback loans do not affect transfer-out odds, however, as holders of these loans are likely unable to stay in school. The impact of aid received should also be examined in conjunction with remaining (unmet) need, a factor that consistently raised the dropout and transfer-out risk across different models examined.

Several insights gained from the study help solve the retention 'puzzle' at the institutional level and inform state policymakers in their impact assessment of the state-funded Millennium scholarship program. Unquestionably, Millennium aid has been the prime catalyst behind the 10 percent rise in the college-going rate of the state's high school graduates since the program started four years ago. At the institution, the average proportion of new freshmen on scholarship aid more than tripled during that period. Contrary to the national trend of steady increases in the proportion of non-gift aid financing (IHEP, 2004), students at this institution rely less on debt-incurring assistance, thanks to Millennium support. The proportion of new freshmen on loans dropped by 4 percent, without a notable increase in the amount borrowed.

Benefits associated with the Millennium-driven growth in new freshmen enrollment—from increased funding to drawing more students from outside the local area (particularly from the state's 400-mile separated high population center in the south)—must be tempered by the absence of any improvement in the overall retention rate and a diluted level of academic preparation in new freshmen that occurred with the start of the scholarship. On average, new freshmen enter with both lower test scores and high school grades, though indications are the latter may rise in the future due to Millennium-induced grade inflation. A rise in the proportion of remedial students, a drop in those selecting math-intensive majors, and, perhaps more importantly, a 20 percent scholarship eligibility attrition rate among Millennium students after the first semester are signs that a growing number of underprepared students are entering the institution.

And while Millennium support has likely attracted well prepared high school graduates that previously did not consider the institution an enrollment choice, these students are more difficult to retain. Some make use of the free tuition for the first year only to later enroll at an out-of-

state school; others may leave due to insufficient financial aid, results suggest. The fact that the academically better prepared are more likely to depart must be of some concern amid efforts by the institution to enhance its academic reputation. Since the propensity to remain enrolled is influenced by financial support from the institution and a student's unmet need, according to the findings, adjusting financial aid awards for those students with marginally positive or negative return odds may help maximize the institution's retention rate for a given amount of available aid. Those in the top third on the preparation index who have remaining need as well as middle-income students with at least $2,500 in unmet first-year need might be a starting point for consideration of additional support.

Perhaps more difficult challenges for the institution are the retention of non-local students and those from middle and lower income backgrounds. The portability of Millennium dollars within the state—now the largest source of aid to in-state students—encourages enrollment swirl across the state, thereby complicating efforts to identify those at risk of dropping out from those moving around or switching back and forth between institutions. Retention of students from lower income backgrounds is equally formidable. Financial support is a factor, as the Millennium effect for first-semester students shows. But continuing on into the second year, once re-enrolled in the spring, depends even more on sustained academic success (which ensures continued Millennium aid) and the ability to take on and pass key gateway courses. Results also confirm that should a student choose to simultaneously enroll at another school, doing so enhances retention, presumably affording the student the kind of scheduling flexibility and/or complementary course offerings that increasingly shape today's matriculation pattern.

Having experienced a 50 percent growth in new freshmen enrollment over the past three years, the fact that neither class size nor the difficulty of getting into a class bear on a student's

chance of re-enrollment should give some comfort to university management it its effort to meet demand for increased instruction.

Finally, focusing on second-year financial aid offers may further improve the predictability of a student's second-year enrollment choice. Though establishing the exact inducement effect of aid awards is complicated due to selection bias and the fluid timing of award processing across different offers—some awards are easily anticipated by students but not formally made until weeks later—using information on offers has significantly added to the prediction accuracy of the spring model over the one using fall information only. Such information could be added to enrollment predictions at staggered points in time during the spring semester to facilitate timely intervention with at-risk students. Employing prediction models in this way is not new (Sadler, Cohen, & Kockesen, 1997). The ability to target individual students based on their departure risk, while identifying which factors jeopardize retention, should yield operationally useful information to student support services and academic advising alike.

Since a student's financial aid status may change substantially (e.g., loss of scholarship eligibility from one term to the next), the model used to generate predicted enrollment at a given point should be guided by availability of reliable data and the comparative accuracy of models that control different financial aid aspects. In multinomial models, accuracy of predicted *departure* is typically poor due to the lopsided distribution in actual enrollment outcomes (i.e., most institutions retain many more students than they lose), the assumption that alternative outcomes to retention are equally likely (Weiler, 1987), and computational constraints in measuring model specificity versus sensitivity across all outcomes via established criteria (e.g., Brier score, Hosmer-Lemeshow fit, ROC graphing). Therefore, emphasis should be placed on

predicted return, while using parameter estimates on dropout/stopout and transfer-out risk to *explain* enrollment choices.

Table 1: New Freshmen, Fall Terms 2000-2002

Descriptive Summary		N	Percentage or Mean
Enrollment Year 2	Transfer within 1 Year	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 in-state & 'Good Neighbor'	2,069	39.3%
	Local Area *	2,789	53.0%
Parent Income	Missing	1,280	24.3%
	Top 28% (> $80K)	1,119	21.3%
	30-72%tile ($42-80K)	1,564	29.7%
	Bottom 30% * (< $42K)	1,298	24.7%
High School Preparation 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%
Campus employment	yes	548	10.4%
	no *	4,713	89.6%
Use of recreation facilities	Yes	1,966	37.4%
	no *	3,295	62.6%
Concurrently enrolled at other institution during first semester	yes	353	6.7%
	no *	4,908	93.3%
First-semester credit load	> 14 credits	2,534	48.2%
	14 Credits or less *	2,727	51.8%
Selected Major requires Calculus 1	yes	1,237	23.5%
	no *	4,024	76.5%
Passed first-year math course	yes	4,357	82.8%
	no *	904	17.2%
Took remedial English	yes	1,309	24.9%
	no *	3,952	75.1%
Took remedial math	yes	649	12.3%
	no *	4,612	87.7%
First-semester GPA	> 3.33 (top 3rd)	1,758	33.4%
	2.51 - 3.33 (middle 3rd)	1,856	35.3%
	<= 2.5 (bottom third) *	1,647	31.3%
Peer challenge during first semester	weak	1,561	29.7%
	neutral	1,754	33.3%
	strong *	1,946	37.0%
First-semester class selection	Big and Full	2,330	44.3%
	Small and Open	523	9.9%
	Big or Full *	2,408	45.8%
Cohort	Fall 2000	1,662	31.6%
	Fall 2001	1,720	32.7%
	Fall 2002 *	1,879	35.7%
First-semester financial aid package received	Millennium scholarship only	1,962	37.3%
	Scholarships and/or grants (all types)	1,677	31.9%
	Packages with loans/work study	1,060	20.1%
	No Aid *	562	10.7%
Millennium scholarship status at end of first (fall) semester	Non-Millennium student	1,084	20.6%
	Received and lost after first sem	763	14.5%
	Received and maintains eligibility *	3,414	64.9%
First-semester $ amount received	Grants (all types)	810	1,496
	Pells	644	1,183
	Non-Pell Grants	370	1,027
	Subsidized Loans	724	1,245
	Unsubsidized Loans	545	2,760
	Loans (all types)	1,062	2,265
	Millennium Scholarships	4,362	1,134
	Other Scholarships	1,985	1,215
	Institutional (by source)	1,994	1,224
	State/Federal (by source)	4,722	1,796
Remaining 1st year need ($ amount)		1,479	4,779

* Reference category

Table 2: New Freshmen, Fall Terms 1996-99

Descriptive Summary		N	Percentage or 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%
	Local Area *	2,548	59.3%
Parent Income	Missing	1,006	23.4%
	Top 28% (> $80K)	867	20.2%
	30-72%tile ($42-80K)	1,284	29.9%
	Bottom 30% * (< $42K)	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%
First 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 Employment	yes	626	14.6%
	no *	3,672	85.4%
Cohort	Fall 96	981	22.8%
	Fall 97	992	23.1%
	Fall 98	1,063	24.7%
	Fall 99 *	1,262	29.4%
First semester financial aid packages	Scholarships/grants only	833	19.4%
	Packages with loans/work study	1,065	24.8%
	No aid *	2,400	55.8%
First-semester $ amount received	Grants (all types)	728	1,492
	Pells	566	1,105
	Non-Pell Grants	368	1,253
	Subsidized Loans	760	1,436
	Unsubsidized Loans	444	2,566
	Loans (all types)	1,016	2,197
	Scholarships	1,903	1,403
	Institutional (by source)	1,885	1,412
	State/Federal (by source)	1,374	2,522

* Reference category

Table 3: New Freshmen (Fall Terms 2000-2002 cohorts) Who Returned in Spring

Descriptive Summary		N	Percentage
Enrollment Year 2 (F00-02)	Transfer within 1 Year	327	7.0%
	No	444	9.5%
	Yes *	3,900	83.5%
Age 19 or older	yes	438	9.4%
	no *	4,233	90.6%
Gender	male	2,000	42.8%
	female *	2,671	57.2%
Ethnicity	Unknown	192	4.1%
	African/Hispanic/Native Am	512	11.0%
	Caucasian/Asian *	3,967	84.9%
Residency	Out of state	333	7.1%
	Other in-state & 'Good Neighbor'	1,813	38.8%
	Local Area *	2,525	54.1%
Parent Income	Missing	1,110	23.8%
	Top 28% (> $80K)	1,011	21.6%
	30-72%tile ($42-80K)	1,398	29.9%
	Bottom 30% * (< $42K)	1,152	24.7%
High School Preparation Index	Top 33%	1,657	35.5%
	33-67%tile	1,623	34.7%
	Bottom 32% *	1,391	29.8%
Living on campus	yes	2,364	50.6%
	no *	2,307	49.4%
Campus Employment	yes	508	10.9%
	no *	4,163	89.1%
Use of recreation facilities	Yes	1,783	38.2%
	no *	2,888	61.8%
Concurrently enrolled at other institution during fall or spring semester	yes	396	8.5%
	no *	4,275	91.5%
Spring semester credit load	> 14 credits	2,567	55.0%
	14 Credits or less*	2,104	45.0%
Selected Major requires Calculus 1	yes	1,124	24.1%
	no *	3,547	75.9%
Passed first-year math course	yes	4,055	86.8%
	no *	616	13.2%
Took remedial English	yes	1,122	24.0%
	no *	3,549	76.0%
Took remedial math	yes	545	11.7%
	no *	4,126	88.3%
Spring semester cumulative GPA	Top Q (> 3.47)	1,188	25.4%
	2nd Q (3.00 - 3.47)	1,114	23.8%
	3rd Q (2.46 - 3.00)	1,192	25.5%
	Bottom Q (< 2.46) *	1,177	25.2%
Peer Challenge during first semester	weak	1,494	32.0%
	neutral	1,620	34.7%
	strong *	1,557	33.3%
Cohort	Fall 2000	1,512	32.4%
	Fall 2001	1,494	32.0%
	Fall 2002 *	1,665	35.6%
Spring semester aid package received	Millennium only	2,200	47.1%
	Scholarships and/or grants (all types)	1,520	32.5%
	Pckg w/ Loans/work study or no aid (only 2)*	951	20.4%
Second-year aid package offered by end of summer	Millennium offered	2,883	61.7%
	Non-Millennium scholarships/grants	387	8.3%
	Pckg with loans or work study	309	6.6%
	No offer by mid August *	1,092	23.4%

* Reference category

Table 4: Dropout/Stopout and Transfer Odds versus Re-Enrollment Odds, New Freshmen Fall Terms 2000-2002

			Dropout/Stopout					Transfer				
						Odds Ratio[a]					Odds Ratio[a]	
Model A			Parameter Estimate	Standard Error	Sig.	Full Model	Excl Aid[b]	Parameter Estimate	Standard Error	Sig.	Model	Excl Aid[b]
	Intercept		0.20	0.22	0.35			-1.17	0.25	0.00		
Demographics	Age 19 or older	yes	-0.13	0.15	0.39	-1.14		-0.19	0.17	0.26	-1.21	
	Gender	male	0.01	0.10	0.88	1.01		-0.26	0.11	0.01	**-1.30**	**-1.31**
	Ethnicity	Unknown	-0.11	0.22	0.64	-1.11		0.06	0.23	0.80	1.06	
		African/Hispanic/Native Am	0.01	0.14	0.94	1.01		0.19	0.14	0.18	1.21	
	Residency	Out of state	0.70	0.19	0.00	**2.02**	**2.19**	1.58	0.20	0.00	**4.84**	**4.35**
		Other in-state & 'Good Neighbor'	0.28	0.11	0.01	**1.33**	**1.39**	1.40	0.13	0.00	**4.04**	**4.00**
	Parent Income	Missing	-0.13	0.14	0.36	-1.14	**-1.30**	0.29	0.15	0.06	1.33	
		Top 28%	-0.24	0.14	0.09	-1.27	**-1.40**	0.10	0.15	0.51	1.11	
		30-72%tile	-0.06	0.12	0.62	-1.06		0.07	0.14	0.59	1.08	
	High School Preparation Index	Top 33%	0.32	0.15	0.03	**1.38**	**1.39**	0.13	0.16	0.39	1.14	
		33-67%tile	0.12	0.11	0.28	1.13		0.11	0.12	0.37	1.11	
College Experience	Living on-campus	yes	-0.56	0.11	0.00	**-1.76**	**-1.68**	-0.36	0.12	0.00	**-1.43**	**-1.38**
	Campus employment	yes	-0.19	0.16	0.24	-1.21		-0.11	0.16	0.49	-1.12	
	Use of recreation facilities	yes	-0.25	0.11	0.02	**-1.29**	**-1.30**	0.04	0.11	0.71	1.04	
	Concurrently enrolled	yes	-0.66	0.24	0.00	**-1.94**	**-1.96**	-3.18	0.71	0.00	**-23.81**	**-23.81**
	First-semester credit load	> 14 credits	-0.30	0.10	0.00	**-1.36**	**-1.36**	-0.24	0.10	0.02	**-1.27**	**-1.29**
	Major requires Calculus 1	yes	-0.23	0.12	0.05	***-1.26***		-0.21	0.13	0.11	-1.24	
	Passed first-year math course	yes	-1.09	0.10	0.00	**-2.97**	**-2.99**	-1.25	0.11	0.00	**-3.48**	**-3.42**
	Took remedial English	yes	-0.06	0.11	0.59	-1.06		-0.25	0.12	0.04	**-1.29**	**-1.30**
	Took remedial math	yes	0.35	0.13	0.01	**1.42**	**1.42**	0.44	0.14	0.00	**1.56**	**1.55**
	First-semester GPA	> 3.33 (top 3rd)	-1.46	0.23	0.00	**-4.31**	**-4.33**	-1.21	0.23	0.00	**-3.36**	**-3.46**
		2.51 - 3.33 (middle 3rd)	-0.78	0.14	0.00	**-2.18**	**-2.18**	-0.86	0.16	0.00	**-2.36**	**-2.36**
	Peer challenge during first semester	weak	-0.40	0.21	0.05	***-1.49***	***-1.48***	0.11	0.22	0.60	1.12	
		neutral	-0.42	0.14	0.00	**-1.53**		0.06	0.16	0.70	1.06	
	First-semester class selection	Big and Full	0.00	0.10	0.99	-1.00		0.05	0.10	0.62	1.05	
		Small and Open	0.04	0.16	0.82	1.04		0.17	0.18	0.32	1.19	
	Cohort	Fall 2000	-0.04	0.11	0.73	-1.04		-0.16	0.12	0.19	-1.17	
		Fall 2001	0.08	0.11	0.46	1.08		0.29	0.11	0.01	**1.33**	**1.32**
	First-semester financial aid package received	Millennium scholarship only	-0.11	0.16	0.51	-1.11	n/a	0.31	0.18	0.08	1.36	n/a
		Other scholarships single/comb.	0.07	0.17	0.69	1.07	n/a	0.02	0.19	0.90	1.02	n/a
		Pckg with loans or work study	0.28	0.18	0.12	1.32	n/a	0.41	0.19	0.03	**1.50**	n/a

[a]<= 5% significance bolded; italics indicates tendency; [b] Significant variables only

Model Fit (full model)

	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	7,435			
Final	6,335	1,099	62	0
Nagelkerke R^2		0.248		
Akaike's IC (AIC)		1.216		

Model Fit (excluding concurrent enrollment, college math variables, and remedial experience)

	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	7,241			
Final	6,423	818	52	0
Nagelkerke R^2		0.190		

Fit comparison with full model: Chi-Square critical value 29.59 < 88 (df = 10, p.=.001)

Model Accuracy

	Predicted			
Observed	Transfer	Dropout	Return	% correct
Transfer	60	51	458	10.5%
Dropout	38	99	543	14.6%
Return	49	52	3,911	97.5%
Overall %	2.8%	3.8%	93.4%	77.4%

Table 5: Dropout/Stopout and Transfer Odds versus Re-Enrollment Odds, New Freshmen Fall Terms 2000-2002 (spring re-enrolled only)

			Dropout/Stopout				Transfer			
Model O			Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]	Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]
	Intercept		1.30	0.26	0.00		0.21	0.30	0.47	
Demographics	Age 19 or older	yes	-0.37	0.20	0.06	-1.45	-0.13	0.22	0.56	-1.14
	Gender	male	-0.03	0.13	0.83	-1.03	-0.57	0.15	0.00	**-1.76**
	Ethnicity	Unknown	-0.42	0.34	0.22	-1.52	-0.25	0.37	0.49	-1.29
		African/Hispanic/Native Am	-0.08	0.18	0.66	-1.08	0.14	0.20	0.47	1.16
	Residency	Out of state	-0.27	0.22	0.22	-1.31	-0.08	0.24	0.76	-1.08
		Other in-state & 'Good Neighbor'	0.24	0.15	0.10	1.27	1.06	0.17	0.00	**2.88**
	Parent Income	Missing	-0.49	0.19	0.01	**-1.63**	-0.01	0.22	0.97	-1.01
		Top 28%	-0.49	0.19	0.01	**-1.63**	0.01	0.22	0.95	1.01
		30-72%tile	-0.24	0.16	0.13	-1.27	-0.14	0.19	0.47	-1.15
	High School Preparation Index	Top 33%	0.97	0.20	0.00	**2.63**	0.64	0.23	0.01	**1.90**
		33-67%tile	0.56	0.15	0.00	**1.74**	0.41	0.17	0.02	**1.50**
College Experience	Living on-campus	yes	-0.57	0.15	0.00	**-1.77**	-0.18	0.17	0.28	-1.20
	Campus employment	yes	0.07	0.21	0.73	1.07	0.29	0.21	0.18	1.33
	Use of recreation facilities	yes	-0.12	0.14	0.36	-1.13	0.05	0.15	0.73	1.05
	Concurrently enrolled	yes	-0.56	0.29	0.05	***-1.75***	-1.26	0.41	0.00	**-3.53**
	Second semester credit load	> 14 credits	-0.40	0.13	0.00	**-1.49**	-0.35	0.15	0.02	**-1.42**
	Major requires Calculus 1	yes	-0.42	0.16	0.01	**-1.53**	-0.38	0.19	0.04	**-1.46**
	Passed first-year math course	yes	-0.54	0.15	0.00	**-1.72**	-0.67	0.17	0.00	**-1.95**
	Took remedial English	yes	-0.13	0.15	0.37	-1.14	-0.09	0.17	0.58	-1.10
	Took remedial math	yes	0.10	0.18	0.57	1.11	0.22	0.19	0.27	1.24
	Second semester cumulative GPA	Top Q (> 3.47)	-0.75	0.29	0.01	**-2.11**	-0.30	0.32	0.35	-1.35
		2nd Q (3.00 - 3.47)	-0.44	0.24	0.06	-1.55	-0.28	0.27	0.30	-1.32
		3rd Q (2.46 - 3.00)	-0.31	0.18	0.08	-1.36	-0.25	0.21	0.24	-1.28
	Peer challenge	weak	-0.27	0.24	0.26	-1.31	0.21	0.27	0.42	1.24
		neutral	-0.03	0.17	0.84	-1.04	0.31	0.20	0.12	1.36
	Cohort	Fall 2000	-0.07	0.14	0.63	-1.07	-0.12	0.17	0.47	-1.13
		Fall 2001	0.04	0.15	0.79	1.04	0.23	0.16	0.16	1.26
Financial Aid	Second semester aid package received	Millennium only	-0.75	0.18	0.00	**-2.11**	-0.74	0.20	0.00	**-2.11**
		Millennium & grants/other gift aid	-0.25	0.18	0.16	-1.28	-0.29	0.20	0.14	-1.34
	Second year aid package offered by end of summer	Millennium offered	-3.39	0.17	0.00	**-29.41**	-4.36	0.25	0.00	**-77.96**
		Non-Millennium scholarships/grants	-1.59	0.20	0.00	**-4.90**	-1.61	0.21	0.00	**-5.01**
		Pckg with loans or work study	-3.10	0.34	0.00	**-22.22**	-3.21	0.36	0.00	**-24.76**

[a]<= 5% significance bolded; italics indicates tendency

Model Fit

	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	5,198			
Final	3,554	1,644	64	0
Nagelkerke R^2		0.440		
Akaike's IC (AIC)		0.775		

Model Accuracy

	Predicted			
Observed	Transfer	Dropout	Return	% correct
Transfer	69	57	201	21.1%
Dropout/Stopout	39	118	287	26.6%
Return	31	65	3,804	97.5%
Overall %	3.0%	5.1%	91.9%	85.4%

Table 6: Dropout/Stopout and Transfer Odds versus Re-Enrollment Odds, New Freshmen Fall Terms 2000-2002

			Dropout/Stopout				Transfer			
			Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]	Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]
First-semester amount received (per $ 1,000)	Model B: Aid Type	Pells	0.16	0.11	0.15	1.18	0.06	0.13	0.66	1.06
		Non-Pell Grants	0.01	0.18	0.96	1.01	0.13	0.18	0.47	1.14
		Subsidized Loans	-0.04	0.11	0.73	0.96	0.03	0.12	0.78	1.03
		Unsubsidized Loans	0.12	0.04	0.00	**1.13**	0.05	0.04	0.26	1.05
		Millennium Scholarships	-0.03	0.12	0.83	0.97	0.30	0.13	0.03	**1.35**
		Other Scholarships	-0.02	0.07	0.73	0.98	-0.19	0.08	0.01	**-1.21**
	Model C: Source	State/Federal	0.10	0.03	0.00	**1.10**	0.06	0.03	0.05	**1.07**
		Institutional	-0.03	0.07	0.64	0.97	-0.19	0.07	0.01	**-1.21**
Model D: Millenn. Status	Non-Millennium student		0.46	0.89	0.00	**1.54**	-0.12	0.16	0.46	0.89
	Received and lost after first semester		0.00	1.81	0.00	**2.54**	0.59	0.15	0.00	**1.81**
Model E: First-semester amount received & first-year remaining need (per $ 1,000)		Pells	-0.07	0.13	0.58	0.93	-0.13	0.14	0.36	0.88
		Non-Pell Grants	-0.08	0.18	0.67	0.93	0.06	0.18	0.72	1.07
		Subsidized Loans	-0.07	0.11	0.52	0.93	0.00	0.12	0.97	1.00
		Unsubsidized Loans	0.13	0.04	0.00	**1.14**	0.06	0.04	0.17	1.06
		Millennium Scholarships	0.03	0.12	0.78	1.03	0.36	0.14	0.01	**1.43**
		Other Scholarships	0.02	0.07	0.78	1.02	-0.16	0.08	0.04	**-1.18**
		Remaining Need	0.09	0.02	0.00	**1.10**	0.08	0.02	0.00	**1.08**
Model F: First-year remaining need (per $ 1,000)			0.08	0.02	0.00	**1.09**	0.07	0.02	0.00	**1.07**
Model G: First-semester aid package received and remaining need (per $ 1,000)		Millennium scholarship only	-0.09	0.16	0.59	0.92	0.33	0.18	0.07	***1.39***
		Other scholarships single/comb. Pckg with loans or work study	0.00	0.17	1.00	1.00	-0.03	0.19	0.89	0.97
			0.18	0.18	0.30	1.20	0.34	0.19	0.08	***1.40***
		Remaining 1st year need ($ amount)	0.08	0.02	0.00	**1.08**	0.07	0.02	0.00	**1.07**
Model M: HS Prep/Remaining 1st year need (Yes/No) Interaction (1st sem aid controlled): Top 33% with remaining 1st year need			0.13	0.25	0.60	1.14	0.60	0.26	0.02	**1.86[b]**
Model N: Parent Income/Remaining 1st year need (ordinal) Interaction (1st sem aid controlled): 30-72%tile Parent Income		Top 3rd remaining need (>$4999)	0.82	0.33	0.02	**2.33[b]**	0.87	0.38	0.02	**2.43[b]**
		Middle 3rd remaining need ($2431 - $4999)	0.92	0.35	0.01	**1.83[b]**	0.69	0.41	0.09	1.99
		Bottom 3rd remaining need (< $2431)	0.35	0.36	0.34	1.41	0.72	0.40	0.08	2.04

[a]<= 5% significance bolded; italics indicates tendency; [b] Product of main effects and interaction effect
Note: Each model derived separately using the demographic, high school, and college experience variables in Table 4

Table 7: Dropout/Stopout and Transfer Odds versus Re-Enrollment Odds
New Freshmen Fall Terms 2000-2002 (spring re-enrolled only)

		Dropout/Stopout				Transfer			
		Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]	Parameter Estimate	Standard Error	Sig.	Odds Ratio[a]
Model I: Spring semester amount received (per $ 1,000)	Pells	0.16	0.14	0.23	1.18	0.10	0.16	0.52	1.11
	Non-Pell Grants	-0.10	0.22	0.64	-1.11	0.25	0.21	0.24	1.28
	Millennium Scholarships	-0.30	0.12	0.01	**-1.35**	-0.06	0.14	0.67	-1.06
	Other Scholarships	0.00	0.07	0.96	1.00	-0.06	0.08	0.48	-1.06
	Unsubsidized Loans	0.12	0.06	0.03	**1.13**	0.09	0.06	0.12	1.09
	Subsidized Loans	0.01	0.12	0.95	1.01	-0.06	0.14	0.70	-1.06
Model J: Spring semester aid package received	Millennium only	-0.44	0.16	0.00	**-1.55**	-0.38	0.17	0.03	**-1.46**
	Millennium & grants/other gift aid	-0.22	0.16	0.17	-1.24	-0.32	0.18	0.07	-1.38
Model K: Second year aid package offered	Millennium offered	-3.34	0.17	0.00	**-27.78**	-4.29	0.25	0.00	**-71.43**
	Non-Millennium scholarships/grants	-1.41	0.19	0.00	**-4.08**	-1.44	0.21	0.00	**-4.22**
	Pckg with loans or work study	-2.86	0.33	0.00	**-17.54**	-2.96	0.35	0.00	**-19.23**

[a]<= 5% significance bolded; italics indicates tendency

Note: Each model derived separately using the demographic, high school, and college experience variables in Table 5

Table 8: Fall 2000-02 New Freshmen Transfer-Out Students by Millennium Status and Transfer Destination

First Semester Millennium Status		Transfer Destination: Out of State N	Out of State Mean	In State N	In State Mean	Total N	Total Mean
Not received	ACT Composite	89	22.18	72	20.13	161	21.26
	High School GPA	98	3.21	74	2.88	172	3.07
	First semester GPA	89	2.53	72	1.75	161	2.18
	Total 1st semester Aid ($1K)	100	1.05	75	1.24	175	1.13
	1st sem. Institutional Aid ($1K)	100	0.26	75	0.25	175	0.26
Received and lost after first semester	ACT Composite	15	21.40	140	21.08	155	21.11
	High School GPA	15	3.11	146	3.17	161	3.16
	First semester GPA	13	0.93	131	1.28	144	1.25
	Total 1st semester Aid ($1K)	15	1.36	146	1.63	161	1.60
	1st sem. Institutional Aid ($1K)	15	0.06	146	0.16	161	0.15
Received and eligible after first semester	ACT Composite	50	24.02	225	22.41	275	22.70
	High School GPA	50	3.53	232	3.36	282	3.39
	First semester GPA	50	3.19	232	2.98	282	3.02
	Total 1st semester Aid ($1K)	50	1.96	232	2.10	282	2.08
	1st sem. Institutional Aid ($1K)	50	0.55	232	0.26	282	0.31
Total	ACT Composite	154	22.70	437	21.61	591	21.89
	High School GPA	163	3.30	452	3.22	615	3.24
	First semester GPA	152	2.61	435	2.26	587	2.35
	Total 1st semester Aid ($1K)	165	1.35	453	1.81	618	1.69
	1st sem. Institutional Aid ($1K)	165	0.33	453	0.23	618	0.25

Only 8 percent of Millennium-supported students who maintained eligibility after the first semester transferred to an out-of-state institution. Yet, on average, they are among the best students in the new freshmen class. The loss of better students to out-of-state institutions also occurs among those who never received Millennium support.

Table 9: Fall 2000-02 New Freshmen by Millennium Status and Second Year Enrollment Outcome

First Semester Millennium Status		Transfer within 1 Year		Dropout/Stopout		Return		Total	
		N	Mean	N	Mean	N	Mean	N	Mean
Not received	ACT Composite	161	21.26	184	21.52	711	22.19	1,056	21.93
	High School GPA	172	3.07	202	2.98	757	3.15	1,131	3.11
	First semester GPA	161	2.18	189	1.73	759	2.72	1,109	2.47
	Total 1st semester Aid ($1K)	175	1.13	203	1.20	761	1.31	1,139	1.27
	1st sem. Institutional Aid ($1K)	175	0.26	203	0.23	761	0.32	1,139	0.30
Received and lost after first semester	ACT Composite	155	21.11	253	21.25	400	21.65	808	21.42
	High School GPA	161	3.16	261	3.21	410	3.22	832	3.21
	First semester GPA	144	1.25	237	1.21	398	1.97	779	1.61
	Total 1st semester Aid ($1K)	161	1.60	261	1.74	410	1.62	832	1.65
	1st sem. Institutional Aid ($1K)	161	0.15	261	0.18	410	0.24	832	0.21
Received and eligible after first semester	ACT Composite	275	22.70	266	22.81	2,909	23.12	3,450	23.06
	High School GPA	282	3.39	273	3.43	2,962	3.47	3,517	3.46
	First semester GPA	282	3.02	273	2.93	2,964	3.22	3,519	3.18
	Total 1st semester Aid ($1K)	282	2.08	273	1.96	2,964	1.96	3,519	1.97
	1st sem. Institutional Aid ($1K)	282	0.31	273	0.40	2,964	0.48	3,519	0.46
Total	ACT Composite	591	21.89	703	21.91	4,020	22.81	5,314	22.59
	High School GPA	615	3.24	736	3.23	4,129	3.39	5,480	3.35
	First semester GPA	587	2.35	699	2.02	4,121	3.01	5,407	2.81
	Total 1st semester Aid ($1K)	618	1.69	737	1.67	4,135	1.81	5,490	1.78
	1st sem. Institutional Aid ($1K)	618	0.25	737	0.28	4,135	0.43	5,490	0.39

Over 50 percent of those who lost eligibility after the first semester did not return; in contrast, only 15 percent of those who maintained eligibility transferred or dropped out, while 33 percent of those without Millennium support (e.g., out-of-state students) did so. The Millennium scholarship also attracts underprepared students based on grades and test scores of those who lost eligibility: Their average first-semester GPA was 1.61, compared to 3.18 and 2.47 for those who maintained eligibility or never had one from the start, respectively. Similarly, their ACT scores are lower compared to those maintaining eligibility or those who never had one (21.42 vs. 23.06 and 21.93). The latter group, however, entered with a lower average high school GPA (3.11 vs. 3.21) compared to those who lost scholarship eligibility, which may indicate an inflationary effect on high school grades associated with GPA-based initial Millennium awards.

[1] For more information, check the website at: http://millennium.state.nv.us/

[2] E.g., removal of 48 cases based on Mahalanobis distance < 61.10 (X^2 critical value at p. <.001, df=31) and predicted p = .1 through .9 had no meaningful change on model fit indicators. Detailed diagnostic results may be obtained from the author.

[3] These are in most cases the default settings in SPSS, version 12.0.1, the statistical package used. This maximizes the power of the algorithm to seek likelihood convergence.

[4] 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 to 2 percent for fall 1997-1999 cohorts; the average number of remedial English classes offered during fall terms was 23, while the number of remedial Math classes was 10.

[5] 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.

References

Adelman, C. (2004). *Principal Indicators of Student Academic Histories in Postsecondary Education, 1972-2000*. Washington, DC: US Department of Education.

Adelman, C. (1999). *Answers in the Tool Box*. Washington, DC: US Department of Education.

Andres, L., & Carpenter, S. (1997, December). *Today's Higher Education Students: Issues of Admission, Retention, Transfer, and Attrition*. Working paper, Center for Policy Studies in Education, Univ. of British Columbia.

Bean, J. P. (1982). Student attrition, intentions, and confidence: interaction effects in a path model. *Research in Higher Education*, 17, 291-319.

Beeson, M., & Wessel, R. (2002). The impact of working on campus on the academic persistence of freshmen. *Journal of Student Financial Aid,* 32(2), 37-45.

Beil, C., Reisen C. A., & Zea, M. C. (1999). A longitudinal study of the effects of academic and social integration and commitment on retention. *NASPA Journal,* 37, 376-385.

Belch, H., Gebel M., & Maas, G. M. (2001). Relationship between student recreation complex use, academic performance, and persistence of first-time freshmen. *NASPA Journal,* 38, 254-268.

Belsley, D. A. (1991). *Conditioning Diagnostics*. New York: Wiley.

Bettinger, E. (2002, August). *How Financial Aid Affects Persistence*. Working paper, Case Western Reserve University.

Borden, V. M. H. (2004). Accommodating student swirl: when traditional students are no longer the tradition. *Change*, March/April 2004, 10-17.

Braunstein, A., McGrath, M., & Pescatrice, D. (2001). Measuring the Impact of Financial Factors on College Persistence. *Journal of College Student Retention*, 2(3), 191-203.

Braxton, J. M., Milem, J. F., & Sullivan, A. S. (2000). The influence of active learning on the college student departure process. *Journal of Higher Education* 71, 569-590.

Braxton, J. M., Sullivan, A. S., & Johnson, R. M. (1997). Appraising Tinto's theory of college student departure. In J.C. Smart (Ed.), *Higher Education: Handbook of theory and research: Vol. XII.* New York: Agathon.

Bresciani, M. J., & Carson, L. (2002). A study of undergraduate persistence by unmet need and percentage of gift aid. *NASPA Journal* 40, 104-123.

Cabrera. A. F., La Nasa, S. M. (2001). On the path to college: three critical tasks facing America's disadvantaged. *Research in Higher Education*, 42 (2), 119-149.

Cabrera, A. F., Amaury N., & Castaneda, M. (1993). College Persistence: Structural Equations Modeling Test of an Integrated Model of Student Retention. *Journal of Higher Education*, 64(2), 123-39.

Cabrera, A. F. , Castaneda, M. B., Nora, A., & Hengstler, D. (1992). The Convergence between Two Theories of College Persistence. *Journal of Higher Education*, 63(2), 143-64.

Cambiano, R. L., Denny, G. S., & De Vore, J. B. (2000). College student retention at a midwestern university: a six-year study. *Journal of College Admission,* 166: 22-29.

Clabaugh, Jeff. (2004, January 15). Sallie Mae doles out record student loans. *Washington Business Journal*, retrieved January 29, 2004, from http://washington.bizjournals.com/washington/stories/2004/01/12/daily27.html

Cohen, J. , Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd Ed.), Mahwah, NJ: L. Erlbaum Associates Publishers.

Cofers, J., & Somers, P. (1998, April*). I sold my soul to the company store: low debtload influences student decisions at public and private colleges*. Paper presented at the American Educational Research Association annual meeting, San Diego, CA.

DesJardins, S. (2003). Event history methods: conceptual issues and an application to student departure from college. Advance copy of book chapter in *Higher Education: Handbook of Theory and Research, Vol. XVIII*

DesJardins, S. (2001). A Comment on Interpreting Odds-Ratios When Logistic Regression Coefficients Are Negative*. AIR Professional File*, no 81.

DesJardins, S. , McCall, B. P., Ahlburg, D. A., & Moye, M. J. (2002). Adding a Timing Light to the "Tool Box". *Research in Higher Education*, 43(1), 83-114.

DesJardins, S., Ahlburg, D., & McCall, B. (2002). Simulating the Longitudinal Effects of Changes in Financial Aid on Student Departure from College. *Journal of Human Resources*, 37(3), 653-79.

DesJardins, S., Ahlburg D. & McCall B. (1994, May-June). *Studying the Determinants of Student Stopout: Identifying 'True' from Spurious Time-Varying Effects*. Paper presented at the 34th annual forum of the Association for Institutional Research, New Orleans, LA.

DuBrock, C., & Fenske, R. (2000, May). *Financial Aid and College Persistence: A Five-Year Longitudinal Analysis*. Paper presented at the 40th annual forum of the Association for Institutional Research, Cincinnati, OH.

Fenske, R., Porter, J., & DuBrock, C. (1999, May-June). *Analyzing Student Aid Packaging to Improve Low-Income and Minority Student Access, Retention, and Degree Completion*. Paper presented at the 39th annual forum of the Association for Institutional Research, Seattle, WA.

Fiske, E. B. (2004). Student success. *Focus*, (Lumina Foundation), Spring, 4-23.

Gardner, J. N., McClenney, K., & Terenzini, P. T. (2004, April). *Rethinking Retention*. National Resource Center for the First-Year Experience & Students in Transition, Teleconference #3 of the 2004 Teleconference Series.

Gillespie, M. & Noble, J. (1992). *Factors Affecting Student Persistence: A Longitudinal Study.* ACT Research Report 92-4.

Grandy, J. (1998). Persistence in science of high-ability minority students. *Journal of Higher Education,* 69, 589-620.

Greene, J. P., Forster, G. (2003, September). *Public High School Graduation and College Readiness Rates in the United States* (Education Working Paper No. 3). New York: Manhattan Institute.

Haycock, K. (2002). Still at risk. *Thinking K-16*, Education Trust, 6(1): 3-22.

Hebel, S. (2004, April 7). Need-based aid is biggest influence on students' ability to attend college, report says. *Chronicle of Higher Education*, retrieved April 7, 2004, from http://chronicle/com/daily/2004/04/20040702n.htm

Hendel, D. D. (2001, April). *The relative contribution of participating in a first-year seminar on student satisfaction and retention into the sophomore year*. Paper presented at the annual meeting of the American Educational Research Association, Seattle, WA.

Hollomon, C. (2003, May). *Using Financial Aid Variables to Study Retention Among First-Time Full-Time Entering Freshmen*. Paper presented at the 43th annual forum of the Association for Institutional Research, Tampa, FL.

Horn, L., Peter, K., & Carroll, D. (2003). *What Colleges Contribute: Institutional Aid to Full-Time Undergraduates Attending 4-Year Colleges and Universities.* Washington DC: US Department of Education. (NCES Report 2003-157)

Hosmer, D. W., & Lemeshow, S. (2000). *Applied Logistic Regression* (2nd ed.). New York: Wiley.

Hu, S. & St. John, E. (2001). Student Persistence in a Public Higher Education System: Understanding Racial and Ethnic Differences. *The Journal of Higher Education*, 72(3), 265-86.

Institute for Higher Education Policy (IHEP). (2004). *Investing in America's Future: Why Student Aid Pays Off For Society and Individuals*. Washington, DC.

Ishitani, T. T. (2003). A Longitudinal Approach to Assessing Attrition Behaviour Among First-Generation Students. *Research in Higher Education*, 44(4), 433-49.

Ishitani, T. T., & DesJardins, S. L. (2002). A longitudinal investigation of dropout from college in the United States. *Journal of College Student Retention,* 4(2), 173-201.

King, J. E. (2002), *Crucial Choices: How Students' Financial Decisions Affect Their Academic Success.* Washington, DC: American Council on Education. (Report No. 309419)

Laden, R., Matranga, R., & Peltier, G. (1999). Persistence of special admissions students at a small university. *Education,* 120: 76-81.

Lau, L. K. (2003). Institutional factors affecting student retention. *Education,* 124: 126-136.

Leppel, K. (2002). Similarities and differences in the college persistence of men and women. *Review of Higher Education,* 25: 433-450.

Long, S. (1998). *Influence of Work Study, Loans, Need-Based Gift Aid, Merit-base Aid, and Satisfaction with Financial Aid on Freshmen-to-Sophomore Retention*. Unpublished doctoral dissertation, University of Missouri, Columbia.

Mau, W. (2003). Factors That Influence Persistence in Science and Engineering Career Aspirations. *Career Development Quarterly*, 51, 234-43.

McGrath, M., & Braunstein, A. (1997). The prediction of freshmen attrition: an examination of the importance of certain demographic, academic, financial, and social factors. *College Student Journal,* 31: 396-408.

McPherson, M. S., & Schapiro, M. O. (1990, April). *Does student aid affect college enrollment? New evidence on a persistent controversy*. Williams Project on the Economics of Higher Education, Discussion Paper No. 1, Williams College, Williamstown, MA.

Menard, S. (2001). *Applied Logistic Regression Analysis* (2nd ed.). Newbury Park, CA: Sage.

Mortenson, T. (2003, November). *Emerging higher education policy trends and roles for institutional research*. Paper presented at the Midwest Institutional Research Association, Bloomington, MN.

Murtaugh, P. A., Burns L. D., & Schuster, J. (1999). Predicting the retention of university students. *Research in Higher Education,* 40, 355-371.

Office of Academic & Student Affairs. (2004). *Performance Indicator Report 2003-04*. Reno, NV: University & Community College System of Nevada (UCCSN).

Okun, M. A., Benin, M., & Brandt-Williams, A. (1996). Staying in college: moderators of the relation between intention and institutional departure. *Journal of Higher Education,* 67, 577-596.

Pascarella, E. T., Terenzini, P. T., & Wolfle, L. M. (1986). Orientation to college and freshman year persistence/withdrawal decisions. *Journal of Higher Education*, 57, 155-175.

Paulsen, M., & St. John, E. P. (2002) Social class and college costs: examining the financial nexus between college choice and persistence. *Journal of Higher Education,* 73: 189-236.

Pedhazur, E. J. (1997). *Multiple Regression in Behavioral Research*. New York: Harcourt Brace.

Peng, C. J., So, T. H., Stage, F. K., & St. John, E. P. (2002) The Use and Interpretation of Logistic Regression in Higher Education Journals: 1988-99. *Research in Higher Education*, 43(3), 259-93.

Perna, L. W. (1997). *The Contribution of Financial Aid to Undergraduate Persistence*. Paper presented at the 22th annual forum of the Association for Study of Higher Education, Albuquerque, NM.

Porter, S. R. (2002, Winter). Including transfer-out behavior in retention models: using the NSC EnrollmentSearch data. *Air Professional File* 82.

Potter, W. (2003, October 2). Students Overestimate Cost of Attending College, Report Says. *Chronicle of Higher Education*, 50(9), A27.

Rosenbaum, J. E. (2001). *Beyond College For All*. New York: Russell Sage.

Sanoff, A. P. (2004, April 30). Americans see money for college somewhere over the rainbow [Electronic version]. *Chronicle of Higher Education*, 50(34), p. B6.

Sidle, M. W., & McReynolds, J. (1999). The Freshman Year Experience: Student Retention and Student Success. *NASPA Journal*, 36, 288-300.

Somers, P. (1995). A Comprehensive Model for Examining the Impact of Financial Aid on Enrollment and Persistence. *Journal of Student Financial Aid*, 25(1), 13-27.

Spady, W.G. (1970). Dropouts from Higher Education: An Interdisciplinary Review and Synthesis. *Interchange*, 1(1), 64-85.

St. John, E. P. (1992). Workable Models for Institutional Research on the Impact of Student Financial Aid. *Journal of Student Financial Aid*, 22(3), 13-26.

St. John, E.P., Hu, S., Simmons, A., Carter, D.F., & Weber, J. (2004). What difference does a major make? The influence of college major field on persistence by African American and White students. *Research in Higher Education*, 45, 209-232.

St. John, E., Hu S., & Weber, J. (2001) State Policy and the Affordability of Public Higher Education. *Research in Higher Education*, 42(4), 401-28.

St. John, E. (2000). The Impact of Student Aid on Recruitment and Retention: What Research Indicates. *New Directions for Student Services*, 89, 61-75.

St. John, E., Hu, S., & Tuttle, T. (2000). Persistence by undergraduates in an urban public university: understanding the effects of financial aid. *Journal of Student Financial Aid*, 30(2), 23-37.

Tinto, V. (1997). Classroom as communities: exploring the educational character of student persistence. *Journal of Higher Education*, 68, 599-623.

Tinto, V. (1987). *Leaving College: Rethinking the Causes and Cures of Student Attrition.* Chicago: Univ. of Chicago Press.

Tinto, V. (1975). Dropout from higher education: a theoretical synthesis of recent research. *Review of Educational Research* 45, 89-125.

Weiler, W. C. (1987). An application of the nested multinomial logit model to enrollment choice behavior. *Research in Higher Education,* 27, 273-282.