A Four Year Longitudinal Study of Freshman Persistence: Analysis of Family Income, Financial Aid, and Re-enrollment Rates at UH and Other Institutions.

Overview

During the fall of 2003, 6,035 students classified as freshmen were enrolled at UH. Two-thirds (66%) of these students received financial aid in the form of grants, scholarships or loans (n = 3,990). The remaining 2,045 students received no university based financial assistance to fund the cost of college. These students, herein referred to as the 2003 Freshmen cohort, were followed over a 4 year period for the purpose of gaining a better understanding of how student socio-economic status impact persistence patterns[1]. Specifically, the study sought to determine whether family income differences influence the persistence patterns of students receiving aid and whether students receiving financial aid persist at different rates than students who do not receive financial aid. When differences in persistence rates among these student groups were found, the study sought to identify possible moderating student and university factors. Additionally, the study tracked students who left UH to ascertain their subsequent patterns of enrollment in other institutions of higher education with the goal of identifying actionable solutions to assist the university in retaining quality students.

Results suggest that while family income is not associated with differing retention rates for students receiving financial aid during their first four years of attendance, students who are not receiving aid are retained at lower rates. Retention differences are most pronounced during the first semester when nearly one-fifth of the students not receiving aid fail to return to UH. Furthermore, approximately three out of four students not receiving financial aid who leave UH after one semester subsequently attend another institution of higher education, most commonly a community college. This disproportionate retention occurs despite the groups being equally qualified for college as measured by SAT and ACT scores and despite having similar first semester grade point averages at UH. Further study is needed to determine which financial or other factors may be impacting the lower rate in which students who do not receive financial aid are being retained at UH.

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[1] Not all students made it to the final file. Some students received aid but did not apply (e.g. scholarship); thus, the file did not contain income information. Some students could not be tracked due to FERPA laws to determine whether they subsequently re-enrolled at another institution. The final file contained 5,603 students or 93% of the 2003 freshmen cohort.

Student Characteristics

Most freshmen receiving aid were full-time, Texas residents dependent on parents for assistance with college.
Median family income was $33,947
Average financial aid package was $6,724

The majority of freshmen receiving financial aid during academic year 2003–2004 were full-time (91%), Texas residents (98%), who were classified as *dependent* on parental support for financial aid purposes (95%). Sixty-three percent were considered "first time in college" (FTIC) freshmen. The students receiving aid had a median family income of $33,947, and their average financial aid package award was $6,724 (sd = 4,252). Information about dependency status and family income were not available for the 2,045 students attending UH who did not apply for financial aid in 2003, as these indicators are not typically collected as part of the application or enrollment process at UH or any other institution of higher education.

Financial Aid and Cost of Attendance

Over $24.9 million in financial aid was disbursed to the 2003 freshman cohort
Average financial aid package more than tuition and fees
Financial need met for less than 1/5 of students

The University of Houston disbursed $24.9 million in financial assistance to the 2003 freshman cohort during their first year in college. The majority of the aid (66.1%) came in the form of grant aid, which included federal and state need-based grants, institutional need-based and non need-based grants, scholarships, and tuition waivers. Student loans comprised 30.5% of the aid distributed, while 3.4% of the aid came in the form of federal and state work study programs.

During the 2003–04 academic year, undergraduate tuition and fees at UH were $3,217.[2] Tuition and fees do not reflect the true cost of college for students. The most widely accepted indicator of the true cost of higher education is the *cost of attendance*, which is calculated using Federal Methodology[3]. The *cost of attendance* includes tuition, fees and living expenses, and the actual dollar amount is different for each student depending on personal circumstances taken into account with the Federal Methodology. In 2003, the average calculated *cost of*

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[2] Based on two 12 credit hour semesters.
[3] The Federal Methodology is a consistent methodology to determine student financial need that is mandated under Part F of the Higher Education Act of 1965, as Amended (HEA), which sets forth standards to determine cost of attendance and expected family contribution to determine student financial need. The actual formula is as follows: Need = cost of attendance (minus) expected family contribution. The Federal Methodology takes into account family size and other varying factors that can affect a family's ability to pay for college.

attendance for freshman receiving financial aid at UH was $14,042, an amount significantly higher than tuition and fees.

The primary goal of the Federal Methodology is to determine f*inancial need.*   This is defined as the *cost of attendance* minus the *expected family contribution* (amount of money the student and family are expected to contribute to the cost of college depending on their income).   Institutions of higher education engaging in "best practice" approaches to the disbursement of financial aid attempt to cover as much financial need as possible with grant aid before supplementing with loans.   Regardless, financial need is difficult to fully meet even after exhausting federal, state and institutional resources. At UH, only 11.5% of the 2003 freshman cohort (n=378) had their financial need fully met through grant aid.   When loans are factored in, 17.2% of the freshman cohort had their financial need fully met, and only 18.2% of the freshman cohort had financial need fully met after receiving all forms of grant, loan and work study aid. In short, while students on average received more financial assistance than the cost of tuition and fees, only about one-fifth of students received enough financial aid to fully cover the cost of attendance.

Family Income is Not Associated with Retention

Students in the 2003 freshman cohort who applied for and were receiving financial aid were stratified into three family income groups: less than or equal to $40,000 per year; greater than $40,000 but less than or equal to $60,000 per year; greater than $60,000 per year. A fourth category was created for students not receiving any form of financial aid. As mentioned previously, income was unknown for this group. Family income was determined by the Office of Scholarships and Financial Aid and was obtained using Federal Methodology. The three income categories were selected for comparison after analysis of income and financial need demonstrated a natural break point at around $40,000 where students began to have lower percentages of need met (presumably because federal and state needs based aid was beginning to taper off). A second break point could be established for students with family incomes around $60,000 (presumably when families can be expected to contribute larger amounts towards the student's education in the form of an expected family contribution under Federal Methodology rules). In essence, a slight curvilinear relationship could be established between family income and level of need met with those in lower and higher income brackets tending to have more need met than those in middle income bracket.   More students in the lowest income bracket can be expected to be receiving state and federal need-based grant aid, while students in the highest income bracket can be expected to be receiving grant aid primarily in the form of merit based scholarships.

As **Table 1** demonstrates, among the 2003 freshman cohort, most of the students receiving financial aid enrolled in classes for a second semester. Interestingly, the retention rate is virtually the same for all income groups. However, students not receiving financial aid were much less likely to return to UH. In fact, 19% of the freshman cohort did not return to UH for a second semester.

Retention rates for the freshman cohort for eight semesters show a similar pattern. Students receiving financial aid, regardless of family income, were more likely to persist than students not receiving financial aid.

Table 1: Percent of Students Returning to UH Second and Eighth Semesters

Income Group	Return 2nd Sem	Return 8th Sem
Less than $40,000	92.9%	44.8%
$40,000 to 60,000	92.0%	45.3%
Over $60,000	91.8%	42.1%
No Aid	80.4%	33.8%

Figure 1 contains Kaplan Meier Survival Plots[4] that illustrate the pattern of retention for students from the three income groups by plotting the probability that students will persist at UH over the course of 8 semesters.   A Kaplan Meier plot is a Survival Analysis technique that provides descriptive data much like a bar chart or histogram. Survival analysis is a collection of statistical data analysis techniques that model the outcome variable *time until an event occurs*. In this study, the event of interest is failing to re-enroll at UH. The survival curves model the probability of surviving past a specified time period (measured here as academic semesters excluding summers)[5].   Looking at Figure 1, one can glean that mean survival times for the three income groups are similar. Students with yearly family incomes below $40,000 had a mean survival time of 4.7 semesters (almost 2 ½ years), while students with yearly family incomes in the $40,000 to $60,000 range and students in the highest income bracket of more than $60,000 experienced mean survival times of 4.8 semesters and 4.6 semesters respectively. Median survival times for the three income groups were identical at 6 semesters, indicating little difference in survival probabilities across the span of eight semesters. A Log Rank test was

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[4] A Kaplan Meier Survival Plot is a descriptive method that gives the probability of surviving past the previous survival time (t_{j-1}), multiplied by the conditional probability of surviving past time $t_{(j)}$, given survival to at least time $t_{(j)}$.

[5] The next logical use for the survival methodology will be to define the event of interest to be graduation, but enrollment data for academic year 2007–08 is not yet available.

conducted to assess whether differences existed in the survival curves for students in the three income categories (e.g. do students leave at different rates during some point in time during their college careers?).   No significant differences in the persistence patterns of students from the three income categories were found (χ^2 = 2.5, _df_ = 2, _p_ = 2.9). This suggests that family income does not impact the likelihood that students receiving financial aid will persist at UH for the first 4 years of attendance.

**Figure 1: Family Income and Retention at UH**
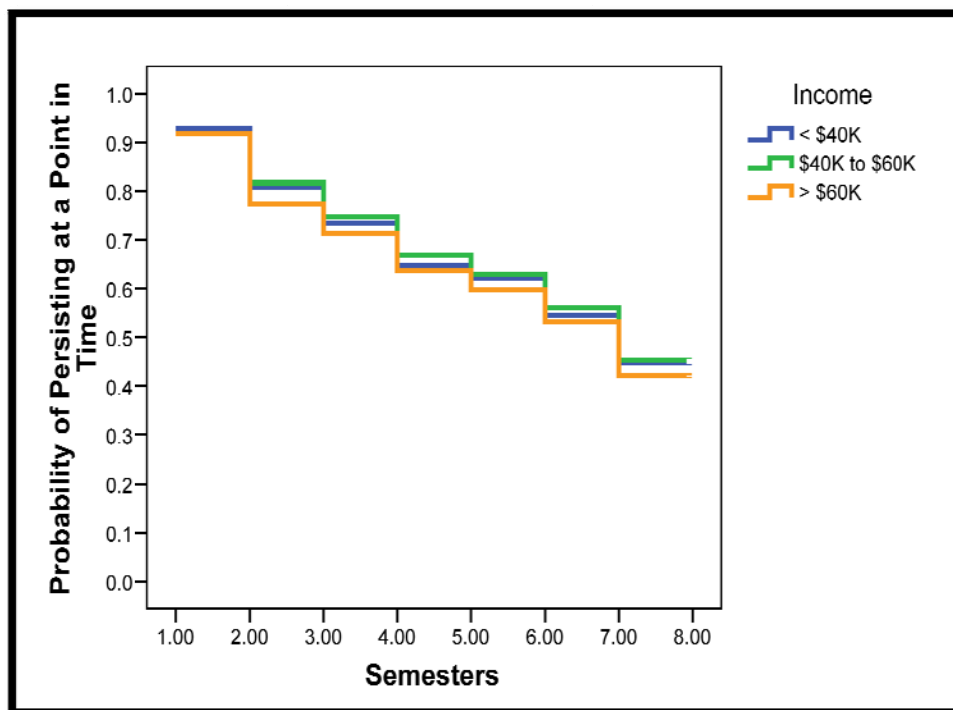
Students Not Receiving Financial Aid are Retained at Lower Rates
Differences are most pronounced the first semester

A survival curve representing students receiving no financial aid has been added to the survival curves for the three income categories in **Figure 2**. In this survival plot, the students receiving no financial aid show clear differences in survival probabilities.   In fact, the probability of surviving past the first semester is markedly lower for the group not receiving financial aid with approximately 80% of students not receiving financial aid expected to persist compared to rates at approximately 92% for students receiving financial aid.   This time, the Log Rank test does find significant differences in the four survival curves (χ^2 = 80.3, _df_ = 3, _p_ < .001).   This suggests that while family income does not impact the likelihood that students will re-enroll at

U of H for the first 4 years of attendance, whether or not students receive financial aid does. Interestingly, it appears that after the initial semester, persistence probabilities among the aid and no aid groups are more similar.

Figure 2: Students Receiving No Financial Aid and Persistence
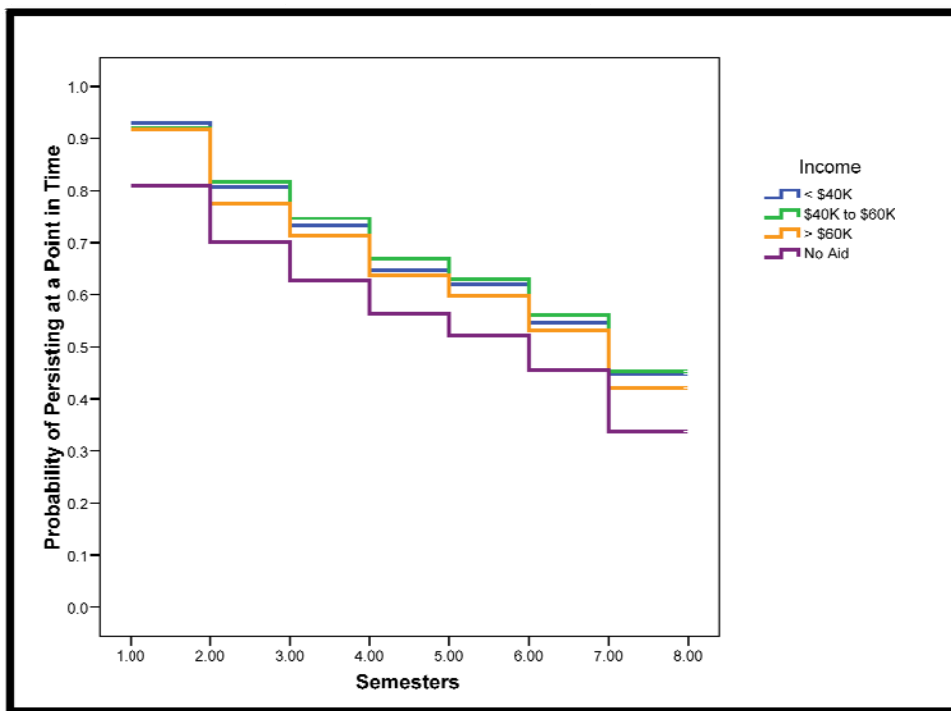
Most Students who leave UH Attend Another Institution of Higher Education
Retention in college rates differ among students from the different family income groups.

As**, Table 2** below demonstrates, students receiving no financial aid are more than twice as likely to leave UH after their first semester than students receiving financial aid, regardless of family income.[6]   But, students of different socio-economic backgrounds may be leaving UH for different reasons. For example, while only 7.1% of students in the lowest income family income group (< $40,000) fail to return to UH the second semester, they represent the largest group of students who fail to re-enroll in another institution of higher education once they do leave UH, with 36.3% of this income group to have likely dropped out of college.[7] On the other hand,

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[6] The number and percent of students leaving UH at the end of the first semester is merely a mirror view of information in Table 1, which depicts students re-enrolling at UH for a second semester.

[7] Information about subsequent enrollment in other institutions of higher education was obtained from the Student Tracker service through the National Student Clearinghouse. Information is available for approximately 92% of institutions of higher education nationwide. Thus, while it is possible for students to attend colleges that

students in the middle income bracket ($40,000 to $60,000) are the second least likely group to leave UH at the end of their first semester (8.0%), but 88.9% of these students subsequently enroll in another institution of higher education. The students not receiving any financial aid might be considered the most concerning, as they are more than twice as likely to leave UH by the second semester, and nearly three quarters of them (72.5%) subsequently enroll in another institution of higher education.

Table 2: Number and Percent of Students (within each of the four aid groups) Leaving UH and Subsequent College Attendance

	Leave UH		Drop Out of College		Attend Another Institution	
	N	**%**	**N**	**%**	**N**	**%**
LE $40K	157	7.1	57	36.3	100	63.7
$40K to $60K	54	8.0	6	11.1	48	88.9
GT $60K	69	8.2	18	26.1	51	73.9
No Aid	361	19.6	99	27.4	262	72.5
Total	641	11.3	180	28.1	461	71.9

Most Students Leaving UH at the End of the First Semester Attend Community College

The largest number of students who leave UH at the end of the first semester attend Houston Community College (HCC), followed by North Harris Montgomery County Community College, but there are some differences by income grouping (**Table 3**). A higher proportion of students from the lowest family income bracket attended Texas Southern University after leaving UH, and a higher proportion of students from the middle and upper income brackets attended UH Downtown.

Table 3: Institutions with Highest Subsequent Enrollment

	Institution 1	Institution 2	Institution 3
LE $40K	HCC (38)	Texas Southern (12)	North Harris CC (7)
$40K to $60K	HCC (11)	North Harris CC (9)	UHD (5)
GT $60K	HCC (10)	North Harris CC (8)	UHD (7)
No Aid	HCC (103)	North Harris CC (49)	San Jacinto CC (28)

would not show up in the database, the number of instances is not expected to be appreciable. Likewise, there is no reason to believe that students from the different groups under study would be lost to follow-up in differing rates.

Students Not Receiving Financial Aid Who Leave the First Semester Do Not Have Lower SAT and ACT Scores

Students appear equally prepared for college

The lower return rate for students not receiving financial aid does not appear to be due to a lower probability of success in college as measured by the SAT and ACT

Table 4 contains the mean SAT and ACT scores for students in the three family income categories and those not receiving financial aid. Not surprisingly, students receiving aid with family incomes above $60,000 have the highest mean SAT and ACT scores. As mentioned previously, it is highly likely that grant aid for this group came in the form of merit based assistance. But, the students who are not receiving financial aid have the second highest mean SAT and ACT scores. Based on these standardized tests students not receiving financial aid could be considered, as a group, better prepared or as prepared as most of their student counterparts receiving financial aid. The larger failure to return to UH rate during the first semester for the students who did not receive financial aid does not appear to be due to differing levels of college preparedness[8].

Table 4: Mean SAT and ACT Scores for Students Leaving UH at the End of the First Semester

	SAT Math	SAT Verbal	SAT Total	ACT Math	ACT Verbal	ACT Total
< $40,000	487	486	972	19.8	18.9	19.7
$40,000 to $60,000	509	490	997	20.2	18.9	19.9
> $60,000	526	524	1047	21.2	22.1	21.8
No Aid	523	505	1027	21.5	20.3	21.0

The GPA for Students Receiving No Aid Who Leave UH at the End of the First Semester is Not Lower than Students Who Receive Aid

The lower retention rate for students not receiving financial aid does not appear to be due to poorer academic performance at UH

As **Table 5** demonstrates, students who leave UH tend to have lower GPAs across the aid/no aid groups. This lower GPA could be due to a variety of factors not considered in this study, including poor performance, lack of motivation or simply giving up once a decision is

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[8] Students not receiving financial aid who either are retained or leave UH after the first semester also do not have significantly different mean SAT scores (t = -1.6, df (1071), p = .09).

made to change schools. Nevertheless, students not receiving financial aid do not have appreciably lower GPAs than their counterparts receiving financial aid. GPA during the first semester does not seem to explain why students receiving no financial aid leave UH at higher rates during their first semester than students receiving financial aid.

Table 5 Mean GPA for Students Retained and Not Retained at the End of the First Semester

	Students Not Retained	Students Retained
< $40,000	1.4	2.3
$40,000 to $60,000	1.5	2.3
> $60,000	1.7	2.3
No Aid	1.5	2.3

Discussion

The study of attendance patterns for students who do not apply for and receive financial aid is frustrated by the fact that accurate family income information is not available for this population. Even if family income information could be gathered from application data or by some other method, it is not likely to be comparable unless calculated using the Federal Methodology. Still, the disparate rates in which students who are not receiving financial aid fail to persist at UH, especially at the end of the first semester, warrants additional attention, concern and study.   Two explanations were explored: college preparedness and academic performance. While not ruled out completely, SAT and ACT scores and semester grade point averages were similar for the students receiving financial aid and those not receiving financial aid. Likewise, the students receiving financial aid who left UH after only one semester had similar first semester grade point averages as those not receiving financial aid, leading one to conclude that these factors do not likely play a large role in the disparate persistence rates between the groups.

Another theory receiving little backing from the data is that students may qualify for financial aid, but they are equally unmotivated about applying for financial aid as they are about attending college. In short, the unwillingness to negotiate the application process is a proxy for college commitment in general. However, the fact that 72% of these students who leave UH after the end of the first semester enroll at another institution of higher education somewhat dispels that theory. Possibly the most fruitful avenue for further exploration revolves around concepts involving student financial decision-making as it pertains to college choice. For example, do factors such as loan adversity or personal debt stressors impact

student persistence at UH either by causing financial stress or by necessitating that choices be made to gain college credits at less expensive institutions? While these avenues for further exploration may also be frustrated by incomplete data, the large number of students lost is a compelling inducement for further research.