Online Appendix for

Effects of Reduced Community College Tuition on
College Choices and Degree Completion

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Table A.1. Michigan's Community College Districts

Community College	Counties	School Districts	Cities/Townships
Alpena		Alpena	
Bay de Noc	Delta Dickinson*		
Delta	Bay Midland Saginaw		
Glen Oaks	Branch* St. Joseph		
Gogebic	Gogebic		
Grand Rapids		Kent ISD: Byron Center, Caledonia, Cedar Springs, Comstock Park, East Grand Rapids, Forest Hills, Godfrey Lee, Godwin Heights, Grand Rapids, Grandville, Kelloggsville, Kenowa Hills, Kent City, Kentwood, Lowell, Northview, Rockford, Sparta, Thornapple Kellogg, Wyoming	
Henry Ford		Dearborn	
Jackson	Jackson		
Kalamazoo Valley		Climax-Scotts, Comstock, Galesburg-Augusta, Gull Lake, Kalamazoo, Mattawan, Parchment, Portage, Schoolcraft, Vicksburg	
Kellogg		Albion, Athens, Battle Creek, Harper Creek, Homer, Lakeview, Mar-Lee, Marshall, Pennfield, Tekonsha, Union City	
Kirtland		C.O.O.R. ISD: Crawford-AuSable, Fairview Area, Houghton Lake, Mio-AuSable, Roscommon Area, West Branch-Rose City	

Lake Michigan	Berrien	South Haven	Covert
Lansing		Bath, Dansville, Dewitt, East Lansing, Grand Ledge, Haslett, Holt/Diamondale, Lansing, Leslie, Mason, Okemos, Stockbridge, Waverly, Webberville, Williamston	
Macomb	Macomb		
Mid Michigan		Clare-Gladwin RESA: Beaverton Clare, Farwell, Gladwin, Harrison	
Monroe County	Monroe		
Montcalm		Montcalm Area ISD: Carson City-Crystal, Central Montcalm, Greenville, Lakeview, Montabella, Tri County, Vestaburg	
Mott		Genesee ISD: Atherton, Beecher, Bendle, Bentley, Carman-Ainsworth, Clio, Davison, Fenton, Flint, Flushing, Genesee, Goodrich, Grand Blanc, Kearsley, Lake Fenton, Lakeville, Linden, Montrose, Mt. Morris, Swartz Creek, Westwood Heights	
Muskegon	Muskegon		
North Central Michigan	Emmet		
Northwestern Michigan	Grand Traverse		
Oakland	Oakland		
Schoolcraft		Clarenceville, Garden City, Livonia, Northville, Novi (part), Plymouth-Canton	
Southwestern Michigan	Cass		Keeler, Hamilton
St. Clair County		Algonac, Capac, East China, Marysville, Memphis, Port Huron, Yale	
Washtenaw	Washtenaw		
Wayne County	Wayne		NOT INCLUDED: Dearborn, Garden City, Highland Park, Livonia, Northville, Plymouth, Canton (part)
West Shore		Bear Lake, Free Soil, Kaleva-Norman-Dickson, Ludington, Manistee, Mason County Central, Mason County Eastern, Onekama, Walkerville	Crystal, Elbridge, Weare

Notes: * denotes service district area.

Table A.2. Associate Degree Programs Offered by Community & Vocational Colleges

CIP Code	CIP Title	MI Comm. Colleges	Vocational Colleges	Diff.
1	Agriculture, Agriculture Operations, and Related	0.342	0.198	0.144
3	Natural Resources and Conservation	0.258	0.006	0.252
4	Architecture and Related Services	0.249	0.001	0.248
5	Area, Ethnic, Cultural, and Gender Studies	0.097	0.000	0.097
9	Communication, Journalism, and Related	0.536	0.726	-0.191
10	Communications Technologies/Technicians and Support	0.615	0.724	-0.109
11	Computer and Information Sciences and Support	0.996	0.957	0.039
12	Personal and Culinary Services	0.723	0.13	0.593
13	Education	0.864	0.735	0.129
14	Engineering	0.750	0.427	0.323
15	Engineering Technologies/Technicians	0.999	0.778	0.221
16	Foreign Languages, Literatures, and Linguistics	0.371	0.302	0.069
19	Family and Consumer Sciences/Human Sciences	0.838	0.725	0.112
22	Legal Professions and Studies	0.782	0.343	0.440
23	English Language and Literature/Letters	0.346	0.006	0.339
24	Liberal Arts and Sciences, General Studies, Humanities	1.000	0.084	0.916
25	Library Science	0.191	0.000	0.190
26	Biological and Biomedical Sciences	0.585	0.056	0.529
27	Mathematics and Statistics	0.377	0.006	0.372
29	Military Technologies	0.000	0.001	-0.001
30	Multi/Interdisciplinary Studies	0.429	0.007	0.422
31	Parks, Recreation, Leisure, and Fitness Studies	0.381	0.115	0.266
38	Philosophy and Religious Studies	0.185	0.000	0.185
39	Theology and Religious Vocations	0.018	0.000	0.017
40	Physical Sciences	0.416	0.006	0.411
41	Science Technologies/Technicians	0.439	0.000	0.438
42	Psychology	0.397	0.007	0.389
43	Security and Protective Services	0.996	0.939	0.056
44	Public Administration and Social Service Professions	0.483	0.010	0.473
45	Social Sciences	0.284	0.008	0.276
46	Construction Trades	0.567	0.016	0.551
47	Mechanic and Repair Technologies/Technicians	0.931	0.802	0.129
48	Precision Production	0.842	0.421	0.421
49	Transportation and Materials Moving	0.264	0.745	-0.482
50	Visual and Performing Arts	0.930	0.765	0.165
51	Health Professions and Related Clinical Sciences	1.000	0.945	0.055
52	Business, Management, Marketing, and Related	1.000	0.962	0.038
54	History	0.231	0.011	0.220

Notes: All data come from the U.S. Department of Education's College Scorecard. All variables are averaged across all 2009-16 high school graduates who enroll in college within one year of high school graduation to reflect the characteristics of the colleges that students attend.

Table A.3. Baker College versus Private Two-Year Colleges

Variable:	Baker College (1)	All Private Two-Years (2)	For-Profit (3)	Not-For-Profit (4)
Average Net Price	$12,333	$16,320	$16,200	$17,172
Instruction $ per FTE	$4,010	$4,361	$3,908	$7,525
% Full-Time Faculty	0.103	0.481	0.457	0.580
200% Graduation Rate	0.168	0.682	0.688	0.635
% Liberal Arts Degrees	0.003	0.007	0.000	0.058
Median Earnings	$26,880	$26,129	$24,512	$35,725
Median Debt	$8,447	$8,927	$8,673	$10,637
Institutions	1	2,092	1,838	336

Notes: Data come from the College Scorecard, averaged over all years 2009-2016.

Table A.4. Michigan's Traditional Four-Year Colleges

Variable:	Flagships (UM & MSU) (1)	Other Public (2)	All Private (3)
Undergraduates	32,475	12,522	1,669
Avg. Net Price	$15,477	$13,245	$18,995
Instruction $ per FTE	$17,943	$8,448	$8,430
% Full-Time Faculty	0.840	0.640	0.685
200% Graduation Rate	0.850	0.512	0.521
Median Earnings	$55,220	$42,229	$41,938
Median Debt	$18,771	$14,170	$16,106
Institutions	2	13	26

Notes: Data comes from the College Scorecard, averaged over all years 2009-2016. Flagship institutions are the University of Michigan (Ann Arbor) and Michigan State University.

Table A.5. First Stage Estimates of In-District Status on Tuition

Variable:	No Controls (1)	Distance Controls (2)	All Controls (3)
In-District Status	-1,814***	-1,795***	-1,797***
	(269.0)	(240.6)	(240.0)
Observations	64,667	64,667	64,667
Partial F-Statistic	45.46	55.67	56.06
Adjusted R^2	0.901	0.905	0.905

Notes: Each coefficient is estimated from a single regression and corresponds to λ in equation (2), representing the difference in local community college tuition faced by students residing inside of a community college district, as compared to students residing outside of a community college district. All standard errors are clustered at the boundary segment level.
$*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01.

Table A.6. Balance Tests of Census Tract Characteristics

Outcome	Median HH Income (1)	Poverty Share (2)	Mean 3rd Grade Math Score (3)	2 Bedroom Rental Price (4)
In-District Effect	1,427	-0.003	-0.077	13.08
	(1,065)	(0.005)	(0.116)	(12.69)
Observations	64,645	64,667	64,653	46,927
Mean	59,505	0.118	2.976	748.58

Outcome	Single Parent Share (5)	Non-White Share (6)	High-Paying Job Share (7)	Job Growth 2004-2013 (8)
In-District Effect	0.001	0.001	0.008	0.004
	(0.011)	(0.001)	(0.006)	(0.009)
Observations	64,667	64,667	64,667	64,667
Mean	0.245	0.142	0.387	0.006

Notes: The sample consists of all students who reside within two miles of the nearest community college district boundary segment and graduated from high school between 2009 and 2016. Each coefficient is estimated from a single regression that regresses the student characteristic of interest on a dummy variable for in-district status and the full set of boundary segment by year fixed effects. The coefficients represent the average difference in characteristics among students who reside within two miles of the same community college district boundary and graduate from high school in the same year. All data comes from the Equality of Opportunity Project and is publicly available at: https://opportunityinsights.org/data. All standard errors are clustered at the boundary segment level. $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01.

Table A.7: Balance Tests of Distance to Postsecondary Institutions

Outcome	Local CC (1)	Public Four-Year (2)	Private Four-Year (3)	Private Vocational (4)
In-District Effect	-1.462***	0.023	-0.929**	-0.717
	(0.178)	(0.432)	(0.442)	(0.468)
Observations	64,667	64,667	64,667	64,667
Mean	10.30	19.50	23.73	19.93

Notes: The sample consists of all students who reside within two miles of the nearest community college district boundary segment and graduated from high school between 2009 and 2016. Each coefficient is estimated from a single regression that regresses the student characteristic of interest on a dummy variable for in-district status and the full set of boundary segment by year fixed effects. The coefficients represent the average difference in characteristics among students who reside within two miles of the same community college district boundary and graduate from high school in the same year. All standard errors are clustered at the boundary segment level.
$*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table A.8. Heterogeneous Effects by Graduation Year

Variable:	Local CC (1)	Non-Local CC (2)	Vocational College (3)	Four-Year College (4)	Any College (5)
In-District Effect	0.066***	-0.024***	-0.007***	-0.009	0.019***
	(0.008)	(0.006)	(0.002)	(0.007)	(0.006)
In-District x 2009-2011 Grad	-0.005	-0.010**	-0.001	-0.001	-0.017**
	(0.008)	(0.004)	(0.003)	(0.007)	(0.007)
Observations	64,667	64,667	64,667	64,667	64,667
Mean	0.209	0.089	0.035	0.375	0.674

Notes: The sample consists of all students who reside within two miles of the nearest community college district boundary segment and graduated from high school between 2009 and 2016. The coefficients in the "in-district effect" rows correspond to δ in equation (1) for the 2012-2016 cohorts, representing the estimated change in the probability of an outcome due to a student residing in a community college district. The coefficients in the second row represent the difference in the in-district effect between the 2009-2011 cohorts and the 2012-2016 cohorts. All standard errors are clustered at the boundary segment level. $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table A.9. Academic Program Categories

Major Group	Two-Digit CIP Code	CIP Title
General Studies	24	Liberal Arts and Sciences, General Studies and Humanities
Liberal Arts	1	Agriculture, Agriculture Operations, and Related Sciences
	3	Natural Resources and Conservation
	5	Area, Ethnic, Cultural, and Gender Studies
	16	Foreign Languages, Literatures, and Linguistics
	23	English Language and Literatures
	26	Biological and Biomedical Sciences
	27	Mathematics and Statistics
	30	Multi/Interdisciplinary Studies
	38	Philosophy and Religious Studies
	40	Physical Sciences
	42	Psychology
	45	Social Sciences
	50	Visual and Performing Arts
	54	History
Health	51	Health Professions and Related Clinical Sciences
Business	52	Business, Management, Marketing, and Related Support Services
Technical	4	Architecture and Related Services
	10	Communications Technologies/Technicians and Support Services
	11	Computer and Information Sciences and Support Services
	14	Engineering
	15	Engineering Technologies/Technicians
	41	Science Technologies/Technicians
	46	Construction Trades
	47	Mechanic and Repair Technologies/Technicians
	48	Precision Production
	49	Transportation and Materials Moving
Professional	9	Communication, Journalism, and Related Programs
	12	Personal and Culinary Services
	13	Education
	19	Family and Consumer Sciences/Human Sciences
	22	Legal Professions and Studies
	25	Library Science
	31	Parks, Recreation, Leisure, and Fitness Studies
	43	Security and Protective Services
	44	Public Administration and Social Service Professions

Table A.10. Distribution of Bachelor's Degree Increases Across Professional Majors

Outcome	Protective Service	Family & Consumer Sciences	Personal Care & Culinary	Legal Studies	Education & Library Science	Comm. & Journalism	Public Admin.	Parks/Rec., Leisure, & Fitness
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In-District	0.001	-0.001	0.000	0.000	0.004**	-0.000	0.002*	0.003**
Effect	(0.002)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Tuition	0.001	-0.001	0.000	0.000	0.002**	0.000	0.001	0.002*
Effect	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	23,734	23,734	23,734	23,734	23,734	23,734	23,734	23,734
Mean	0.008	0.004	0.0002	0.001	0.018	0.017	0.008	0.011

Notes: The sample consists of all students who reside within two miles of the nearest community college district boundary segment and graduated from high school between 2009 and 2011. Each coefficient is estimated from a single regression. The coefficients in the "in-district effect" rows correspond to δ in equation (1), representing the estimated change in the probability of an outcome due to a student residing in a community college district. The coefficients in the "tuition effect" rows correspond to β 1000, where β is defined as in equation (3). These coefficients represent the estimate change in the probability of an outcome due to a $1,000 decrease in the annual tuition rate at a student's local community college. All standard errors are clustered at the boundary segment level. $*$ p < 0.10, $**$ p < 0.05, $***$ p < 0.01.

Table A.11. Characteristics of Community and Vocational Colleges

Variable:	MI Community Colleges (1)	Vocational Colleges (2)	Difference (3)
Avg. Net Price	$5,325.38	$14,004.62	-$8,679.24
Instruction $ per FTE	$4,993.05	$3,897.80	$1,095.25
% Full-Time Faculty	0.400	0.213	0.188
Transfer Rate	0.360	0.111	0.249
150% Graduation Rate	0.135	0.196	-0.061
% Liberal Arts Degrees	0.349	0.006	0.343
Median Earnings	$29,326.50	$29,018.95	$307.55
Median Debt	$4,211.58	$8,867.49	-$4,655.91
Students	191,394	21,720	-
Institutions	28	144	-

Notes: All data comes from the U.S. Department of Education's College Scorecard, except for the transfer rate variable which is calculated on the full sample of Michigan's 2009-2011 high school graduates who enroll in community or vocational colleges within one year of high school graduation. All variables are averaged across all 2009-2016 high school graduates who enroll in college within one year of high school graduation to reflect the characteristics of the colleges that students attend.

Table A.12. Balance Tests of Student Characteristics, Varying Bandwidths

Bandwidth:	**White**	**Male**	**FRPL**	**SPED**	**ELL**	**Math**	**Reading**	**On-Time**	**Dual**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
4 Miles	-0.015	0.001	-0.009	-0.008*	0.004	0.018	0.026**	-0.001	-0.007
(N=145,775)	(0.013)	(0.003)	(0.016)	(0.004)	(0.003)	(0.016)	(0.012)	(0.003)	(0.006)
3 Miles	-0.008	-0.000	-0.012	-0.009**	0.004	0.022*	0.023**	-0.001	-0.007*
(N=102,791)	(0.009)	(0.004)	(0.012)	(0.004)	(0.004)	(0.013)	(0.011)	(0.002)	(0.004)
2 Miles	0.001	-0.004	-0.015	-0.009***	0.006	0.012	0.015	-0.001	-0.008*
(N=64,667)	(0.010)	(0.005)	(0.012)	(0.003)	(0.006)	(0.013)	(0.012)	(0.003)	(0.004)
1 Mile	0.016	0.004	-0.023	-0.010**	0.010	0.020	0.008	-0.002	-0.011*
(N=31,541)	(0.013)	(0.007)	(0.019)	(0.005)	(0.010)	(0.016)	(0.015)	(0.003)	(0.006)
0.5 Miles	0.020	0.005	-0.032	-0.009	0.008	0.017	0.026	-0.003	-0.014*
(N=15,185)	(0.014)	(0.009)	(0.025)	(0.007)	(0.010)	(0.020)	(0.022)	(0.006)	(0.008)
0.1 Miles	-0.014	0.054**	0.051**	-0.011	0.001	-0.015	0.020	-0.015	-0.023
(N=1,136)	(0.022)	(0.025)	(0.023)	(0.018)	(0.003)	(0.052)	(0.070)	(0.024)	(0.028)

Notes: The sample consists of all students who reside within the specified distance of the nearest community college district boundary segment and graduated from high school between 2009 and 2016. Each coefficient is estimated from a single regression that regresses the student characteristic of interest on a dummy variable for in-district status and the full set of boundary segment by year fixed effects. The coefficients represent the average difference in characteristics among students who reside within the specified distance of the same community college district boundary and graduate from high school in the same year. All standard errors are clustered at the boundary segment level. $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table A.13. Full Enrollment Results for Within Same School District Sample

Outcome	Local CC	Non-Local CC	Vocational College	Four-Year College	Any College
	(1)	(2)	(3)	(4)	(5)
In-District Effect	0.050***	-0.020*	-0.001	-0.016	0.014
	(0.014)	(0.012)	(0.005)	(0.018)	(0.016)
Tuition Effect	0.032***	-0.013	-0.001	-0.010	0.009
	(0.011)	(0.008)	(0.003)	(0.012)	(0.010)
Observations	17,783	17,783	17,783	17,783	17,783
Mean	0.233	0.067	0.035	0.336	0.643

Notes: The sample consists of all students who reside within a school district that intersects a community college district and graduated from high school between 2009 and 2016. Each coefficient is estimated from a single regression that includes a full set of school district by graduation year fixed effects. The coefficients in the "policy effect" represent the estimated change in the probability of an outcome due to a student residing in a community college district. The coefficients in the "tuition effect" row represent the estimate change in the probability of an outcome due to a $1,000 decrease in the annual tuition rate at a student's local community college. All standard errors are clustered at the boundary segment level.
$*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Figure A.1. Distribution of Border Pair Tuition Differentials

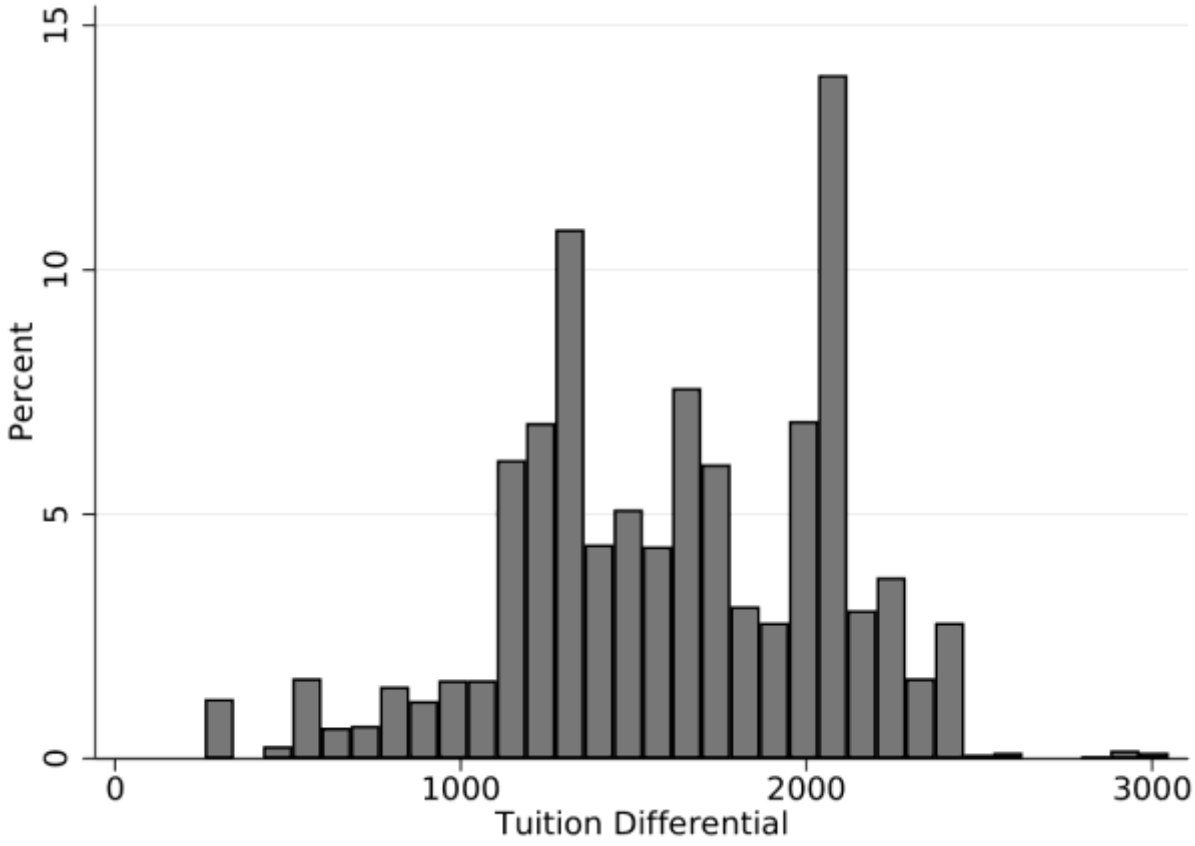
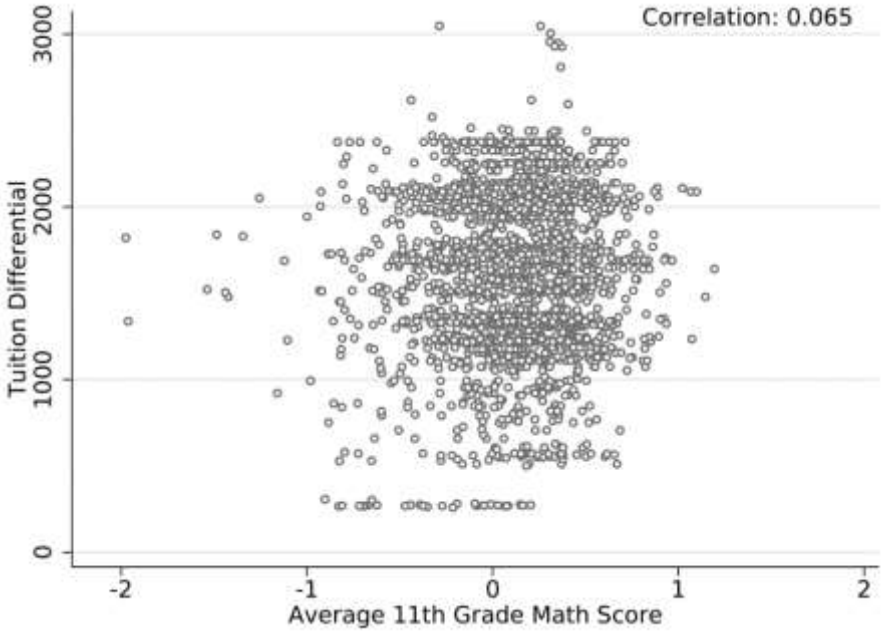
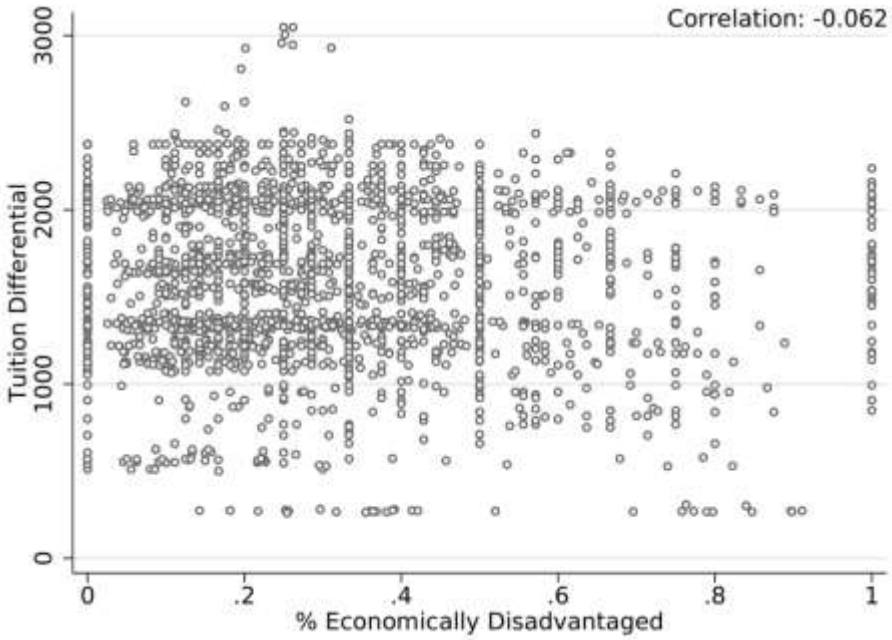


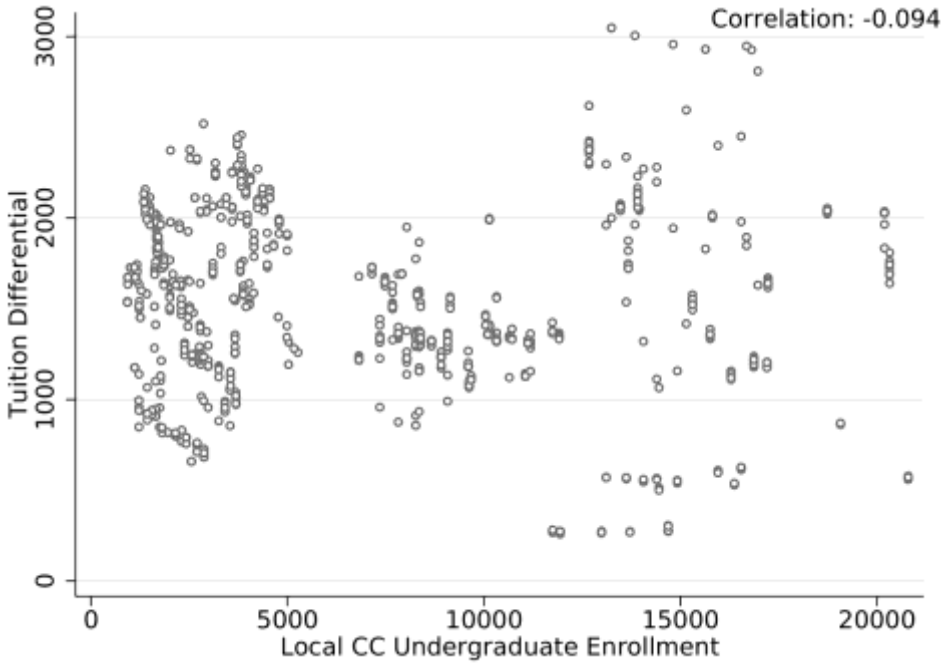
Figure A.2. Correlation Between Tuition Differentials and Area Characteristics



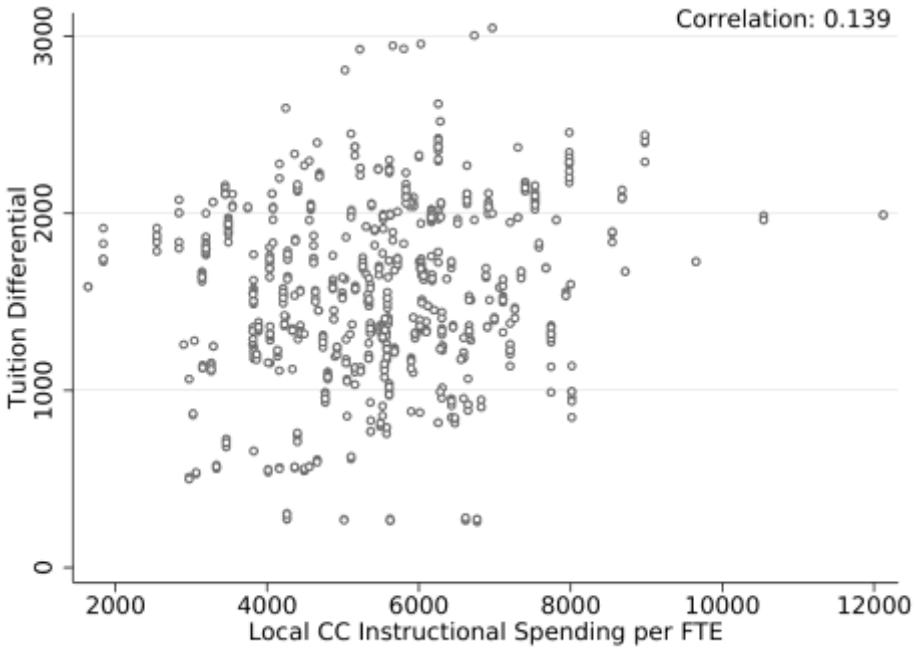
(a) % Economically Disadvantaged



(b) Math Test Scores



(c) Local CC Size



(d) Local CC Quality

Figure A.3. Reduced Form Estimates with Alternative Bandwidths

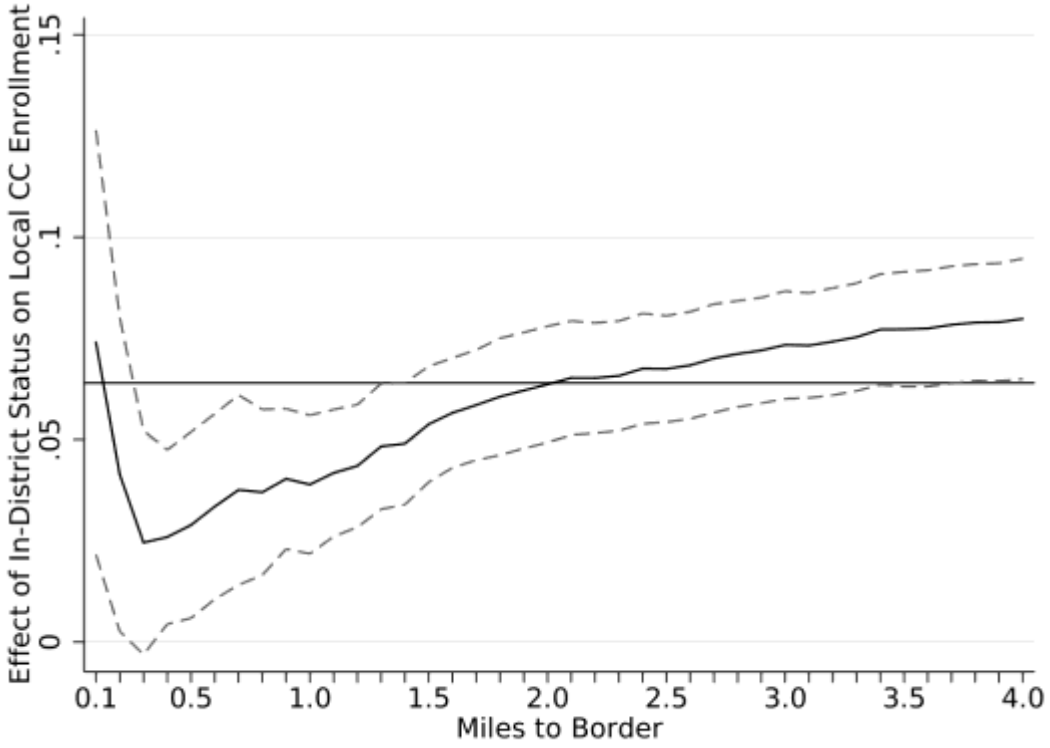


Figure A.4. School Districts Overlapping Community College Districts