

Does financial aid impact student success at regional comprehensive universities in the U.S.? A Panel Data Approach

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Research Question

Does financial aid impact student success at regional comprehensive universities in the U.S.?

- EWU - regional comprehensive university
 - Working on measures to improve student success.
- Looking at “peer group”

Selected Literature

- Lynn E. Pelco et al. (2014)
 - First-generation students (frequently low-income) – lower GPAs and SAT scores and are less likely to take more challenging courses in high school resulting in less academic preparation and fewer merit-based scholarships
- Singell and Stater (2006)
 - Find need-based funding acts as an income equalizer compared to non-low income students who receive more merit-based aid
 - Implications for reducing funding to low-income students
 - Reduces their opportunity to find the best institutional match
 - Forces low-income students to lean on merit-based funding
- Taniguchi and Kaufman (2005)
 - Rising population of parenting students
 - High drop-out rate: Part-time enrollment, student loans, added time constrains

Importance of the Study

- **Advisory Committee on Student Financial Assistance (2013)**
 - Net price of education 2012-2013
 - Less than 20% for middle income families, approximately 25% for moderate income families, and 50% for low-income families
 - Degree completion - 30% of students families versus 59% from middle income
- **Nelson et al. (2013)**
 - One quarter or approximately 4 million students are parents in the U.S.
- **Institute for Women's Policy Research (2013)**
 - Expected Family Contribution of zero:
 - 62% of single parent students
 - 20% of non-parent students
 - 18% of married parenting students

How Schools Were Chosen

IPEDS

- 4-year and above public institution
- Institutional Category: degree-granting, primarily baccalaureate and above
- Size: 10,000 or larger
- Eliminated primarily “online” schools
- Carnegie Classification: Master Colleges and Universities (small, medium and large programs, and Baccalaureate Colleges (arts and sciences and diverse fields)

Total Number of Institutions: 82

Years: 2009/2010 to 2014/2015 (6 years of data)

Dependent Variable

Institutional Graduation Rate

- Percentage of students earning a Bachelor's Degree within 6 years

Independent Variables

Region	States placed within the eight Bureau of Economic Analysis (BEA) Regions
PctAdmit	Total number of undergraduate students admitted divided by the total number of undergraduate applications (full or part-time) in the Fall
Hisp	Percentage of undergraduate population that is Hispanic in the fall
Black	Percentage of undergraduate population that is Black or African American in the fall
PctLoan	Percentage of undergraduate students that take out a federal and/or private student loan (excludes parent loans)
AmtLoan	Average amount of student loan aid awarded to full-time first-time undergraduate students
PctPell	Percentage of full-time first-time undergraduate students awarded the Pell Grant
AmtPell	Average amount of Pell Grant aid awarded to full-time first-time undergraduate students
PctFed	Percentage of full-time first-time undergraduate students awarded any federal grant (excludes Pell Grant)
AmtFed	Average amount of federal grant aid awarded to full-time first-time undergraduate students
PctState	Percentage of full-time first-time undergraduate students awarded state and local grant aid
AmtState	Average amount of state and local aid awarded to full-time first-time undergraduate students
PctInst	Percentage of full-time first-time undergraduate students awarded institutional grant aid from their institution
AmtInst	Average amount of institutional grant aid awarded to full-time first-time undergraduate students
Totenrl	Total number of men and women (in thousands) enrolled for credit in the fall
SATMath	SAT Math 25th percentile score
Tuition	Total cost of in-state tuition and fees (in thousands of dollars)

Source: Integrated Postsecondary Education Data System (IPEDS)

Model

Generalized Least Squares (GLS) model

- Testing for both Fixed Effects (FE) & Random Effects (RE)
- Fixed effects would check if there are significant institutional differences (cross-sectional) that would explain variation in graduation rates
- Random effects would explain if there were changes over time that affected all schools in the sample similarly (time series)
- Ultimately we will use a Hausman Test to compare the two sets of results and determine which model better describes the data.

Empirical Model

$$\begin{aligned} \text{Graduation Rate} = & \beta_0 + \beta_1 (\text{AmtPell}) + \beta_2 (\text{AmtFed}) + \beta_3 (\text{AmtState}) \\ & \quad \quad \quad (-) \quad \quad \quad (-) \quad \quad \quad (+/-) \\ & + \beta_4 (\text{AmtLoan}) + \beta_5 (\text{AmtInst}) + \beta_6 (\text{PctAdmit}) + \beta_7 (\text{Hispanic}) + \beta_8 (\text{Black}) \\ & \quad \quad \quad (+) \quad \quad \quad (+) \quad \quad \quad (-) \quad \quad \quad (-) \quad \quad \quad (-) \\ & + \beta_9 (\text{TotEnrl}) + \beta_{10} (\text{SATMath}) + \beta_{11} (\text{Tuition}) + e \\ & \quad \quad \quad (+) \quad \quad \quad (+) \quad \quad \quad (+) \end{aligned}$$

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Region	492	4.671	2.183	1.000	8.000
PctAdmit	466	0.670	0.186	0.191	0.998
Hisp	492	0.125	0.137	0.010	0.610
Black	492	0.096	0.079	0.010	0.420
GradRate	492	0.476	0.132	0.120	0.830
PctLoan	492	0.495	0.193	0.050	0.870
AmtLoan	492	0.880	0.179	0.442	1.643
PctPell	492	0.416	0.144	0.110	0.840
AmtPell	492	0.670	0.174	0.320	1.113
PctFed	492	0.420	0.144	0.110	0.840
AmtFed	492	0.717	0.191	0.326	1.268
PctState	489	0.448	0.218	0.010	0.910
AmtState	492	0.459	0.202	0.000	1.318
PctInst	481	0.376	0.199	0.010	0.860
AmtInst	492	0.578	0.257	0.000	1.310
Totenrol	492	15.866	5.844	8.360	40.131
SATMath	375	466.240	45.387	350.000	600.000
Tuition	492	6.891	1.747	3.639	12.815

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
r1	492	0.037	0.188	0.000	1.000
r2	492	0.183	0.387	0.000	1.000
r3	492	0.134	0.341	0.000	1.000
r4	492	0.098	0.297	0.000	1.000
r5	492	0.256	0.437	0.000	1.000
r6	492	0.049	0.216	0.000	1.000
r7	492	0.049	0.216	0.000	1.000
r8	492	0.195	0.397	0.000	1.000

r1	New England:	CT, ME, MA, NH, RI, VT
r2	Mid East:	DE, DC, MD, NJ, NY, PA
r3	Great Lakes:	IL, IN, MI, OH, WI
r4	Plains:	IA, KS, MN, MO, NE, ND, SD
r5	Southeast:	AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV
r6	Southwest:	AZ, NM, OK, TX
r7	Rocky Mountains:	CO, ID, MT, UT, WY
r8	Far West	AK, CA, HI, NV, OR, WA

- **Region 5 has the most schools – 25% (1 in 4)**
- **Region 1 has the least with only 4%**

Correlations Matrix

	Region	PctAdmit	Hisp	Black	Gradrate	PctLoan	AmtLoan	PctPell	AmtPell	PctFed	AmtFed	PctState	AmtState	PctInst	AmtInst	Totenol	SATMath	Tuition	r1	r2	r3	r4	r5	r6	r7	r8	
Region	1																										
PctAdmit	0.083	1																									
Hisp	0.306	-0.432	1																								
Black	-0.411	-0.235	0.250	1																							
Gradrate	-0.072	-0.179	-0.237	-0.375	1																						
PctLoan	-0.067	0.521	-0.594	-0.207	0.011	1																					
AmtLoan	0.029	-0.053	-0.102	-0.049	-0.158	-0.032	1																				
PctPell	0.053	-0.152	0.648	0.505	-0.626	-0.394	-0.082	1																			
AmtPell	0.189	-0.371	0.489	0.172	-0.341	-0.682	0.497	0.508	1																		
PctFed	0.051	-0.146	0.644	0.507	-0.625	-0.383	-0.086	0.998	0.504	1																	
AmtFed	0.203	-0.339	0.417	0.109	-0.275	-0.628	0.513	0.396	0.965	0.391	1																
PctState	-0.178	-0.150	0.139	0.343	-0.365	-0.288	-0.004	0.541	0.338	0.533	0.272	1															
AmtState	0.056	-0.167	0.114	0.262	-0.108	-0.336	0.119	0.160	0.345	0.169	0.309	0.073	1														
PctInst	0.363	0.274	-0.097	-0.272	0.008	0.432	-0.157	0.016	-0.220	0.024	-0.205	-0.081	-0.304	1													
AmtInst	0.233	-0.210	0.374	0.094	-0.213	-0.567	0.014	0.448	0.559	0.441	0.512	0.333	0.170	-0.143	1												
Totenol	0.301	-0.238	0.389	-0.193	0.168	-0.362	-0.061	0.136	0.242	0.129	0.227	-0.033	-0.190	-0.070	0.352	1											
SATMath	-0.254	-0.368	-0.291	-0.190	0.663	-0.283	-0.045	-0.536	-0.104	-0.542	-0.080	-0.091	0.110	-0.306	-0.090	0.042	1										
Tuition	-0.235	0.249	-0.292	-0.015	0.319	0.513	-0.592	-0.342	-0.905	-0.338	-0.887	-0.213	-0.300	0.181	-0.470	-0.169	0.093	1									
r1	-0.378	0.036	-0.093	0.052	0.034	0.232	-0.012	-0.138	-0.193	-0.140	-0.172	-0.050	-0.202	0.033	-0.205	-0.163	-0.098	0.145	1								
r2	-0.611	-0.464	0.224	0.508	0.087	-0.422	-0.061	0.256	0.173	0.256	0.130	0.223	0.197	-0.517	0.066	0.028	0.256	0.004	-0.114	1							
r3	-0.227	0.252	-0.212	-0.109	-0.092	0.232	-0.063	-0.091	-0.208	-0.094	-0.181	-0.242	-0.132	-0.034	-0.199	-0.047	-0.051	0.132	-0.066	-0.144	1						
r4	-0.097	0.266	-0.232	-0.199	0.112	0.199	-0.093	-0.185	-0.214	-0.177	-0.185	-0.118	-0.301	0.234	-0.193	-0.067	0.039	0.191	-0.063	-0.139	-0.080	1					
r5	0.054	0.192	-0.438	-0.056	0.018	0.202	0.121	-0.154	-0.069	-0.153	-0.072	0.337	0.090	0.129	0.105	-0.250	0.134	-0.010	-0.146	-0.320	-0.184	-0.177	1				
r6	0.104	-0.028	0.038	0.238	-0.179	0.084	0.222	0.022	0.058	0.031	0.011	-0.098	0.254	0.016	-0.103	-0.110	-0.096	-0.064	-0.046	-0.100	-0.058	-0.055	-0.128	1			
r7	0.176	0.057	0.022	-0.113	-0.231	-0.021	0.150	-0.082	0.058	-0.086	0.045	-0.160	-0.171	-0.102	-0.125	0.029	-0.008	-0.134	-0.042	-0.092	-0.053	-0.051	-0.118	-0.037	1		
r8	0.784	-0.116	0.547	-0.314	0.050	-0.230	-0.133	0.185	0.217	0.181	0.242	-0.208	0.043	0.246	0.269	0.429	-0.278	-0.179	-0.128	-0.282	-0.163	-0.156	-0.361	-0.113	-0.104	1	

Amount of Funding as Percent of Tuition - RE

Dependent Variable: 6-Year Graduation Rate						
Independent Variables	(1) All Amts	(2) AmtPell	(3) AmtFed	(4) AmtState	(5) AmtLoan	(6) AmtInst
AmtPell	-0.0255	-0.00414				
	-0.0771	-0.0441				
AmtFed	0.0303		0.0195			
	-0.0525		-0.0302			
AmtState	-0.0387*			-0.0453**		
	-0.0214			-0.0208		
AmtLoan	0.027				0.0384*	
	-0.0223				-0.0205	
AmtInst	-0.0391**					-0.0475***
	-0.0186					-0.0176
PctAdmit	0.0331	0.0385*	0.0367*	0.0445**	0.0347*	0.0361*
	-0.0206	-0.0205	-0.0205	-0.02	-0.0201	-0.0199
Hisp	-0.0973	-0.111*	-0.0972	-0.103	-0.0823	-0.108*
	-0.0651	-0.0647	-0.0661	-0.0653	-0.066	-0.065
Black	-0.311***	-0.319***	-0.312***	-0.297***	-0.304***	-0.296***
	-0.107	-0.108	-0.107	-0.107	-0.107	-0.106
Totenrl	0.00553***	0.00598***	0.00614***	0.00561***	0.00589***	0.00624***
	-0.00148	-0.00146	-0.00149	-0.00151	-0.00149	-0.00148
SATMath	0.000380***	0.000344***	0.000333***	0.000351***	0.000350***	0.000286**
	-0.000121	-0.000119	-0.000117	-0.000117	-0.000118	-0.000116
Tuition	0.0173***	0.0160***	0.0188***	0.0147***	0.0188***	0.0141***
	-0.00486	-0.00452	-0.00481	-0.00249	-0.00282	-0.00251
Constant	0.139	0.144	0.11	0.166**	0.0849	0.210***
	-0.0953	-0.0921	-0.0876	-0.0694	-0.0768	-0.0723
Observations	375	375	375	375	375	375
Overall R squared	0.5153	0.48	0.4679	0.4648	0.4816	0.4735
Number of unitid	69	69	69	69	69	69

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Amount of Funding as Percent of Tuition - RE

Dependent Variable: 6-Year Graduation Rate						
Independent Variables	(1) All Amt	(2) AmtPell	(3) AmtFed	(4) AmtState	(5) AmtLoan	(6) AmtInst
r1	0.0199	0.0372	0.0364	0.031	0.0349	0.0253
	-0.0475	-0.048	-0.0496	-0.0505	-0.0502	-0.0503
r2	0.0392	0.0414	0.0361	0.0439	0.0368	0.0338
	-0.0307	-0.031	-0.0319	-0.0321	-0.0319	-0.0318
r3	-0.0817**	-0.0725**	-0.0728*	-0.0757**	-0.0702*	-0.0816**
	-0.0361	-0.0365	-0.0376	-0.0382	-0.0381	-0.0382
r4	-0.00625	0.0074	0.00761	0.0014	0.00975	0.000293
	-0.0389	-0.0393	-0.0405	-0.0413	-0.041	-0.0411
r5	-	-	-	-	-	-
r6	-0.0728	-0.0735	-0.0765	-0.0638	-0.0825	-0.0889*
	-0.0499	-0.0501	-0.0516	-0.0528	-0.0523	-0.0523
r7	-0.161***	-0.145**	-0.145**	-0.153**	-0.148**	-0.159***
	-0.0576	-0.0582	-0.0601	-0.0611	-0.0608	-0.0609
r8	0.00246	-0.000849	-0.00586	0.000444	-0.00301	-0.00406
	-0.0315	-0.0318	-0.0326	-0.0329	-0.0327	-0.0326
Constant	0.139	0.144	0.11	0.166**	0.0849	0.210***
	-0.0953	-0.0921	-0.0876	-0.0694	-0.0768	-0.0723
Observations	375	375	375	375	375	375
Overall R squared	0.5153	0.48	0.4679	0.4648	0.4816	0.4735
Number of unitid	69	69	69	69	69	69

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Amount of Funding as Percent of Tuition - FE

Dependent Variable: 6-Year Graduation Rate						
Independent Variables	(1) All Amts	(2) AmtPell	(3) AmtFed	(4) AmtState	(5) AmtLoan	(6) AmtInst
AmtPell	-0.00182 -0.0755	-0.00992 -0.0421				
AmtFed	0.0101 -0.0524		0.00922 -0.0293			
AmtState	-0.0440** -0.0203			-0.0483** -0.0199		
AmtLoan	0.00833 -0.0207				0.0186 -0.0194	
AmtInst	-0.0372** -0.018					-0.0427** -0.0173
PctAdmit	0.0448** -0.0196	0.0455** -0.0196	0.0431** -0.0197	0.0498*** -0.0191	0.0418** -0.0193	0.0424** -0.019
Hisp	0.108 -0.0909	0.127 -0.0916	0.136 -0.0908	0.116 -0.0888	0.139 -0.0897	0.111 -0.0889
Black	0.00876 -0.126	0.0169 -0.125	0.0132 -0.123	0.0172 -0.122	0.00682 -0.123	0.00626 -0.122
TotEnrol	0.00708*** -0.00216	0.00809*** -0.00213	0.00821*** -0.00214	0.00746*** -0.00212	0.00788*** -0.00213	0.00764*** -0.00211
SATMath	9.81E-05 -0.000121	7.47E-05 -0.000119	8.52E-05 -0.000118	0.000117 -0.000116	9.66E-05 -0.000118	4.82E-05 -0.000116
Tuition	0.00970** -0.00488	0.00920** -0.00434	0.0112** -0.00489	0.00883*** -0.00286	0.0114*** -0.00321	0.00870*** -0.00287
Constant	0.252** -0.0979	0.222** -0.0945	0.189** -0.0922	0.230*** -0.0706	0.179** -0.0765	0.270*** -0.0744
Observations	375	375	375	375	375	375
Overall R-squared	0.0527	0.0278	0.0278	0.0377	0.0325	0.0376
Number of unitid	69	69	69	69	69	69

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key Findings

- Higher student loans → Higher graduation rates
- Higher institutional grants → Lower graduation rates
- Pell Grant and Federal Grants → Statistically insignificant
 - Change with more years in the sample?

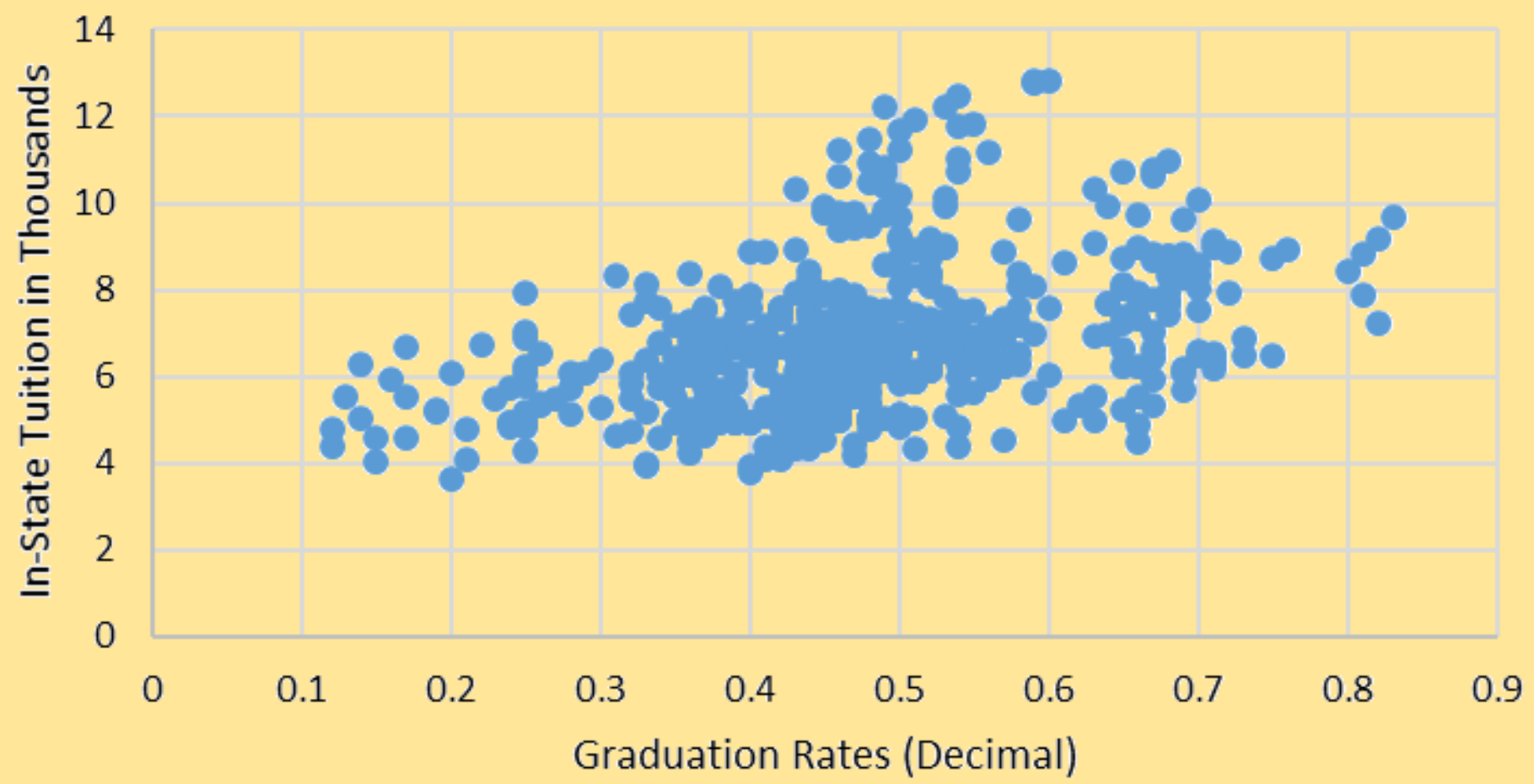
Future Research

- Sampling more years
- Observing changes in graduation rates
 - Lag
- Remove heterogeneity – Grouping by size or degree granting categories
- Considering retention rate – dependent variable

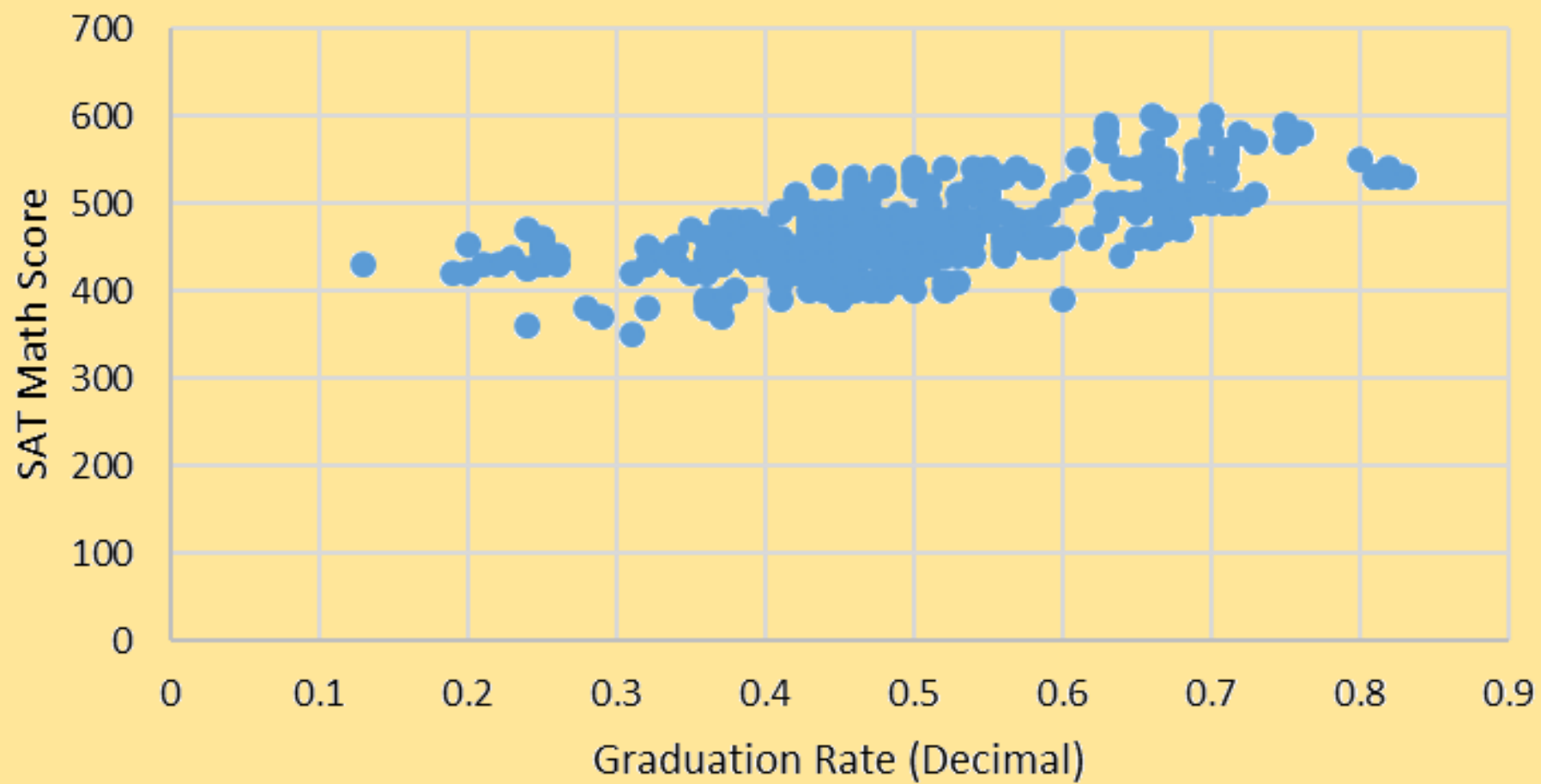
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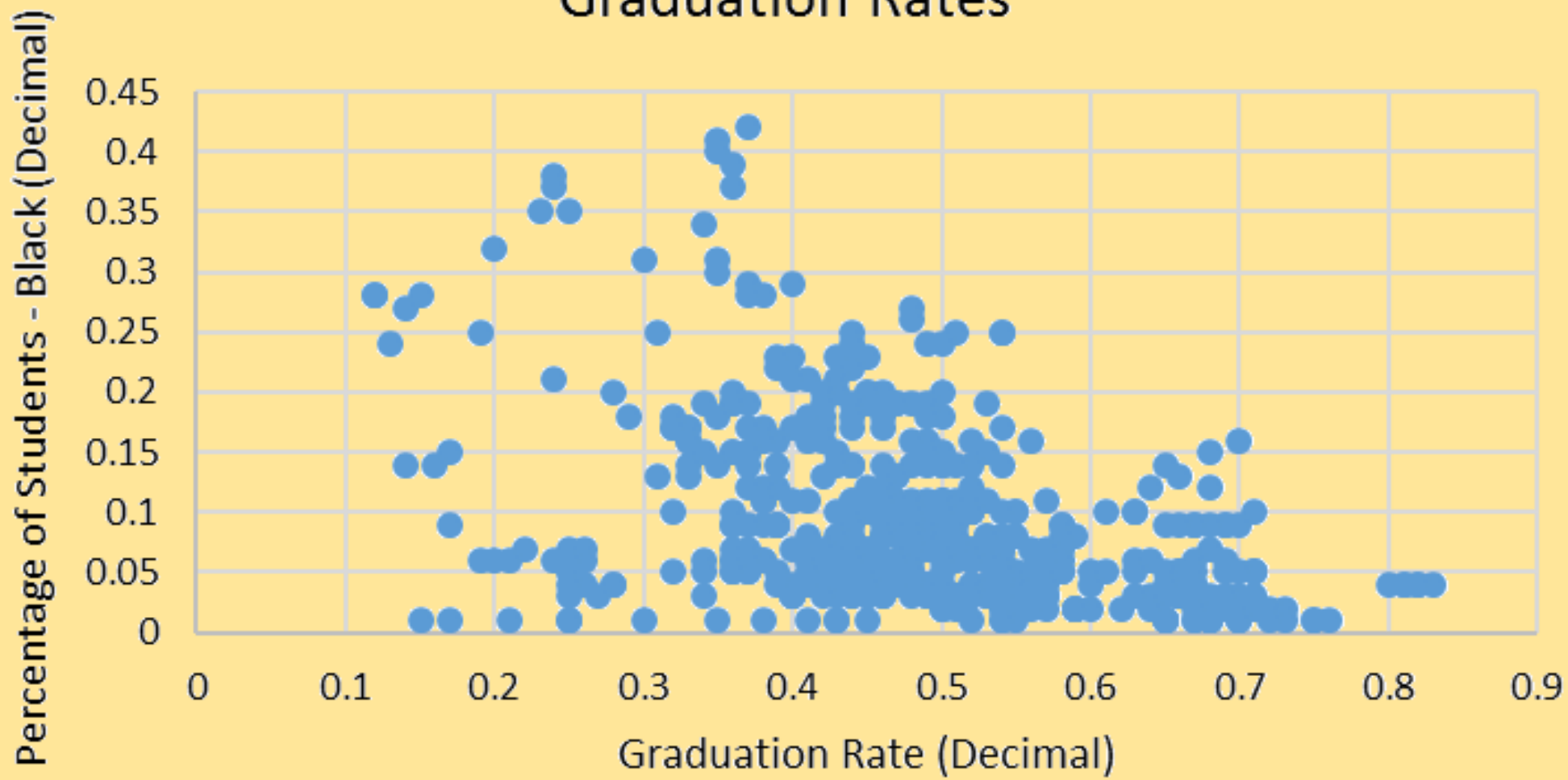
Tuition Cost and Graduation Rates



SAT Math Scores and Graduation Rates



Percentage of Student Population Black and Graduation Rates



Percentage of Applicants Admitted and Graduation Rates

