

Descriptive Logistic Regression Results

This report uses logistic regression models to describe the multivariate relationships between student attributes/academic preparation and retention/graduation among the most recent three cohorts of first-time, full-time freshman. The odds ratios (table 1) obtained from the regression coefficients are provided as well as the difference in predicted probability (table 2) of retention/graduation assuming all else equal¹. Descriptive statistics for each regression model are provided in the appendix. The current study is an update of two previous studies that used similar methodology with prior cohorts of first-time, full-time freshman.

Summary

Non-residents, Pell recipients, and first-generation students have lower odds of retention and graduation. Index is positively associated with both retention and graduation. The associations by ethnic groups are not as clearly defined; there is variation by ethnicity group and cohort.

Residency

After controlling for ethnicity, gender, index, first-generation and Pell Grant recipient status, resident students have higher odds of being retained or graduating in 4, 5, and 6 years compared to non-residents (51%, 15%, 47%, and 45% higher odds; respectively). These higher odds translate into higher predicted probabilities of being retained or graduating in 4, 5, and 6 years when all else is equal. There are 5.2, 3.6, 8.6 and 7.8 percentage point increases in the likelihood of the respective event occurring for residents compared to non-residents assuming all else is equal.

Ethnicity

The prior report (which this one updates) used the FA03, FA04, and FA05 cohorts for the 6-year graduation models and did not identify any statistically significant associations by ethnicity. However, this report's 6-year graduation model uses more recent cohorts (FA05, FA06, and FA07) and identifies negative associations for multi-racial, Hispanic, and Native American students. This difference in findings is largely due to the inclusion of the FA06 cohort (which had a large, 9.9, percentage point gap in minority/non-minority graduation rates) and the exclusion of the FA04 cohort (which had a small, 5.2, gap in minority/non-minority graduation rates) in the current study.

Hawaiian /Pacific Islander & Asian American

Hawaiian /Pacific Islander & Asian American students have similar odds of being retained and graduating in 4, 5, or 6 years compared to non-minority students after controlling for the other variables in the model.

African American

After controlling for other demographic variables and index, African American students have 108% higher odds of being retained compared to non-minority students. African American students have a likelihood of being retained that is 6 percentage points higher than non-minority students. In terms of graduation, African American students have similar odds and probabilities compared to non-minority students assuming all else is equal.

Hispanic

In terms of retention, Hispanic students have similar odds and probabilities compared to non-minority students. However, Hispanic students have lower odds of graduation compared to non-minority students. The predicted probability of graduation is 3 to 6 percentage points lower for Hispanic students compared to non-minority students (all else equal).

¹ All else equal assumes the student is a resident, nonminority, female, with an index of 114 who is not first-generation or a Pell recipient unless otherwise indicated.

Multi-Racial

In terms of retention, multi-racial students have similar odds and probabilities compared to non-minority students. However, multi-racial students have lower odds of graduation (in years 5 and 6) compared to non-minority students. The predicted probability of graduation is 5 to 8 percentage points lower for multi-racial students compared to non-minority students (all else equal).

Native American

Native American students have lower odds and predicted probabilities of retention and graduation compared to non-minority students; however, the difference is only statistically significant for 6-year graduation. This is due to a small number of Native American students which causes larger uncertainty in the regression coefficients estimates.

Gender

Females have 9% lower odds of being retained compared to males after controlling for residency, ethnicity, CCHE index, first-generation, and Pell Grant recipient status. These lower odds translate to a 1 percentage point difference in the likelihood of being retained for females compared to males. However, females have higher odds of graduating in 4, 5, or 6-years compared to males after controlling for the other variables (97%, 40%, and 22% higher odds; respectively). These higher odds result in the following gaps: a 16.3 percentage point gap in the likelihood of males graduating in four years compared to females, a 7.4 percentage point gap for males graduating in five years compared to females, and a 4.1 percentage point gap for males graduating in six years compared to females.

CCHE Index

CCHE index is positively associated with retention and graduation after controlling for demographic variables. For every one point increase in index score a student has 3% higher odds of being retained and about 4% higher odds of graduating in 4, 5, or 6 years. A student with an index score of 115 has a predicted probability of being retained that is about 2 percentage points higher and a predicted probability of graduating in 4, 5, or 6 years that is about 4 to 5 percentage points higher compared to a student with an index score of 110.

First-Generation Status

First-generation status is negatively associated with retention and graduation after controlling for other demographic variables and CCHE index. First-generation students have 34% lower odds of being retained compared to non-first generation students after controlling for other demographic and academic variables, which results in a 5 percentage point gap in predicted retention rates. First-generation students also have lower odds of graduating compared to non-first generation students (16%, 27%, and 28% lower odds of graduating in 4, 5, or 6 years). These lower odds result in a 4 to 7 percentage point gap in the predicted probability of graduating in 4, 5, or 6 years.

Pell Recipient Status

Pell recipient status is negatively associated with retention and graduation after controlling for other demographic variables and index. Pell recipients have about 17% lower odds of being retained compared to non-Pell recipients, which results in a 2 percentage point gap in Pell recipients' predicted probability of being retained compared to non-Pell recipients (all else equal). Pell recipients also have lower odds (23%, 20%, and 22%) of graduating in 4, 5, or 6 years compared to non-Pell recipients after controlling for the other variables in the model. Pell recipients have predicted probabilities of graduating in 4, 5, or 6 years that are a 5 to 6 percentage points lower compared to non-Pell recipients (all else is equal).

Table 1.

Retention/Graduation Logistic Regression Results

	Retained ¹	4-year Graduation ²	5-year Graduation ³	6-year Graduation ⁴
	Odds Ratio ⁵			
CO Resident	1.508***	1.154***	1.472***	1.445***
Ethnicity ⁶				
Asian Pacific	1.260	1.071	0.847	0.980
African American	2.082***	0.998	1.032	0.815
Hispanic	1.048	0.822***	0.770***	0.861**
Multi-Racial	0.922	0.835	0.687***	0.794*
Native American	0.600	0.667	0.677	0.400***
Female	0.907*	1.974***	1.398***	1.218***
Index	1.029***	1.043***	1.041***	1.041***
First-Generation	0.660***	0.843***	0.727***	0.716***
Pell Recipient	0.835***	0.775***	0.804***	0.779***
Observations	13,093	12,694	12,452	11,955
Model Chi ²	319.22	1086.28	825.15	712.98
Model Degrees Freedom	11	11	11	11
Pseudo R ²	0.029	0.064	0.050	0.046

¹Includes new full-time freshmen who started in FA10, FA11, & FA12

²Includes new full-time freshmen who started in FA07, FA08, & FA09

³Includes new full-time freshmen who started in FA06, FA07, & FA08

⁴Includes new full-time freshmen who started in FA05, FA06, & FA07

⁵*P<.1, ** P<.05, *** P<.01

⁶All the ethnicities are compared to the reference group of non-minority students which includes international, white, and students who do not report their ethnicity

Table 2.

Predicted Probability ⁵	Predicted Probability of Graduation and Retention			
	Freshman Retention ¹	4-year Graduation ²	5-year Graduation ³	6-year Graduation ⁴
Residents	87.5%	49.4%	70.9%	72.9%
Non-Residents	82.2%	45.8%	62.3%	65.1%
PP Difference ⁶	5.2***	3.6***	8.6***	7.8***
Asian Pacific	89.8%	51.1%	67.3%	72.5%
Non-Minority	87.5%	49.4%	70.9%	72.9%
PP Difference	2.3	1.7	-3.5	-0.4
African American	93.6%	49.3%	71.5%	68.7%
Non-Minority	87.5%	49.4%	70.9%	72.9%
PP Difference	6.1***	0.0	0.6	-4.2
Hispanic	88.0%	44.5%	65.2%	69.9%
Non-Minority	87.5%	49.4%	70.9%	72.9%
PP Difference	0.5	-4.9***	-5.7***	-3.1**
Multi-Racial	86.5%	44.9%	62.6%	68.1%
Non-Minority	87.5%	49.4%	70.9%	72.9%
PP Difference	-0.9	-4.5	-8.3***	-4.8*
Native American	80.7%	39.4%	62.2%	51.9%
Non-Minority	87.5%	49.4%	70.9%	72.9%
PP Difference	-6.8	-10.0	-8.6	-21.1***
Female	87.5%	49.4%	70.9%	72.9%
Male	88.5%	33.1%	63.5%	68.9%
PP Difference	-1.0*	16.3***	7.4***	4.1***
Index 110	86.1%	45.2%	67.4%	69.7%
Index 115	87.8%	50.4%	71.7%	73.7%
PP Difference	-1.6***	-5.3***	-4.3***	-4.0***
First-Generation	82.2%	45.1%	63.9%	65.9%
Non-First Generation	87.5%	49.4%	70.9%	72.9%
PP Difference	-5.3***	-4.3***	-7.0***	-7.1***
Pell Recipient	85.3%	43.1%	66.2%	67.7%
Non-Pell Recipient	87.5%	49.4%	70.9%	72.9%
PP Difference	-2.1***	-6.3***	-4.7***	-5.2***

¹Includes new full-time freshmen who started in FA10, FA11, & FA12

²Includes new full-time freshmen who started in FA07, FA08, & FA09

³Includes new full-time freshmen who started in FA06, FA07, & FA08

⁴Includes new full-time freshmen who started in FA05, FA06, & FA07

⁵The predicted probability of the specified retention/graduation outcome assumes a resident, nonminority, female, with an index of 114 who is not first-generation or a Pell recipient unless otherwise indicated.

⁶Significance level of the coefficient that causes the percentage point (pp) difference in predicted probabilities

*P<.1, ** P<.05, *** P<.01

Appendix

Descriptive Statistics for the Logistic Regression Predicting Freshman Retention (FA10, FA11, & FA12 cohorts)

Variable	Observations	Mean	Standard Deviation	Min	Max
Retained	13237	0.849	0.358	0	1
CO Resident	13237	0.772	0.420	0	1
Asian Pacific	13237	0.020	0.140	0	1
African American	13237	0.023	0.151	0	1
Hispanic	13237	0.099	0.299	0	1
Multi-Racial	13237	0.037	0.189	0	1
Native American	13237	0.004	0.061	0	1
Non-minority	13237	0.817	0.387	0	1
Female	13237	0.557	0.497	0	1
Index	13093	114.8	11.5	76	146
First-Generation	13237	0.250	0.433	0	1
Pell Recipient	13237	0.230	0.421	0	1

Descriptive Statistics for the Logistic Regression Predicting 4-Year Graduation (FA07, FA08, & FA09 cohorts)

Variable	Observations	Mean	Standard Deviation	Min	Max
Graduated (4 yrs)	12799	0.393	0.488	0	1
CO Resident	12799	0.789	0.408	0	1
Asian Pacific	12799	0.022	0.146	0	1
African American	12799	0.019	0.135	0	1
Hispanic	12799	0.076	0.264	0	1
Multi-Racial	12799	0.024	0.153	0	1
Native American	12799	0.006	0.076	0	1
Non-minority	12799	0.854	0.353	0	1
Female	12799	0.553	0.497	0	1
Index	12694	113.7	11.1	88	146
First-Generation	12799	0.248	0.432	0	1
Pell Recipient	12799	0.156	0.363	0	1

Descriptive Statistics for the Logistic Regression Predicting 5-Year Graduation (FA06, FA07, & FA08 cohorts)

Variable	Observations	Mean	Standard Deviation	Min	Max
Graduated (5 yrs)	12567	0.609	0.488	0	1
CO Resident	12567	0.794	0.405	0	1
Asian Pacific	12567	0.023	0.148	0	1
African American	12567	0.018	0.134	0	1
Hispanic	12567	0.074	0.262	0	1
Multi-Racial	12567	0.023	0.150	0	1
Native American	12567	0.005	0.071	0	1
Non-minority	12567	0.857	0.350	0	1
Female	12567	0.558	0.497	0	1
Index	12452	113.1	10.9	86	144
First-Generation	12567	0.257	0.437	0	1
Pell Recipient	12567	0.139	0.346	0	1

Descriptive Statistics for the Logistic Regression Predicting 6-Year Graduation (F05, FA06, & FA07 cohorts)

Variable	Observations	Mean	Standard Deviation	Min	Max
Graduated (6 yrs)	12066	0.644	0.479	0	1
CO Resident	12066	0.800	0.400	0	1
Asian Pacific	12066	0.024	0.152	0	1
African American	12066	0.018	0.134	0	1
Hispanic	12066	0.074	0.261	0	1
Multi-Racial	12066	0.024	0.152	0	1
Native American	12066	0.005	0.069	0	1
Non-minority	12066	0.856	0.351	0	1
Female	12066	0.565	0.496	0	1
Index	11955	112.9	10.9	81	144
First-Generation	12066	0.272	0.445	0	1
Pell Recipient	12066	0.140	0.347	0	1