



Using Propensity Score Matching to Compare Postsecondary Outcomes of Community College Transfers and Rising Juniors

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Community College Penalty and Bachelor's Degree Completion?

- Penalty-Community college students are less likely to earn a bachelor's degree than direct entrants to four-year colleges.
- Penalty seems to be related to the point at which the given study commences tracking outcomes
 - At initial community college enrollment
 - After vertical transfer
- Wide variation in college readiness among community college enrollees
- Observationally equivalent groups
- One cannot earn a bachelor's degree at a community college
- Parallel point of entry and time allotted for degree completion

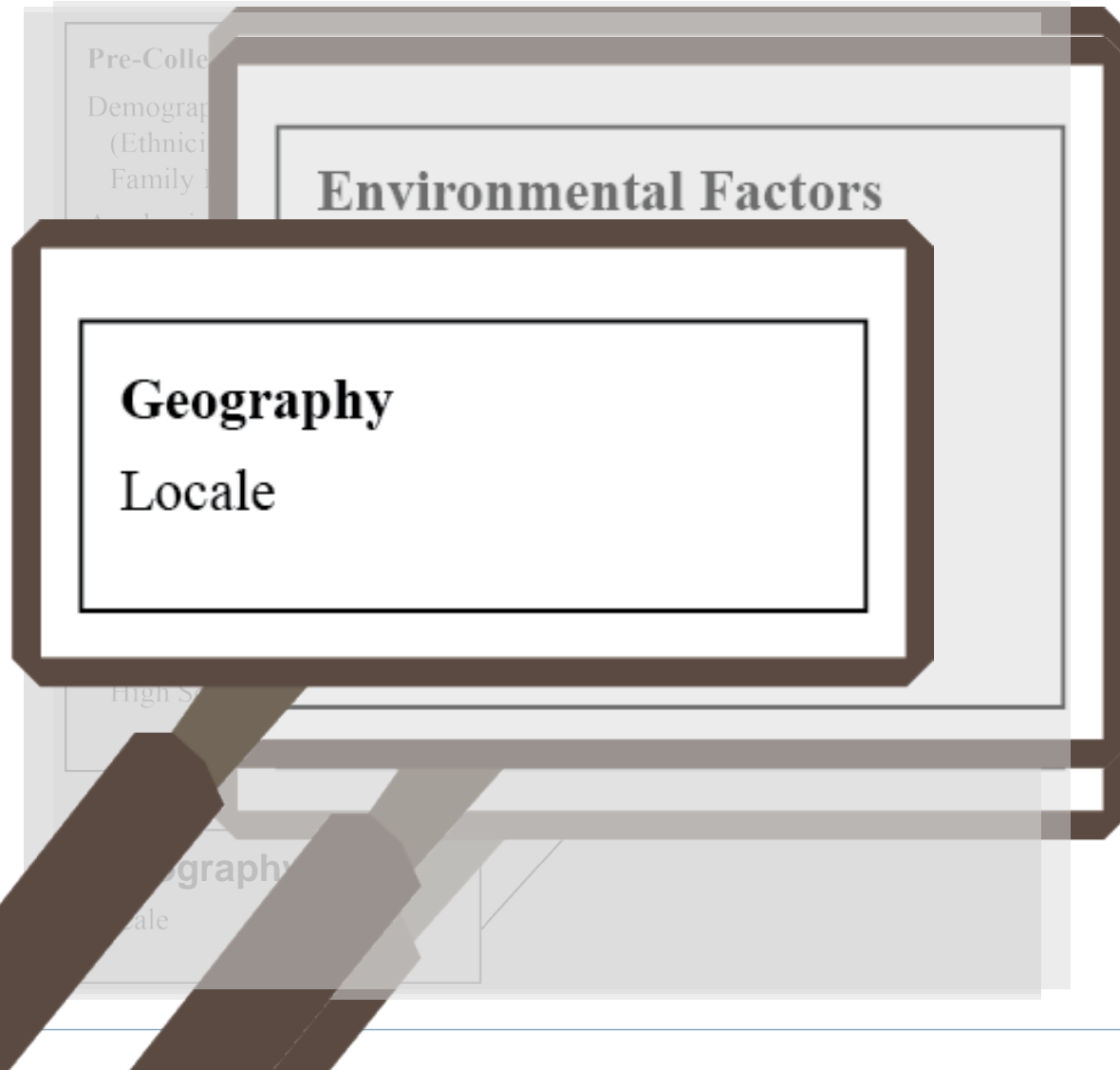
Data Sources

- ACT HS Class of 2003
 - ACT Scores
 - Student Interest Profiler
- National Student Clearinghouse
 - Enrollment
 - Degree completion
- Barron's

Observationally Equivalent Groups

- **Treatment group** ($n=2,154$): those initially enrolling at a community college FT, maintaining that enrollment through their 1st and 2nd years, and then transferring to a four-year college (no lateral transfers).
- **Comparison group** ($n=21,522$): rising four-year college juniors with a similar pattern of full-time enrollment (no lateral transfers)

Framework for the Propensity Score Matching Model



Matching Approach

- Exact match on high school
- Used propensity scores to find suitable matches
- Nearest neighbor (one-to-one)
- Caliper (.25 standard deviation units)
- Replacement (allows a comparison group member to be matched to more than one treatment group member)

Second Match that Involved a Post-Treatment Adjustment

- Controlled for college context
- Exact match on the selectivity (Barron's) of their undergraduate college
 - Large differences in bachelor's completion by selectivity level even after controlling for academic preparation (Lichtenberger & Dietrich, 2012)
- This approach is theoretically supported by Flores and Flores-Lagunes (2009) and Frangakis and Rubin (2002)

Comparing the Matched Pairs

For each community college transfer student we found a rising four-year college junior:

- With a similar profile based on key demographic, academic, and environmental factors
- Graduated from the same high school
- Enrolled at a similarly selective four-year college (in many cases it was the same college)

Research Questions

1. Is there a community college penalty with regards to bachelor's degree completion and end of study enrollment status after achieving sufficient balance on the pre-treatment characteristics?
2. Is there a community college penalty with regards to bachelor's degree completion and end of study enrollment status after achieving sufficient balance on the post-treatment adjustment?

Differences in Demographics Prior to Match

	Prior to Matching
Control	Standardized Difference
Race: White	26.32
Race: Latino	-5.43
Race: Asian	-18.16
Race: African American	-21.65
Race: Other	3.27
Gender: Male	8.19
Family Income: High \$80k+	-32.37
Family Income: Mid High \$50k-<\$80k	9.95
Family Income: Mid Low \$30k-<\$50k	16.27
Family Income: Low \$<30k	6.70
Family Income: Missing	0.00

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group

Differences in Academic Factors Prior to Match

	Prior to Matching
Control	Standardized Difference
HS GPA: 3.5+	-37.07
HS GPA: 3.0-3.4	11.99
HS GPA: 2.5-2.9	19.51
HS GPA: <2.5	22.23
HS GPA: Missing	4.71
ACT Math	-80.05
ACT English	-80.11
ACT Reading	-62.94
ACT Science	-67.67
ACT Composite	-84.18
HS Program: College Prep	-27.99
HS Program: CTE	19.25
HS Program: General	21.35
HS Program: Missing	4.65
HS Class Rank: Top 25%	-33.93
HS Class Rank: Second 25%	26.22
HS Class Rank: Third 25%	22.49
HS Class Rank: Bottom 25%	0.00
HS Class Rank: Missing	4.71

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group

Differences in Environmental Factors Prior to Match

	Prior to Matching
	Standardized Difference
Control	
Work Expectation: Yes	4.05
Work Expectation: No	-9.12
Work Expectation: Missing	4.86
Aid Expectation: Yes	-2.06
Aid Expectation: No	-2.83
Aid Expectation: Missing	2.44
Number of Siblings	-3.57
Locale: Chicago	-27.11
Locale: Other Urban	0.00
Locale: Suburban	-29.63
Locale: Town	32.90
Locale: Rural	35.65

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group

Differences in Institutional Selectivity Prior to Match

Barron's Institutional Selectivity	Prior to Matching
	Standardized Difference
Barron's: Most/Highly Competitive	-49.15
Barron's: Very Competitive	-34.98
Barron's: Competitive	60.94
Barron's: Less/Non Competitive	21.32
Barron's: Other	14.36

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group



- Rising four-year juniors were more likely to be at more competitive institutions.
- Community college transfer were more likely to be at less competitive institutions.

Differences in Demographics After Match

	Prior to Matching	After Match
	Standardized Difference	Standardized Difference
Control		
Race: White	26.32	-4.91
Race: Latino	-5.43	0.00
Race: Asian	-18.16	5.44
Race: African American	-21.65	0.00
Race: Other	3.27	0.00
Gender: Male	8.19	4.03
Family Income: High \$80k+	-32.37	2.63
Family Income: Mid High \$50k-<\$80k	9.95	7.19
Family Income: Mid Low \$30k-<\$50k	16.27	0.00
Family Income: Low \$<30k	6.70	0.00
Family Income: Missing	0.00	-8.51

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group

Differences in Academic Factors after Match

	Prior to Matching	After Match
	Standardized Difference	Standardized Difference
Control		
HS GPA: 3.5+	-37.07	2.24
HS GPA: 3.0-3.4	11.99	0.00
HS GPA: 2.5-2.9	19.51	9.08
HS GPA: <2.5	22.23	0.00
HS GPA: Missing	4.71	-6.72
ACT Math	-80.05	-3.04
ACT English	-80.11	-2.30
ACT Reading	-62.94	-0.40
ACT Science	-67.67	-0.29
ACT Composite	-84.18	-1.14
HS Program: College Prep	-27.99	0.00
HS Program: CTE	19.25	0.00
HS Program: General	21.35	10.21
HS Program: Missing	4.65	-8.92
HS Class Rank: Top 25%	-33.93	0.00
HS Class Rank: Second 25%	26.22	2.22
HS Class Rank: Third 25%	22.49	3.59
HS Class Rank: Bottom 25%	0.00	0.00
HS Class Rank: Missing	4.71	-8.92

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group



Differences in Environmental Factors After Match

	Prior to Matching	After Match
	Standardized Difference	Standardized Difference
Control		
Work Expectation: Yes	4.05	12.02
Work Expectation: No	-9.12	-7.08
Work Expectation: Missing	4.86	-6.89
Aid Expectation: Yes	-2.06	6.17
Aid Expectation: No	-2.83	2.93
Aid Expectation: Missing	2.44	-6.89
Number of Siblings	-3.57	1.79
Locale: Chicago	-27.11	0.00
Locale: Other Urban	0.00	0.00
Locale: Suburban	-29.63	0.00
Locale: Town	32.90	0.00
Locale: Rural	35.65	0.00

* Cells are shaded according to their difference from zero

Difference favoring 4-year group



Difference favoring community college group

Differences in Institutional Selectivity After Match

	Prior to Matching	After Match
Barron's Institutional Selectivity	Standardized Difference	Standardized Difference
Barron's: Most/Highly Competitive	-49.15	0.00
Barron's: Very Competitive	-34.98	0.00
Barron's: Competitive	60.94	0.00
Barron's: Less/Non Competitive	21.32	0.00
Barron's: Other	14.36	0.00

* Cells are shaded according to their difference from zero

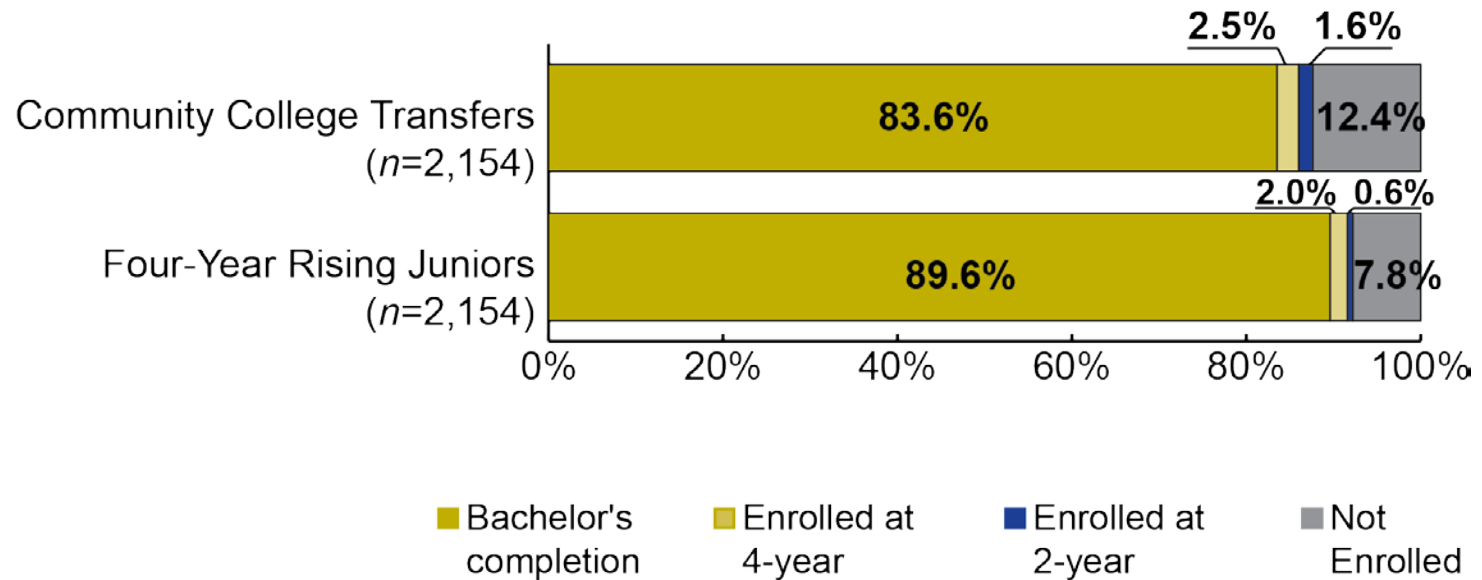
Difference favoring 4-year group



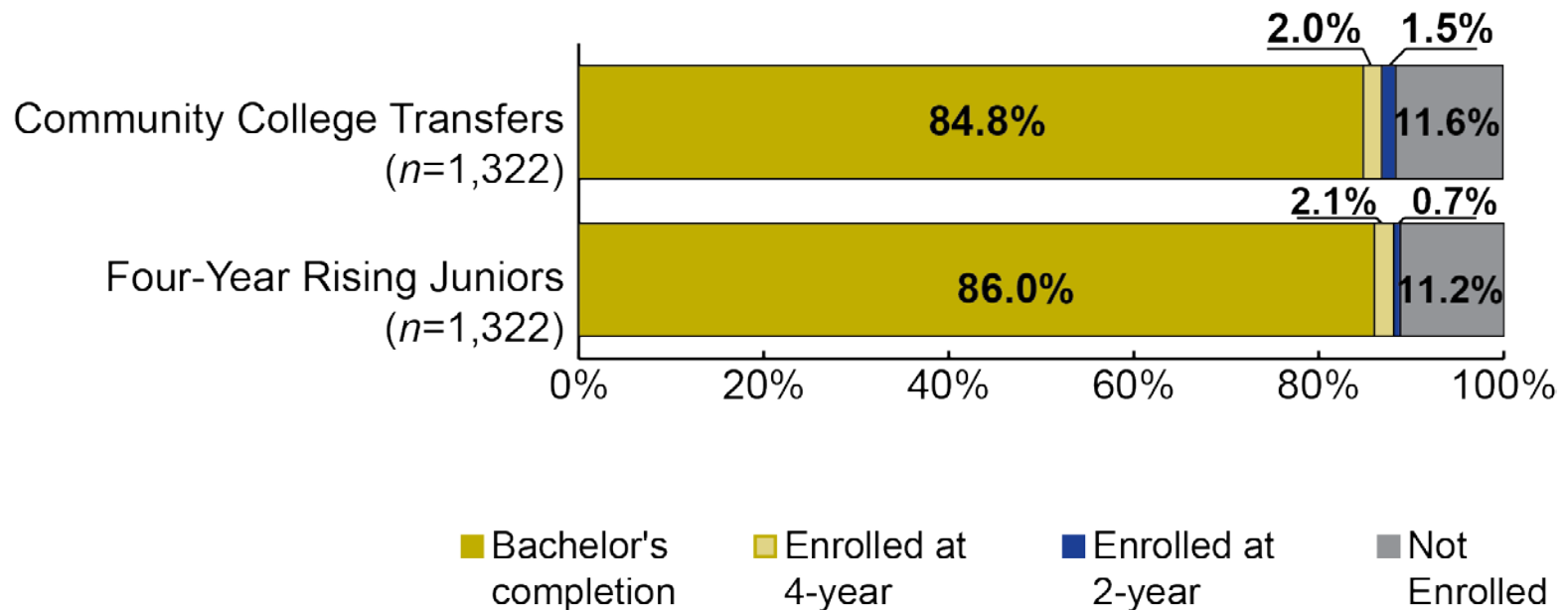
Difference favoring community college group

- After the Post-Treatment Adjustment- perfect balance on institutional selectivity.

Outcomes Prior to Matching



Outcomes After Matching



Multinomial Logistic Regression Model after Post-Treatment Adjustment

End of Study Status		B	Sig.	Odds Ratio	95% Confidence Interval for Odds Ratio	
					Lower Bound	Upper Bound
No Bachelor's, Enrolled at Four-year	Community College Transfer	-.094	.749	.910	.511	1.621

Enrolled at Community College	Community College Transfer	.778	.063	2.177	.938	4.947
	Work Expectation: Yes to No	.527	.365	1.693	.542	5.287
	Work Expectation: Missing to No	1.220	.278	3.388	.373	30.760
	HS Program: General to College Prep	-.376	.534	.687	.210	2.247
	HS Program: CTE to College Prep	.382	.536	1.465	.437	4.917
	HS Program: Missing to College Prep	-.314	.762	.731	.096	5.558
No Bachelor's, Enrolled at Four-year	Intercept	-2.615	.000			
	Community College Transfer	-.094	.749	.910	.511	1.621
	Work Expectation: Yes to No	1.110	.027	3.035	1.135	8.114
	Work Expectation: Missing to No	.830	.322	2.292	.444	11.833
	HS Program: General to College Prep	.015	.971	1.015	.461	2.235
	HS Program: CTE to College Prep	-.593	.361	.553	.155	1.972
	HS Program: Missing to College Prep	.471	.506	1.602	.399	6.423

Multinomial Logistic Regression Model after Post-Treatment Adjustment

End of Study Status		B	Sig.	Odds Ratio	95% Confidence Interval for Odds Ratio	
					Lower Bound	Upper Bound
Bachelor's	Intercept	2.122	.000			
	Community College Transfer	-.047	.701	.954	.749	1.214
	Work Expectation: Yes to No	.012	.937	1.012	.753	1.360
	Work Expectation: Missing to No	-.128	.715	.880	.442	1.751
	HS Program: General to College Prep	-.263	.106	.769	.559	1.058
	HS Program: CTE to College Prep	-.448	.037	.639	.420	.973
	HS Program: Missing to College Prep	.117	.722	1.124	.589	2.144
No Bachelor's, Enrolled at Community College	Intercept	-3.327	.000			
	Community College Transfer	.778	.063	2.177	.958	4.947
	Work Expectation: Yes to No	.527	.365	1.693	.542	5.287
	Work Expectation: Missing to No	1.220	.278	3.388	.373	30.760
	HS Program: General to College Prep	-.376	.534	.687	.210	2.247
	HS Program: CTE to College Prep	.382	.536	1.465	.437	4.917
	HS Program: Missing to College Prep	-.314	.762	.731	.096	5.558
No Bachelor's, Enrolled at Four-year	Intercept	-2.615	.000			
	Community College Transfer	-.094	.749	.910	.511	1.621
	Work Expectation: Yes to No	1.110	.027	3.035	1.135	8.114
	Work Expectation: Missing to No	.830	.322	2.292	.444	11.833
	HS Program: General to College Prep	.015	.971	1.015	.461	2.235
	HS Program: CTE to College Prep	-.593	.361	.553	.155	1.972
	HS Program: Missing to College Prep	.471	.506	1.602	.399	6.423

Summary

- The profile of CC transfers was significantly different than that of the rising four-year college juniors prior to matching.
- 84% of the CC transfers had earned a bachelor's degree within 5 academic years of transitioning to a four-year college.
- Balancing with PSM and post-treatment adjustment
- After achieving balance, *no significant community college penalty was evident regarding any of the outcomes.*

Policy Implications

- Continue to develop baseline information about statewide transfer performance.
- Set goals for institutional performance related to vertical transfer.
 - Community colleges and four-year institutions
- Help students face their financial aid future by developing information and incentives spanning undergraduate enrollment.
- Create policies that encourage/allow for full-time enrollment.



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