How do Institutional and Student Cohort Characteristics Affect Retention Rates at 4-Year, Private Baccalaureate Colleges?

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Abstract

Retention rates are crucial for colleges and universities to consider, both in an effort to maintain their student body, as well as to compete in higher education ranking systems. This research aims to use data provided by The Integrated Postsecondary Education Data System to estimate the factors that affect the retention rates of private, four-year colleges classified by the Carnegie Classification of Institutions of Higher Education as Baccalaureate, both Arts and Sciences and Diverse Fields, using a time series cross-sectional model. Results indicated that five factors, out of the fifteen considered, were robust in determining retention rates. These were the 50th percentile ACT score of the student cohort, the student-to-faculty ratio of the college, instruction expenditures per student, the full time enrollment - or size - of the school, and if the school was an arts and sciences institution.

Empirical Model & Variables

$$Ret_{it} = f(MALE_{it}, WHITE_{it}, PELL_{it}, NETPRICE_{it}, ACT50_{it}, STUDFAC_{it}, INSTRST_{it}, SSST_{it}, RURAL_{it}, TOWN_{it}, SUBURB_{it}, FTE_{it}, CAMPUS_{it}, ADMIT_{it}, AS_{it})$$

Retention Rate (RET_{it}) – percentage of first time, full-time students who attended in the fall of year *t*, and returned in the fall of year *t+1*

Student Cohort Characteristics: Demographic Information

- ***Percentage Male ($MALE_{it}$)*** – percentage of freshman cohort that is male; no clear hypothesis
- ***Percentage White ($WHITE_{it}$)*** – percentage of the freshman cohort that is white; it was hypothesized that cohorts with greater white representation would have higher retention rates

Student Cohort Characteristic: Socioeconomic Status

- ***Federal Pell Grant Recipients ($PELL_{it}$)*** – percentage of freshman cohort receiving a Federal Pell Grant; it was hypothesized that cohorts with more students of low income backgrounds would have lower retention rates
- ***Average Net Price per Student ($NETPRICE_{it}$)*** – average net price paid by the freshman cohort receiving some form of grant aid; it was hypothesized that the more students paid to attend, the lower their retention rate

Student Cohort Characteristic: Achievement

- ***Average ACT Score of Cohort ($ACT50_{it}$)*** – 50th percentile ACT score of the freshman cohort; it was hypothesized that higher ACT scores indicated greater college-readiness, and therefore we would observe higher retention rates

Empirical Model & Variables

Institutional Characteristic: Resource Variables

- ***Student Faculty Ratio ($STUDFAC_{it}$)*** – number of students per faculty member; it was hypothesized that the more students per faculty member, the lower the retention rate
- ***Instructional Expenditures per Student ($INSTRST_{it}$)*** – dollar amount spent on instruction per student; it was hypothesized that higher levels of spending per student will lead to higher retention rates
- ***Student Service Expenditures per Student ($SSST_{it}$)*** – dollar amount spent on student services per student; hypothesis was the same as above

Institutional Characteristics: Reputation Variable

- ***Acceptance Rate ($ADMIT_{it}$)*** – percentage of applicants who applied to the institution who were then accepted; it was hypothesized that lower acceptance rates indicate greater prestige and thus, lead to higher retention rates

Institutional Characteristics: Programmatic Orientation Variables

- ***Urban Locale ($RURAL_{it}$, $TOWN_{it}$, $SUBURB_{it}$)*** – dummy variables equal to 1 if institution is located in a rural location, town, or suburb (respectively); if all three variables equal 0, institution is located in an urban location. It was hypothesized that urban institutions would have higher retention rates
- ***On Campus Living Required for Freshman ($CAMPUS_{it}$)*** – dummy variable equal to 1 if freshman are required to live on campus; it was hypothesized that freshmen who were required to live on campus were more likely to be retained
- ***Arts and Sciences (AS_{it})*** – dummy variable equal to 1 if institution was classified as Arts and Sciences by the Carnegie Classification of Institutions of Higher Education, 0 if Diverse Fields; it was hypothesized that Arts and Sciences institutions would have higher retention rates
- ***Full Time Enrollment (FTE_{it})*** – number of full-time students enrolled in the institution in the fall of year *t*; it was hypothesized that as the student body size increase, retention would rise at decreasing rates

Data

Panel data set including 140 private, four-year higher-educational institutions classified by the Carnegie Classification of Institutions of Higher Education as Baccalaureate, both Arts and Sciences and Diverse Fields; data collected for academic years 2010-2011, 2011-2012, and 2012-2013.

Data Source: The Integrated Postsecondary Education Data System (https://nces.ed.gov/ipeds/datacenter/)

Data Limitations and Challenges:

- ***Student Engagement*** – Student engagement, such as involvement in collegiate athletics or holding a work-study job, was not controlled for; data was unavailable
- ***Distance from Home*** – Whether or not the student was from out-of-state or a foreign country was not controlled for; data on these variables was inconsistent and unreliable
- ***Unobserved Heterogeneity*** – The sample included many colleges with unique missions, such as all-Black colleges, all-male or all-female colleges; this could create difficulties in predicting the effect of variables such as race or sex

Empirical Results

Table 1
Retention rate regressions, unbalanced panel least squares

Specification:		Version 1		Version 2	
Institutional Characteristics:					
Resources	Student/faculty ratio	-0.319809*	(0.161051)	-0.337707 *	(0.154008)
	Instruction expenditures per student	0.000227*	(0.000110)	0.000170**	(9.46E-05)
	Student services expenditures per student	-0.000121	(0.000171)		
Programmatic Orientation	Rural	-0.682116	(1.239320)		
	Town	0.338382	(0.883450)		
	Suburban	1.062335	(0.986040)		
	Full-time enrollment (log)	3.919144*	(0.587235)	4.208944*	(0.558517)
	Required to live on-campus	0.086945	(0.971088)		
	Arts and sciences	4.390576*	(0.964345)	4.436753*	(0.878168)
Reputation	Acceptance rate	0.018961	(0.020200)		
Student Cohort Characteristics:					
Demographic Information	Percentage of cohort male	-0.005744	(0.018682)		
	Percentage of cohort white	-0.001373	(0.013938)		
Socioeconomic Status	Percentage of cohort receiving Federal Pell Grant	-0.013423	(0.031225)		
	Average net price for students receiving aid	7.70E-05	(7.55E-05)		
Achievement	Average ACT composite of cohort	1.936035*	(0.198506)	2.055214*	(0.145741)
	Adjusted R^2	0.797666		0.799273	
	Number of observations/Degrees of freedom	405/389		406/400	
	Cross-Sections Included/Time Periods Included	140/3		140/3	

Standard errors shown in parentheses below coefficients. (*, **) Statistically different from zero at (0.05, 0.10) level of significance, two-tailed test

Conclusions & Implications

- ***Model Performance*** – The adjusted-R^2 increased after the removal of insignificant variables, strengthening confidence that the removed variables were irrelevant; the model performed well, the details are as follows:
  - The derivation of the final model incorporated two regression estimations. The initial model explained approximately 79.8% of the variation in the retention rate, while the second model explained approximately 79.9%.
- ***Significant Results*** – Five variables were found to be significant in the initial regression; they retained their significance in the second regression, after removing insignificant variables, thus are concluded to be robust. The results were as follows:
  - A decrease in the student/faculty ratio by one student per faculty is estimated to raise the retention rate by 0.34%
  - An increase in instructional expenditures by $1,000 per student raises retention by 0.17%
  - A 1% increase in the full-time enrollment of an institution increases the retention by 4.21%
  - Being classified as an Arts and Sciences institution increases retention by 4.4%
  - A 1 point increase in the average ACT score of the student cohort increases retention by 2.06%
- ***Implications*** - Our results suggest that colleges and universities have the incentive to gear their own efforts towards increasing their student body size, decreasing their student to faculty ratio, and spending more per student on instruction. In selecting their students, they should also strive to enroll those who scored highest on the ACT.