



```

name: <unnamed>
log: D:\Thesis\Code\Spells_Nia_2026_CODE.smcl
log type: smcl
opened on: 9 Apr 2026, 10:07:03

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1 .
2 . *1. Import Dataset
3 . use "D:\Thesis\Processed Data\Spells_Nia_NETSBikeNetworkData.dta", clear

4 .
5 . **delcare panel
6 . xtset nta_id_num year

Panel variable: nta_id_num (strongly balanced)
Time variable: year, 2007 to 2019
Delta: 1 unit

7 .
8 .
9 . *2. Borusyak & Hull Recentering for Connectivity
10. ** run regression with year FE and clustering by NTA
11. reghdfe connectivity coverage_2007 log_bike_miles_2007 street_width if year > 2007,
> absorb(year) cluster(nta_id)
(MWFE estimator converged in 1 iterations)

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```

HDFE Linear regression      Number of obs   =      2,160
Absorbing 1 HDFE group     F(   3,   179) =      18.91
Statistics robust to heteroskedasticity  Prob > F       =      0.0000
                                         R-squared      =      0.3471
                                         Adj R-squared  =      0.3429
                                         Within R-sq.   =      0.3353
                                         Root MSE      =      0.0506

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Number of clusters (nta_id) =      180
                               (Std. err. adjusted for 180 clusters in nta_id)

```

connectivity	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
coverage_2007	.0217387	.0115089	1.89	0.061	-.000972	.0444494
log_bike_miles_2007	-.0327082	.0066917	-4.89	0.000	-.0459129	-.0195035
street_width	-.0026306	.0008975	-2.93	0.004	-.0044016	-.0008596
_cons	.1738731	.0362189	4.80	0.000	.1024021	.245344

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
year	12	0	12

```

12.
13. ** store model to memory for later export
14. estimates store connectivity_model

15.
16. ** generate fitted values (_mu)
17. predict connectivity_mu, xb

```

```

18.
19. ** generate recentered residual (_tilde)
20. gen connectivity_tilde = connectivity - connectivity_mu

21.
22. *3. Borusyak & Hull Recentering for Betweenness
23.
24. reghdfe betweenness coverage_2007 log_bike_miles_2007 street_width if year > 2007, a
    > bsorb(year)
    (MWFE estimator converged in 1 iterations)

```

HDFE Linear regression
Absorbing 1 HDFE group

```

Number of obs   =      2,160
F(   3,   2145) =     180.57
Prob > F        =      0.0000
R-squared       =      0.2352
Adj R-squared   =      0.2302
Within R-sq.    =      0.2016
Root MSE       =     620.1988

```

betweenness	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
coverage_2007	688.6164	66.30754	10.39	0.000	558.5826	818.6502
log_bike_miles_2007	125.1704	15.20859	8.23	0.000	95.34532	154.9956
street_width	-32.33119	4.649421	-6.95	0.000	-41.44903	-23.21334
_cons	1133.147	161.6759	7.01	0.000	816.0893	1450.205

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
year	12	0	12

```

25.
26. estimates store betweenness_model

27.
28. predict betweenness_mu, xb

29.
30. gen betweenness_tilde = betweenness - betweenness_mu

31.
32. ** save dataset with the recentered variables
33. save "D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetworkData.dta", replac
    > e
    (file D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetworkData.dta not
     found)
    file D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetworkData.dta saved

34.
35. export delimited using "D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetwor
    > kData.csv", replace
    (file D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetworkData.csv not
     found)
    file D:\Thesis\Processed Data\Spells_Nia_NETSRecenteredBikeNetworkData.csv saved

36.

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37. *4. Balance Test Regression: Connectivity
 38. reghdfe L.connectivity_tilde L.coverage L.log_bikemiles log_income log_med_rent log_> pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id_num year) clus-
 > ter(nta_id_num)
 (MWFE_estimator converged in 2 iterations)

HDFE Linear regression
 Absorbing 2 HDFE groups
 Statistics robust to heteroskedasticity

Number of obs = 2,160
 F(7, 179) = 11.05
 Prob > F = 0.0000
 R-squared = 0.8685
 Adj R-squared = 0.8553
 Within R-sq. = 0.5757
 Root MSE = 0.0203

Number of clusters (nta_id_num) = 180

(Std. err. adjusted for 180 clusters in nta_id_num)

L. connectivity_tilde	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
coverage L1.	.1105854	.0241785	4.57	0.000	.0628739	.1582968
log_bikemiles L1.	-.075762	.0116995	-6.48	0.000	-.0988486	-.0526754
log_income	-.183563	.1940394	-0.95	0.345	-.566462	.1993359
log_med_rent	.6039131	.6245578	0.97	0.335	-.6285303	1.836356
log_pop	-.0030198	.0035692	-0.85	0.399	-.010063	.0040234
unemployment_rate	-6.258475	5.789384	-1.08	0.281	-17.6827	5.165747
pct_nvehicle_comm	.4077213	.267135	1.53	0.129	-.1194178	.9348603
_cons	-2.206685	2.414323	-0.91	0.362	-6.970881	2.557512

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
nta_id_num	180	180	0 *
year	12	1	11

* = FE nested within cluster; treated as redundant for DoF computation

39.
 40. estimates store balance_connectivity
 41.
 42. *5. Balance Test Regression: Betweenness
 43. reghdfe L.betweenness_tilde L.coverage L.log_bikemiles log_income log_med_rent log_p-
 > op unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id_num year) clust-
 > er(nta_id_num)
 (MWFE_estimator converged in 2 iterations)

HDFE Linear regression
 Absorbing 2 HDFE groups
 Statistics robust to heteroskedasticity

Number of obs = 2,160
 F(7, 179) = 5.66
 Prob > F = 0.0000
 R-squared = 0.7353
 Adj R-squared = 0.7087
 Within R-sq. = 0.1592
 Root MSE = 314.4455

Number of clusters (nta_id_num) = 180

(Std. err. adjusted for 180 clusters in nta_id_num)

L. betweenness_tilde	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
coverage L1.	1051.89	308.8102	3.41	0.001	442.5134	1661.267
log_bikemiles L1.	43.7884	46.46818	0.94	0.347	-47.90751	135.4843
log_income	-3450.557	5428.345	-0.64	0.526	-14162.34	7261.227

log_med_rent	9045.077	13813.22	0.65	0.513	-18212.63	36302.78
log_pop	83.26034	130.4054	0.64	0.524	-174.0694	340.59
unemployment_rate	-104686.3	101467.5	-1.03	0.304	-304912.6	95540.03
pct_nvehicle_comm	1257.251	4068.173	0.31	0.758	-6770.498	9284.999
_cons	-25725.53	40768.2	-0.63	0.529	-106173.6	54722.59

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

44.

45. estimates store balance_betweenness

46.

47. *6. Outcome Regressions: Connectivity

48. ** outcome 1: log-ratio

49. reghdfe log_sitdownrest L.connectivity_tilde L.coverage L.log_bikemiles log_income 1
> og_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id
> d year) cluster(nta_id)
(MWFE estimator converged in 3 iterations)

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(8, 179)	=	8.31
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9328
	Adj R-squared	=	0.9260
	Within R-sq.	=	0.0367
Number of clusters (nta_id)	Root MSE	=	0.0952

(Std. err. adjusted for 180 clusters in nta_id)

log_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-.1218221	.1679516	-0.73	0.469	-.4532418	.2095977
coverage L1.	-.0015087	.0449716	-0.03	0.973	-.0902514	.0872339
log_bikemiles L1.	.003105	.0150857	0.21	0.837	-.0266638	.0328738
log_income	-.0984193	1.168071	-0.08	0.933	-2.403379	2.206541
log_med_rent	1.80913	3.322252	0.54	0.587	-4.746687	8.364948
log_pop	-.1241221	.0172182	-7.21	0.000	-.158099	-.0901452
unemployment_rate	-22.32854	28.54471	-0.78	0.435	-78.65597	33.99888
pct_nvehicle_comm	1.172735	1.199731	0.98	0.330	-1.1947	3.540171
_cons	-13.02693	11.51718	-1.13	0.260	-35.75386	9.699989

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

50.

51. estimates store conn_ratio

52.

53. ** outcome 2: raw establishment count

54. reghdfe count_sitdownrestaurants L.connectivity_tilde L.coverage L.log_bikemiles log
 > _income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, abs
 > orb(nta_id year) cluster(nta_id)
 (MWFE_estimator converged in 2 iterations)

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(8, 179)	=	10.64
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9819
	Adj R-squared	=	0.9801
	Within R-sq.	=	0.2468
Number of clusters (nta_id)	Root MSE	=	14.7569

(Std. err. adjusted for 180 clusters in nta_id)

count_sitdownres~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-42.91503	27.38379	-1.57	0.119	-96.95161	11.12155
coverage L1.	57.49972	13.31489	4.32	0.000	31.22537	83.77407
log_bikemiles L1.	-8.373891	3.030656	-2.76	0.006	-14.3543	-2.393481
log_income	-27.89287	183.0405	-0.15	0.879	-389.0877	333.302
log_med_rent	138.0868	440.4481	0.31	0.754	-731.0519	1007.225
log_pop	5.111382	3.50813	1.46	0.147	-1.81123	12.03399
unemployment_rate	-3235.213	3282.788	-0.99	0.326	-9713.155	3242.73
pct_nvehicle_comm	-420.2662	113.6755	-3.70	0.000	-644.5827	-195.9497
_cons	-251.2848	1262.389	-0.20	0.842	-2742.364	2239.794

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

55.

56. estimates store conn_count

57.

58. ** outcome 3: employees count

59. reghdfe emps_sitdownrestaurants L.connectivity_tilde L.coverage L.log_bikemiles log_
 > income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, abso
 > rb(nta_id year) cluster(nta_id)
 (MWFE_estimator converged in 2 iterations)

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(8, 179)	=	7.80
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9906
	Adj R-squared	=	0.9896
	Within R-sq.	=	0.1395
Number of clusters (nta_id)	Root MSE	=	162.6011

(Std. err. adjusted for 180 clusters in nta_id)

emps_sitdownrest~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-290.8671	307.7578	-0.95	0.346	-898.1671	316.433
coverage L1.	428.3907	148.2377	2.89	0.004	135.8725	720.9089
log_bikemiles L1.	-52.94559	33.29006	-1.59	0.114	-118.637	12.74587
log_income	2192.409	2311.748	0.95	0.344	-2369.377	6754.194
log_med_rent	-3406.162	5550.046	-0.61	0.540	-14358.1	7545.774
log_pop	74.08918	35.17642	2.11	0.037	4.675361	143.503
unemployment_rate	9430.719	42681.88	0.22	0.825	-74793.68	93655.11
pct_nvehicle_comm	-3902.035	1224.791	-3.19	0.002	-6318.922	-1485.149
_cons	3569.376	15222.42	0.23	0.815	-26469.11	33607.86

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

60.

61. estimates store conn_emps

62.

63. ** outcome 4: employees per establishment

64. reghdfe epe_sitdownrest L.connectivity_tilde L.coverage L.log_bikemiles log_income l
 > og_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_i
 > d year) cluster(nta_id)
 (MWFE estimator converged in 3 iterations)

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(8, 179)	=	3.51
Statistics robust to heteroskedasticity	Prob > F	=	0.0008
	R-squared	=	0.8716
	Adj R-squared	=	0.8586
	Within R-sq.	=	0.0755
	Root MSE	=	1.2608

Number of clusters (nta_id) = 180

(Std. err. adjusted for 180 clusters in nta_id)

epe_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	2.037581	1.642066	1.24	0.216	-1.202717	5.277879
coverage L1.	-.1769342	.8005048	-0.22	0.825	-1.756575	1.402706
log_bikemiles L1.	.192153	.244443	0.79	0.433	-.2902078	.6745138
log_income	15.52929	17.3168	0.90	0.371	-18.64205	49.70063
log_med_rent	-4.51702	49.07911	-0.09	0.927	-101.3651	92.33106
log_pop	-.3599584	.2654271	-1.36	0.177	-.883727	.1638103
unemployment_rate	32.61994	426.4136	0.08	0.939	-808.8242	874.0641
pct_nvehicle_comm	29.82541	15.61052	1.91	0.058	-.97891	60.62974
_cons	-137.7558	167.5574	-0.82	0.412	-468.3977	192.8861

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

65.

66. estimates store conn_epe

67.

68. *7. Outcome Regressions: Betweenness

69. ** outcome 5: log-ratio

70. reghdfe log_sitdownrest L.betweenness_tilde L.coverage L.log_bikemiles log_income lo
> g_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id
> year) cluster(nta_id)
(MWFE_estimator converged in 3 iterations)

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(8 , 179)	=	8.59
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9328
	Adj R-squared	=	0.9260
	Within R-sq.	=	0.0366
Number of clusters (nta_id)	=	180	Root MSE = 0.0952

(Std. err. adjusted for **180** clusters in **nta_id**)

log_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
betweenness_tilde L1.	7.08e-06	.0000123	0.58	0.566	-.0000172	.0000313
coverage L1.	-.0224278	.0439765	-0.51	0.611	-.1092068	.0643513
log_bikemiles L1.	.0120243	.0117806	1.02	0.309	-.0112223	.0352709
log_income	-.051616	1.162335	-0.04	0.965	-2.345258	2.242026
log_med_rent	1.671492	3.315687	0.50	0.615	-4.871372	8.214356
log_pop	-.1243513	.0170389	-7.30	0.000	-.1579744	-.0907283
unemployment_rate	-20.82496	28.54077	-0.73	0.467	-77.14462	35.49471
pct_nvehicle_comm	1.114156	1.202723	0.93	0.356	-1.259184	3.487495
_cons	-12.57578	11.53043	-1.09	0.277	-35.32884	10.17727

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

71.

72. estimates store bet_ratio

73.

74. ** outcome 6: raw establishment count

75. reghdfe count_sitdownrestaurants L.betweenness_tilde L.coverage L.log_bikemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(b(nta_id year) cluster(nta_id))
(MWFE_estimator converged in 2 iterations)

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(8, 179)	=	11.64
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9822
	Adj R-squared	=	0.9804
	Within R-sq.	=	0.2580
Number of clusters (nta_id)	Root MSE	=	14.6465

(Std. err. adjusted for 180 clusters in nta_id)

count_sitdownre~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
betweenness_tilde L1.	.0063628	.0023419	2.72	0.007	.0017416	.010984
coverage L1.	46.06099	13.03875	3.53	0.001	20.33155	71.79043
log_bikemiles L1.	-5.401181	2.452061	-2.20	0.029	-10.23985	-.5625157
log_income	1.939916	174.5889	0.01	0.991	-342.5774	346.4572
log_med_rent	54.61791	417.6257	0.13	0.896	-769.4851	878.7209
log_pop	4.711208	3.669169	1.28	0.201	-2.529184	11.9516
unemployment_rate	-2300.533	3099.68	-0.74	0.459	-8417.148	3816.082
pct_nvehicle_comm	-445.7632	110.6474	-4.03	0.000	-664.1044	-227.422
_cons	7.101242	1199.662	0.01	0.995	-2360.198	2374.4

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

76.

77. estimates store bet_count

78.

79. ** outcome 7: employees count

80. reghdfe emps_sitdownrestaurants L.betweenness_tilde L.coverage L.log_bikemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(b(nta_id year) cluster(nta_id))
(MWFE_estimator converged in 2 iterations)

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(8, 179)	=	10.17
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9908
	Adj R-squared	=	0.9899
	Within R-sq.	=	0.1629
Number of clusters (nta_id)	Root MSE	=	160.3701

(Std. err. adjusted for 180 clusters in nta_id)

emps_sitdownres~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
betweenness_tilde L1.	.0873857	.0328679	2.66	0.009	.0225273	.1522441
coverage L1.	304.3049	142.8479	2.13	0.035	22.42245	586.1873
log_bikemiles L1.	-34.73541	26.43047	-1.31	0.190	-86.89079	17.41997
log_income	2547.33	2212.348	1.15	0.251	-1818.307	6912.968
log_med_rent	-4372.231	5276.302	-0.83	0.408	-14783.99	6039.525
log_pop	67.69177	35.46002	1.91	0.058	-2.281679	137.6652
unemployment_rate	20399.19	40426.88	0.50	0.614	-59375.4	100173.8
pct_nvehicle_comm	-4130.494	1176.812	-3.51	0.001	-6452.703	-1808.284
_cons	6459.272	14388.7	0.45	0.654	-21934.03	34852.58

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

81.

82. estimates store bet_emps

83.

84. ** outcome 8: employees per establishment

85. reghdfe epe_sitdownrest L.connectivity_tilde L.betweenness_tilde L.coverage L.log_bi
 > kemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year
 > > 2007, absorb(nta_id year) cluster(nta_id)
 (MWFE estimator converged in 3 iterations)

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(9, 179)	=	3.28
Statistics robust to heteroskedasticity	Prob > F	=	0.0010
	R-squared	=	0.8716
	Adj R-squared	=	0.8585
	Within R-sq.	=	0.0755
	Root MSE	=	1.2611

Number of clusters (nta_id) = 180

(Std. err. adjusted for 180 clusters in nta_id)

epe_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	2.051188	1.64971	1.24	0.215	-1.204194	5.30657
betweenness_tilde L1.	-9.25e-06	.0001158	-0.08	0.936	-.0002378	.0002193
coverage L1.	-.1687079	.8162241	-0.21	0.836	-1.779367	1.441952
log_bikemiles L1.	.193589	.2452928	0.79	0.431	-.2904487	.6776266
log_income	15.49985	17.36729	0.89	0.373	-18.77111	49.77081
log_med_rent	-4.441535	49.19016	-0.09	0.928	-101.5087	92.62567
log_pop	-.3591405	.2670617	-1.34	0.180	-.8861349	.1678538
unemployment_rate	31.73666	427.8316	0.07	0.941	-812.5058	875.9792
pct_nvehicle_comm	29.8315	15.61445	1.91	0.058	-.9805703	60.64358
_cons	-137.9639	167.7874	-0.82	0.412	-469.0598	193.132

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

86.

87. estimates store bet_epe

88.

89. *8. Outcome Regressions: Joint Model

90. ** outcome 9: log-ratio

91. reghdfe log_sitdownrest L.connectivity_tilde L.betweenness_tilde L.coverage L.log_bi
> kemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm, absorb(
> nta_id year) cluster(nta_id)
(MWFE_estimator converged in 3 iterations)

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(9, 179)	=	7.72
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9328
	Adj R-squared	=	0.9260
	Within R-sq.	=	0.0373
Number of clusters (nta_id)	Root MSE	=	0.0952

(Std. err. adjusted for 180 clusters in nta_id)

log_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-.1334378	.1685895	-0.79	0.430	-.4661164	.1992407
betweenness_tilde L1.	7.90e-06	.0000124	0.64	0.524	-.0000165	.0000323
coverage L1.	-.0085316	.0455852	-0.19	0.852	-.098485	.0814219
log_bikemiles L1.	.001879	.0151614	0.12	0.902	-.028039	.0317971
log_income	-.0732921	1.160203	-0.06	0.950	-2.362728	2.216144
log_med_rent	1.744689	3.304311	0.53	0.598	-4.775725	8.265103
log_pop	-.1248203	.0170485	-7.32	0.000	-.1584622	-.0911783
unemployment_rate	-21.57448	28.39202	-0.76	0.448	-77.6006	34.45165
pct_nvehicle_comm	1.167536	1.195365	0.98	0.330	-1.191284	3.526355
_cons	-12.84927	11.47612	-1.12	0.264	-35.49517	9.796632

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

```

92.
93. estimates store joint_ratio

94.
95. ** outcome 10: raw establishment count
96. reghdfe count sitdownrestaurants L.connectivity_tilde L.betweenness_tilde L.coverage
> L.log_bikemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm
> if year > 2007, absorb(nta_id year) cluster(nta_id)
(MWFE_estimator converged in 2 iterations)

```

```

HDFE Linear regression      Number of obs   =      2,160
Absorbing 2 HDFE groups    F(      9,    179) =      10.39
Statistics robust to heteroskedasticity  Prob > F       =      0.0000
                                      R-squared        =      0.9823
                                      Adj R-squared     =      0.9805
                                      Within R-sq.      =      0.2619
Number of clusters (nta_id) =      180      Root MSE      =      14.6113

```

(Std. err. adjusted for 180 clusters in nta_id)

count_sitdownres~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-52.74946	27.17631	-1.94	0.054	-106.3766	.8777001
betweenness_tilde L1.	.0066861	.0024172	2.77	0.006	.0019163	.0114559
coverage L1.	51.55427	13.62572	3.78	0.000	24.66657	78.44197
log_bikemiles L1.	-9.411738	3.001356	-3.14	0.002	-15.33433	-3.489147
log_income	-6.627481	174.7063	-0.04	0.970	-351.3763	338.1214
log_med_rent	83.55002	418.1373	0.20	0.842	-741.5626	908.6626
log_pop	4.525	3.708607	1.22	0.224	-2.793214	11.84321
unemployment_rate	-2596.823	3109.03	-0.84	0.405	-8731.889	3538.244
pct_nvehicle_comm	-424.6625	109.5307	-3.88	0.000	-640.8001	-208.5249
_cons	-100.9839	1199.601	-0.08	0.933	-2468.163	2266.195

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

```

97.
98. estimates store joint_count

99.
100 ** outcome 11: employees count
101 reghdfe emps sitdownrestaurants L.connectivity_tilde L.betweenness_tilde L.coverage
> L.log_bikemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm
> if year > 2007, absorb(nta_id year) cluster(nta_id)
(MWFE_estimator converged in 2 iterations)

```

```

HDFE Linear regression      Number of obs   =      2,160
Absorbing 2 HDFE groups    F(      9,    179) =      8.92
Statistics robust to heteroskedasticity  Prob > F       =      0.0000
                                      R-squared        =      0.9909
                                      Adj R-squared     =      0.9899
                                      Within R-sq.      =      0.1653
Number of clusters (nta_id) =      180      Root MSE      =      160.1827

```

(Std. err. adjusted for 180 clusters in nta_id)

emps_sitdownrest~s	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	-423.2165	303.2781	-1.40	0.165	-1021.677	175.2439
betweenness_tilde L1.	.0899793	.033496	2.69	0.008	.0238815	.1560772
coverage L1.	348.3782	148.0361	2.35	0.020	56.25781	640.4987
log_bikemiles L1.	-66.91269	32.00046	-2.09	0.038	-130.0594	-3.766013
log_income	2478.593	2219.355	1.12	0.266	-1900.873	6858.059
log_med_rent	-4140.105	5304.19	-0.78	0.436	-14606.89	6326.682
log_pop	66.1978	35.5357	1.86	0.064	-3.924982	136.3206
unemployment_rate	18022.02	40802.55	0.44	0.659	-62493.88	98537.91
pct_nvehicle_comm	-3961.2	1176.756	-3.37	0.001	-6283.3	-1639.101
_cons	5592.089	14490.48	0.39	0.700	-23002.06	34186.24

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
nta_id	180	180	0 *
year	12	1	11

* = FE nested within cluster; treated as redundant for DoF computation

102

103 estimates store joint_emps

104

105 ** outcome 12: employees per establishment

```
106 reghdfe epe_sitdownrest L.connectivity_tilde L.betweenness_tilde L.coverage L.log_bi
> kemiles log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year
> > 2007, absorb(nta_id year) cluster(nta_id)
(MWFE_estimator converged in 3 iterations)
```

HDFE Linear regression	Number of obs	=	2,159
Absorbing 2 HDFE groups	F(9, 179)	=	3.28
Statistics robust to heteroskedasticity	Prob > F	=	0.0010
	R-squared	=	0.8716
	Adj R-squared	=	0.8585
	Within R-sq.	=	0.0755
Number of clusters (nta_id)	=	180	Root MSE = 1.2611

(Std. err. adjusted for 180 clusters in nta_id)

epe_sitdownrest	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	2.051188	1.64971	1.24	0.215	-1.204194	5.30657
betweenness_tilde L1.	-9.25e-06	.0001158	-0.08	0.936	-.0002378	.0002193
coverage L1.	-.1687079	.8162241	-0.21	0.836	-1.779367	1.441952
log_bikemiles L1.	.193589	.2452928	0.79	0.431	-.2904487	.6776266
log_income	15.49985	17.36729	0.89	0.373	-18.77111	49.77081
log_med_rent	-4.441535	49.19016	-0.09	0.928	-101.5087	92.62567
log_pop	-.3591405	.2670617	-1.34	0.180	-.8861349	.1678538

unemployment_rate	31.73666	427.8316	0.07	0.941	-812.5058	875.9792
pct_nvehicle_comm	29.8315	15.61445	1.91	0.058	-.9805703	60.64358
_cons	-137.9639	167.7874	-0.82	0.412	-469.0598	193.132

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
nta_id	180	180	0 *
year	12	1	11

* = FE nested within cluster; treated as redundant for DoF computation

107

108 estimates store joint_epe

109

110 *9. Outcome Regressions: Total Establishments

111 **outcome 13: connectivity - total establishments

112 reghdfe total_est L.connectivity_tilde L.coverage L.log_bikemiles log_income log_med

> _rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id year

>) cluster(nta_id)

(MWFE estimator converged in 2 iterations)

HDFE Linear regression

Absorbing 2 HDFE groups

Statistics robust to heteroskedasticity

Number of obs = **2,160**

F(**8**, **179**) = **8.33**

Prob > F = **0.0000**

R-squared = **0.9960**

Adj R-squared = **0.9956**

Within R-sq. = **0.0684**

Root MSE = **85.8086**

Number of clusters (nta_id) = **180**

(Std. err. adjusted for **180** clusters in **nta_id**)

total_est	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	111.7477	102.0122	1.10	0.275	-89.55343	313.0489
coverage L1.	39.96905	95.51529	0.42	0.676	-148.5118	228.4499
log_bikemiles L1.	-4.206424	16.00235	-0.26	0.793	-35.78395	27.3711
log_income	3191.52	921.9648	3.46	0.001	1372.202	5010.838
log_med_rent	-7386.099	2205.218	-3.35	0.001	-11737.67	-3034.531
log_pop	48.60181	23.99349	2.03	0.044	1.255335	95.94829
unemployment_rate	60584.79	17962.4	3.37	0.001	25139.48	96030.09
pct_nvehicle_comm	-3216.242	472.8602	-6.80	0.000	-4149.34	-2283.145
_cons	19384.78	5970.871	3.25	0.001	7602.425	31167.13

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs
nta_id	180	180	0 *
year	12	1	11

* = FE nested within cluster; treated as redundant for DoF computation

113

114 estimates store conn_total

115

116 **outcome 14: betweenness - total establishments

```
117 reghdfe total_est L.betweenness_tilde L.coverage L.log_bikemiles log_income log_med_
> rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007, absorb(nta_id year)
> cluster(nta_id)
(MWFE estimator converged in 2 iterations)
```

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(8, 179)	=	8.40
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9960
	Adj R-squared	=	0.9956
	Within R-sq.	=	0.0801
Number of clusters (nta_id)	Root MSE	=	85.2697

(Std. err. adjusted for 180 clusters in nta_id)

total_est	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
betweenness_tilde L1.	.0313695	.0163449	1.92	0.057	-.0008839	.063623
coverage L1.	19.3294	95.04597	0.20	0.839	-168.2253	206.8841
log_bikemiles L1.	-14.04627	10.31029	-1.36	0.175	-34.39162	6.29907
log_income	3279.25	909.4385	3.61	0.000	1484.65	5073.85
log_med_rent	-7602.353	2169.415	-3.50	0.001	-11883.27	-3321.435
log_pop	45.65252	22.01137	2.07	0.040	2.217357	89.08768
unemployment_rate	63169.38	17845.46	3.54	0.001	27954.82	98383.93
pct_nvehicle_comm	-3210.12	479.4348	-6.70	0.000	-4156.191	-2264.049
_cons	19945.18	5861.62	3.40	0.001	8378.419	31511.95

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

118

119 estimates store bet_total

120

121 **outcome 15: joint - total establishments

```
122 reghdfe total_est L.connectivity_tilde L.betweenness_tilde L.coverage L.log_bikemile
> s log_income log_med_rent log_pop unemployment_rate pct_nvehicle_comm if year > 2007
> , absorb(nta_id year) cluster(nta_id)
(MWFE estimator converged in 2 iterations)
```

HDFE Linear regression	Number of obs	=	2,160
Absorbing 2 HDFE groups	F(9, 179)	=	7.58
Statistics robust to heteroskedasticity	Prob > F	=	0.0000
	R-squared	=	0.9960
	Adj R-squared	=	0.9956
	Within R-sq.	=	0.0803
Number of clusters (nta_id)	Root MSE	=	85.2809

(Std. err. adjusted for 180 clusters in nta_id)

total_est	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]	
connectivity_tilde L1.	66.20348	88.60302	0.75	0.456	-108.6373	241.0443
betweenness_tilde L1.	.0309638	.0162036	1.91	0.058	-.0010109	.0629385
coverage L1.	12.43503	99.66788	0.12	0.901	-184.2401	209.1102
log_bikemiles L1.	-9.012804	14.4879	-0.62	0.535	-37.60185	19.57624
log_income	3290.002	908.8503	3.62	0.000	1496.563	5083.442
log_med_rent	-7638.665	2165.369	-3.53	0.001	-11911.6	-3365.731
log_pop	45.88622	22.06854	2.08	0.039	2.338241	89.4342
unemployment_rate	63541.24	17834.22	3.56	0.000	28348.86	98733.61
pct_nvehicle_comm	-3236.602	477.6045	-6.78	0.000	-4179.062	-2294.143
_cons	20080.84	5834.352	3.44	0.001	8567.879	31593.8

Absorbed degrees of freedom:

Absorbed FE	Categories	- Redundant	= Num. Coefs	
nta_id	180	180	0	*
year	12	1	11	

* = FE nested within cluster; treated as redundant for DoF computation

123

124 estimates store joint_total

125

126

127 *10. Create Output Tables with Readable Variable Names

128 **define labels for mapping covariates

129 local recenter labels ///

```
> street_width "2007 Street Width (ft)" ///
```

```
> coverage_2007 "2007 Coverage" ///
```

```
> log_bike_miles_2007 "2007 Log Bike Lane Miles"
```

130

131 local labels ///

```
> L.connectivity_tilde "Lagged Connectivity" ///
```

```
> L.betweenness_tilde "Lagged Betweenness" ///
```

```
> L.coverage "Lagged Coverage" ///
```

```
> L.log_bikemiles "Lagged Log Bike Lane Miles" ///
```

```
> log_income "Log Income Per Capita" ///
```

```
> log_med_rent "Log Median Rent" ///
```

```
> log_pop "Log Population" ///
```

```
> unemployment_rate "Unemployment Rate" ///
```

```
> pct_nvehicle_comm "Non-Vehicle Commuter Share"
```

132

133 local balance labels ///

```
> street_width "2007 Street Width (ft)" ///
```

```
> coverage_2007 "2007 Coverage" ///
```

```
> log_bike_miles_2007 "2007 Log Bike Lane Miles" ///
```

```
> L.connectivity_tilde "Lagged Connectivity" ///
```

```
> L.betweenness_tilde "Lagged Betweenness" ///
```

```
> L.coverage "Lagged Coverage" ///
```

```
> L.log_bikemiles "Lagged Log Bike Lane Miles" ///
```

```
> log_income "Log Income Per Capita" ///
```

```
> log_med_rent "Log Median Rent" ///
```

```
> log_pop "Log Population" ///
```

```
> unemployment_rate "Unemployment Rate" ///
```

```
> pct_nvehicle_comm "Non-Vehicle Commuter Share"
```

```

134
135 **10a. Recentering Regressions
136 esttab connectivity_model betweenness_model using "D:\Thesis\Processed Data\Output T
  > ables\Recentering_Connectivity_Betweenness.csv", replace b(%9.3f) se(%9.3f) label ti
  > tle("Recentering for Network Metrics") varlabels(`recenter_labels`) se star(* 0.1 **
  > 0.05 *** 0.01) mtitles("Connectivity" "Betweenness") nocons stats(r2 N, fmt(3 0) la
  > bels("R-squared" "Observations"))
  (output written to D:\Thesis\Processed Data\Output Tables\Recentering_Connectivity_Bet
  > weenness.csv)

137
138 **10b. Balance Tests
139 esttab balance_connectivity balance_betweenness using "D:\Thesis\Processed Data\Outp
  > ut Tables\BalanceTests_Connectivity_Betweenness.csv", replace b(%9.3f) se(%9.3f) lab
  > el title("Balance Tests for Network Metrics") varlabels(`balance_labels`) se star(*
  > 0.1 ** 0.05 *** 0.01) mtitles("Connectivity" "Betweenness") nocons stats(r2 N, fmt(3
  > 0) labels("R-squared" "Observations"))
  (output written to D:\Thesis\Processed Data\Output Tables\BalanceTests_Connectivity_Be
  > tweenness.csv)

140
141
142 **10c. Connectivity and Sector Characteristics
143 esttab conn_ratio conn_count conn_emps conn_epe using "D:\Thesis\Processed Data\Outp
  > ut Tables\Connectivity_Sector_Output.csv", replace b(%9.4f) se(%9.4f) label title("C
  > onnectivity & Sector Characteristics") mtitles("Log (Restaurant Share)" "Restaurant
  > Count" "Total Employment" "Employees per Establishment") varlabels(`labels`) se star
  > (* 0.1 ** 0.05 *** 0.01) nocons stats(r2 N, fmt(3 0) labels("R-squared" "Observation
  > s"))
  (output written to D:\Thesis\Processed Data\Output Tables\Connectivity_Sector_Output.c
  > sv)

144
145 **10d. Betweenness and Sector Characterisitcs
146 esttab bet_ratio bet_count bet_emps bet_epe using "D:\Thesis\Processed Data\Output T
  > ables\Betweenness_Sector_Output.csv", replace b(%9.3f) se(%9.3f) label title("Between
  > ness & Sector Characteristics") mtitles("Log (Restaurant Share)" "Restaurant Count"
  > "Total Employment" "Employees per Establishment") varlabels(`labels`) se star(* 0.1 *
  > * 0.05 *** 0.01) nocons stats(r2 N, fmt(3 0) labels("R-squared" "Observations"))
  (output written to D:\Thesis\Processed Data\Output Tables\Betweenness_Sector_Output.cs
  > v)

147
148 **10e. Joint Model and Sector Characteristics
149 esttab joint_ratio joint_count joint_emps joint_epe using "D:\Thesis\Processed Data\
  > Output Tables\Joint_Sector_Output.csv", replace b(%9.4f) se(%9.4f) label title("Join
  > t Connectivity & Betweenness & Sector Characteristics") mtitles("Log (Restaurant Sha
  > re)" "Restaurant Count" "Total Employment" "Employees per Establishment") varlabels(
  > `labels`) se star(* 0.1 ** 0.05 *** 0.01) nocons stats(r2 N, fmt(3 0) labels("R-squa
  > red" "Observations"))
  (output written to D:\Thesis\Processed Data\Output Tables\Joint_Sector_Output.csv)

150
151 **10f. Total Establishment Regressions (Connectivity, Betweenness, Joint)
152 esttab conn_total bet_total joint_total using "D:\Thesis\Processed Data\Output Table
  > s\Total_Establishments_Output.csv", replace b(%9.4f) se(%9.4f) label title("Total Es
  > tablishments Regressions") mtitles("Connectivity" "Betweenness" "Joint") varlabels(`
  > labels`) order(L.connectivity tilde L.betweenness tilde) se star(* 0.1 ** 0.05 *** 0
  > .01) nocons stats(r2 N, fmt(3 0) labels("R-squared" "Observations"))
  (output written to D:\Thesis\Processed Data\Output Tables\Total_Establishments_Output.
  > csv)

153
154 log close
    name: <unnamed>
      log: D:\Thesis\Code\Spells_Nia_2026_CODE.smcl
    log type: smcl
  closed on: 9 Apr 2026, 10:07:09

```
