An Institutional Model for Degree Completion: A *Moneyball* Approach.

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Introduction

At the turn of the twenty-first century, the Oakland Athletics revolutionized the way baseball players were evaluated by moving away from conventional measures (e.g., batting average, runs batted in, and home runs) to measures that would increase a team's chances of winning (e.g., on-base percentage and slugging percentage). By understanding the rules (the team with the most runs wins), the Oakland Athletics used data effectively to win games in a more efficient manner (i.e., spending less money). This *Moneyball* (Lewis, 2003) approach allowed Oakland to compete against more expensive teams like the New York Yankees and Boston Red Sox, even though their payroll was remarkably smaller.

With public funding decreasing for higher education and an increasing demand for accountability with regards to degree completion, institutions need to become more efficient and effective in graduating students. Most institutions already collect and report institutional data to the federal government in order to be eligible for federal monies (e.g., Integrated Postsecondary Education Data System [IPEDS]). Institutions also collect and track data to ensure records are properly and accurately maintained for their day-to-day operations. The issue is not whether institutions collect enough data, but instead whether institutions are using already collected data effectively and efficiently, especially with respect to graduation.

For example, institutions must report one-year retention rates to IPEDS and theoretically having high retention rates should lead to high graduation rates. Yet, just reporting retention rates does not capture if students who are being retained actually have a chance to graduate or if they are being retained but really have no chance of being eligible to graduate (i.e., students who are retained from one year to another but have a grade-point-average (GPA) less than one). As the cost of higher education continues to increase, retaining students who have little to no chance of earning a credential while accumulating a large sum of debt becomes troublesome.

By combining data already collected, institutions can more accurately predict graduation rates. Examining metrics such as retention and GPA, institutions can develop better measures (i.e., retention to graduation rate – which examines the retention rates by first semester GPA) to do so. Understanding these breakdowns allows administrators and faculty members to develop better policies and programs that are more effective. For example, if a large number of students are not being retained because of low GPA, administrators and faculty members may examine what courses are contributing to their poor academic performance. The purpose of this research, therefore, is to develop a model for degree completion from an institutional perspective. By having such a framework, institutional researchers and administrators may be better able to develop and evaluate measures, policies, and programs that can improve the graduation rates at their institutions.

Literature review

The field of higher education has been guided by many influential frameworks such as input-environment-outcomes models including Terenzini and Reason's (2005) *Comprehensive Model of Influences on Student Learning and Persistence* and sociological models such as Tinto's (1993) *Longitudinal Model of Institutional Departure*. This allows prominent and important concepts such as academic and social integration (Tinto, 1993) or student engagement (Kuh, Kinzie, Schuh, Whitt, & Associates, 2003) to guide an institution's assessment practices and policies, especially with regards to learning outcomes. Through their review of higher education research, Pascarella and Terenzini (2005) found social and academic involvement are positive influences on student persistence, but the "findings are inconsistent and the causal linkages remain obscure" (p. 440). One possible explanation for these inconsistent and causal linkages is that institutions rarely deny students their degree because of their involvement or engagement levels. If students meet certain academic requirements, the institution will more than likely award them a degree regardless of their level of involvement with professors (e.g., conducting undergraduate research) or extracurricular activities (e.g., participating in student organizations).

Instead of examining retention and graduation from a student perspective, we propose an institutionally focused model based upon the requirements that students need to satisfy in order to graduate from the university. At most higher education institutions, these graduation requirements are: 1) achieve a certain cumulative GPA and accumulate a certain number of credits in a specified curriculum, 2) pay tuition, and 3) do not commit any acts of extreme social or academic deviance (e.g., selling drugs, assaulting classmates, plagiarism). This model, thus, allows institutional researchers to easily operationalize variables with data already collected by the registrars and student aid offices. More importantly, the results can inform administrators of tangible actions that they can more easily act upon. Administrators, for example, can review and assess a fee policy to examine whether it is placing undue hardships for those least able to afford them (e.g., adding a convenience fee for those paying their tuition by credit card) and then change it.

Data Sources and Methodology

For this study, we examined longitudinal student records and financial data for first-time, full-time, baccalaureate-seeking students who started in the summer or fall 2004 (N = 12,212 students) at a large public Mid-Atlantic Research I University and its regional campuses. The student record data (first-year cumulative GPA, initial campus, last semester of attendance, graduation indicator) for the 2004 cohort was obtained through the institution's data warehouse. The financial information (total federal aid[1], total state aid, total institutional aid[2], total private aid[3], total aid[4], cost of attendance, and income[5]) was provided by the institution's Office of Student Aid. Using this information, we derived the net cost

[1] This includes veteran's benefits.
[2] This includes University scholarships, University grants and University fellowships.
[3] This includes private loans, external scholarships, and loans
[4] Total aid is the sum of total federal aid, total state aid, total institutional aid, and total private aid.
[5] Income calculated by the federal processer and based on FAFSA.

of attendance (NCOA) by calculating the difference between the cost of attendance and total aid awarded. The financial aid and family income information was available only for students who completed the Free Application for Federal Student Aid (FAFSA). The student record information was retrieved for all semesters starting from summer 2004 to spring 2010 (a six-year timeframe), while financial information was collected based on an academic year timeframe from 2004-05 to 2009-10.

To operationalize the proposed model, these analyses focused on academic performance, family income, and NCOA (i.e., cost of attendance minus financial aid received) on graduation because as long as a student meets the academic guidelines of a major (i.e., meets a certain GPA requirement and obtains the required number of credits in a prescribed curriculum) and pays tuition, she/he will generally earn a degree from her/his institution. In developing this model, our focus shifts from examining the influence of financial aid, which includes loans, grants, and work-study, to examining the influence of NCOA on graduation. Financial aid is important because it lowers the NCOA, however, if the student cannot afford to pay the NCOA, he or she cannot be enrolled. Due to the sensitivity and accessibility of whether a student was dismissed because of social and academic deviance, this factor was omitted from these analyses. We do recognize that this does occur but it is generally the exception and not the rule.

For this study, we defined academic performance as the cumulative GPA at the end of the first academic year. In the 2004 cohort, 107 students did not have a cumulative GPA at the end of their first academic year. These students are included in the descriptive tables, but omitted from the logistic and ordinary least-squares (OLS) regression analyses. A student’s family income level was determined by the median of the supplied income values obtained from the Free Application for Federal Student Aid (FAFSA) applications during the six-year timeframe. Only 16.6 percent or 2,025 students of the 2004 cohort did not file the FAFSA at least once during the examined time period. For the descriptive tables supplied in the report, family income was binned according to the 2004 quintiles set by federal guidelines (Tax Policy Center, 2011); however, for the logistic and OLS regression analyses, the family income variable was kept continuous (units = per ten thousand dollars). To prevent the exclusion of the students whose family income was unknown from logistic and OLS regression analyses, a dichotomous variable was created to indicate whether the student completed the form at least once (1 = filed form at least once; 0 = never filed a FAFSA form). Another variable was then created by calculating the product of the dichotomous variable and the family income variable. Models were then created utilizing the dichotomous variable and the modified family income variable to gauge the influence of family income on graduation and cumulative GPA without having to omit students from the analyses.

We utilized descriptive statistics (e.g., frequencies, rates), logistic regression, and OLS regression to examine the relationships between academic performance, family income, NCOA for the first year, and six-year graduation rates. For the logistic regression models, we modeled the influence of academic performance, family income, and NCOA on whether students graduate or not. The OLS regressions modeled the influence of family income and NCOA for the first year on academic performance.

We created separate logistic and OLS regression models for each of the family income quintiles[6] because we hypothesized that the NCOA might have differing effects at various family income levels. For example, a NCOA of $10,000 for a family with a combined income of $18,000 could have a more severe consequence than for a family with a combined income of $88,000. Due to the limitations of the data and the varying residential statuses of the campuses, which have a subsequent influence on cost of attendance (i.e., students who reside on campus have a higher cost of attendance compared to students who commute[7]), the analyses were further disaggregated in the following fashion: 1) Flagship Campus (the majority of first-year students are required to reside on campus), 2) Residential Regional Campuses

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[6] For the sake of readability, this report uses the following labels: lowest quintile (less than $18, 486), second-lowest quintile ($18,487 to $34, 675), middle quintile ($34,676 to $55, 230), second-highest quintile ($55,231 to $88,002), and highest quintile (more than $88, 002).

[7] A limitation of the NCOA variable was that it did not include the costs incurred by commuter students living off-campus (e.g., rent).

(students have the option to reside on campus during their first year), and 3) Nonresidential Regional Campuses (all students commute to campus).

The strength of this study is that it utilizes population data to confirm the validity of the proposed model; yet, this is also a weakness as the generalizability of the results are limited to a single institution/system. More research needs to be conducted in order to examine whether the results are generalizable to other types of institutions (e.g., two-year institutions, private, for-profit).

Results

Table 1 provides the six-year graduation rates for all 2004 first-time, full-time, baccalaureate-seeking students who started in the summer or fall 2004 disaggregated by family income and 2004-2005 cumulative GPA. Regardless of where a student starts at the University, students who performed better academically at the end of the first-year were more likely to graduate than those who perform poorly. The data also suggested that students from families with higher incomes were more likely to graduate than those students from poorer families. The logistic regression models (Table 2) found that for every one point increase in the cumulative GPA, a student increased her/his odds of graduating within six years by 4.49. In other words, a student with 3.0 cumulative GPA at the end of her/his first academic year had a 349 percent higher chance of graduating than a student with a 2.0 cumulative GPA. First-year cumulative GPA was a stronger predictor than family income. For every $10,000 increase in total family income, a student's odds of graduating increased by 1.06. Assuming a gap of $70,000 between the lowest and the highest family income, a student in the highest family income level would have a 50 percent [8] higher chance of graduating than a student from the lowest family income level. Overall the final model that included both first-year cumulative GPA and family income increased the percent predicted correctly by 8 percent compared to the null model (i.e., a model with no variables) and had a Nagelkerke R^2 of .306.

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[8] This is calculated by (1.06)^7 = 1.50, where 1.06 is the odds ratio and 7 equates to 70 thousand.

University-wide, 22 percent of students had a NCOA greater than $20,000 (Table 3); however, the majority of these students were in the highest family income quintile. The mean (average) NCOA for all students was about $12,800 while the median (midpoint) was $12,600. Flagship Campus students had a higher mean NCOA ($15,200, see Table 4) than Residential Regional Campus students ($10,900, see Table 5) and Nonresidential Regional Campus students ($9,400, see Table 6). At the Flagship, 37 percent of the students had a NCOA greater than $20,000, whereas only 12 percent of Residential Regional Campus students and 2 percent of Nonresidential Regional Campus students had a NCOA greater than $20,000.

At the Flagship Campus (Table 7), with the exception of the students in the lowest family income quintile, for every increase of $10,000 in the NCOA, a student's chance of graduating decreased (odds ratio for the other income quintiles ranged from .72 to .96). The findings for the Residential Regional Campuses were relatively inconsistent. For students in the lowest, middle, and second-highest quintile, when the NCOA increased, the odds of graduating decreased; whereas, for the students in the second-lowest and highest-quintile, the odds of graduating increased as NCOA increased. These inconsistent results may be explained by the model's lack of a control variable for whether a student resided on campus or not. Except for students in the highest family income quintile (where NCOA had no effect on whether a student graduated or not), students at Nonresidential Regional Campuses had a lower chance of graduating as their NCOA increased. The effects did appear to vary among the family income levels as the students in the middle family quintile had the greatest effect (odds ratio of .62), while students in the second-lowest quintiles had the smallest effect (odds ratio of .90). Within all models, regardless of where a student starts at the University, first-year cumulative GPA was the strongest predictor of whether a student graduated or not. Overall, the addition of these two variables into the model increased the percent predicted correctly compared to the null model.

To examine whether any moderating effects existed between cumulative GPA and family income level, family income level was regressed on cumulative GPA (Table 10), controlling for total SAT. The models suggested that family income had little effect per $10,000 on a student's cumulative GPA (b-weight = .01) regardless of where a student started at the University. If we assume a $70,000 difference between the lowest family income quintile and the highest family quintile, a student in the highest family income quintile would have a .07 higher cumulative GPA than a student in the lowest family income quintile. The practical insignificance of the relationship between cumulative GPA and family income level suggests that the two variables might be mutually exclusive, which itself was an important finding. This finding indicates that even though family income and cumulative GPA were significant predictors of graduation, the effects of each variable were relatively independent of the other.

We also examined the relationship between cumulative GPA and NCOA. At the Flagship Campus, the NCOA had a negligible effect on a student's cumulative GPA (Table 11) as the b-weights ranged from -.01 for students who did not complete a FAFSA to .07 for students in the lowest quintile. The positive b-weight for the lowest family income quintile might suggest that support and programs to help these students academically at the Flagship Campus are effective. The effects were more substantial for students at the Regional Campuses regardless of whether the campuses had housing or not (Table 12 and Table 13). The b-weights ranged from -.25 to .11. A negative b-weight meant that as NCOA increased a student's cumulative GPA decreased. A concern is that the larger negative effects on cumulative GPA involved students in the second-lowest and middle quintile for Residential Regional Campus students. The negative effects were relatively large for all groups of Nonresidential Regional Campus students except for those in the highest family quintile. Utilizing the largest negative b-weight (-.25 for the middle family income quintile for Residential Regional Campus students) and assuming a NCOA of $20,000, this would correspond to a decrease in cumulative GPA of .5. Even though NCOA had practical significance, the variable explained 2.5 percent or less of the variance in cumulative GPA.

Lastly, we developed a regression model to examine the relationship between the time spent enrolled at the University and cumulative GPA and NCOA (Table 14) for students who did not graduate within six years (n = 3,639). Cumulative GPA had a positive effect on time spent enrolled (b-weight = .24) in that the higher the cumulative GPA, the more time a student who would not graduate within six years spent enrolled at the University. The NCOA, conversely, had a negative effect on time spent enrolled (b-weight = -.13), so if the student had a larger NCOA, she/he spent less time enrolled at the University.

Conclusions

Utilizing data on first-time, full-time, baccalaureate-seeking students who started in the summer or fall 2004, the current analyses find that academic performance (first-year cumulative GPA), family income, and NCOA are important predictors of graduation, validating the proposed model. An important finding is that the effects of cumulative GPA and family income on graduation are relatively independent of each other. Based on these findings, we posit that students from families with higher incomes are more likely to graduate than students from poor families, at least in part because they can afford the NCOA and persist to complete their degree requirements even in the face of poor academic performance. In examining the influence of NCOA on graduation, we find that it has differing effects at different family income levels. The findings mostly suggest that for students with less financial means, when NCOA increases, the influence on graduation and cumulative GPA is more negative than it is for students with more financial means. We also find that for non-graduates in the 2004 cohort, the higher the NCOA, the less time they spend enrolled.

Understanding that paying tuition is necessary for a student to graduate provides a more plausible explanation for the graduation gaps between the varying family income levels and leads to the following hypothesis of success: The longer you are able to play the game, the more likely you are to succeed. This hypothesis is better illustrated with Mid-Atlantic Research I University students who have gone to non-degree status because of poor academic performance. Students who are dropped to this status can continue attending the University for up to 30 credits as long as they earn at least a 2.01 GPA in any semester attended in non-degree status. This period is an opportunity for students to pull their cumulative GPA up to a level that allows them to be academically eligible to enter a major. Unfortunately, students in this status are ineligible for financial aid. Thus, students from families with high income who have entered this status can remain at the University because they have the resources to continue to pay the tuition, thereby having an opportunity to become eligible academically. Without financial aid, students from poor families may depart because they cannot afford the tuition to continue. Based on this logic, we hypothesize that the primary reason for the graduation gap that exists between the varying family income levels is simple: the wealthy have more financial resources than the poor, allowing them to remain enrolled until they graduate. Money then essentially buys time.

Maintaining a certain cumulative GPA may also have financial implications for some students. Even though our models suggest that academic performance and family income are relatively independent of each other, we do think a real-world relationship exists between the two. Anecdotally, many students cite financial concerns as their reason for leaving the University without completing a degree. We hypothesize that in some cases the cause of their financial distress may be their failure to maintain a certain cumulative GPA, which in turn prevents them from qualifying for certain forms of aid.

By having such a model, institutional researchers and administrators may be better able to develop and evaluate measures, policies, and programs that can improve the graduation rates at an institution. This model purposefully focuses on graduation; however, the difficulty in implementing strategies towards graduation is the time needed to assess the effectiveness and efficiencies of such plans (e.g., we need six years to see if graduation rates improve from cohort to cohort). Understanding the importance of academic performance and degree completion allows institutional researchers to develop *Moneyball* (Lewis, 2003) measures that are timelier than waiting six years to examine whether a student completed a degree or not. One such measure is monitoring the percentage and number of students who earn a cumulative grade-point-average below 2.0 in their first year. The 2.0 cut-off is important at the University, because students cannot enter a major or graduate with a cumulative grade-point-average below it. Other hardships could also be incurred, such as a student entering into non-degree status, which prevents them from receiving federal student aid. This, then, becomes a more useful and timelier indicator to measure the effectiveness of programs that are geared towards improving graduation rates.

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Table 1: 2004 Cohort Six-Year Graduation Rate by Family Income and 2004-2005 Cumulative GPA: University Wide

Income	Total Students		2004-2005 Cumulative GPA													
			No GPA		<1.00		1.00-1.99		2.00-2.49		2.50-2.99		3.00-3.49		3.50-4.00	
	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate	n	6-year Grad Rate
Did not file FAFSA Form	2025	74.3%	20	0.0%	56	7.1%	126	22.2%	198	53.5%	442	76.7%	661	85.0%	522	89.3%
<$18,486	640	50.0%	12	8.3%	46	0.0%	88	15.9%	95	37.9%	143	57.3%	148	71.6%	108	75.0%
$18,487-$34675	1010	53.8%	15	0.0%	56	3.6%	134	15.7%	135	40.7%	243	62.6%	258	68.6%	169	80.5%
$34,676-$55230	1613	62.7%	20	0.0%	53	0.0%	168	21.4%	253	47.4%	363	69.4%	441	78.5%	315	81.9%
$55,231-$88,002	2557	66.4%	24	0.0%	62	0.0%	257	24.5%	328	51.5%	597	68.0%	731	79.2%	558	86.0%
>$88,002	4367	77.6%	16	0.0%	65	3.1%	298	32.2%	445	58.9%	1002	74.6%	1405	88.1%	1136	91.9%
Total Students	12212	69.3%	107	0.9%	338	2.4%	1071	24.1%	1454	51.4%	2790	70.9%	3644	82.5%	2808	87.8%

Table 2: Logistic Regression Model - Predicting Six-year Graduation for All Students (n=12,105)

	Model 1	Model 2	Model 3
Model Variables[a]			
Constant	.030	3.01	.04
First-year cumulative GPA	4.69	-	4.49
Completed FAFSA	-	.38	.49
Completed FAFSA and Family Income (10k)	-	1.08	1.06
Model			
Correct Predicted	77.5%	69.9%	77.5%
Nagelkerke R^2	.289	.048	.306

Null model correct predicated = 69.9%

a: Odds ratio presented

Table 3: Distribution of First-year Net Cost of Attendance by Family Income (University-Wide)

		Net Cost of Attendance							
	n	Less than $0	$0k – $5k	$5k -$10k	$10k-$15k	$15k-$20k	More than $20k	Mean (in $10k)	Median (in $10k)
Did Not file FAFSA	2025	.9%	1.7%	2.6%	7.5%	25.2%	62.0%	2.07	2.07
<$18,486	640	3.8%	37.5%	26.7%	17.2%	8.3%	6.6%	0.79	0.61
$18,487-$34,675	1010	3.6%	38.8%	32.5%	14.8%	6.7%	3.7%	0.70	0.58
$34,676-$55,230	1613	2.0%	33.2%	31.3%	18.7%	10.4%	4.3%	0.83	0.71
$55,231-$88,002	2557	1.3%	27.5%	23.5%	23.4%	15.9%	8.3%	1.01	0.94
>$88,002	4367	1.0%	19.2%	12.8%	14.8%	26.9%	25.3%	1.43	1.56
Total	12212	1.5%	22.5%	18.2%	16.0%	19.5%	22.3%	1.28	1.26

Table 4: Distribution of First-year Net Cost of Attendance by Family Income (Flagship Campus)

		Net Cost of Attendance							
	n	Less than $0	$0k – $5k	$5k -$10k	$10k-$15k	$15k-$20k	More than $20k	Mean (in $10k)	Median (in $10k)
Did Not file FAFSA	1287	1.5%	1.8%	2.4%	6.8%	8.4%	79.1%	2.25	2.09
<$18,486	203	5.4%	40.9%	18.2%	14.3%	8.9%	12.3%	0.85	0.59
$18,487-$34,675	298	7.0%	39.9%	24.8%	13.1%	7.0%	8.1%	0.73	0.54
$34,676-$55,230	552	4.3%	38.2%	22.5%	15.8%	10.5%	8.7%	0.84	0.65
$55,231-$88,002	1006	1.4%	33.8%	15.5%	16.2%	17.3%	15.8%	1.09	0.98
>$88,002	2566	1.4%	19.1%	8.4%	8.8%	26.4%	35.9%	1.61	1.82
Total	5912	2.1%	21.4%	10.8%	10.7%	17.9%	37.1%	1.52	1.72

Table 5: Distribution of First-year Net Cost of Attendance by Family Income (Residential Regional Campuses)

		Net Cost of Attendance							
	n	Less than $0	$0k – $5k	$5k -$10k	$10k-$15k	$15k-$20k	More than $20k	Mean (in $10k)	Median (in $10k)
Did Not file FAFSA	459	0.0%	1.1%	2.8%	5.7%	42.5%	47.9%	1.88	1.99
<$18,486	256	2.3%	35.5%	28.5%	19.9%	8.6%	5.1%	0.80	0.67
$18,487-$34,675	404	2.7%	35.4%	33.2%	16.3%	9.7%	2.7%	0.75	0.65
$34,676-$55,230	665	.9%	32.6%	32.5%	19.7%	11.7%	2.6%	0.83	0.74
$55,231-$88,002	988	1.5%	27.3%	24.0%	24.1%	18.5%	4.6%	0.97	0.94
>$88,002	1235	.5%	23.4%	14.7%	17.2%	30.3%	14.0%	1.22	1.34
Total	4007	1.1%	25.3%	21.3%	18.1%	22.2%	12.0%	1.09	1.04

Table 6: Distribution of First-year Net Cost of Attendance by Family Income (Nonresidential Regional Campuses)

		Net Cost of Attendance							
	n	Less than $0	$0k – $5k	$5k -$10k	$10k-$15k	$15k-$20k	More than $20k	Mean (in $10k)	Median (in $10k)
Did Not file FAFSA	259	0.0%	2.3%	3.5%	14.7%	75.7%	3.9%	1.52	1.56
<$18,486	169	4.1%	39.1%	36.1%	13.0%	5.3%	2.4%	0.66	0.54
$18,487-$34,675	293	1.4%	44.4%	39.6%	11.9%	2.4%	.3%	0.59	0.55
$34,676-$55,230	376	.8%	28.7%	43.6%	19.7%	5.9%	1.3%	0.77	0.69
$55,231-$88,002	539	.7%	17.3%	38.2%	35.3%	7.6%	.9%	0.90	0.86
>$88,002	550	.2%	10.7%	29.3%	37.1%	21.5%	1.3%	1.08	1.20
Total	2186	.9%	21.1%	32.8%	25.8%	18.0%	1.5%	0.94	0.89

Table 7: Six-year Graduation Logistic Regression Model for Flagship Campus by Family Income

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Model Variables[a]						
Constant	.08	.02	.13	.23	.05	.04
First-year cumulative GPA	4.38	5.59	3.23	4.33	5.41	5.75
NCOA (per 10k)	.97	1.06	.72	.78	.75	.96
Model Evaluation						
Correct Predicted	88.2%	80.8%	78.5%	84.2%	87.2%	89.6%
Nagelkerke R^2	.184	.361	.167	.225	.259	.221
Null Model Correct Predicted	86.6%	70.9%	74.5%	80.6%	83.2%	88.2%
n	1287	203	298	552	1006	2566

a: Odds ratio presented

Table 8: Six-year Graduation Logistic Model for Residential Regional Campuses by Family Income

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Model Variables[a]						
Constant	.04	.04	.01	.04	.09	.04
First-year cumulative GPA	3.48	3.24	4.72	4.08	3.13	3.70
NCOA (per 10k)	1.24	.80	1.20	.64	.80	1.38
Model Evaluation						
Correct Predicted	73.4%	63.3%	70.8%	71.9%	69.6%	73.4%
Nagelkerke R^2	.228	.233	.329	.293	.201	.227
Null Model Correct Predicted	62.1%	56.6%	50.0%	57.4%	61.6%	67.7%
n	459	256	404	665	988	1235

a: Odds ratio presented

Table 9: Six-year Graduation Logistic Model for Nonresidential Regional Campuses by Family Income

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Model Variables[a]						
Constant	<.01	.01	.03	.04	.01	.03
First-year cumulative GPA	3.42	4.69	3.36	3.62	4.79	3.65
NCOA (per 10k)	6.54	.73	.90	.62	.85	1.00
Model Evaluation						
Correct Predicted	67.2%	69.2%	65.9%	71.0%	70.1%	68.4%
Nagelkerke R^2	.288	.363	.260	.249	.296	.233
Null Model Correct Predicted	59.5%	62.1%	59.4%	50.8%	53.4%	52.9%
n	259	169	293	376	539	550

a: Odds ratio presented

Table 10: First-year CGPA OLS Regression Models with SAT and Family Income as Predictors

	University-Wide	Flagship Campus	Residential Regional Campuses	Nonresidential Regional Campuses
Constant	2.05	2.44	2.17	1.95
Total SAT score (per 100)	.09	.06	.06	.06
Completed FAFSA	-.17	-.16	-.07	.07
Completed FAFSA and Family Income (per 10k)	.01	.01	.01	.01
Adjusted R^2	.077	.054	.021	.024

Table 11: First-year CGPA OLS Regression Models by Family Income Levels (Flagship Campus)

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Constant	3.18	2.80	2.95	2.98	3.04	3.16
NCOA (per 10k)	-.01	.07	.01	.01	.02	.01
Adjusted R^2	.000	.000	.000	.000	.000	.000

Table 12: First-year CGPA OLS Regression Models by Family Income Levels (Residential Regional Campuses)

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Constant	2.56	2.61	2.78	2.92	2.77	2.80
NCOA (per 10k)	.11	-.01	-.21	-.25	.03	.02
Adjusted R^2	.002	.000	.014	.025	.000	.000

Table 13: First-year CGPA OLS Regression Models by Family Income Levels (Nonresidential Regional Campuses)

	Did Not fill FAFSA	<$18,486	$18,487-$34,675	$34,676-$55,230	$55,231-$88,002	>$88,002
Constant	2.88	2.54	2.71	2.79	2.85	2.66
NCOA (per 10k)	-.24	-.22	-.33	-.12	-.20	.03
Adjusted R^2	.001	.005	.013	.001	.009	.000

Table 14: OLS Regression Models for Length of time for Students who did not Graduate within Six Years (n=3,639)

	Model 1	Model 2
Constant	2.36	2.50
First-year cumulative GPA	.24	.24
NCOA (10k)	-	-.13
Adjusted R^2	.017	.019