Price Regulation, Price Discrimination, and Equality of Opportunity in Higher Education: Evidence from Texas

BY *Rodney J. Andrews and Kevin M. Stange**

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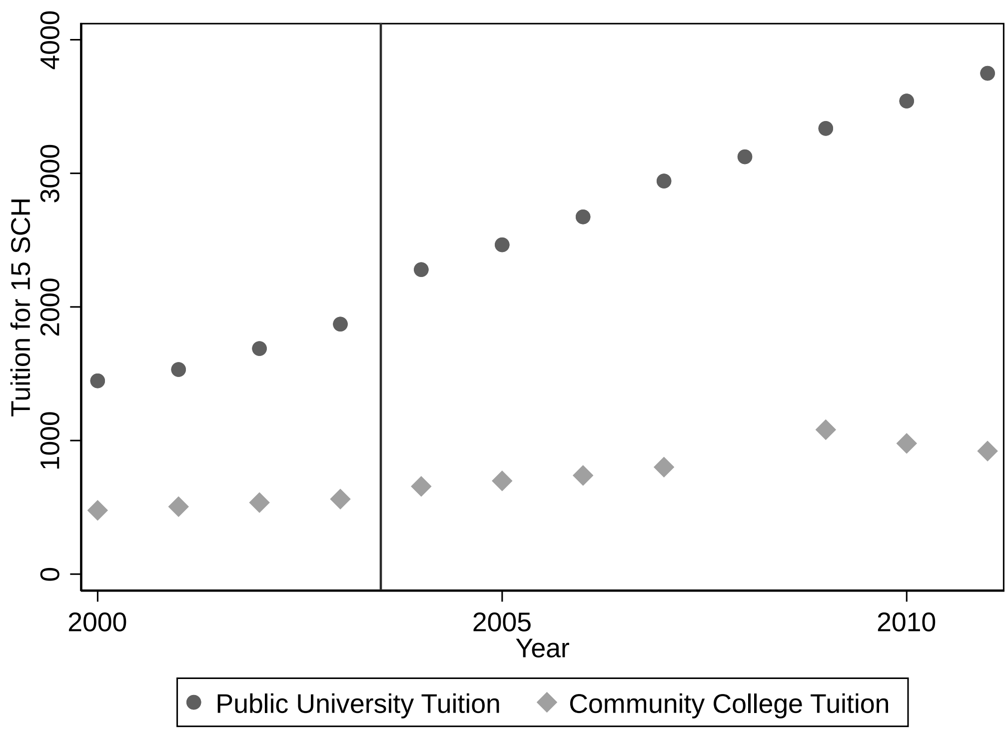
Online Appendix Materials

APPENDIX A. Additional Figures and Tables

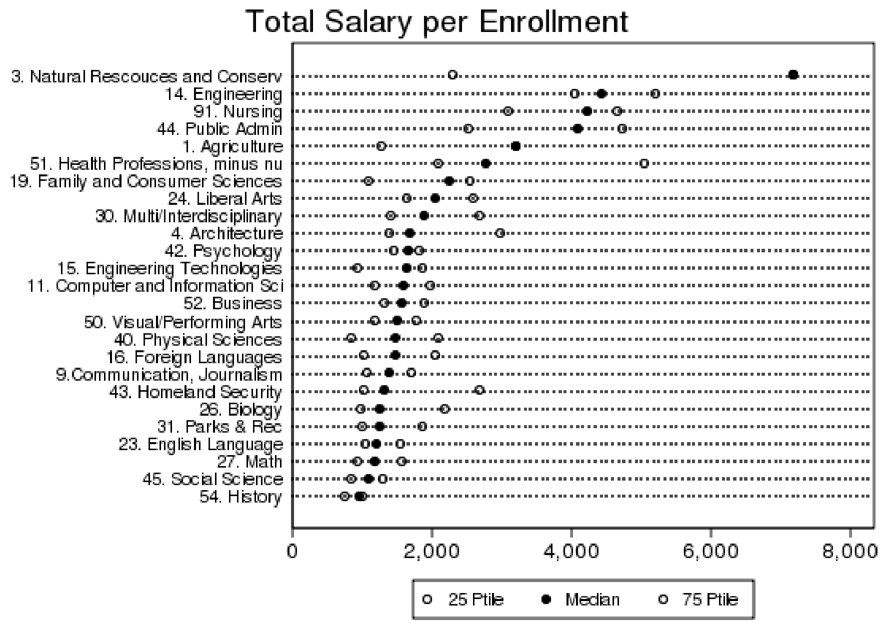
Figure A1. Tuition In Public 4-year and 2-year Colleges in Texas

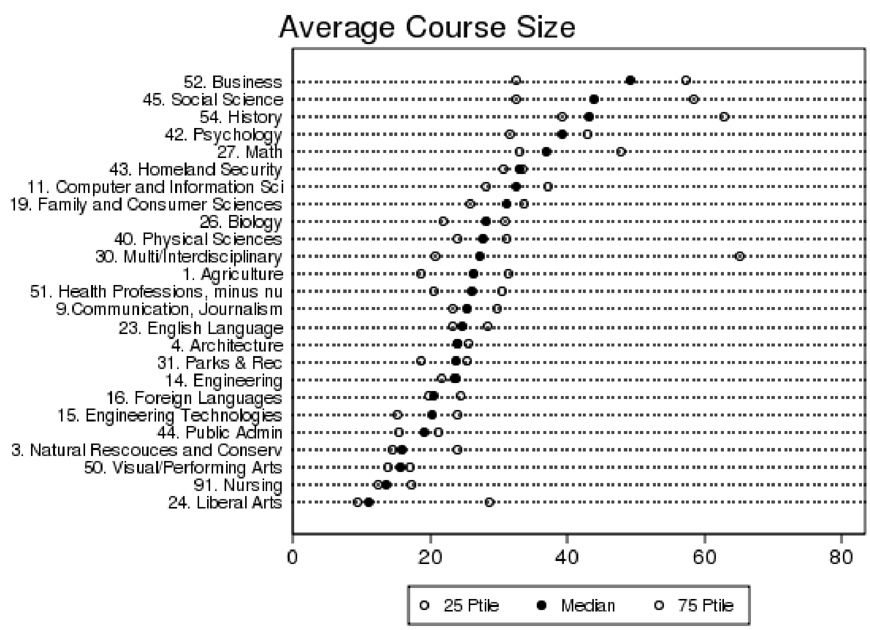
Fall Semester, In-state/district students, 15 Student Credit Hours



Notes: Public University sample includes approximately 640 programs observed each year. Sticker price was obtained from course catalogs and archival sources and captured separately for each identifiable program (with a distinct tuition or fee), residency status, undergraduate level, academic year, entering cohort, and number of credit hours. Community College sample includes average institution-level price for all community colleges in Texas. Tuition rates not available for 2008.

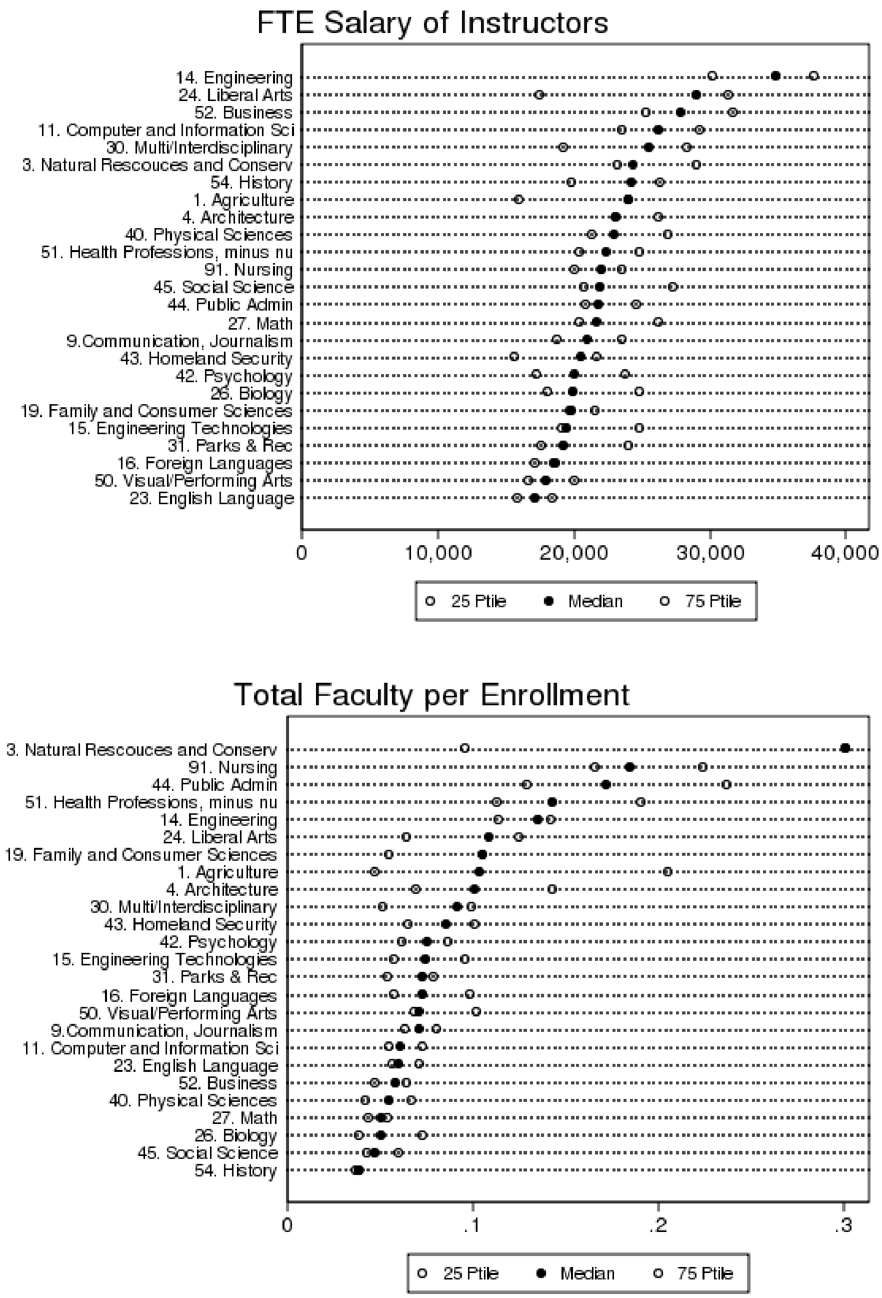
Figure A2. Resource Differences by Field, 2000





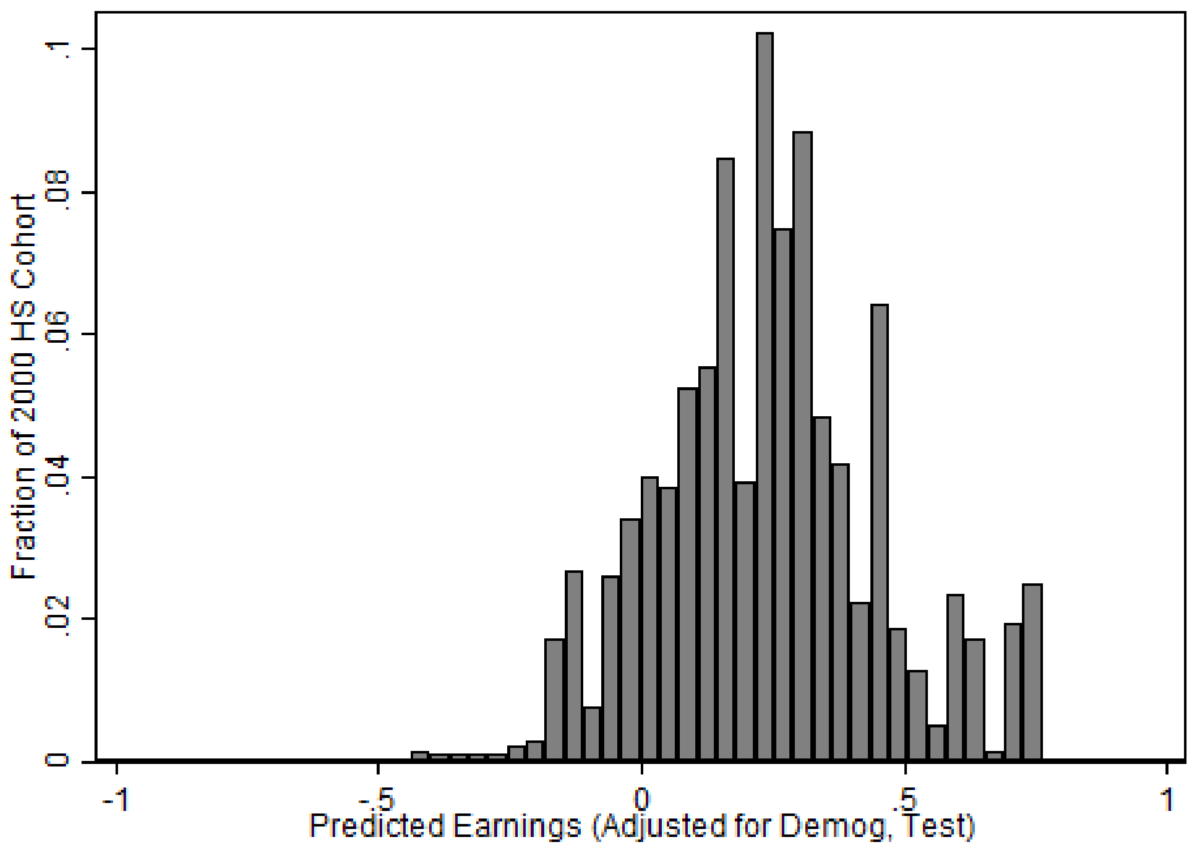
Notes: Excludes fields with fewer than 10 programs. Full sample includes 641 programs.

Figure A3. Resource Differences by Field, 2000



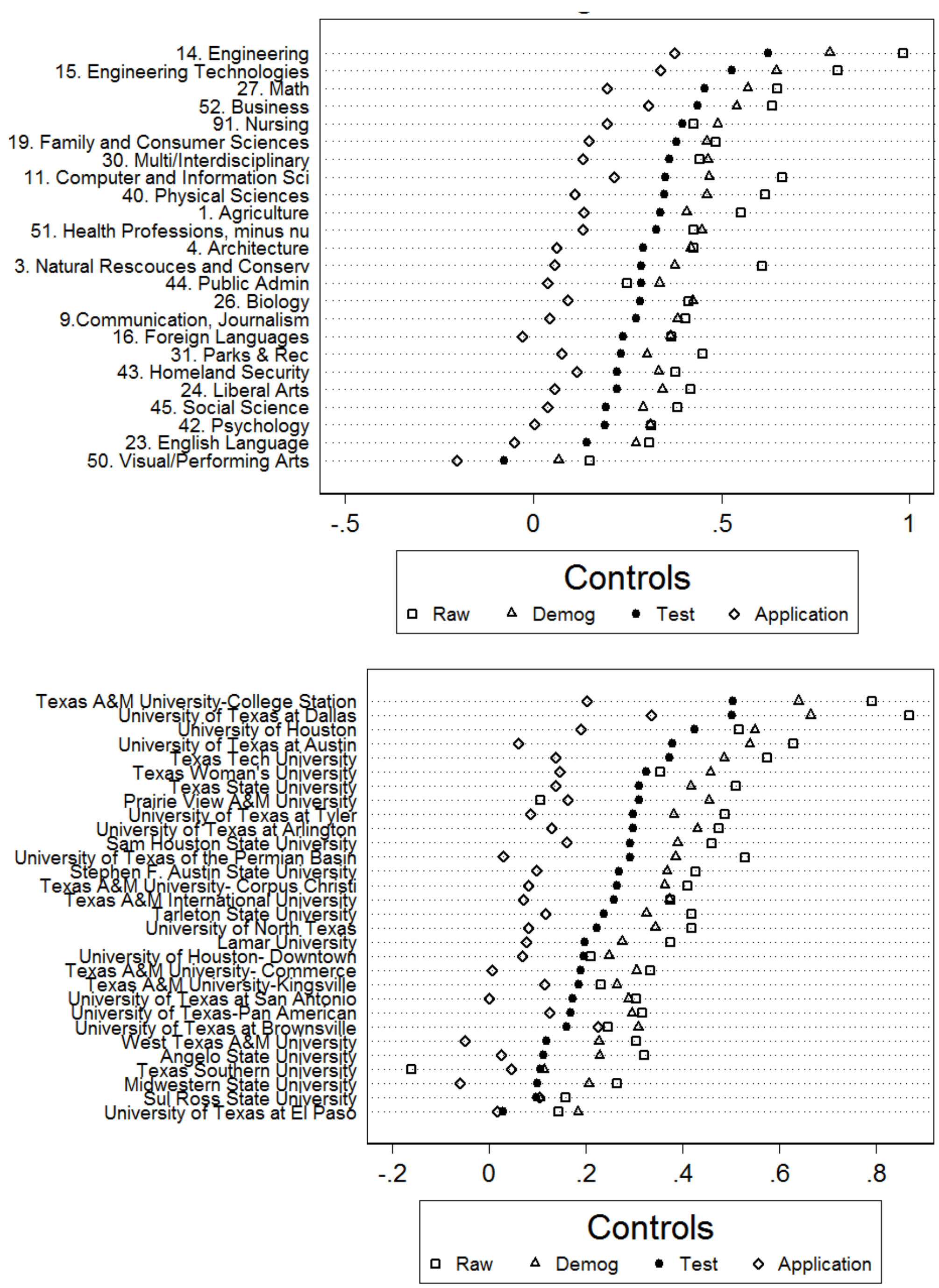
Notes: Excludes fields with fewer than 10 programs. Sample includes 641 programs.

Figure A4. Distribution of Predicted Program Earnings, 2000



Notes: Full sample includes 643 programs, though this distribution omits 68 programs that have fewer than five students enrolled from the 2000 cohort. Programs weighted by number of enrollees from 2000 high school cohort. Program-level predicted earnings control for poor, demographic controls, and standardized achievement test scores. Earnings premium is in reference to high school graduates who did not attend a Texas public university.

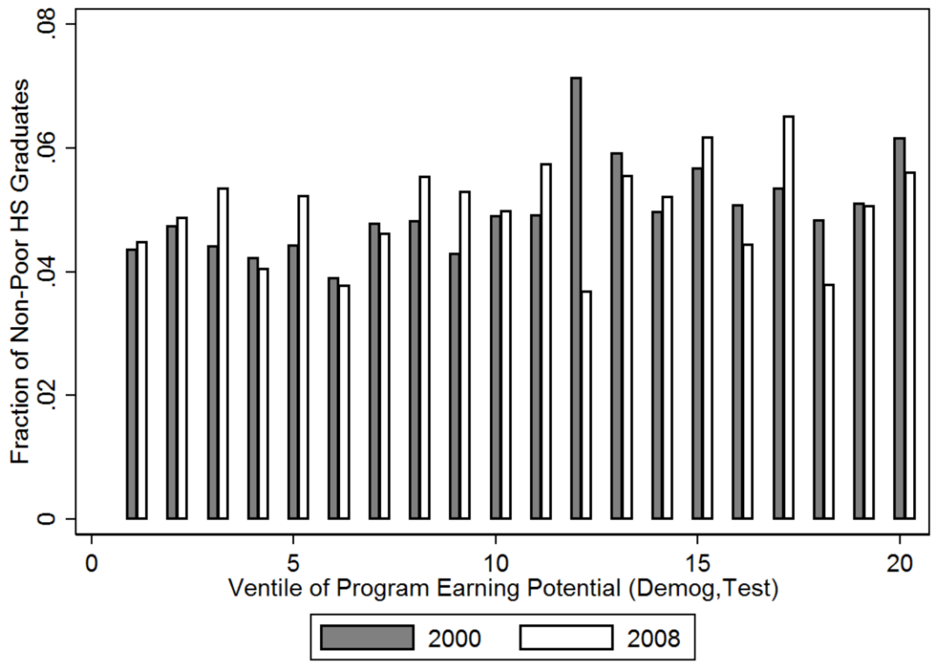
Figure A5. Earnings Differences by Field and Institution, Robustness to Controls



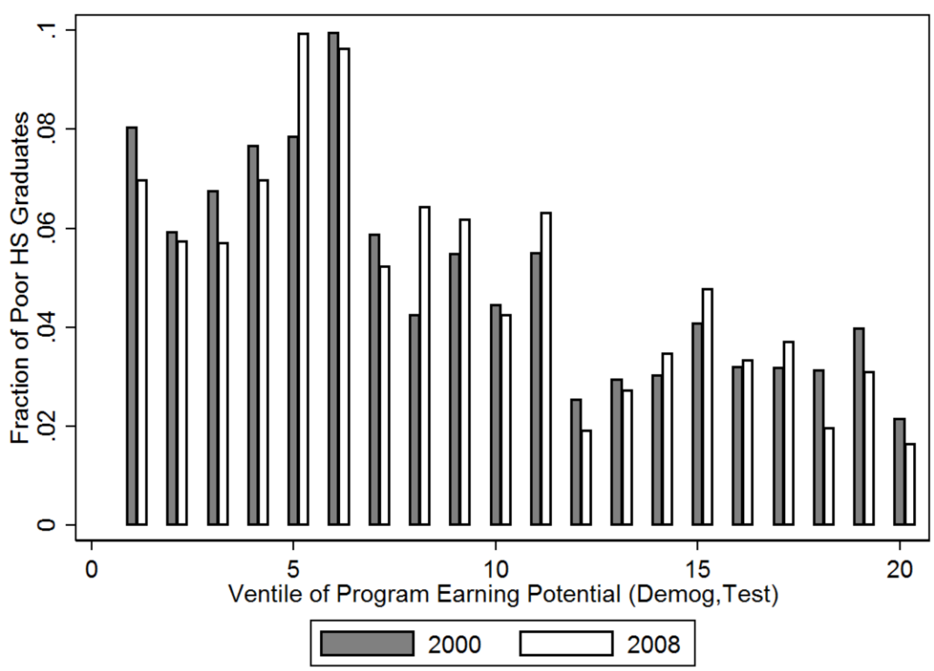
Notes: Full sample includes 643 programs, though this graph omits 68 programs that have fewer than five students enrolled from the 2000 cohort and also does not display any fields or institutions with fewer than 10 observations. Programs weighted by number of enrollees from 2000 cohort when computing 50th percentile.

FigureA6. Distribution of Students Across Programs, 2000 and 2008 Cohorts

Panel A. Non-Poor Students

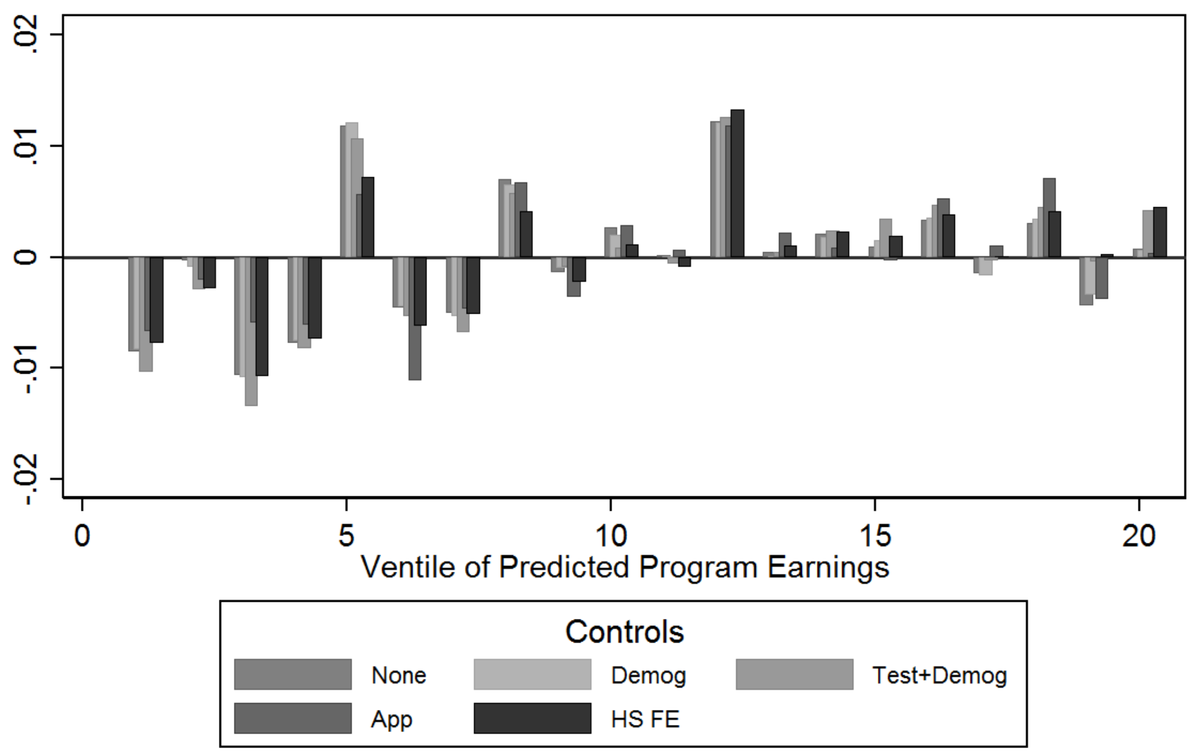


Panel B. Poor Students



Notes: Ventile of program earnings estimated via equation (1), controlling for poor, demographic controls, and standardized achievement test scores. Sample includes all 2000 graduates from Texas public high schools that enrolled in a Texas public university within two years of high school graduation.

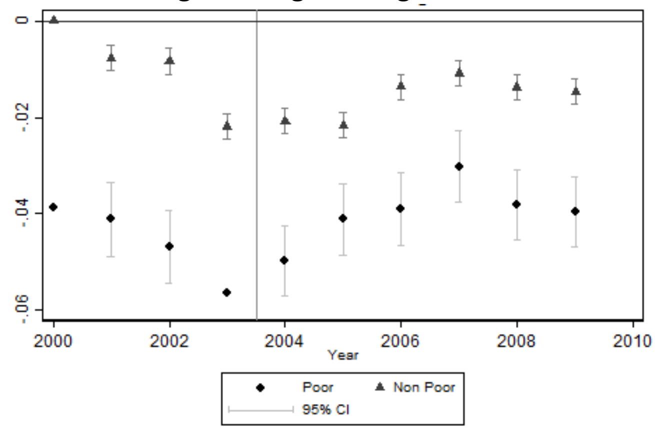
FigureA7. Change in Enrollment of Poor and Non-Poor Students Across Programs, Robustness



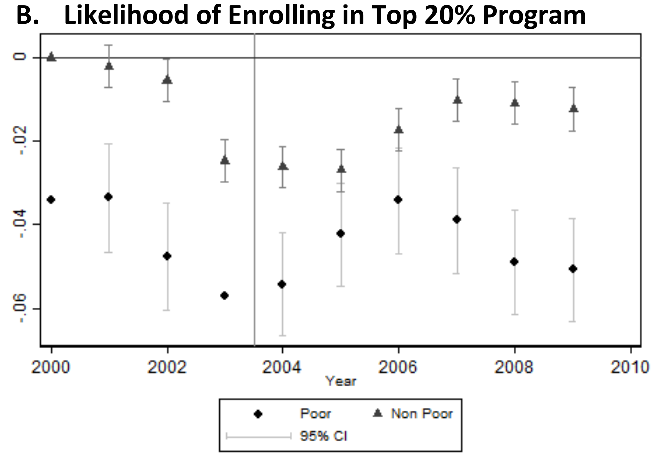
Notes: Estimates in figure come from one hundred separate regressions of indicators for enrolling in a program in each ventile on a dummy for *Poor*, *Post* X *Poor*, *Time* (linearly), *Post*, and the stated controls (if applicable), as described in equation (2). Bars plot the coefficients on the *Post* X *Poor* interaction. "None" is our specification which includes no controls. "Demog" is our specification which includes controls for student race, ethnicity, sex, and limited English proficiency. "Test+Demog" is our preferred specification, which controls for student race, ethnicity, sex, limited English proficiency, and standardized math test scores. "App" specification includes 33 indicators for whether the student applied to each university and 33 indicators for whether the student was accepted to each university, on top of controls from the base model. "HS FE" specification includes high school fixed effects on top of the controls from the preferred model.

Figure A8. Event-Study Estimates in Levels

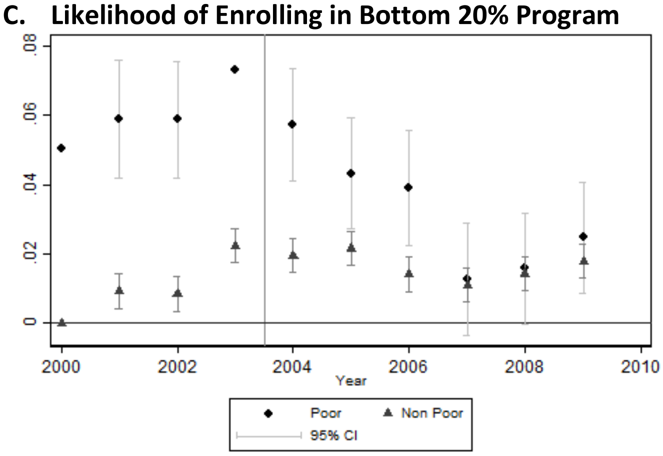
A. Average Earnings of Program Enrolled in



B. Likelihood of Enrolling in Top 20% Program

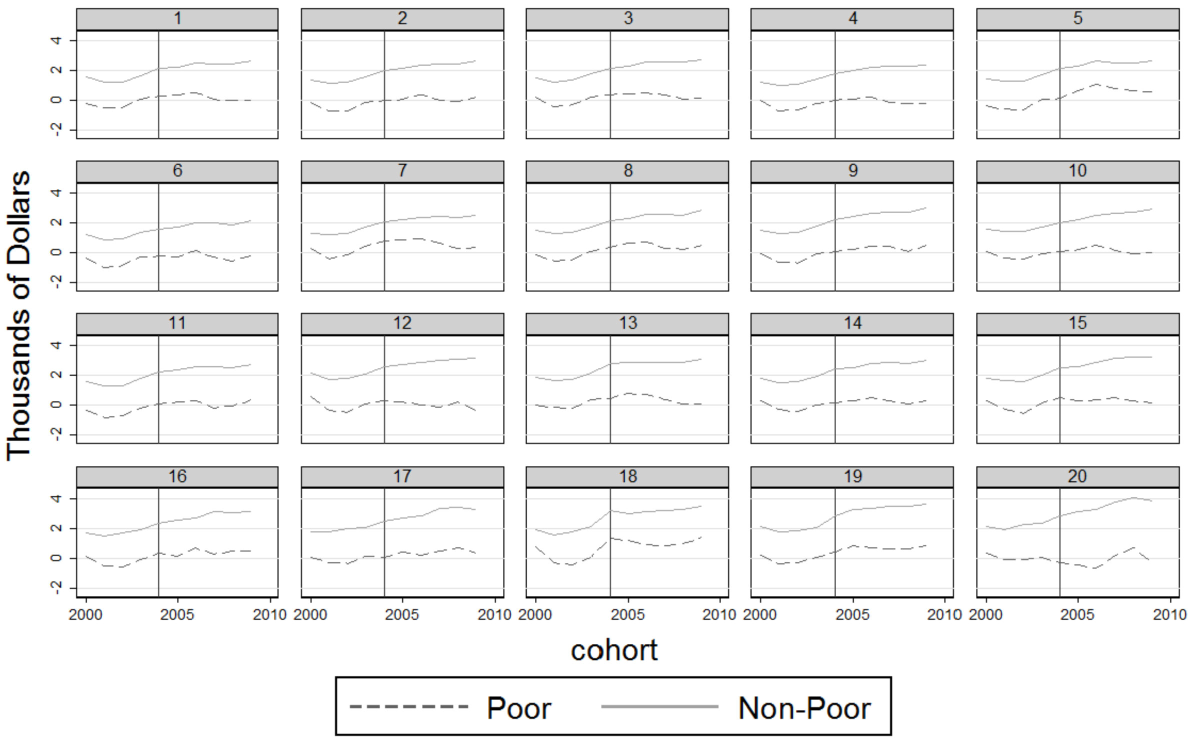


C. Likelihood of Enrolling in Bottom 20% Program



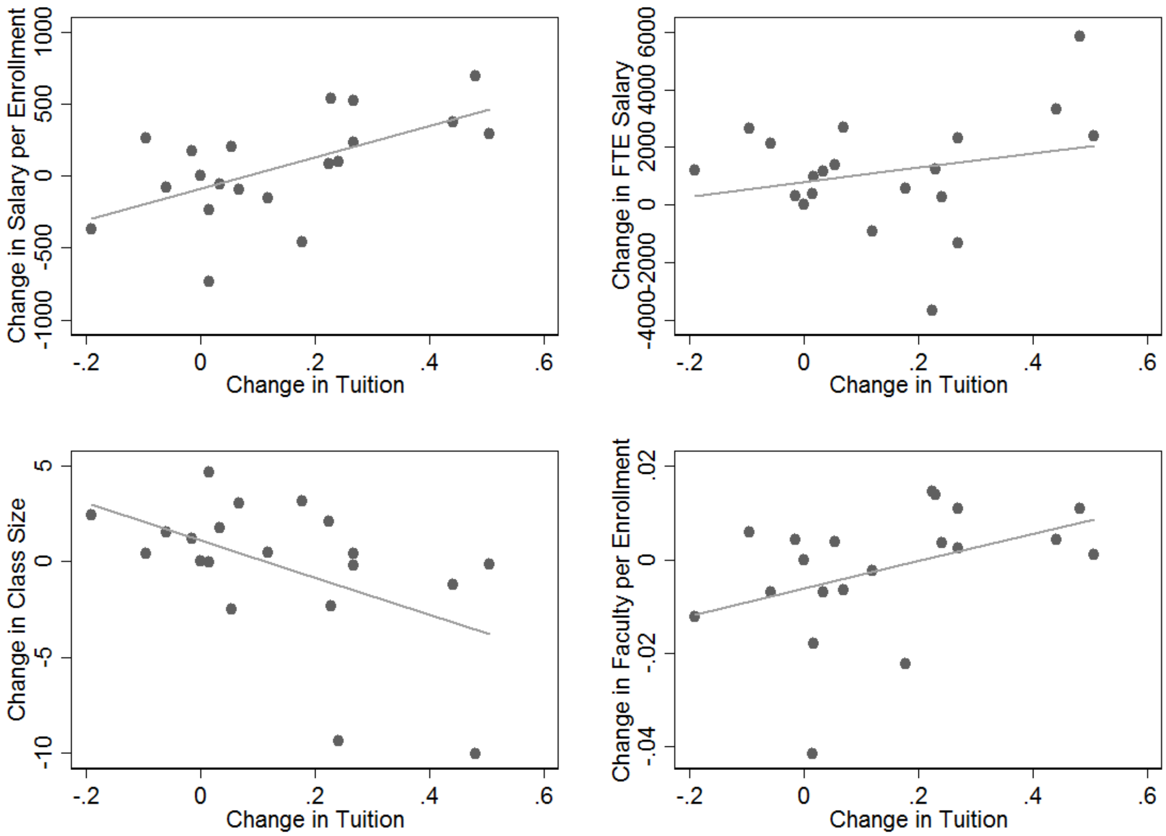
Notes: Model includes a full set of year fixed effects, a dummy for poor interacted with year effects, race/ethnic indicators, indicator for limited English, and scaled reading and math scores. Figures plot the year fixed effects (non-poor group) and the year fixed effects plus the poor-year interactions (poor group). The year 2003 fixed effect is omitted and serves as the reference category. Outcomes are predicted earnings of the university program the student first enrolled (Panel A) and indicators for this program being in the top (Panel B) or bottom (Panel C) 20% of predicted student earnings. Standard errors are clustered by high school cohort.

Figure A9. Net Tuition Over Time, Separately by Program Earnings Ventile



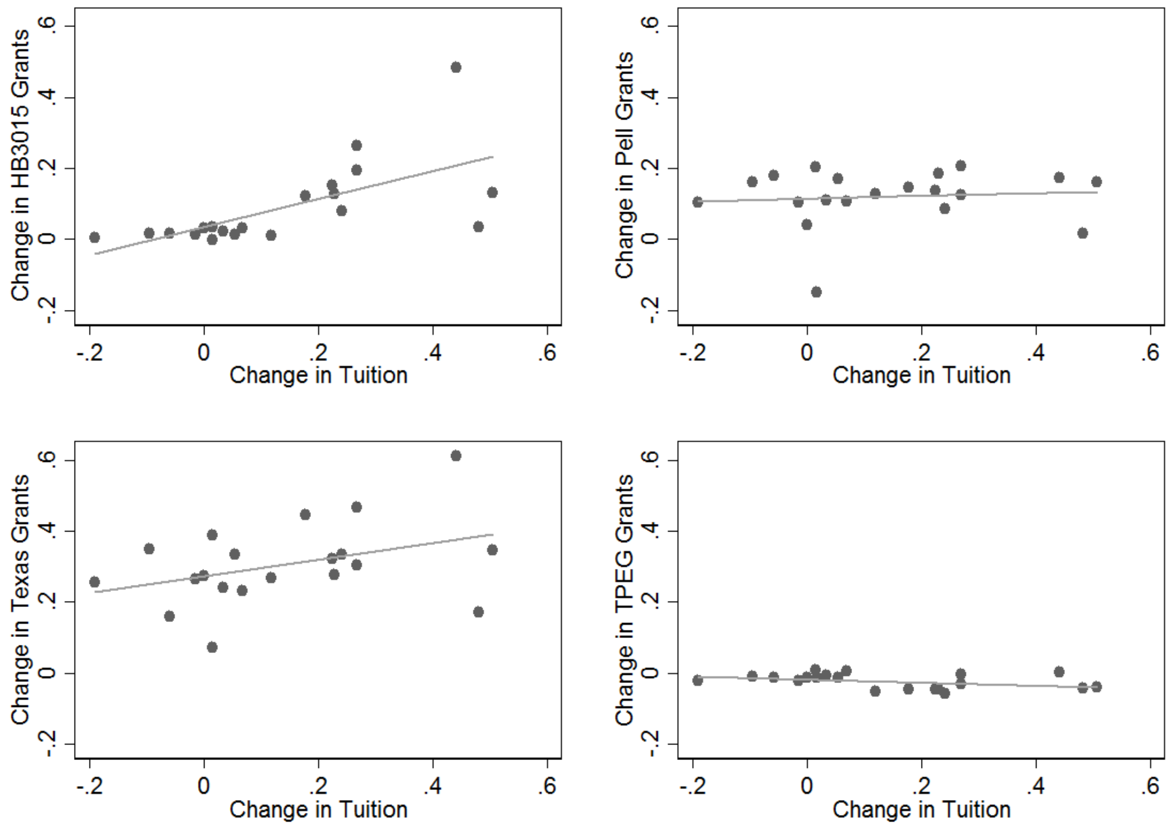
Notes: Graph plots student-level averages of tuition minus need-based grant aid in the Fall for programs in each ventile, separately for poor and non-poor students. Grant aid does not include merit, categorical, or other institutional aid that does not require a needs analysis.

Figure A10. Resource Changes vs. Tuition Changes



Notes: Each dot represents an estimate of the change in two outcomes for a single ventile.

Figure A11. Grant Aid Changes vs. Tuition Changes



Notes: Each dot represents an estimate of the change in two outcomes for a single ventile.

Table A1. TEXAS Grant Program Characteristics Over time

Panel A. Eligibility, Aggregate Numer of Recipients and Amounts, by Program Year

FY	Initial Yr. EFC Max. for Priority	# of Recipients (new and continuing)	Max. Award Amount	Average Award Amounts Disbursed	Amount Disbursed
2000	$5,000	6,108	Actual T&F	$2,315	$14,160,014
2001	$5,000	9,780	Actual T&F	$2,529	$24,820,124
2002	$5,000	26,982	$2,688	$2,685	$72,798,233
2003	$8,500	42,713	$2,950	$2,827	$121,341,457
2004	$8,500	40,379	$3,140	$2,879	$116,628,000
2005	$4,000	38,947	$3,590	$3,301	$128,814,417
2006	$4,000	38,823	$4,180	$3,815	$148,340,997
2007	$4,000	34,523	$4,750	$4,261	$147,309,274
2008	$4,000	35,633	$5,170	$4,737	$169,063,824
2009	$4,000	39,686	$5,280	$4,864	$193,445,513
2010	$4,000	41,828	$6,080	$5,546	$232,419,667
2011	$4,000	48,474	$6,780	$6,182	$300,349,881
2012	$4,000	53,335	$7,100	$4,770	$254,936,425
2013	$4,000	55,880	$7,400	$4,676	$261,915,170

Panel B. Participation and EFC Distribution in Analysis Sample, by Cohort

	EFC Distribution among TEXAS Grant Recipients				
Entering cohort	EFC=0	EFC 1 to 2000	EFC 2001 to 4000	EFC 4001 to 6000	EFC >= 6001
2000	38%	35%	18%	7%	3%
2001	29%	26%	18%	12%	15%
2002	29%	25%	16%	12%	17%
2003	35%	29%	17%	10%	9%
2004	42%	38%	19%	1%	0%
2005	40%	38%	20%	1%	0%
2006	47%	34%	19%	1%	0%
2007	48%	28%	18%	4%	2%
2008	46%	29%	19%	3%	2%
2009	62%	20%	16%	1%	1%

Notes: Top panel refer to fiscal year and include amounts for initial and continuing grant recipients. Dollar amounts are in nominal terms. Source: Texas Grant Report to Legislature June 2016. Author's analysis of Financial Aid Data.

Table A2. Summary Stats of Program-Level Panel Data

	All programs and years		All programs, 2009		Low-price program, 2009		High-price program, 2009	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Semester price ($2012, 1000s)	2.853	0.793	3.691	0.583	2.923	0.176	3.945	0.427
Total ugrad enrollments	4,790	5,080	5,300	5,468	1,822	1,741	6,411	5,782
Lower level	1,773	1,970	1,907	2,024	676	764	2,301	2,142
Upper level	2,937	3,645	3,285	3,991	1,068	1,329	3,993	4,290
Number of faculty per ugrad enrollment (/5)	0.101	0.471	0.091	0.059	0.094	0.070	0.090	0.055
New hires per ugrad enrollment (/5)	0.004	0.049	0.004	0.006	0.005	0.008	0.004	0.006
Total faculty salary per ugrad enrollment (/5)	2,989	14,645	2,814	1,999	2,375	2,118	2,948	1,945
Number of courses per enrollment (/5)	0.094	0.138	0.089	0.144	0.137	0.274	0.074	0.051
Number of sections per enrollment (/5)	0.220	0.184	0.221	0.223	0.265	0.405	0.206	0.112
FTE salary overall	30,586	9,509	31,817	11,110	26,609	7,917	33,394	11,460
Professor FTE salary	45,201	12,677	53,330	15,627	43,915	15,093	55,651	14,881
Assoc Prof FTE salary	34,012	9,042	39,675	12,102	34,573	6,188	41,140	12,969
Assist Prof FTE salary	30,673	10,087	35,655	11,090	31,239	7,437	36,813	11,597
New hire FTE salary	31,266	13,449	33,528	12,051	29,594	9,566	34,376	12,375
Average class size	30.18	15.17	29.68	14.54	25.17	11.09	31.12	15.21
Predicted program earnings (raw)	0.303	0.278	0.303	0.278	0.122	0.197	0.361	0.276
Predicted program earnings (controls)	0.252	0.217	0.252	0.217	0.116	0.175	0.296	0.211
Number of unique programs	641		641		295		346	
Number of observations	6410		641		295		346	

Notes: Sample statisitcs weighted by number of students enrolled in program from the class of 2000. Many characteristics will have fewer observations due to missing data.

Table A3. Earnings Estimates for Specific Programs, 2000 High School Graduates

Adjusting for demographics and test scores				**Adjusting for demographics, test scores, application/admissions behavior**			
Top 10		Log earnings premium	Number of students	Top 10		Log earnings premium	Number of students
UT Austin	52. Business	0.76	631	Texas A&M Galveston	14. Engineering	0.62	30
Texas A&M	52. Business	0.74	703	Texas A&M	92. Economics	0.56	41
Texas A&M Galveston	14. Engineering	0.72	30	UT Austin	52. Business	0.51	631
Texas A&M	15. Engineering Technologies	0.71	64	Texas A&M	52. Business	0.47	703
Texas A&M	14. Engineering	0.71	901	Texas A&M	14. Engineering	0.45	901
Texas A&M	92. Economics	0.70	41	UH Clear Lake	52. Business	0.44	35
Texas Tech University	15. Engineering Technologies	0.67	36	Texas Tech University	15. Engineering Technologies	0.44	36
UH Clear Lake	52. Business	0.67	35	Lamar University	14. Engineering	0.42	121
Sam Houston State	15. Engineering Technologies	0.65	26	Texas A&M	15. Engineering Technologies	0.39	64
UT Austin	14. Engineering	0.63	885	Texas A&M University Corpus Christi	15. Engineering Technologies	0.39	39
U Houston	14. Engineering	0.62	292	UT Dallas	52. Business	0.37	163
Bottom 10				Bottom 10			
Texas A&M University Kingsville	42. Psychology	-0.18	35	Texas A&M University Commerce	45. Social Science	-0.34	26
Midwestern State University	50. Visual/Performing Arts	-0.18	48	Texas Tech University	50. Visual/Performing Arts	-0.36	148
Tarleton State University	23. English Language	-0.19	31	Texas Woman's University	50. Visual/Performing Arts	-0.37	42
West Texas A&M University	50. Visual/Performing Arts	-0.21	81	U Houston	23. English Language	-0.38	59
Midwestern State University	45. Social Science	-0.22	35	UT Austin	50. Visual/Performing Arts	-0.40	206
Lamar University	45. Social Science	-0.22	29	UT El Paso	45. Social Science	-0.40	28
UT El Paso	45. Social Science	-0.26	28	Texas Southern University	50. Visual/Performing Arts	-0.42	33
Prairie View A&M University	50. Visual/Performing Arts	-0.32	30	Prairie View A&M University	50. Visual/Performing Arts	-0.46	30
Texas Southern University	50. Visual/Performing Arts	-0.33	33	UT El Paso	50. Visual/Performing Arts	-0.54	65
UT El Paso	50. Visual/Performing Arts	-0.44	65	Tarleton State University	23. English Language	-0.55	31

Notes: Number of students in the above table refers to the number of students from our sample enrolled in these programs from 2000 high school cohort.

Table A4. Specific Programs in Each Predicted Earnings Ventile
(Only programs with at least 100 students from high school class of 2000)

		Log earnings premium	Number of students
Ventile 20 (Top 5% of enrollment)			
U. OF TEXAS AT AUSTIN	52. Business	0.756834	873
TEXAS A&M UNIVERSITY	52. Business	0.741412	751
TEXAS A&M UNIVERSITY	14. Engineering	0.711975	1019
Ventile 19			
TEXAS TECH UNIVERSITY	14. Engineering	0.594146	366
U. OF TEXAS AT AUSTIN	14. Engineering	0.631361	813
LAMAR UNIVERSITY	14. Engineering	0.589594	133
TEXAS A&M UNIVERSITY	11. Computer and Information Science	0.586123	135
U. OF TEXAS AT AUSTIN	11. Computer and Information Science	0.541886	321
UNIVERSITY OF HOUSTON	14. Engineering	0.616315	237
U. OF TEXAS AT DALLAS	52. Business	0.581707	156
U. OF HOUSTON-DOWNTOWN	52. Business	0.549304	144
Ventile 18			
TEXAS TECH UNIVERSITY	52. Business	0.469502	1003
TEXAS A&M UNIV-KINGSVILLE	14. Engineering	0.476993	111
U. OF TEXAS AT DALLAS	11. Computer and Information Science	0.511318	159
UNIVERSITY OF HOUSTON	52. Business	0.507564	726
Ventile 17			
U. OF TEXAS AT SAN ANTONIO	52. Business	0.427202	270
TEXAS A&M UNIVERSITY	24. Liberal Arts	0.463787	1099
U. OF TEXAS AT ARLINGTON	91. Nursing	0.442971	101
TEXAS WOMAN'S UNIVERSITY	91. Nursing	0.435848	116
TEXAS STATE UNIV - SAN MARCOS	52. Business	0.462685	608
Ventile 16			
TEXAS A&M UNIVERSITY	40. Physical Sciences	0.403948	121
SAM HOUSTON STATE UNIVERSITY	52. Business	0.390754	493
U. OF TEXAS AT ARLINGTON	14. Engineering	0.401623	343
TEXAS A&M UNIVERSITY	30. Multi/Interdisciplinary	0.376928	734
UNIVERSITY OF HOUSTON	51. Health Professions, minus nursing	0.381286	215
U. OF TEXAS AT AUSTIN	40. Physical Sciences	0.398223	102
TEXAS A&M UNIV AT GALVESTON	24. Liberal Arts	0.393067	114

Table A4. Specific Programs in Each Predicted Earnings Ventile
(Only programs with at least 100 students from high school class of 2000)

		Log earnings premium	Number of students
Ventile 15			
TEXAS A&M UNIVERSITY	26. Biology	0.35496	425
U. OF TEXAS AT ARLINGTON	52. Business	0.338882	475
LAMAR UNIVERSITY	52. Business	0.355361	181
U. OF TEXAS AT AUSTIN	26. Biology	0.367627	528
TEXAS A&M UNIVERSITY	4. Architecture	0.350294	120
TEXAS TECH UNIVERSITY	11. Computer and Information Scien	0.347627	119
TEXAS STATE UNIV - SAN MARCOS	30. Multi/Interdisciplinary	0.353864	256
U. OF TEXAS AT SAN ANTONIO	14. Engineering	0.361831	150
Ventile 14			
UNIVERSITY OF NORTH TEXAS	11. Computer and Information Scien	0.316478	158
TEXAS A&M UNIVERSITY	45. Social Science	0.32932	238
STEPHEN F. AUSTIN STATE UNIV	52. Business	0.315243	434
TEXAS A&M UNIVERSITY	23. English Language	0.314094	125
UNIVERSITY OF HOUSTON	30. Multi/Interdisciplinary	0.314496	110
STEPHEN F. AUSTIN STATE UNIV	91. Nursing	0.315027	143
TEXAS A&M UNIVERSITY	31. Parks & Rec	0.322999	169
U. OF TEXAS AT AUSTIN	30. Multi/Interdisciplinary	0.319695	492
Ventile 13			
UNIVERSITY OF NORTH TEXAS	52. Business	0.312661	811
U. OF TEXAS AT DALLAS	24. Liberal Arts	0.291534	166
TEXAS TECH UNIVERSITY	19. Family and Consumer Sciences	0.282151	235
U. OF TEXAS AT AUSTIN	9.Communication, Journalism	0.300599	324
TEXAS A&M UNIV-CORPUS CHRISTI	52. Business	0.286421	176
TEXAS TECH UNIVERSITY	51. Health Professions, minus nursin	0.30923	408
U. OF TEXAS AT AUSTIN	45. Social Science	0.292939	222
Ventile 12			
TEXAS STATE UNIV - SAN MARCOS	26. Biology	0.273267	170
TEXAS A&M UNIVERSITY	9.Communication, Journalism	0.279515	104
STEPHEN F. AUSTIN STATE UNIV	51. Health Professions, minus nursin	0.26533	209
TEXAS A&M UNIVERSITY	42. Psychology	0.281518	219
U. OF TEXAS AT AUSTIN	24. Liberal Arts	0.271732	2067
U. OF TEXAS AT SAN ANTONIO	11. Computer and Information Scien	0.271584	151
SAM HOUSTON STATE UNIVERSITY	30. Multi/Interdisciplinary	0.280551	223
Ventile 11			
U. OF TEXAS-PAN AMERICAN	30. Multi/Interdisciplinary	0.255236	177
TEXAS STATE UNIV - SAN MARCOS	51. Health Professions, minus nursin	0.257261	128
STEPHEN F. AUSTIN STATE UNIV	30. Multi/Interdisciplinary	0.252774	191
UNIVERSITY OF HOUSTON	26. Biology	0.250025	253
SAM HOUSTON STATE UNIVERSITY	43. Homeland Security	0.248724	304
TEXAS TECH UNIVERSITY	4. Architecture	0.252416	273
UNIVERSITY OF NORTH TEXAS	30. Multi/Interdisciplinary	0.248585	189
U. OF TEXAS AT AUSTIN	42. Psychology	0.257893	207
TARLETON STATE UNIVERSITY	52. Business	0.264949	209
TEXAS TECH UNIVERSITY	9.Communication, Journalism	0.249035	294

Table A4. Specific Programs in Each Predicted Earnings Ventile
(Only programs with at least 100 students from high school class of 2000)

		Log earnings premium	Number of students
Ventile 10			
TEXAS STATE UNIV - SAN MARCOS	24. Liberal Arts	0.229603	692
PRAIRIE VIEW A&M UNIVERSITY	91. Nursing	0.245463	120
U. OF TEXAS AT ARLINGTON	24. Liberal Arts	0.231254	264
SAM HOUSTON STATE UNIVERSITY	13. Education	0.245777	113
TEXAS STATE UNIV - SAN MARCOS	9.Communication, Journalism	0.235092	219
ANGELO STATE UNIVERSITY	52. Business	0.231611	163
UNIVERSITY OF HOUSTON	9.Communication, Journalism	0.233144	102
STEPHEN F. AUSTIN STATE UNIV	11. Computer and Information Science	0.231451	142
TEXAS A&M UNIVERSITY-COMMERCE	52. Business	0.234772	118
U. OF TEXAS AT SAN ANTONIO	30. Multi/Interdisciplinary	0.245648	198
Ventile 9			
TEXAS TECH UNIVERSITY	30. Multi/Interdisciplinary	0.19969	100
TEXAS STATE UNIV - SAN MARCOS	31. Parks & Rec	0.228398	142
U. OF TEXAS-PAN AMERICAN	14. Engineering	0.229355	163
U. OF TEXAS AT ARLINGTON	26. Biology	0.216236	201
WEST TEXAS A&M UNIVERSITY	52. Business	0.214884	159
TEXAS TECH UNIVERSITY	31. Parks & Rec	0.190173	114
UNIVERSITY OF HOUSTON	42. Psychology	0.225448	147
Ventile 8			
STEPHEN F. AUSTIN STATE UNIV	24. Liberal Arts	0.184776	309
UNIVERSITY OF HOUSTON	24. Liberal Arts	0.170931	399
UNIVERSITY OF NORTH TEXAS	24. Liberal Arts	0.162854	482
TEXAS TECH UNIVERSITY	45. Social Science	0.163918	105
PRAIRIE VIEW A&M UNIVERSITY	52. Business	0.164168	179
Ventile 7			
TARLETON STATE UNIVERSITY	24. Liberal Arts	0.144712	202
TEXAS A&M INTERNATIONAL UNIV	24. Liberal Arts	0.146506	127
LAMAR UNIVERSITY	24. Liberal Arts	0.149164	410
TEXAS A&M UNIVERSITY-COMMERCE	30. Multi/Interdisciplinary	0.15386	102
UNIVERSITY OF NORTH TEXAS	26. Biology	0.146522	163
TEXAS A&M UNIV AT GALVESTON	26. Biology	0.160241	104
U. OF HOUSTON-DOWNTOWN	24. Liberal Arts	0.146414	470
SAM HOUSTON STATE UNIVERSITY	42. Psychology	0.149385	119
Ventile 6			
TEXAS STATE UNIV - SAN MARCOS	45. Social Science	0.144579	127
TEXAS TECH UNIVERSITY	42. Psychology	0.119664	154
TEXAS A&M UNIV-KINGSVILLE	52. Business	0.14345	124
U. OF TEXAS-PAN AMERICAN	52. Business	0.116592	358
SAM HOUSTON STATE UNIVERSITY	24. Liberal Arts	0.125919	127
U. OF TEXAS AT EL PASO	52. Business	0.128472	211
U. OF TEXAS-PAN AMERICAN	51. Health Professions, minus nursing	0.127493	336
TEXAS A&M UNIV-KINGSVILLE	24. Liberal Arts	0.116254	129
SAM HOUSTON STATE UNIVERSITY	9.Communication, Journalism	0.138233	124
TEXAS SOUTHERN UNIVERSITY	51. Health Professions, minus nursing	0.134407	121

Table A4. Specific Programs in Each Predicted Earnings Ventile
(Only programs with at least 100 students from high school class of 2000)

		Log earnings premium	Number of students
Ventile 5			
U. OF TEXAS-PAN AMERICAN	91. Nursing	0.088538	137
TEXAS A&M UNIVERSITY-COMMERCE	24. Liberal Arts	0.099854	156
TEXAS A&M UNIV-CORPUS CHRISTI	26. Biology	0.091717	190
UNIVERSITY OF NORTH TEXAS	42. Psychology	0.0944	184
U. OF TEXAS AT EL PASO	13. Education	0.095916	101
TEXAS STATE UNIV - SAN MARCOS	42. Psychology	0.092641	124
U. OF TEXAS AT ARLINGTON	45. Social Science	0.095301	59
TEXAS TECH UNIVERSITY	26. Biology	0.108173	121
U. OF TEXAS AT BROWNSVILLE	24. Liberal Arts	0.07872	173
U. OF TEXAS AT SAN ANTONIO	26. Biology	0.096274	363
U. OF TEXAS AT SAN ANTONIO	42. Psychology	0.082556	153
Ventile 4			
ANGELO STATE UNIVERSITY	30. Multi/Interdisciplinary	0.065623	113
U. OF TEXAS AT SAN ANTONIO	4. Architecture	0.035616	104
UNIVERSITY OF HOUSTON	45. Social Science	0.070085	137
STEPHEN F. AUSTIN STATE UNIV	9.Communication, Journalism	0.067484	129
ANGELO STATE UNIVERSITY	24. Liberal Arts	0.063743	361
U. OF TEXAS AT EL PASO	51. Health Professions, minus nursin	0.065665	111
U. OF TEXAS AT ARLINGTON	4. Architecture	0.054068	108
TEXAS A&M UNIV-KINGSVILLE	26. Biology	0.069663	116
U. OF TEXAS AT EL PASO	14. Engineering	0.026901	256
Ventile 3			
U. OF TEXAS AT SAN ANTONIO	9.Communication, Journalism	0.021003	118
UNIVERSITY OF NORTH TEXAS	9.Communication, Journalism	-0.0114	270
MIDWESTERN STATE UNIVERSITY	24. Liberal Arts	0.008185	159
U. OF TEXAS AT EL PASO	30. Multi/Interdisciplinary	-0.00714	119
UNIVERSITY OF NORTH TEXAS	45. Social Science	-0.00041	115
TEXAS SOUTHERN UNIVERSITY	30. Multi/Interdisciplinary	0.022367	268
U. OF TEXAS AT SAN ANTONIO	24. Liberal Arts	0.015896	455
Ventile 2			
SAM HOUSTON STATE UNIVERSITY	50. Visual/Performing Arts	-0.03009	190
TEXAS TECH UNIVERSITY	24. Liberal Arts	-0.05045	168
U. OF TEXAS-PAN AMERICAN	42. Psychology	-0.06245	104
UNIVERSITY OF HOUSTON	50. Visual/Performing Arts	-0.06302	193
STEPHEN F. AUSTIN STATE UNIV	50. Visual/Performing Arts	-0.05159	139
TEXAS SOUTHERN UNIVERSITY	52. Business	-0.02561	145
TEXAS STATE UNIV - SAN MARCOS	50. Visual/Performing Arts	-0.04912	241
Ventile 1 (bottom 5% of enrollment)			
U. OF TEXAS AT AUSTIN	50. Visual/Performing Arts	-0.13624	222
TEXAS TECH UNIVERSITY	50. Visual/Performing Arts	-0.14105	156
U. OF TEXAS AT EL PASO	24. Liberal Arts	-0.13846	558
UNIVERSITY OF NORTH TEXAS	50. Visual/Performing Arts	-0.1499	538
U. OF TEXAS-PAN AMERICAN	24. Liberal Arts	-0.14312	104

Table A5. Robustness to Different Inference Procedures

	Clustering on		
	Cohort	Poor X Cohort	Institution
Robust			
Poor	-0.0370	-0.0370	-0.0370
	(0.000)	(0.0000)	(0.0006)
PostXPoor	0.0129	0.0129	0.0129
	(0.000)	(0.0526)	(0.0134)
Observations	580,253	580,253	580,253
Block - Bootstrapping			
Poor	-0.0370	-0.0370	-0.0370
	(0.000)	(0.0000)	(0.0003)
PostXPoor	0.0129	0.0129	0.0129
	(0.000)	(0.0852)	(0.0139)
Observations	580,253	580,253	580,253
Wild - Bootstrapping			
Poor	-0.0370	-0.0370	-0.0370
	(0.0040)	(0.0040)	(0.0080)
PostXPoor	0.0129	0.0129	0.0129
	(0.0000)	(0.0880)	(0.0240)
Observations	580,253	580,253	580,253

Note: P-Values are reported in parentheses. Controls include gender, race/ethnic indicators and indicator for limited English, and scaled reading and math scores. Sample includes students in the high school classes of 2000 to 2009 that enroll in a Texas public university within two years of high school graduation. Outcome is the predicted earnings of the university program (institution X major) the student first enrolled in. Predicted earnings is estimated using 2000-2002 cohorts and applied to all cohorts (see text).

Table A6. Characteristic of Program Attending Two Years After Initial Enrollment
Robustness

	Base Model	No controls	Drop LOS/CS Schools	Drop LEP Students	Drop top 30% of graduating class	Poor = always FRPL	Poor = ever FRPL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Average Predicted earnings							
Poor	-0.0556***	-0.1075***	-0.0612***	-0.0371***	-0.0533***	-0.0388***	-0.0594***
	(0.0020)	(0.0030)	(0.0021)	(0.0018)	(0.0028)	(0.0027)	(0.0030)
Post X Poor	0.0121***	0.0025	0.0150***	0.0124***	0.0125**	0.0150***	0.0086**
	(0.0025)	(0.0037)	(0.0028)	(0.0018)	(0.0046)	(0.0025)	(0.0028)
B. Top 10% of Programs							
Poor	-0.0200***	-0.0423***	-0.0230***	-0.0154***	-0.0072**	-0.0143***	-0.0178***
	(0.0021)	(0.0025)	(0.0024)	(0.0016)	(0.0023)	(0.0031)	(0.0019)
Post X Poor	0.0027	-0.0028	0.0067*	0.0039	0.0076*	0.0060	0.0033
	(0.0035)	(0.0033)	(0.0035)	(0.0032)	(0.0034)	(0.0045)	(0.0038)
C. Top 20% of Programs							
Poor	-0.0369***	-0.0704***	-0.0488***	-0.0359***	-0.0186***	-0.0212***	-0.0320***
	(0.0013)	(0.0017)	(0.0022)	(0.0021)	(0.0020)	(0.0037)	(0.0016)
Post X Poor	0.0094***	0.0024	0.0111**	0.0069	0.0158***	0.0172***	0.0141***
	(0.0023)	(0.0024)	(0.0037)	(0.0041)	(0.0035)	(0.0044)	(0.0026)
D. Bottom 20% of Programs							
Poor	0.0687***	0.0314***	0.0110***	0.0500***	0.0147***	0.0054	0.0154***
	(0.0033)	(0.0014)	(0.0027)	(0.0036)	(0.0031)	(0.0040)	(0.0020)
Post X Poor	-0.0260***	-0.0171***	-0.0193***	-0.0332***	-0.0218***	-0.0243***	-0.0179***
	(0.0065)	(0.0035)	(0.0040)	(0.0064)	(0.0049)	(0.0047)	(0.0028)
E. Bottom 10% of Programs							
Poor	0.0471***	0.0317***	0.0142***	0.0241***	0.0202***	0.0051*	0.0131***
	(0.0028)	(0.0005)	(0.0015)	(0.0020)	(0.0020)	(0.0027)	(0.0012)
Post X Poor	-0.0162***	-0.0131***	-0.0132***	-0.0126***	-0.0152***	-0.0088**	-0.0082***
	(0.0048)	(0.0022)	(0.0024)	(0.0038)	(0.0028)	(0.0028)	(0.0017)
Controls							
Demographics	Yes	No	Yes	Yes	Yes	Yes	Yes
Test Scores	Yes	No	Yes	Yes	Yes	Yes	Yes
Time Controls	Time, Post	Time, Post	Time, Post	Time, Post	Time, Post	Time, Post	Time, Post
Obs.	580,253	580,253	534,366	570,688	306,645	580,253	580,253

Notes: Controls include race/ethnic indicators and indicator for limited English, and scaled reading and math scores. Sample includes students in the high school classes of 2000 to 2009 that enroll in a Texas public university within two years of high school graduation. Outcome is the predicted earnings or indicator for predicted earnings rank of the university program (institution X major) the student first enrolled in. Predicted earnings is estimated using 2000-2002 cohorts and applied to all cohorts (see text). Standard errors are clustered by high school cohort.

Table A7. Distribution of Students Across First School

	Test score in Top 30% of high school		Test score in bottom 70% of high school		Full Sample	
First School	Frequency	Percent	Frequency	Percent	Frequency	Percent
Sul Ross State University Rio Grande College	83	0.03	178	0.05	261	0.04
Angelo State University	4,871	1.73	8,612	2.5	13,483	2.15
Texas A&M University-Commerce	3,091	1.1	5,013	1.46	8,104	1.29
Lamar University	6,079	2.16	10,449	3.03	16,528	2.64
Midwestern State University	3,115	1.1	6,036	1.75	9,151	1.46
University of North Texas	16,588	5.88	24,048	6.98	40,636	6.49
The University of Texas-Pan American	10,973	3.89	15,854	4.6	26,827	4.28
Sam Houston State University	8,606	3.05	16,717	4.85	25,323	4.04
Texas State University-San Marcos	15,168	5.38	22,714	6.59	37,882	6.05
Stephen F. Austin State University	8,143	2.89	15,344	4.45	23,487	3.75
Sul Ross State University	793	0.28	2,408	0.7	3,201	0.51
Prairie View A&M University	2,328	0.83	9,454	2.74	11,782	1.88
Tarleton State University	4,706	1.67	9,580	2.78	14,286	2.28
Texas A&M University	44,837	15.9	22,492	6.53	67,329	10.75
Texas A&M University-Kingsville	3,285	1.16	6,439	1.87	9,724	1.55
Texas Southern University	1,823	0.65	9,068	2.63	10,891	1.74
Texas Tech University	20,272	7.19	25,657	7.45	45,929	7.33
Texas Woman's University	2,288	0.81	5,287	1.53	7,575	1.21
University of Houston	15,325	5.43	20,620	5.99	35,945	5.74
The University of Texas at Arlington	12,183	4.32	14,373	4.17	26,556	4.24
The University of Texas at Austin	45,821	16.25	14,771	4.29	60,592	9.67
The University of Texas at El Paso	7,754	2.75	12,305	3.57	20,059	3.2
West Texas A&M University	3,895	1.38	6,146	1.78	10,041	1.6
Texas A&M International University	2,545	0.9	3,172	0.92	5,717	0.91
The University of Texas at Dallas	6,430	2.28	4,579	1.33	11,009	1.76
The University of Texas of the Permian Basin	1,453	0.52	1,838	0.53	3,291	0.53
The University of Texas at San Antonio	14,298	5.07	26,116	7.58	40,414	6.45
Texas A&M University at Galveston	1,373	0.49	2,179	0.63	3,552	0.57
Texas A&M University-Corpus Christi	4,976	1.76	7,263	2.11	12,239	1.95
The University of Texas at Tyler	3,432	1.22	3,563	1.03	6,995	1.12
University of Houston-Clear Lake	563	0.2	913	0.27	1,476	0.24
University of Houston-Downtown	2,112	0.75	7,660	2.22	9,772	1.56
University of Houston-Victoria	222	0.08	300	0.09	522	0.08
Texas A&M University-Texarkana	218	0.08	292	0.08	510	0.08
The University of Texas at Brownsville	2,354	0.83	2,994	0.87	5,348	0.85
Total	282,003		344,434		626,437	

Sample includes all students in the high school classes of 2000 to 2009 that enroll in a Texas public university within two years of high school graduation. Sample is slighlty larger than sample used in analysis because it is not restricted to students in the "balanced panel" of programs or to those that have non-missing control variables.

Table A8. Distribution of Students Across Majors

	Test score in Top 30% of high school		Test score in bottom 70% of high school		Full Sample	
First Major	Frequency	Percent	Frequency	Percent	Frequency	Percent
1. Agriculture	5,365	1.9	8,564	2.49	13,929	2.22
3. Natural Rescouces and Conservation	1,315	0.47	1,893	0.55	3,208	0.51
4. Architecture	4,541	1.61	4,912	1.43	9,453	1.51
5. Area, Ethnic Cultural, and Gender St	158	0.06	156	0.05	314	0.05
9.Communication, Journalism	10,631	3.77	15,663	4.55	26,294	4.2
10. Communications Tech	155	0.05	149	0.04	304	0.05
11. Computer and Information Sciences	7,423	2.63	6,321	1.84	13,744	2.19
13. Education	1,129	0.4	2,405	0.7	3,534	0.56
14. Engineering	33,049	11.72	15,940	4.63	48,989	7.82
15. Engineering Technologies	2,242	0.8	3,344	0.97	5,586	0.89
16. Foreign Languages	1,180	0.42	1,087	0.32	2,267	0.36
19. Family and Consumer Sciences	2,682	0.95	4,413	1.28	7,095	1.13
22. Legal Professions	612	0.22	906	0.26	1,518	0.24
23. English Language	5,507	1.95	5,923	1.72	11,430	1.82
24. Liberal Arts	41,578	14.74	58,791	17.07	100,369	16.02
26. Biology	27,840	9.87	23,343	6.78	51,183	8.17
27. Math	4,088	1.45	2,124	0.62	6,212	0.99
30. Multi/Interdisciplinary	17,894	6.35	26,820	7.79	44,714	7.14
31. Parks & Rec	6,588	2.34	13,276	3.85	19,864	3.17
38. Philosophy	610	0.22	435	0.13	1,045	0.17
40. Physical Sciences	5,615	1.99	4,074	1.18	9,689	1.55
42. Psychology	10,724	3.8	15,236	4.42	25,960	4.14
43. Homeland Security	4,342	1.54	11,147	3.24	15,489	2.47
44. Public Admin	966	0.34	1,905	0.55	2,871	0.46
45. Social Science	8,142	2.89	9,891	2.87	18,033	2.88
49. Transportation	48	0.02	97	0.03	145	0.02
50. Visual/Performing Arts	13,486	4.78	17,639	5.12	31,125	4.97
51. Health Professions, minus nursing	12,599	4.47	18,049	5.24	30,648	4.89
52. Business	41,027	14.55	51,939	15.08	92,966	14.84
54. History	912	0.32	1,777	0.52	2,689	0.43
91. Nursing	8,241	2.92	14,933	4.34	23,174	3.7
92. Economics	1,314	0.47	1,282	0.37	2,596	0.41
Total	282,003		344,434		626,437	

Sample includes all students in the high school classes of 2000 to 2009 that enroll in a Texas public university within two years of high school graduation. Sample is slighlty larger than sample used in analysis because it is not restricted to students in the "balanced panel" of programs or to those that have non-missing control variables.

Table A9. Contribution of Institutions and Majors to Enrollment Shifts

Initial Program Chosen

	(1)	(2)	(3)	(4)	(5)
A. Program-Specific Predicted earnings					
Poor	-0.0861***	-0.0415***	-0.0370***	-0.0182***	-0.0165***
	(0.0018)	(0.0021)	(0.0019)	(0.0015)	(0.0018)
Post X Poor	0.0057**	0.0063**	0.0129***	0.0073***	0.0116***
	(0.0023)	(0.0022)	(0.0018)	(0.0017)	(0.0020)
B. Institution-average Predicted earnings					
Poor	-0.0896***	-0.0466***	-0.0406***	-0.0118***	-0.0188***
	(0.0016)	(0.0020)	(0.0019)	(0.0013)	(0.0018)
Post X Poor	0.0083***	0.0085***	0.0122***	0.0044***	0.0108***
	(0.0021)	(0.0019)	(0.0019)	(0.0013)	(0.0017)
C. Major-average Predicted earnings					
Poor	-0.0026**	0.0020*	0.0011	0.0015	0.0015
	(0.0011)	(0.0010)	(0.0008)	(0.0010)	(0.0010)
Post X Poor	-0.0035*	-0.0031*	0.0009	-0.0010	0.0012
	(0.0018)	(0.0017)	(0.0017)	(0.0019)	(0.0016)
Controls					
Demographics	No	Yes	Yes	Yes	Yes
Test scores	No	No	Yes	Yes	Yes
Application, admission indica	No	No	No	Yes	No
High school FEs	No	No	No	No	Yes
Time controls	Time, Post	Time, Post	Time, Post	Time, Post	Time, Post

Notes: Controls include gender, race/ethnic indicators and indicator for limited English, and scaled reading and math scores. Sample includes 580,253 students in the high school classes of 2000 to 2009 that enroll in a Texas public university within two years of high school graduation. Outcome is the predicted earnings or indicator for predicted earnings rank of the university program (institution X major) the student first enrolled in. Predicted earnings is estimated using 2000-2002 cohorts and applied to all cohorts (see text). Standard errors are clustered by high school cohort. Our preferred model is specification 3.

Table A10. Institution-Specific Changes in Enrollment, Application, and Admission

Institution (ranked by institution-level predicted earnings)	Predicted Earnings	Coeff on Post X Poor for outcome: Pr(Enroll) (1)	Pr(Apply) (2)	Pr(Admit | Apply) (3)	Institution (ranked by institution-level predicted earnings)	Predicted Earnings	Coeff on Post X Poor for outcome: Pr(Enroll) (1)	Pr(Apply) (2)	Pr(Admit | Apply) (3)
Texas A&M University	0.49	0.0076*	0.0264***	-0.0249	Tarelton State Univerisy	0.18	-0.0015	-0.0029*	-0.0349
		(0.0035)	(0.0044)	(0.0229)			(0.0010)	(0.0014)	(0.0206)
UT - Austin	0.40	0.0233**	0.0246***	0.0688**	Lamar State University	0.18	0.0087***	0.0119***	0.0059
		(0.0080)	(0.0050)	(0.0227)			(0.0016)	(0.0016)	(0.0064)
UT - Dallas	0.37	-0.0009	0.0020	-0.0044	Texas A&M University - Corpus Christi	0.17	0.0023***	0.0122***	0.0160
		(0.0007)	(0.0012)	(0.0274)			(0.0006)	(0.0019)	(0.0163)
Texas A&M University - Galveston	0.37	-0.0002	-0.0009***	0.1038***	Texas A&M University - Kingsville	0.17	-0.0090**	-0.0087**	0.0035
		(0.0006)	(0.0002)	(0.0137)			(0.0029)	(0.0029)	(0.0052)
University of Houston	0.31	-0.0013	0.0017	0.0107	University of North Texas	0.14	-0.0066***	-0.0044	-0.0449**
		(0.0032)	(0.0038)	(0.0071)			(0.0018)	(0.0033)	(0.0190)
Texas Tech university	0.30	0.0046*	-0.0007	-0.0281	UT - Brownsville	0.14	0.0165**	0.0212***	0.0000
		(0.0021)	(0.0043)	(0.0288)			(0.0062)	(0.0053)	0.0000
UT - Arlington	0.25	0.0124***	0.0118**	0.0193*	UT - San Antonio	0.14	-0.0292***	-0.0219***	-0.0145*
		(0.0033)	(0.0041)	(0.0099)			(0.0064)	(0.0048)	(0.0069)
Texas Woman's University	0.25	0.0014**	0.0034**	0.0319*	Texas A&M University - Commerce	0.13	0.0014*	0.0035***	0.0150
		(0.0006)	(0.0014)	(0.0164)			(0.0006)	(0.0010)	(0.0228)
Texas State University	0.25	0.0012	-0.0062	0.0540**	Midwestern State University	0.09	-0.0000	-0.0039***	-0.0174
		(0.0015)	(0.0049)	(0.0199)			(0.0007)	(0.0009)	(0.0240)
University of Houston - Downtown	0.24	-0.0068***	-0.0042	-0.0179**	Angelo State University	0.08	-0.0012	-0.0043**	0.0935**
		(0.0020)	(0.0024)	(0.0055)			(0.0011)	(0.0014)	(0.0329)
UT - Permian Basin	0.24	-0.0021***	-0.0013	-0.0370*	UT - Pan America	0.08	0.0017	0.0596***	0.0083
		(0.0006)	(0.0009)	(0.0178)			(0.0075)	(0.0143)	(0.0071)
Sam Houston State University	0.22	-0.0035	-0.0070	0.0125	West Texas A&M University	0.07	0.0010	-0.0004	0.0268
		(0.0027)	(0.0039)	(0.0173)			(0.0010)	(0.0009)	(0.0353)
Texas A&M University - International	0.22	-0.0018	0.0060	-0.0368	Sul Ross State University	0.06	-0.0030***	-0.0048**	0.0135
		(0.0030)	(0.0035)	(0.0267)			(0.0009)	(0.0016)	(0.0178)
Stephen F. Austin State University	0.20	0.0024	0.0100**	-0.0435**	Texas Southern University	-0.02	-0.0018	-0.0061	0.0004
		(0.0019)	(0.0035)	(0.0155)			(0.0041)	(0.0061)	(0.0013)
Prairie View A&M University	0.19	-0.0010	0.0064	-0.0071	UT - El Paso	-0.04	-0.0126**	-0.0112***	0.0014
		(0.0021)	(0.0036)	(0.0043)			(0.0042)	(0.0028)	(0.0020)
UT- Tyler	0.19	-0.0026**	-0.0025**	-0.0198					
		(0.0011)	(0.0009)	(0.0255)					

Notes: Each cell is a separate regression. All specifications control for gender, race/ethnic indicators and indicator for limited English, and scaled reading and math scores. Sample includes 580,253 students in the high school classes of 2001 to 2009 that enroll in a Texas public university within two years of high school graduation. Outcomes are indicators for enrollment at, application to, admission to, or conditional enrollment at each institution. Universities are ranked here by their predicted earnings in table 7. Standard errors are clustered by high school cohort.

Table A11. Means of Institution-specific Enrollment and Application Outcomes

Institution (ranked by institution-level predicted earnings)	Predicted Earnings	Outcome Mean: Pr(Enroll) (1)	Pr(Apply) (2)	Pr(Admit | Apply) (3)	Pr(Enroll | Admit) (4)
Texas A&M University	0.49	0.101	0.165	0.754	0.682
UT - Austin	0.40	0.100	0.139	0.778	0.745
UT - Dallas	0.37	0.018	0.029	0.655	0.617
Texas A&M University - Galvest	0.37	0.006	0.008	0.948	0.523
University of Houston	0.31	0.058	0.078	0.837	0.618
Texas Tech university	0.30	0.074	0.120	0.802	0.564
UT - Arlington	0.25	0.043	0.047	0.887	0.655
Texas Woman's University	0.25	0.012	0.014	0.810	0.639
Texas State University	0.25	0.062	0.096	0.739	0.574
University of Houston - Downtc	0.24	0.015	0.012	0.934	0.806
UT - Permian Basin	0.24	0.005	0.005	0.961	0.706
Sam Houston State University	0.22	0.040	0.070	0.636	0.576
Texas A&M University - Interna	0.22	0.009	0.009	0.910	0.704
Stephen F. Austin State Univers	0.20	0.038	0.065	0.899	0.496
Prairie View A&M University	0.19	0.018	0.017	0.958	0.701
UT- Tyler	0.19	0.012	0.013	0.898	0.649
Tarelton State Univerisy	0.18	0.020	0.021	0.873	0.756
Lamar State University	0.18	0.027	0.028	0.978	0.702
Texas A&M University - Corpus	0.17	0.020	0.031	0.893	0.526
Texas A&M University - Kingsvil	0.17	0.015	0.020	0.993	0.554
University of North Texas	0.14	0.067	0.088	0.879	0.576
UT - Brownsville	0.14	0.009	0.008	1.000	0.681
UT - San Antonio	0.14	0.066	0.086	0.966	0.621
Texas A&M University - Comme	0.13	0.013	0.013	0.809	0.675
Midwestern State University	0.09	0.015	0.014	0.951	0.640
Angelo State University	0.08	0.021	0.026	0.752	0.807
UT - Pan America	0.08	0.044	0.032	0.948	0.785
West Texas A&M University	0.07	0.015	0.014	0.888	0.788
Sul Ross State University	0.06	0.005	0.005	0.907	0.637
Texas Southern University	-0.02	0.017	0.025	0.997	0.572
UT - El Paso	-0.04	0.032	0.030	0.991	0.855

Notes: Sample includes 580,253 students in the high school classes of 2001 to 2009 that enroll in a Texas public university within two years of high school graduation. Outcomes are indicators for enrollment at, application to, admission to, or conditional enrollment at each institution.

Appendix B. Data on Program-level Resources

To measure program-level resources we utilize previously unused administrative data on all the course sections offered and faculty in each department at each institution since 2000. This information is obtained from Reports 4 and 8 published by the Texas Higher Education Coordinating Board. We construct various measures of resources, quality, and capacity (average class size, faculty per student, faculty salary per student, capacity of course offerings) for each program at each institution in each year before and after deregulation. We aggregated the merged course-faculty micro data to the level of academic program at each Texas university from Fall 2000 to Fall 2009. Since the breadth of academic programs vary by institution, we standardize them using 2-digit Classification of Institutional Program (CIP) codes. Two-digit CIP codes often translate to what are conventionally known as "departments" (e.g. Mathematics and Statistics) but sometimes are broader ("Social Sciences" or "Engineering"). We have separately broken out Economics and Nursing from their larger categories (Social Science and Health Professions, respectively) as they are sometimes housed in units which price differently. We restrict our analysis to programs (defined by 2-digit CIP codes) that enroll at least one student from each high school cohort from 2000 to 2009. Thus we exclude programs that are introduced or discontinued during our analysis window or that have a very small number of students. In practice, this restriction drops fewer than 5% of the student sample across all cohorts. Our final program-level sample includes 641 programs tracked over ten years, for a total sample size of 6,410. Some analysis will have fewer observations due to missing data on prices or program resources in some years.[1]

The program-level panel dataset is summarized in Table A2, with each observation weighted by program enrollment from the 2000 high school cohort. The average program has about 4,800 course enrollments, with the majority being upper-division.[2] Average tuition is $2,853 for the semester. Many resource measures we normalize by the number of course enrollments divided by five. This makes these measures on a per-student basis, assuming that each student takes approximately 5 classes in a semester. The average program has about 1 faculty member per 10 students and spends $2989 on faculty salary per student. The average FTE salary of the main course instructor is $30,500 per semester and the average class size is about 30 students per section. More expensive programs are larger, more lucrative (which we define later), and have greater levels of faculty salary per student, though also tend to have larger classes. A full description of how resources vary across programs is beyond the scope of this paper, but Figures A2 and A3 depict the resource differences across and within fields in our sample. Engineering tends to be among the most resource-intensive, with high-paid faculty, modest class sizes, and high faculty salary per student. Business, by contrast, has very large classes, which offsets the high faculty salaries. These patterns echo prior descriptive work by Johnson and Turner (2009). Interestingly, while there are consistent patterns by field across institutions, there is also substantial variation across institutions for a given field.

[1] There may be some discrepancies between the level at which the price and resource measures are captured. Tuition price is typically reported for each "school" or "college" within each university. We have applied this tuition level to all two-digit CIP codes that appear to fall within this school/college at this university. The school-CIP relationship often varies across universities. For instance, some universities include the Economics major in the College of Liberal Arts (typically a low-priced program) while others include it in Business (sometimes a high-priced program). Since we treat Economics as a stand-alone category, it receives the Liberal Arts or Business price depending on the university. Resource measures, by contrast, are generated from course-level data. CIP codes are directly available for each course from 2005 onwards. Prior to this, we generate a two-digit CIP code based on the course subject prefix or administrative code of the faculty member teaching the course. Faculty are assigned to CIP codes based on the most common major code among the courses they teach. Non-teaching faculty are assigned CIP codes based on the two-digit CIP code most commonly associated with each administrative code.

[2] Since the statistics are weighted by the number of enrollees from the 2000 high school class, these statistics give the program characteristics experienced by the "typical" student rather than the characteristics of the typical program. Thus the typical student will be in a much larger program than the typical program.

Appendix C. Control State Analysis

Our single-state analysis cannot account for any aggregate trends altering the representation of poor students relative to non-poor students at high-earning programs and institutions. For instance, if poor students were making inroads at high-earnings programs around the country because of expansions to Pell or other changes differentially affecting the enrollment of poor vs. non-poor students, our Texas-specific estimates may overstate the gains experienced due to tuition deregulation. To address this, we complement our main analysis with cross-state triple-difference comparison between Texas and other states that did not deregulate tuition-setting authority. We test whether the gap in predicted earnings of institutions attended by poor and non-poor students changes in Texas relative to other states after tuition deregulation in Texas.

Unfortunately comparably rich micro student data including extensive student controls does not exist for many states (and cannot be easily combined with our Texas data). Instead, we compare the public 4-year institutions attended by Pell students to non-Pell students in each state. We combine three data sources to characterize the average predicted earnings of institutions attended by Pell and non-Pell students at a state level over time. First, we start with the universe of public 4-year institutions from IPEDS, which includes total undergraduate enrollment. Second, we merge on the number of Pell recipients at each institution in each year.[1] Finally, mean earnings of students working and not enrolled 10 years after entry for each institution was obtained from the College Scorecard data for the 2001 and 2002 entering cohorts.[2] Having average mean earnings by institution for all institutions in the country was not possible prior to the release of the College Scorecard data in 2015. From these sources we construct for each state and each year the predicted earnings of institutions attended by Pell students and non-Pell students, as well as the difference. Across all years and states in our sample, the mean Pell-NonPell difference is about -$2,650, but is -$4,640 in Texas prior to deregulation.[3] The question we ask is how this gap changes following deregulation in Texas.

Table C1 presents our results. In column (1), we approximate our main (micro-sample- based) analysis using data just from Texas. We find that the Pell-NonPell gap shrank by $270 following deregulation in Texas. While not directly comparable to estimates from our micro sample, the pattern is directionally consistent with our earlier analysis. Pell students attended slightly more lucrative programs following deregulation relative to non-Pell students.[4] The next five columns include other states, which are used to

[1] This data comes from US Department of Education, Office of Postsecondary Education. We are grateful to Lesley Turner for sharing this data with us.
[2] The student sample includes financial aid students in AY2001-02 and AY2002-03 pooled cohort measured in CY2012, CY2013, inflation adjusted to 2015 dollars. Average earnings may be misleading to the extent that the average earnings of aided and non-aided students are different. We drop the state of New York, as the number of Pell recipients is not broken out by individual CUNY and SUNY institutions in the early years. Wyoming and the District of Columbia are also excluded because they do not have multiple public 4-year institutions.
[3] This average weights each state-year observation by the total number of students. Unweighted average is similar.
[4] Results may not be directly comparable to our main analysis for four main reasons. First, our main analysis relies on eligibility for free- or reduced-price lunch in 12th grade as the marker for poor. Results using Pell receipt as a marker for poor are similar, but not identical. Second, our measures of Pell and non-Pell enrollment do not distinguish by residency status or undergraduate level. These measures include both in- and out-of-state students, from freshmen to seniors. Our main analysis tracks the enrollment choices of students that attended public high schools in Texas and enrolled in university within two years. Treatment here will thus not be as “sharp” as in our earlier analysis. Third, the earnings measure pertains to the raw average earnings of students receiving financial aid

control for aggregate trends that could have altered the Pell-Non-Pell institutional gap using a triple-difference. The coefficient on PostXTexas quantifies how much the Pell-NonPell gap in Texas changed post-deregulation relative to the Pell-NonPell gap in other states over the same time period. The pattern is remarkably robust across multiple specifications: Pell students in Texas gained relative to non-Pell students following deregulation at a greater rate than in other states. This pattern is robust to flexibly controlling for year effects (specification 3), weighting states by total enrollment (4), and restricting the control group to geographically proximate states (5 to 7). We exclude Florida in the last two specifications as that state also experienced deregulation towards the end of our sample.

Table C1. Texas vs. Non-Texas Comparison of Change in Pell-NonPell Earnings Gap

Dept variable: Difference in mean predicted earnings of institutions attended by Pell vs. NonPell students in state ($1,000) (= 4.64 in Texas in 2003)

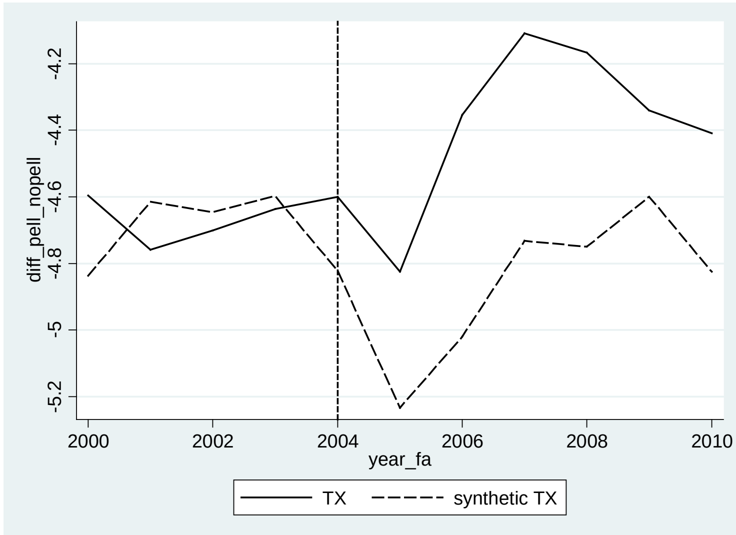
	Texas Only	Texas and Non-Texas States						Synthetic control method
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Texas		-2.348***						0.000737
		(0.283)						(0.0798)
Post	0.273**	-0.133**						
	(0.102)	(0.0608)						
PostXTexas		0.405***	0.410***	0.417***	0.601***	0.531**	0.503***	0.453***
		(0.0608)	(0.0656)	(0.0832)	(0.175)	(0.172)	(0.136)	(0.105)
Observations	11	527	527	527	142	131	164	22
R-squared	0.331	0.024	0.971	0.958	0.938	0.954	0.963	0.905
Year FEs	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Sample	TX only	All	All	All	SE	SE no FL	SESW no FL	synthetic controls
State FE	No	No	Yes	Yes	Yes	Yes	Yes	No
Weighted	No	No	No	Yes	No	No	No	No

Notes: Sample includes 47 states from 2000 to 2010 (New York, DC, and Wyoming are excluded).
Robust standard errors in parentheses. Specifications with multiple states are clustered standard errors by state.

Finally, we implement the synthetic control method described in Abadie, Diamond, and Hainmueller (2010). This method finds a set of states whose weighted behavior most closely match the treated one (here, Texas) on a number of characteristics in the pre-treatment period. We match on the Pell-NonPell earnings gap (our outcome), the Pell share of students, the overall mean predicted earnings (for all students), and the number of institutions per student (to capture the level of differentiation in the public higher education sector). For Texas, this algorithm assigns a weight of 31.2% to California, 26.3% to Delaware, 12.3% to Mississippi, 10.4% to New Mexico, 2.4% to Virginia, 1.1% to Georgia, 1.0% to Oklahoma, and less than 1% to all remaining states. The Pell-NonPell gap for Texas and this synthetic control group is displayed in Figure C1. The two groups do not deviate much from eachother prior to deregulation, but diverge noticeably from 2004 onwards. The implied treatment effect of deregulation from this method is $450 (reported in column (8) of Table C1), which is quite comparable to our standard triple difference estimates.

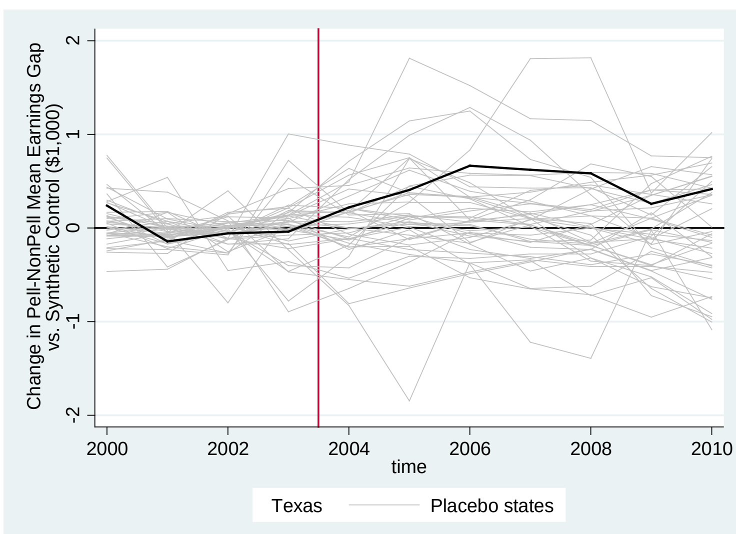
who are working and not enrolled, anywhere in the U.S.. Our Texas-specific analysis uses log earnings for all enrollees working in Texas ten years after enrollment. Finally, we are unable to control for changes in student characteristics, either in the earnings estimates or when assessing changes in program choice. So the estimates from the cross-state analysis are most comparable to column (1) in Table 3 that does not control for changes in student characteristics.

Figure C1. Texas vs. Synthetic Texas



To assess whether the experience of Texas (relative to the synthetic controls) is atypical of the variation one would see, we repeat the synthetic control analysis but assign treatment to all other 47 states as a placebo test. Figure C2 plots the treatment minus synthetic control difference for Texas (in bold) and all other 47 states (in gray) . The Texas experience of modest and sustained gains for Pell students relative to non-Pell students is fairly unusual relative to what would be expected by chance.

Figure C2. Texas-Synthetic Controls and Placebo States



All together, this analysis suggests that our main within-Texas comparison is not conflating deregulation with aggregate trends shifting the institutions attended by Pell vs. NonPell students. In anything, our results are strengthened by including other states as a comparison group.

Appendix D. Program Size Analysis

Our main analysis suggests that the fraction of poor students that enroll in higher-earning programs in post-deregulation increases relative to non-poor students and that the fraction of non-poor students increases relative to poor students at lower-earning programs. This supplementary analysis will determine whether the relative increase in the fraction of poor students enrolled is a result of either enrollment growth in these programs with more growth in the poor student population, enrollment declines with non-poor students leaving high-earning programs at a faster rate than their poor counterparts, or that the fractional changes are a result of poor students displacing non-poor students in the programs with higher earnings. For this analysis, we construct a balanced program-level dataset containing the number of juniors enrolled each program in each academic year, overall and by residency status. [1] We also merge the predicted earnings for freshmen enrolled in these same programs from our main analysis.

To flexibly determine whether program enrollment changed following deregulation, we estimate the post-deregulation deviation from enrollment trend separately for each program earnings ventile using models of the form:

$$Y_{jt} = \beta_1 Time_t + \beta_2 Post_t + \delta_j + \varepsilon_{it}$$

Y_{it} is the log junior enrollment for program *j* at time *t*, overall and by residency status. $Time_t$ is a linear time trend, δ_j is a program fixed effect, and $Post_t$ is an indicator variable which takes a value of 1 for those observations that occur after 2006 and zero otherwise. We weight observations by the level of junior enrollment in 2001 in order to adjust for the influence of small and volatile programs and also cluster standard errors by program.

Figure D1 plots the ventile-specific coefficients on *Time*, which shows that overall enrollment in public 4-year institutions has been steadily growing over time, particularly for programs in the bottom half of the earnings distribution. Higher-earning programs have seen very little growth over the decade. For non-resident students there is little evidence of changes in overall student enrollment, with slight increases in the middle ventiles (Panel B). Figure D2 plots coefficients associated with the *Post* dummy. This figure suggests that the enrollment of students in Texas – overall and non-residents **-** in the post-period do not differ substantially from the pre-period growth trajectory. Nor is there any obvious systematic relationship between the post-deregulation enrollment change and the earnings potential (as measured by the ventile) of the program.

Since ventile-specific estimates are noisy, we also estimate a more parsimonious model that assumes any differences across programs in the time trend or post-deregulation change are linear in predicted program earnings. Specifically, on the entire sample of programs we estimate the following regression:

$$Y_{jt} = \beta_1 Time_t + \beta_2 (Time_t \; X \; Pred_j) + \beta_3 POST_t + \beta_4 \left(Post_t \; X \; Pred_j\right) + \delta_j + \varepsilon_{jt}$$

where $Pred_j$ is the level of predicted earnings for program *j*, after controlling for student demographics and test scores. The mean of this variable in our analysis sample is 0.29. Again we weight observations

[1] We determined residency status based on the receipt of in-state tuition; all students who receive in-state tuition are considered residents, and all other students are non-residents. From this measure, approximately 93% of our sample is made up of Texas Residents. We use Pell Grant receipt to distinguish poor from non-poor students as this measure is available for all enrolled students; free-lunch eligibility is only available for students that graduated from in-state public high schools. We drop programs that have zero total, Pell, or non-Pell enrollment in any year. Our balanced panel contains 556 programs from 2001 to 2008.

by the level of junior enrollment in 2001 in order to adjust for the influence of small but highly volatile programs and also cluster standard errors by program.

Table D1 displays the results from this pooled model, which echo the results shown in the figures. We find that overall enrollment is increasing over time for the average program (predicted earnings = 0.29) and that total program enrollment increases just slightly above trend following deregulation (column (1)). These two features are most substantial for the least lucrative programs (with predicted earnings no greater than high school graduates), with little growth or change post-deregulation for the most lucrative programs. Non-resident enrollment, by contrast, experiences a steeper pre-deregulation growth rate and a more positive change post-deregulation, particularly for the more lucrative programs (though estimates are imprecise). This suggests that some of the programmatic changes following deregulation (e.g. higher prices and more spending) coincided with greater non-resident enrollment.

These program size patterns combined with our main sorting results suggests two proximate channels through which the relative shares of poor and non-poor students across programs are changing post-deregulation. For the most lucrative programs, the lack of any aggregate enrollment change suggests poor students are (modestly) displacing their non-poor counterparts. For programs from the bottom half of the distribution of predicted earnings, there is growth in the enrollment of poor students and non-poor students, but enrollment for non-poor students is occurring at a faster rate.

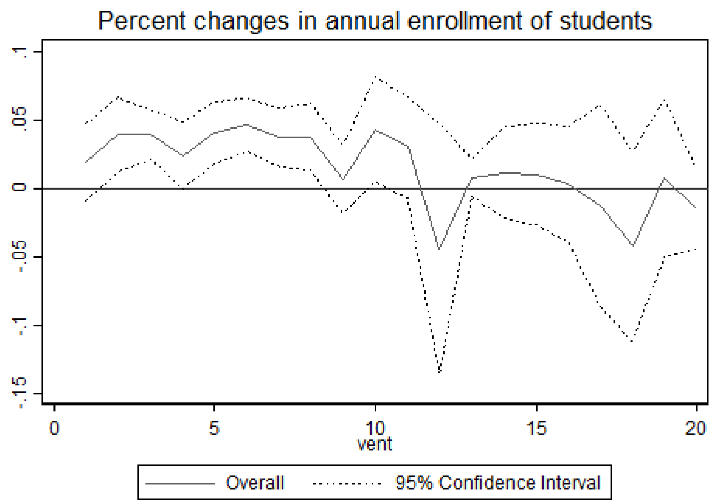
Table D1. Differences in Program-specific Enrollment Trends, by Program Predicted Earnings

VARIABLES	(1) Overall	(2) Non-Resident
Time	0.0267***	0.0624***
	(0.00535)	(0.0147)
Time X Predicted Earnings	-0.0653***	-0.0975**
	(0.0186)	(0.0394)
Post	0.0301	0.0848
	(0.0201)	(0.0585)
Post X Predicted Earnings	-0.0654	0.0699
	(0.0661)	(0.166)
Constant	5.683***	2.595***
	(0.0178)	(0.0431)
Observations	3,583	3,583
R-squared	0.968	0.880

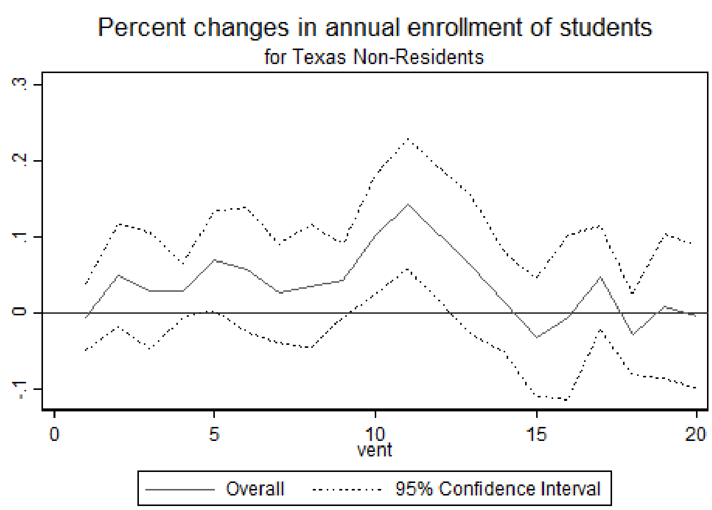
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure D1: Ventile-specific annual enrollment time trend

A. Overall



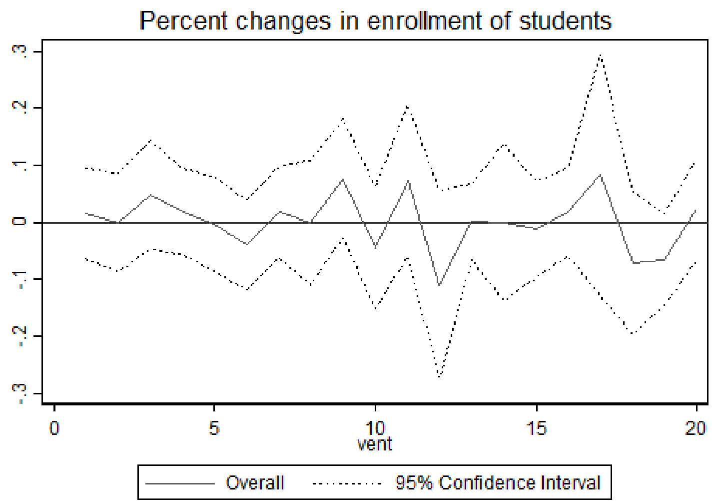
B. Non-residents



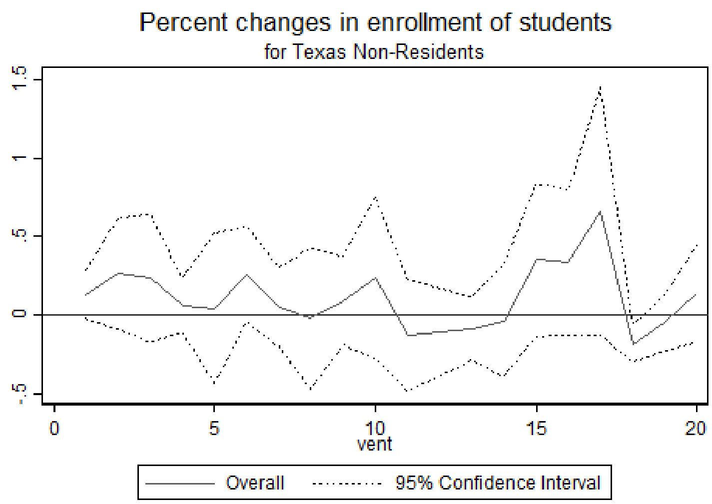
Notes: Each point on each figure corresponds to the coefficient on *Time* from a separate regression described in equation (1), where the log of junior enrollment (overall or for specific group) is the dependent variable. Sample in Panel A includes 556 programs from 2001 to 2008. Panel B omits programs that do not have at least one non-resident enrollment in each year, resulting in a sample of 82 programs. Standard errors clustered by program.

Figure D2: Ventile-specific post-deregulation enrollment change

A. Overall



B. Non-Resident Students



Notes: Each point on each figure corresponds to the coefficient on *Post* from a separate regression described in equation (1), where the log of junior enrollment (overall or for specific group) is the dependent variable. Sample in Panel A includes 556 programs from 2001 to 2008. Panel B omits programs that do not have at least one non-resident enrollment in each year, resulting in a sample of 82 programs. Standard errors clustered by program.