

Online Appendix to “Economic Impacts of the US National Park System”

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1 Summary statistics

Table A.1: NPS designations 1970-2017

Designation	Nature park
International Historic Site	0
National Battlefield	0
National Battlefield Park	0
National Battlefield Site	0
National Historic Landmark	0
National Historic Park	0
National Historic Park and Preserve	0
National Historic Site	0
National Lakeshore	1
National Memorial	0
National Memorial Parks	1
National Military Park	0
National Monument	1 ^a
National Monument and Historic Site	0
National Monument and National Preserve	1
National Park	1
National Park and Preserve	1
National Park for the Performing Arts	0
National Parkway	1
National Preserve	1
National Recreation Area	1
National Recreational River	1
National Reserve	1
National River	1
National River and National Recreation Area	1
National Scenic River/Riverway	1
National Seashore	1
Scenic and Recreational River	1

^a National monuments are categorized as nature parks, except the following: Aztec Ruins, Booker T. Washington, Cabrillo, Casa Grande Ruins, Cesar E. Chavez, Charles Young Buffalo Soldiers, Fort Frederica, Fort Pulaski, Fort Stanwix, Fort Sumter, Fort Union, George Washington Birthplace, George Washington Carver, Gila Cliff Dwellings, Homestead of America, Lincoln Boyhood, Little Bighorn Battlefield, Montezuma Castle and Tuzigoot, Navajo, Ocmulgee, Pipe Spring, Pipestone, Salinas Pueblo Missions

Table A.2: Summary statistics of NPS data over time, all parks

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Visitors	794.966	1581.67	31.8	275.5	1988.5	191
Budget	1169.882	1757.781	146.84	491.729	2665.427	196
Acreage	113.372	319.87	0.045	2.725	243.302	195
Age	36.814	25.102	6.5	40	69	210
National Park	0.157					210
National Monument	0.324					210
National Historic Park	0.048					210
Nature park	0.495					210
<i>1985</i>						
Visitors	922.33	2259.235	29.86	238.326	2104.189	220
Budget	1234.857	1795.48	170.074	535.362	3017.658	222
Acreage	106.244	302.539	0.04	3.156	235.404	222
Age	43.603	26.312	12	48	79	229
National Park	0.157					229
National Monument	0.279					229
National Historic Park	0.07					229
Nature park	0.489					229
<i>1995</i>						
Visitors	925.626	1959.887	32.626	249.029	2430.162	235
Budget	1410.786	1907.108	210.63	709.318	3132.546	235
Acreage	112.83	346.712	0.055	3.973	235.613	235
Age	49.759	28.404	18	49	88	249
National Park	0.165					249
National Monument	0.233					249
National Historic Park	0.1					249
Nature park	0.482					249
<i>2005</i>						
Visitors	806.592	1837.981	24.868	207.199	1996.502	251
Budget	1616.124	2061.824	319.508	813.876	3562.212	252
Acreage	115.332	350.059	0.04	3.556	235.625	252
Age	57.745	29.615	18	57	98	259
National Park	0.174					259
National Monument	0.216					259
National Historic Park	0.108					259
Nature park	0.467					259
<i>2015</i>						
Visitors	846.585	1816.972	26.219	214.441	2284.612	259
Budget	1620.36	2023.625	320.652	838.758	3695.094	259
Acreage	112.17	344.37	0.03	3.669	236.381	259
Age	65.394	31.436	24	60	108	269
National Park	0.171					269
National Monument	0.212					269
National Historic Park	0.13					269
Nature park	0.454					269

Notes: This table extends Table 1 from the paper.

Table A.3: Summary statistics of NPS data over time, national parks

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Visitors	1476.85	1620.092	236.1	1017.3	2625.1	32
Budget	2929.926	2443.494	819.888	1832.807	5504.461	32
Acreage	418.789	506.582	36.01	212.912	1013.598	32
Age	56.515	28.8	10	57	86	33
<i>1985</i>						
Visitors	1329.722	1663.391	164.132	715.064	2711.529	36
Budget	3027.935	2636.702	867.472	1872.212	6349.442	36
Acreage	403.451	480.207	40.151	226.648	1013.572	36
Age	63.139	28.968	18	61.5	96	36
<i>1995</i>						
Visitors	1532.234	1707.21	210.938	960.376	3658.615	41
Budget	3274.774	2818.83	965.223	2269.685	6635.17	41
Acreage	474.462	657.729	46.996	235.613	1013.572	41
Age	72.366	27.284	30	70	97	41
<i>2005</i>						
Visitors	1338.334	1616.454	170.383	781.67	3142.774	45
Budget	3602.344	3116.758	886.329	2735.791	7724.526	45
Acreage	439.368	638.427	32.861	218.2	1013.572	45
Age	79.689	28.16	38	80	107	45
<i>2015</i>						
Visitors	1582.769	1956.127	169.535	883.236	4150.217	46
Budget	3543.866	2963.763	972.082	2672.382	7071.223	46
Acreage	432.232	632.79	32.571	208.659	1013.324	46
Age	90.087	27.976	48	90	117	46

Notes: This table extends Table 1 from the paper.

Table A.4: Summary statistics of log(employment) over time, NP designation sample

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Overall	9.899	1.535	7.971	9.783	12.136	188
Construction	6.974	1.52	5.107	6.894	9.136	187
Mining	4.503	1.96	2.062	4.486	6.851	180
Farm	6.733	1.021	5.497	6.745	7.875	184
<i>1985</i>						
Overall	10.147	1.569	8.248	10.058	12.422	188
Construction	7.278	1.632	5.281	7.319	9.623	184
Mining	4.803	1.979	2.398	4.852	7.176	179
Farm	6.728	0.948	5.577	6.712	7.827	184
<i>1995</i>						
Overall	10.397	1.55	8.497	10.292	12.704	188
Construction	7.55	1.651	5.452	7.635	9.695	183
Mining	4.907	1.574	2.833	5.166	6.638	156
Farm	6.641	0.997	5.455	6.653	7.794	184
<i>2005</i>						
Overall	10.566	1.583	8.565	10.46	12.923	188
Construction	8.044	1.472	6.001	8.009	9.99	181
Mining	4.827	1.719	2.562	5.001	6.908	130
Farm	6.578	0.998	5.311	6.542	7.789	184
<i>2015</i>						
Overall	10.632	1.606	8.595	10.509	13.028	188
Construction	7.821	1.526	5.978	7.78	10.035	180
Mining	5.712	1.513	3.367	5.889	7.478	134
Farm	6.657	1.017	5.438	6.604	8	184

Notes: Summary statistics of the BEA employment variables for selected years in the NP designation regressions. Observations are parks over time. We aggregate county-level data to the park level as described in the paper.

Table A.5: Summary statistics of log(employment) over time, park openings sample

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Overall	9.095	1.285	7.622	8.978	10.769	2703
Construction	5.991	1.432	4.277	5.931	7.792	2664
Mining	3.827	2.01	1.099	3.85	6.405	2300
Farm	6.838	0.882	5.724	6.959	7.759	2680
<i>1985</i>						
Overall	9.246	1.343	7.695	9.137	11.012	2703
Construction	6.196	1.481	4.431	6.105	8.12	2644
Mining	3.92	2.238	0	3.912	6.853	2501
Farm	6.741	0.809	5.749	6.828	7.608	2680
<i>1995</i>						
Overall	9.409	1.391	7.792	9.297	11.222	2703
Construction	6.445	1.556	4.554	6.423	8.399	2614
Mining	4.25	1.789	1.792	4.277	6.562	1873
Farm	6.601	0.825	5.597	6.686	7.485	2680
<i>2005</i>						
Overall	9.491	1.452	7.787	9.363	11.436	2703
Construction	6.892	1.478	5.1	6.817	8.842	2442
Mining	4.187	1.997	1.609	4.443	6.683	1490
Farm	6.434	0.821	5.455	6.502	7.328	2680
<i>2015</i>						
Overall	9.531	1.473	7.816	9.388	11.521	2703
Construction	6.789	1.448	5.088	6.696	8.717	2436
Mining	5.028	1.852	2.89	5.147	7.401	1502
Farm	6.423	0.829	5.447	6.485	7.304	2680

Notes: Summary statistics of the BEA employment variables for selected years in the park opening regressions. Observations are counties or parks (groups of counties) over time. We aggregate county-level data to the park level as described in the paper.

Table A.6: Summary statistics of log(income) over time, NP designation sample

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Overall	12.731	1.654	10.736	12.576	15.062	188
Hotel	7.786	1.691	5.547	7.964	9.946	169
Retail	10.577	1.642	8.543	10.533	12.918	187
Construction	10.106	1.593	8.283	10.02	12.411	187
Mining	8.258	1.867	5.693	8.212	10.733	180
Forestry	7.094	1.612	5.193	7.009	9.157	183
Farm	8.471	1.29	6.974	8.454	10.233	184
<i>1985</i>						
Overall	12.905	1.726	10.714	12.836	15.423	188
Hotel	8.294	1.694	5.998	8.281	10.513	163
Retail	10.709	1.717	8.549	10.647	13.166	188
Construction	10.209	1.771	8.034	10.187	12.677	184
Mining	8.246	1.915	5.854	8.081	10.73	179
Forestry	8.078	1.68	6.223	7.824	10.324	182
Farm	8.472	1.557	6.678	8.378	10.472	169
<i>1995</i>						
Overall	13.175	1.75	11.089	13.07	15.761	188
Hotel	8.315	1.906	5.855	8.469	10.643	179
Retail	10.968	1.744	8.739	10.957	13.331	188
Construction	10.449	1.816	8.247	10.539	12.831	183
Mining	7.573	2.287	4.237	8.101	10.096	153
Forestry	8.78	1.668	6.708	8.52	11.022	173
Farm	8.964	1.5	7.088	8.872	10.815	163
<i>2005</i>						
Overall	13.487	1.767	11.275	13.368	16.096	188
Hotel	8.734	1.804	6.5	8.742	10.922	177
Retail	11.383	1.665	9.167	11.451	13.773	178
Construction	11.049	1.692	8.947	11.026	13.312	181
Mining	7.71	2.368	4.562	7.94	10.309	127
Forestry	8.771	1.512	7.305	8.489	10.796	110
Farm	9.444	1.565	7.862	9.453	11.36	174
<i>2015</i>						
Overall	13.596	1.756	11.328	13.484	16.235	188
Hotel	8.952	1.819	6.635	9.072	11.054	180
Retail	11.421	1.629	9.152	11.423	13.769	179
Construction	10.915	1.705	8.814	10.754	13.18	180
Mining	7.869	2.487	4.268	8.144	10.773	126
Forestry	8.981	1.471	7.471	8.646	11.067	118
Farm	9.659	1.661	7.699	9.587	11.79	170

Notes: Summary statistics of the BEA employment variables for selected years in the NP designation regressions. Observations are parks over time. We aggregate county-level data to the park level as described in the paper.

Table A.7: Summary statistics of log(income) over time, park openings sample

Variable	Mean	Std. dev.	10%	50%	90%	N
<i>1975</i>						
Overall	11.842	1.403	10.253	11.695	13.657	2703
Hotel	5.874	2.267	2.922	5.913	8.739	2029
Retail	9.608	1.448	7.967	9.494	11.466	2689
Construction	8.998	1.553	7.148	8.91	10.985	2664
Mining	7.301	1.969	4.868	7.202	9.979	2299
Forestry	6.259	1.382	4.625	6.246	7.954	2548
Farm	8.517	1.299	6.874	8.654	10.025	2622
<i>1985</i>						
Overall	11.906	1.509	10.152	11.769	13.84	2702
Hotel	7.129	1.884	4.868	7.108	9.468	1302
Retail	9.603	1.574	7.76	9.529	11.61	2698
Construction	8.982	1.677	6.933	8.893	11.17	2644
Mining	7.118	2.195	4.175	7.091	10.055	2497
Forestry	7.136	1.402	5.533	7.095	8.865	2592
Farm	8.591	1.433	6.823	8.799	10.126	2412
<i>1995</i>						
Overall	12.077	1.579	10.235	11.947	14.103	2702
Hotel	6.309	2.366	3.044	6.464	9.242	2033
Retail	9.729	1.673	7.739	9.669	11.887	2693
Construction	9.215	1.743	7.061	9.188	11.425	2614
Mining	6.83	2.392	3.407	7.08	9.774	1732
Forestry	7.75	1.493	6.001	7.656	9.672	2193
Farm	8.7	1.452	6.818	8.87	10.308	2309
<i>2005</i>						
Overall	12.329	1.581	10.5	12.171	14.46	2703
Hotel	6.888	2.434	3.713	7.048	9.63	1926
Retail	10.269	1.65	8.19	10.228	12.426	2142
Construction	9.735	1.696	7.693	9.627	11.963	2442
Mining	6.998	2.77	3.044	7.53	10.192	1385
Forestry	8.294	1.19	6.993	8.206	9.694	1064
Farm	9.372	1.346	7.702	9.557	10.818	2548
<i>2015</i>						
Overall	12.415	1.592	10.553	12.244	14.57	2702
Hotel	7.282	2.255	4.728	7.335	9.967	1864
Retail	10.285	1.661	8.194	10.219	12.488	2168
Construction	9.836	1.603	7.949	9.719	11.979	2436
Mining	7.103	3.015	2.395	7.703	10.612	1411
Forestry	8.702	1.167	7.416	8.594	10.164	1114
Farm	9.351	1.561	7.398	9.461	11.1	2253

Notes: Summary statistics of the BEA income variables for selected years in the park opening regressions. Observations are counties or parks (groups of counties) over time. We aggregate county-level data to the park level as described in the paper.

2 Robustness and additional specifications

Table A.8: The impact of parks on employment and income, no controls

Years since change	NP designation		Park opening	
	Employment (1)	Income (2)	Employment (3)	Income (4)
≤ -5	0.034 (0.030)	0.037 (0.037)	-0.016 (0.015)	0.009 (0.025)
-4	0.000 (0.013)	0.017 (0.020)	0.001 (0.009)	-0.004 (0.016)
-3	0.004 (0.012)	0.028 (0.019)	0.009 (0.007)	0.008 (0.012)
-2	0.006 (0.009)	0.008 (0.016)	0.006 (0.005)	0.012 (0.009)
0	0.001 (0.005)	0.000 (0.007)	0.004 (0.003)	0.006 (0.008)
1	0.015** (0.007)	0.024** (0.010)	0.007 (0.006)	0.021* (0.013)
2	0.022*** (0.008)	0.046*** (0.017)	0.017** (0.008)	0.034* (0.019)
3	0.032** (0.013)	0.058*** (0.022)	0.024** (0.011)	0.037** (0.017)
4	0.036*** (0.011)	0.057** (0.025)	0.028*** (0.011)	0.032* (0.018)
$5 \leq$	0.023 (0.022)	0.020 (0.028)	0.007 (0.015)	0.055** (0.026)
Adj. R ²	0.92	0.86	0.85	0.72
N obs.	9,024	9,024	129,744	129,730
N units	188	188	2,703	2,703

Notes: Event study estimates of the impact of NP designation and park opening on log employment and income, 1970-2017, unweighted. Coefficients represent changes relative to year -1 (the year before the event). All specifications control for park and year fixed effects and log population density. Robust standard errors clustered by park in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

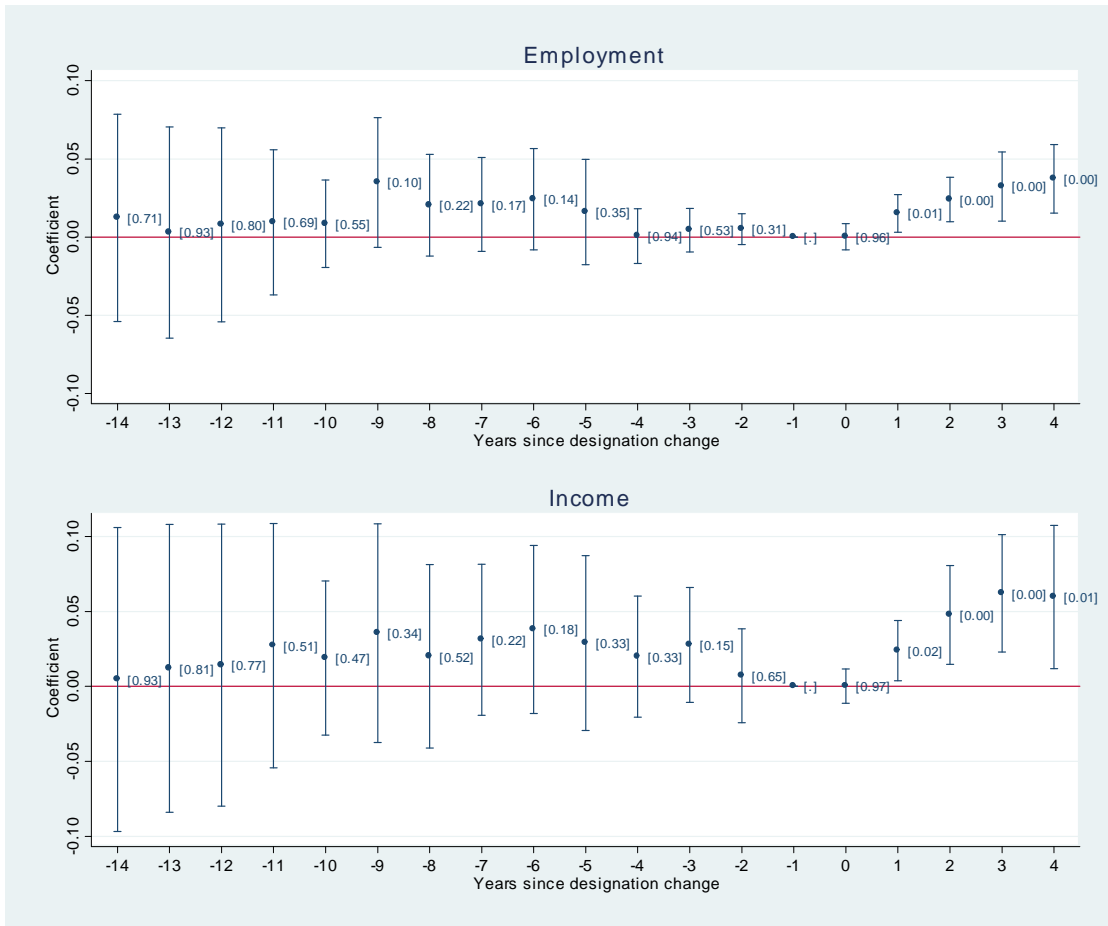


Figure A.9: The impact of NP designation: pretrends

The figure shows estimates on a longer pre-period for the effect of NP designation on log employment and income. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. $N = 9024$.

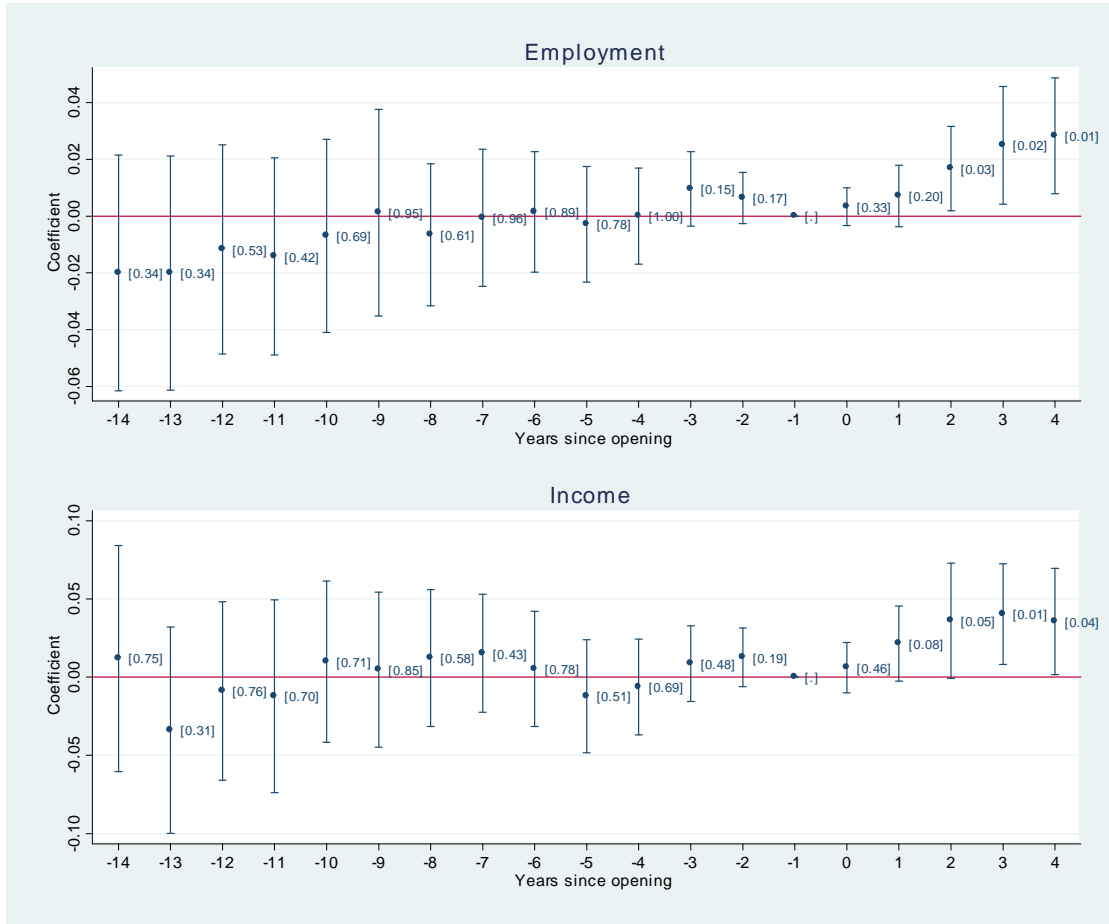


Figure A.10: The impact of park opening: pretrends

The figure shows estimates on a longer pre-period for the effect of park opening on log employment and income. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 129,744 (employment) 129,730 (income).

Table A.11: p-values computed using different procedures, NP designation

Dep. var.:	Employment			Income		
Inference:	Asymptotic	Bootstrap	Asymptotic	Asymptotic	Bootstrap	Asymptotic
Clustering:	park	park	park group	park	park	park group
	(1)	(2)	(3)	(4)	(5)	(6)
≤ -5	0.21	0.24	0.22	0.31	0.34	0.31
-4	0.95	0.95	0.95	0.34	0.37	0.18
-3	0.54	0.52	0.61	0.16	0.18	0.04
-2	0.32	0.25	0.29	0.65	0.69	0.37
0	0.94	0.95	0.94	0.96	0.96	0.96
1	0.01	0.03	0.05	0.02	0.01	0.04
2	0.00	0.00	0.01	0.01	0.00	0.00
3	0.00	0.01	0.01	0.00	0.00	0.00
4	0.00	0.00	0.01	0.02	0.03	0.02
$5 \leq$	0.15	0.18	0.07	0.34	0.36	0.15
N obs.	9024	9024	9024	9024	9024	9024
N clusters	188	188	147	188	188	147

Notes: Columns 1 and 4 report the p-values for the main NP designation specification in the paper (columns 1 and 3 in Table 2 in the paper). Columns 2 and 5 present p-values from the clustered wild bootstrap. Columns 3 and 6 are based on asymptotic standard errors clustered by groups of parks, where parks are partitioned in the smallest sets such that they share a county with at least one park in the same set.

Table A.12: p-values computed using different procedures, park opening

Dep. var.:	Employment			Income		
Inference:	Asymptotic	Bootstrap	Asymptotic	Asymptotic	Bootstrap	Asymptotic
Clustering:	park	park	park group	park	park	park group
	(1)	(2)	(3)	(4)	(5)	(6)
≤ -5	0.22	0.23	0.22	0.99	0.99	0.99
-4	1.00	0.99	1.00	0.69	0.69	0.69
-3	0.15	0.20	0.15	0.48	0.51	0.48
-2	0.17	0.19	0.17	0.19	0.19	0.18
0	0.33	0.33	0.36	0.46	0.47	0.46
1	0.20	0.21	0.22	0.08	0.09	0.09
2	0.03	0.03	0.03	0.05	0.07	0.06
3	0.02	0.01	0.02	0.01	0.03	0.01
4	0.01	0.00	0.01	0.04	0.05	0.04
$5 \leq$	0.55	0.57	0.56	0.03	0.04	0.03
N obs.	129,744	129,744	129,744	129,730	129,730	129,730
N clusters	2703	2703	2653	2703	2703	2653

Notes: Columns 1 and 4 report the p-values for the main park opening specification in the paper (columns 5 and 7 in Table 2 in the paper). Columns 2 and 5 present p-values from the clustered wild bootstrap. Columns 3 and 6 are based on asymptotic standard errors clustered by groups of parks, where parks are partitioned in the smallest sets such that they share a county with at least one park in the same set.

2.1 Robustness: NP designation

Table A.13: The effect of NP designation on employment, robustness

Years since change	(1) main	(2) balanced1	(3) balanced2	(4) nature only	(5) nm only	(6) no pway	(7) no combined	(8) state-year FE	(9) drop all openings	(10) control for WHS
≤-5	0.030 (0.023)	0.027 (0.024)	0.027 (0.024)	0.030 (0.025)	0.015 (0.028)	0.030 (0.023)	0.041 (0.027)	0.009 (0.025)	0.028 (0.038)	0.031 (0.024)
-4	0.001 (0.009)	-0.002 (0.009)	-0.002 (0.009)	-0.003 (0.011)	-0.001 (0.011)	0.001 (0.009)	0.003 (0.010)	-0.016 (0.011)	0.014 (0.016)	0.001 (0.009)
-3	0.004 (0.007)	0.001 (0.007)	0.001 (0.007)	-0.000 (0.008)	0.003 (0.008)	0.004 (0.007)	0.006 (0.008)	-0.007 (0.010)	0.013 (0.011)	0.004 (0.007)
-2	0.005 (0.005)	0.005 (0.005)	0.002 (0.003)	0.002 (0.007)	0.005 (0.006)	0.005 (0.005)	0.008 (0.007)	0.004 (0.010)	0.015 (0.011)	0.005 (0.005)
0	0.000 (0.004)	-0.000 (0.005)	0.004 (0.004)	-0.002 (0.005)	-0.002 (0.006)	0.000 (0.004)	0.001 (0.004)	0.004 (0.007)	0.002 (0.006)	0.000 (0.004)
1	0.015** (0.006)	0.014** (0.007)	0.010* (0.005)	0.013* (0.006)	0.012 (0.008)	0.015** (0.006)	0.017** (0.007)	0.012 (0.010)	0.027*** (0.008)	0.015** (0.006)
2	0.024*** (0.007)	0.021** (0.008)	0.020*** (0.007)	0.020** (0.008)	0.019* (0.010)	0.024*** (0.007)	0.027*** (0.008)	0.021* (0.012)	0.039*** (0.009)	0.024*** (0.007)
3	0.032*** (0.011)	0.031** (0.013)	0.027** (0.012)	0.027** (0.012)	0.025* (0.013)	0.032*** (0.011)	0.037*** (0.011)	0.028* (0.014)	0.054*** (0.015)	0.032*** (0.011)
4	0.037*** (0.011)	0.035*** (0.011)	0.026*** (0.010)	0.034*** (0.011)	0.041*** (0.012)	0.037*** (0.011)	0.040*** (0.012)	0.030** (0.013)	0.051*** (0.016)	0.037*** (0.011)
5 ≤	0.031 (0.022)	0.022 (0.022)	0.029 (0.025)	0.030 (0.022)	0.046* (0.025)	0.031 (0.022)	0.032 (0.025)	0.021 (0.023)	0.017 (0.022)	0.031 (0.021)
Adj. R ²	0.93	0.92	0.93	0.92	0.90	0.93	0.95	0.93	0.93	0.93
N obs.	9024	9212	8928	4272	3312	8928	7776	9024	8112	9024
N parks	188	188	186	89	69	186	162	188	169	188

Notes: Event study estimates of the impact of NP designation on log employment. Coefficients represent changes relative to year -1 (the year before the designation change). Controls include park and year fixed effects, population density, the share of population under 19 and above 65, precipitation and droughts, and the park's age squared. Column 1 repeats the main specification (column 1 in Table 2 in the paper). Column 2 balances the sample by including the year 1969 (which requires dropping the population share controls) and binning the event study coefficients at -3 (and +5). Column 3 balances the sample by excluding Arches NP and Capitol Reef NP. Column 4 restricts the sample to nature parks and column 5 to parks that were national monuments in 1969. Column 6 excludes parkways and 7 excludes all combined parks. Column 8 includes state-year fixed effects. Column 9 drops parks that share a county with a park opened after 1970. Column 10 controls for the World Heritage Site designation event (and its lags and leads). Robust standard errors clustered by park in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent, respectively

Table A.14: The effect of NP designation on income, robustness

Years since change	(1) main	(2) balanced1	(3) balanced2	(4) nature only	(5) nm only	(6) no pway	(7) no combined	(8) state-year FE	(9) drop all openings	(10) control for WHS
≤ -5	0.036 (0.036)		0.041 (0.033)	0.017 (0.037)	0.000 (0.040)	0.036 (0.036)	0.047 (0.040)	0.034 (0.043)	0.017 (0.048)	0.039 (0.036)
-4	0.020 (0.020)		0.025* (0.014)	0.020 (0.022)	0.017 (0.024)	0.020 (0.020)	0.028 (0.020)	0.006 (0.026)	0.029 (0.033)	0.020 (0.021)
-3	0.028 (0.019)		0.033** (0.013)	0.030 (0.022)	0.026 (0.024)	0.028 (0.019)	0.033 (0.020)	0.009 (0.023)	0.035 (0.033)	0.028 (0.020)
-2	0.007 (0.016)	0.012 (0.007)	0.012** (0.005)	0.009 (0.019)	0.011 (0.020)	0.007 (0.016)	0.011 (0.016)	0.008 (0.020)	0.003 (0.027)	0.007 (0.016)
0	0.000 (0.006)	0.001 (0.007)	0.006 (0.005)	-0.001 (0.007)	-0.002 (0.008)	0.000 (0.006)	-0.000 (0.006)	0.007 (0.010)	-0.002 (0.009)	0.000 (0.006)
1	0.024** (0.010)	0.025** (0.010)	0.013** (0.005)	0.024** (0.011)	0.023* (0.013)	0.024** (0.010)	0.025** (0.011)	0.029 (0.018)	0.036** (0.016)	0.024** (0.010)
2	0.048*** (0.017)	0.047*** (0.017)	0.036*** (0.011)	0.047** (0.018)	0.043** (0.021)	0.048*** (0.017)	0.051*** (0.017)	0.051** (0.023)	0.071*** (0.024)	0.047*** (0.017)
3	0.062*** (0.020)	0.061*** (0.021)	0.050** (0.019)	0.061*** (0.023)	0.059** (0.027)	0.062*** (0.020)	0.067*** (0.020)	0.052** (0.024)	0.089*** (0.029)	0.062*** (0.020)
4	0.060** (0.024)	0.057** (0.025)	0.038** (0.019)	0.064** (0.026)	0.076*** (0.028)	0.060** (0.024)	0.063** (0.025)	0.064** (0.026)	0.079** (0.039)	0.059** (0.024)
$5 \leq$	0.029 (0.030)	0.017 (0.029)	0.037 (0.027)	0.039 (0.032)	0.038 (0.037)	0.029 (0.030)	0.027 (0.032)	0.032 (0.040)	0.029 (0.037)	0.027 (0.030)
Adj. R ²	0.87	0.86	0.87	0.86	0.82	0.86	0.88	0.87	0.86	0.87
N obs.	9024	9212	8928	4272	3312	8928	7776	9024	8112	9024
N parks	188	188	186	89	69	186	162	188	169	188

Notes: Event study estimates of the impact of NP designation on log income. Coefficients represent changes relative to year -1 (the year before the designation change). Controls include park and year fixed effects, population density, the share of population under 19 and above 65, precipitation and droughts, and the park's age squared. Column 1 repeats the main specification (column 3 in Table 2 in the paper). Column 2 balances the sample by including the year 1969 (which requires dropping the population share controls) and binning the event study coefficients at -3 (and +5). Column 3 balances the sample by excluding Arches NP and Capitol Reef NP. Column 4 restricts the sample to nature parks and column 5 to parks that were national monuments in 1969. Column 6 excludes parkways and 7 excludes all combined parks. Column 8 includes state-year fixed effects. Column 9 drops parks that share a county with a park opened after 1970. Column 10 controls for the World Heritage Site designation event (and its lags and leads). Robust standard errors clustered by park in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent, respectively

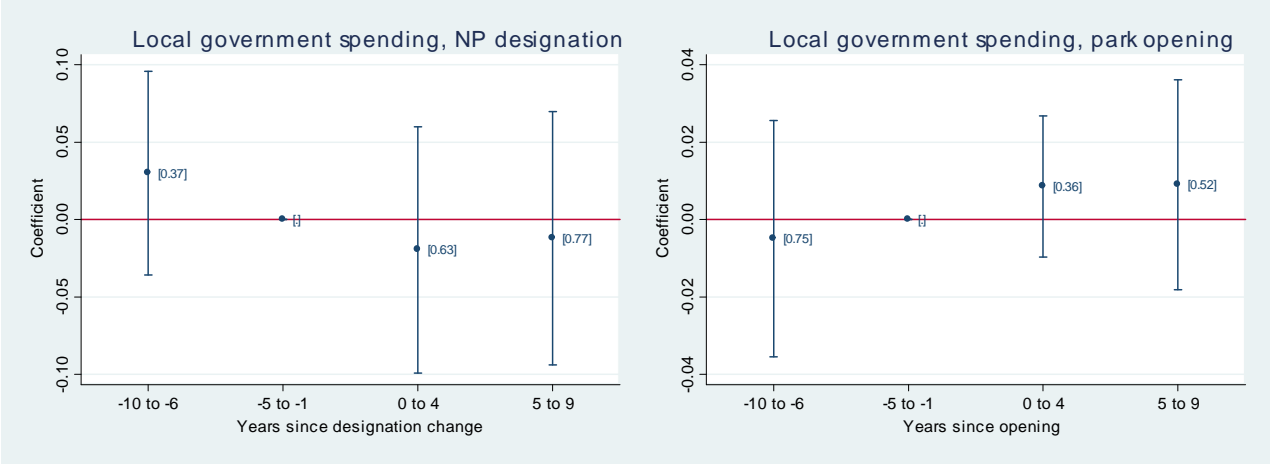


Figure A.15: The impact of NP designation and park opening on local government spending
 Event study coefficient estimates for the impact of NP designation and park opening on local government spending (in logs). Because this data from the Census of Governments is only available every 5 years, we combine multiple pre and post periods. Estimates are relative to the period 1-5 years before the event. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years: 1972-2012. N = 1692, 26730.

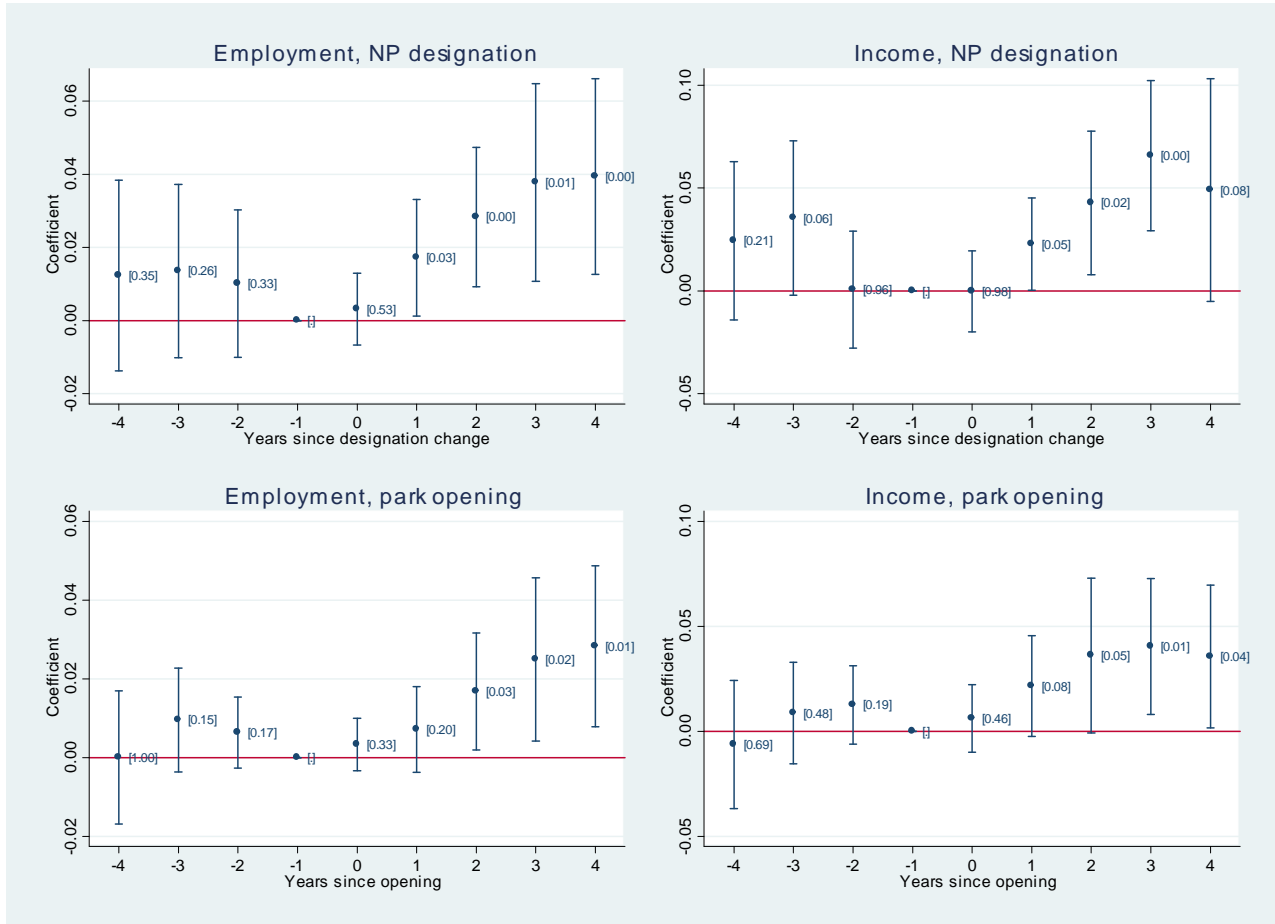


Figure A.16: The impact of NP designation and park opening, joint estimates
 Event study estimates for the impact of NP designation and park opening. The left panels show estimates from the employment regression, the right panels show estimates from the income regression. Both regressions include leads and lags for both treatments. The top panels show the designation change coefficients, the bottom panels the park opening coefficients. Estimates are relative to the year before the change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 129,696 (employment) 129,682 (income).

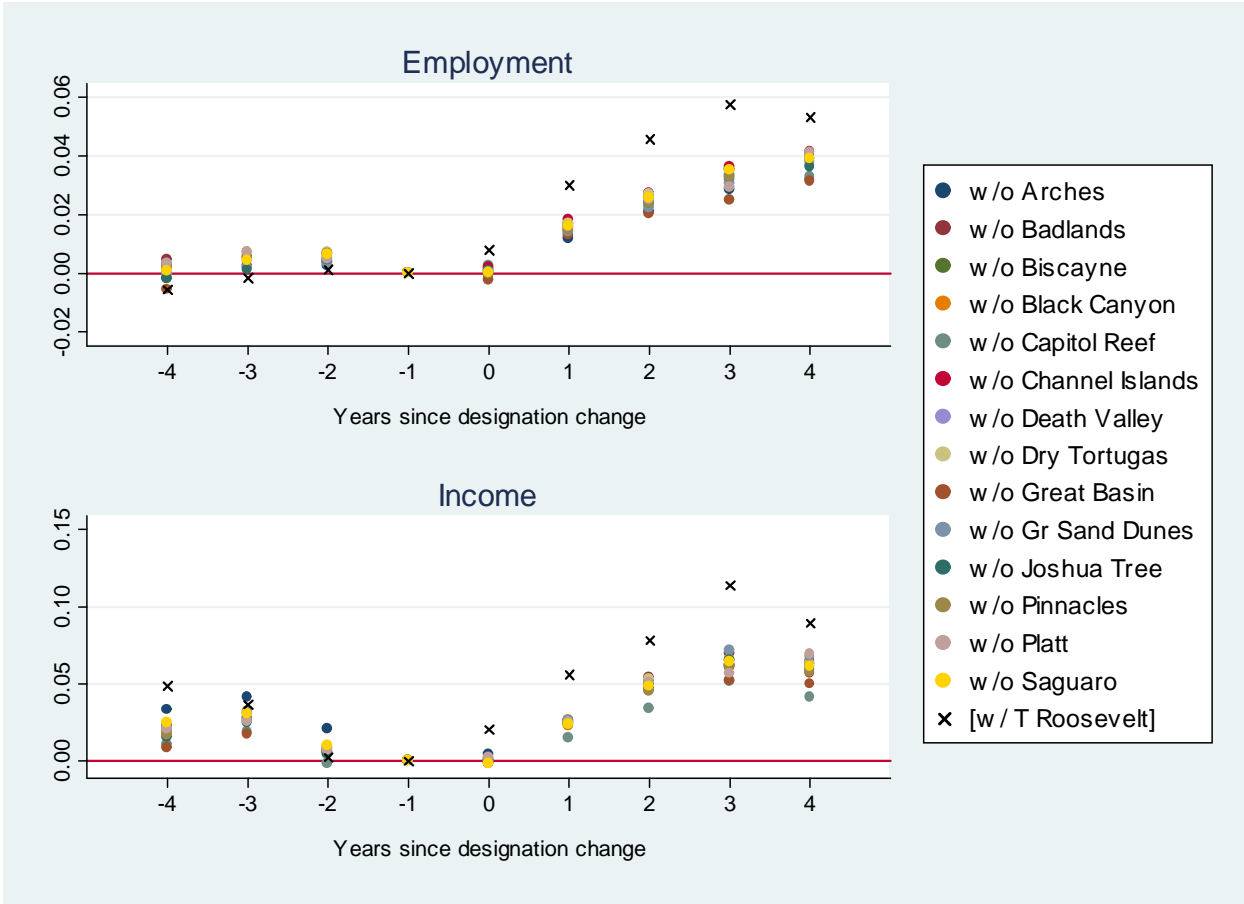


Figure A.17: NP designation, employment and income, changing the sample 1 park at a time

Event study coefficient estimates for the impact of NP designation on log employment and log income.

Specifications drop one NP designation change at a time. The last specification adds T. Roosevelt NP, which is excluded from the main sample. Estimates are relative to the year before the designation change.

Treatment effect heterogeneity. Sun and Abraham (2021) show that, if treatment effects are heterogenous, the event study coefficients β_j can be contaminated by treatment effects in relative periods other than j . This can result in difficult-to-interpret average treatment effect (ATE) estimates, and make testing for pre-trends meaningless.

The problem arises when some treatment cohort’s treatment effect in period j' relative to treatment has a large weight in the estimate of the period- j ATE, β_j . To assess the concern that heterogenous treatment effects might pose, Sun and Abraham (2021) show how to compute the weights of each treatment cohort’s event window in β_j as a function of the sample composition. Ideally, for each treatment effect β_j and each treatment cohort, the weights should only be strictly positive for relative period j and strictly negative for the excluded category (relative period -1 in our case).

Figure A.18 presents the weights in our main specifications. Each panel shows the weights of every treatment cohort in a different coefficient estimate β_j . We have 10 treatment cohorts: one with 3 treated units (Death Valley, Joshua Tree, and Saguaro in 1994), two with 2 treated units (Capitol Reef and Arches in 1971, Biscayne and Channel Islands in 1980) and seven with 1 treated unit. Each panel shows 10 lines corresponding to the weights of each of these cohorts’ observations from relative periods $j \in \{-5, \dots, 5\}$. The line with the largest spike is the 3-unit cohort, the middle spikes are the 2-unit cohorts, and the lowest spikes are the 1-unit cohorts.¹ As can be seen, on each panel only observations from relative period j receive sizeable positive weights, and only relative period -1 receives a sizeable negative weight. This indicates that our event study estimates provide meaningful ATEs (the average impact of NP designation in relative period j) even if treatment effects are heterogeneous across parks.

¹Recall that one of the units, Platt NP, experienced a negative treatment (loss of NP designation). On the figure, we multiply the weights for this park by -1 for ease of comparison with the rest.

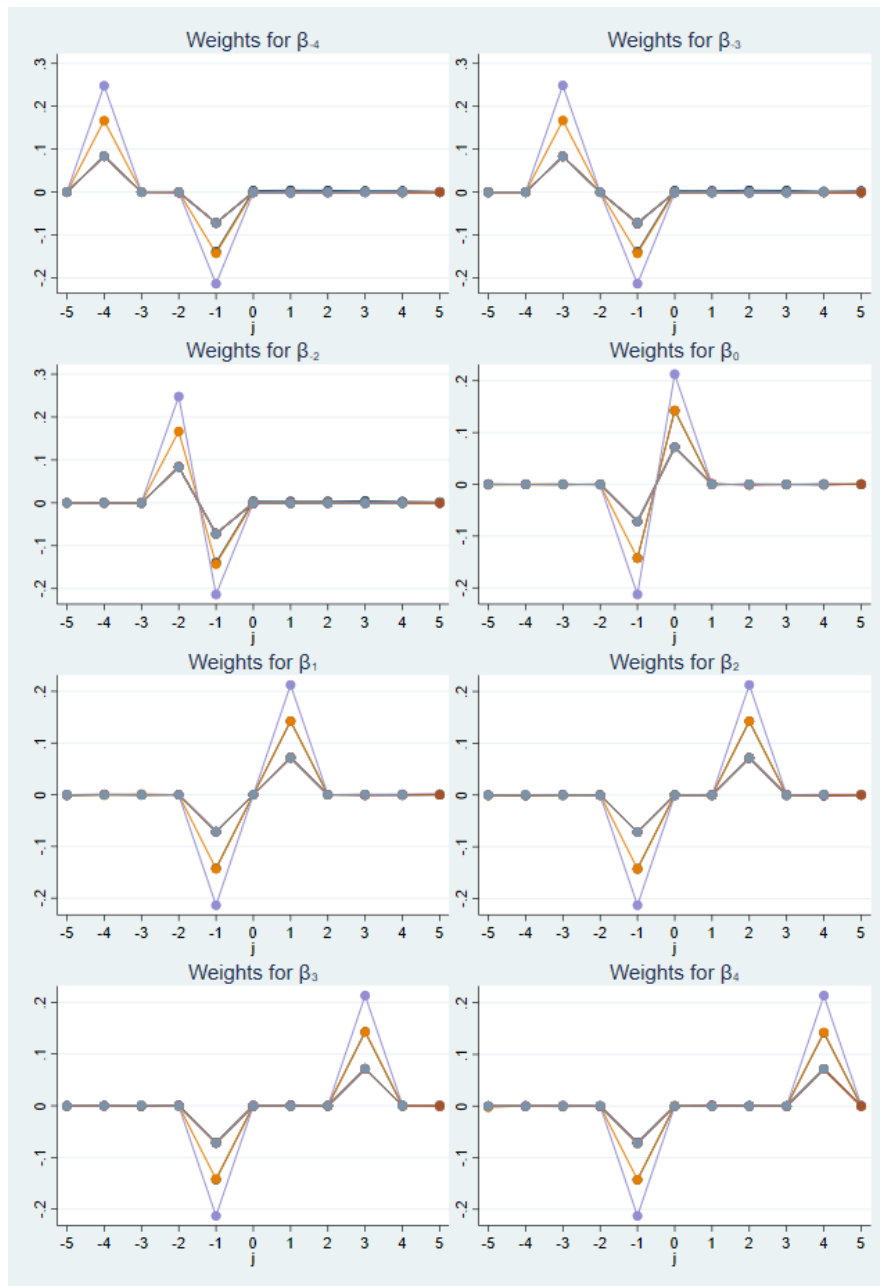


Figure A.18: Weights of different treatment cohorts' event windows in the NP designation estimates

Each panel shows the weights of different treatment cohorts' event windows in the estimates of one of the event study parameters (β_j) based on Sun and Abraham (2021).

2.2 Robustness: Park opening

Different comparison groups. We investigate limiting the sample to units that may be more comparable to each other. Unlike for NP designation, where nature parks and national monuments provided arguably close comparison groups to the treated parks, for new park openings we do not have a story that would allow us limit the comparison group based on a priori considerations. Instead, we attempt to limit the sample to more comparable units based on propensity scores. Specifically, we estimate the propensity score for ever having a park compared to never having a park. We then reestimate our regressions trimming the sample to exclude units with propensity scores in the tails of the distribution (in general, propensity scores close to 0 in the control group and propensity scores close to 1 in the treatment group). Using the propensity scores to trim the sample rather than to weight observations follows the recommendation of Imbens and Rubin (2015) and makes our results less sensitive to the exact specification of the propensity score regression.

We estimate propensity scores using a probit regression of ever having a park on the 1970 values of: log population density and its square, water area divided by land area, all available weather indicators (precipitation, temperature, minimum temperature, maximum temperature, drought severity, cooling degree days, heating degree days), the fraction of population aged 0-19, the fraction aged 65+, and state fixed effects. We then exclude from our regressions units with propensity scores below P_{\min} and above P_{\max} , and we follow two alternative procedures to determine these thresholds. First, we set P_{\min} to be the lowest propensity score in the treatment group, and P_{\max} the highest propensity score in the control group (“common support” trimming). This leaves 2453 units, 43 of which have a park included in the NPS during our sample period. We find that the results in this sample are somewhat stronger than those above (column 2 in Tables A.19 and A.20). Second, we follow a procedure proposed by Crump et al. (2009) which computes P_{\min} and $P_{\max} = 1 - P_{\min}$ based on properties of the sampling variance of the average treatment effect (see Imbens and Rubin, 2015, Ch 16). This trims over 50% of our sample, leaving 1268 units, 37 of which have a park included in the NPS during our sample period. In this sample we get larger standard errors but qualitatively similar results compared to our main specifications (column 3 in Tables A.19 and A.20). Overall, it does not appear that our results are sensitive to these changes in the sample.

Changing the threshold for reporting visitors. In order to exclude openings that were mere formalities, in the main regressions we exclude newly opened parks that did not begin reporting visitors within 10 years. In column 4 we change this threshold to 5 years, and in 5 we remove the threshold. We find that regressions with the 5-year threshold (which have 31 treated parks) yield larger estimates than our main regressions, while regressions without

any threshold (which have 58 treated parks) yield smaller estimates. This is consistent with some of the parks which open but do not report visitors for several years experiencing little actual change in their status and therefore having no significant impact on the local economy.

Extending the sample. As explained in the text, our park opening estimates reflect the impact of parks opened between 1975-2013 to ensure that our sample is not subject to imbalances caused especially by the many parks opening in the late 60-s and early 70-s following Project 66. We now investigate whether our estimates change by including more treated parks. Specifically, we include 7 parks opened in 1974, 6 in 1972, and 2 after 2013, raising the number of treated parks in the regressions from 45 to 60. To retain balance in the estimation of leads, we bin the event study indicators at -3 instead of -5. The results shown in column 6 are similar to those obtained earlier.

Table A.19: The effect of park opening on employment, robustness

Years since change	Main (1)	Pscore trimmed 1 (2)	Pscore trimmed 2 (3)	5 year visitor threshold (4)	No visitor threshold (5)	More treated parks (6)
≤ -5	-0.018 (0.015)	-0.021 (0.015)	-0.010 (0.017)	-0.016 (0.019)	-0.023* (0.013)	
-4	0.000 (0.009)	-0.003 (0.009)	0.002 (0.007)	0.002 (0.011)	-0.005 (0.007)	
-3	0.010 (0.007)	0.008 (0.007)	0.010 (0.006)	0.007 (0.008)	0.006 (0.006)	
-2	0.006 (0.005)	0.006 (0.005)	0.005 (0.004)	0.005 (0.006)	0.003 (0.004)	0.000 (0.004)
0	0.003 (0.003)	0.004 (0.003)	0.004 (0.003)	0.006 (0.004)	0.003 (0.003)	0.002 (0.004)
1	0.007 (0.006)	0.008 (0.006)	0.004 (0.005)	0.005 (0.006)	0.006 (0.004)	0.006 (0.005)
2	0.017** (0.008)	0.018** (0.008)	0.015* (0.008)	0.021** (0.009)	0.013** (0.006)	0.012* (0.006)
3	0.025** (0.011)	0.027** (0.011)	0.020** (0.010)	0.036*** (0.014)	0.020** (0.008)	0.018** (0.009)
4	0.028*** (0.010)	0.029*** (0.011)	0.022** (0.009)	0.037*** (0.014)	0.022*** (0.009)	0.023** (0.010)
$5 \leq$	0.009 (0.015)	0.012 (0.015)	0.013 (0.016)	0.004 (0.017)	0.017 (0.013)	0.020 (0.014)
Adj. R ²	0.85	0.85	0.88	0.85	0.85	0.85
N obs.	129,744	117,744	60,864	129,072	130,368	130,464
N units	2,703	2,453	1,268	2,689	2,716	2,718

Notes: Event study estimates of the impact of park opening on log employment. Coefficients represent changes relative to year -1 (the year before the change). All specifications control for park and year fixed effects, population density, the share of population under 19 and above 65, precipitation and droughts. Column 1 repeats the main specification from Table 2 in the paper. Columns 2 and 3 trim the sample based on estimated propensity scores as described in the text. Column 2 trims to a common support, and column 3 trims to thresholds computed using the Crump et al. (2009) procedure. Column 4 drops parks that do not report visitors within 5 years after opening. Column 5 includes parks even if they do not report visitors within 10 years after opening. Column 6 adds parks opened in 1972, 1974, or after 2013 and bins the event study coefficients at -3 (and +5). Robust standard errors clustered by park in parantheses. ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Table A.20: The effect of park opening on income, robustness

Years since change	Main (1)	Pscore trimmed 1 (2)	Pscore trimmed 2 (3)	5 year visitor threshold (4)	No visitor threshold (5)	More treated parks (6)
≤ -5	0.000 (0.025)	-0.003 (0.026)	-0.001 (0.025)	-0.014 (0.030)	-0.019 (0.022)	
-4	-0.006 (0.016)	-0.010 (0.016)	-0.008 (0.015)	0.006 (0.017)	-0.010 (0.013)	
-3	0.009 (0.012)	0.007 (0.013)	0.003 (0.009)	0.010 (0.014)	0.002 (0.010)	
-2	0.013 (0.010)	0.012 (0.010)	0.005 (0.006)	0.007 (0.009)	0.003 (0.008)	0.010 (0.009)
0	0.006 (0.008)	0.007 (0.008)	0.008 (0.009)	0.013 (0.009)	0.001 (0.007)	0.005 (0.008)
1	0.021* (0.012)	0.024* (0.013)	0.011 (0.010)	0.020 (0.012)	0.010 (0.011)	0.013 (0.011)
2	0.036* (0.019)	0.037* (0.020)	0.024 (0.020)	0.054*** (0.018)	0.021 (0.016)	0.028* (0.016)
3	0.040** (0.016)	0.041** (0.017)	0.031** (0.016)	0.059*** (0.017)	0.027* (0.015)	0.032** (0.015)
4	0.036** (0.017)	0.036** (0.018)	0.030* (0.018)	0.052*** (0.014)	0.022 (0.016)	0.033** (0.015)
$5 \leq$	0.057** (0.026)	0.061** (0.027)	0.057** (0.026)	0.055* (0.030)	0.055** (0.022)	0.066*** (0.023)
Adj. R ²	0.72	0.72	0.76	0.72	0.72	0.72
N obs.	129,730	117,730	60,853	129,058	130,354	130,450
N units	2,703	2,453	1,268	2,689	2,716	2,718

Notes: Event study estimates of the impact of park opening on log income. Coefficients represent changes relative to year -1 (the year before the change). All specifications control for park and year fixed effects, population density, the share of population under 19 and above 65, precipitation and droughts. Column 1 repeats the main specification from Table 2 in the paper. Columns 2 and 3 trim the sample based on estimated propensity scores as described in the text. Column 2 trims to a common support, and column 3 trims to thresholds computed using the Crump et al. (2009) procedure. Column 4 drops parks that do not report visitors within 5 years after opening. Column 5 includes parks even if they do not report visitors within 10 years after opening. Column 6 adds parks opened in 1972, 1974, or after 2013 and bins the event study coefficients at -3 (and +5). Robust standard errors clustered by park in parentheses. ***, **, and * indicate significance at 1, 5, and 10 percent, respectively.

Treatment effect heterogeneity. To evaluate if treatment effect heterogeneity would pose a problem for interpreting our estimates, we again compute the Sun and Abraham (2021) weights of the different treatment cohorts' weights in the estimates. We now have 21 treatment cohorts, ranging from 1 to 7 treated units.

Figure A.21 shows the Sun and Abraham (2021) weights for the different cohorts' relative periods $j \in \{-5, \dots, 5\}$ in the event study coefficient estimates. We again see that for each coefficient β_j , only observations from relative period j have large positive weights, and only relative period -1 has a large negative weight. This indicates that our estimates are meaningful averages even if the treatment effects are heterogenous across units.

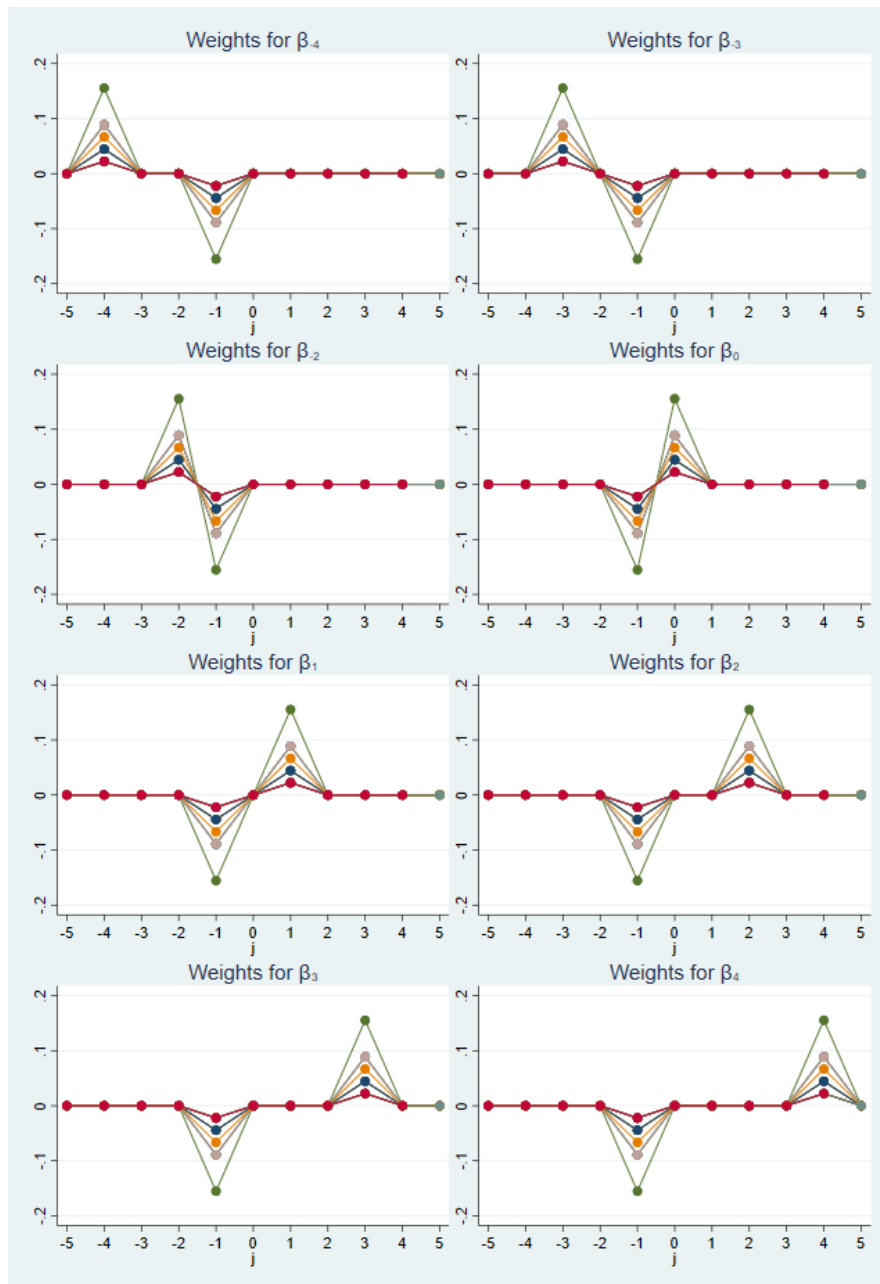


Figure A.21: Weights of different treatment cohorts' event windows in the park opening estimates

Each panel shows the weights of different treatment cohorts' event windows in the estimates of one of the event study parameters (β_j) based on Sun and Abraham (2021).

3 Visitors, development, and other designations

Figure A.22 shows the estimates for the NHP designation change.

The results for World Heritage Sites are on Figure A.23. Because the WHS title is *in addition* to National Park Service designations, these regressions control for the NP designation event and its lags and leads (Table A.13 and A.14 contain the estimated NP designation coefficients). Note that the 10% increase in park budgets just *before* WHS designation is due to one observation, Redwood NP, which underwent a major expansion accompanied by a doubling of its budget between 1978 and 1979, just before receiving its WHS designation in 1980. Excluding that park from the sample yields flat budget estimates.

WHS designation does not appear to increase visitation. It is also associated with a significant *decline* in employment and income, though the clear pre-trend in income suggests that this effect is unlikely to be causal.

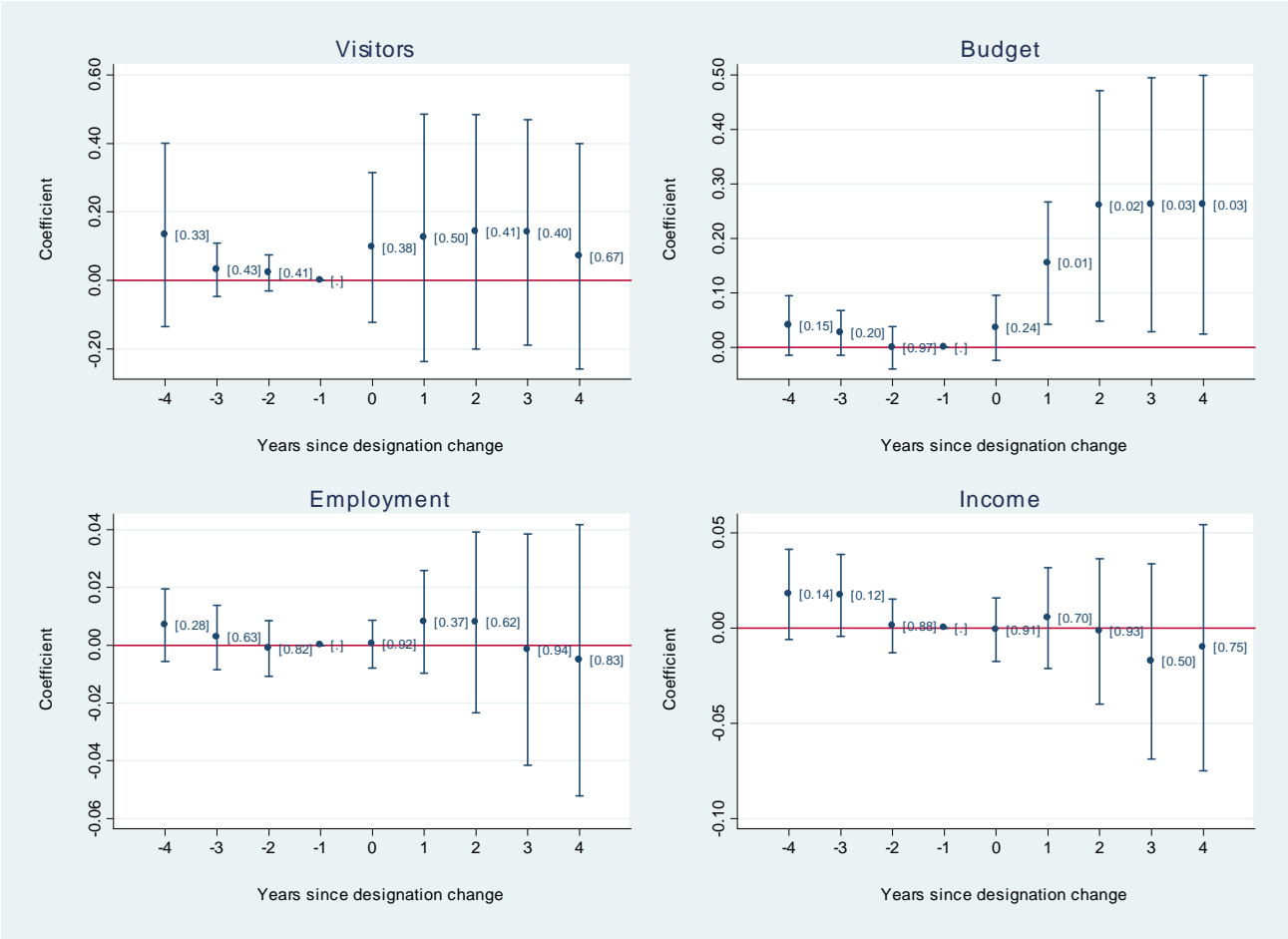


Figure A.22: The impact of NHP designation on visitors and park budgets
 Event study coefficient estimates for the impact of NHP designation. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8928, 8614, 9072, 9072.

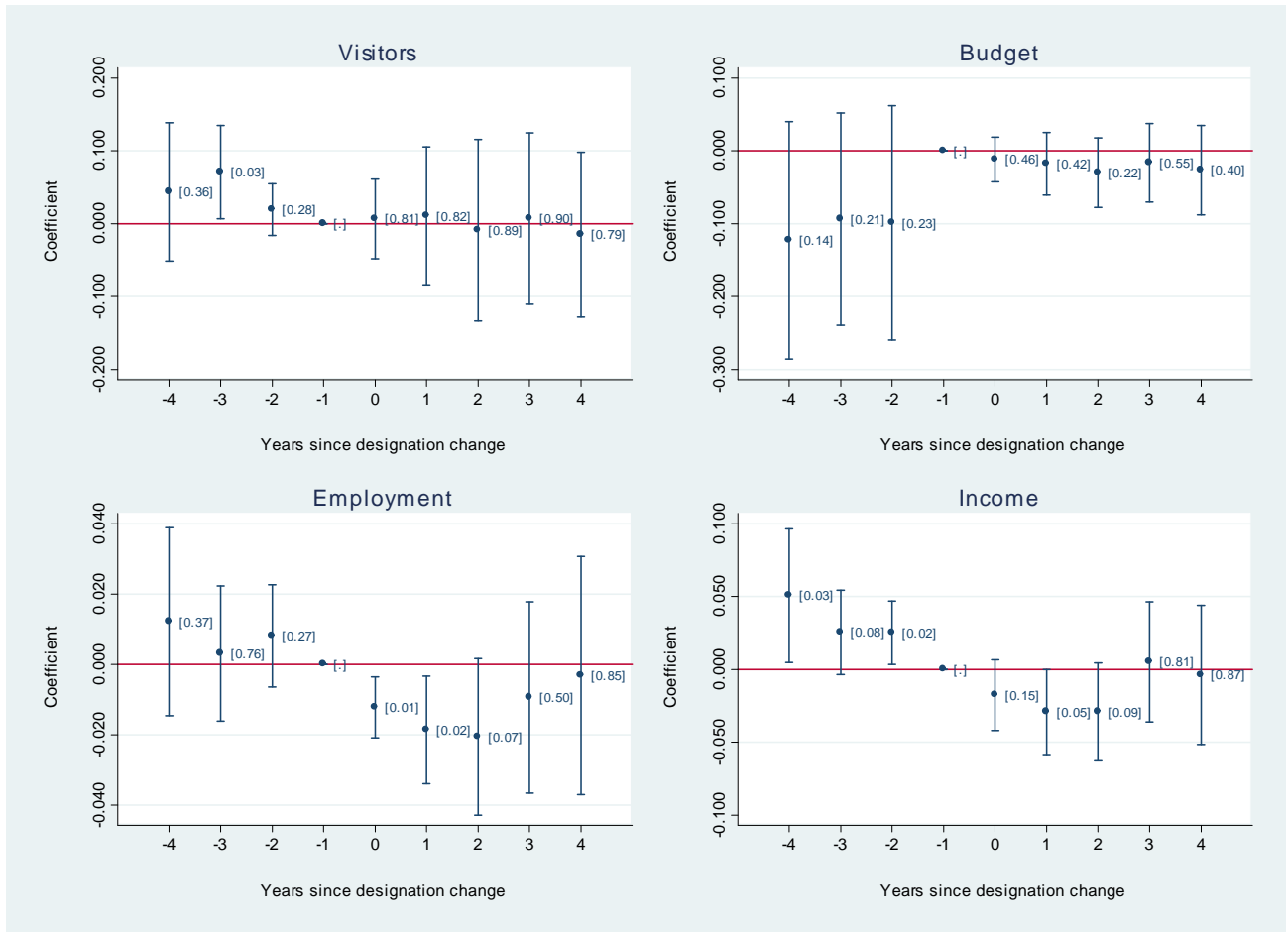


Figure A.23: The impact of World Heritage Site designation

Event study coefficient estimates for the impact of World Heritage Site designation, controlling for NP designation and its leads and lags. Estimates are relative to the year before the WHS designation. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 9024, 9024, 129744, 129730.

4 Spillovers

Figure A.24 shows estimates from a visitor regression that includes two sets of event study coefficients: one for NP designation, and one for NP designation occurring in a park in a 100 mile radius. There are a total of 20 parks receiving the second treatment, but 9 of these are treated in 1971 (and are thus unobserved before year -1 relative to treatment) so there is a large change in sample composition from -2 to -1 year relative to treatment. To eliminate this source of error, we focus on the balanced specification corresponding to Column (2) of Table A.13 (years 1969-2017, no population share controls, event indicators -2 and above) discussed in Section 5 in the paper .

The left panel shows the NP designation coefficients, which are similar to those seen earlier (Figure 5 in the paper). The right panel shows the coefficients for a nearby park receiving NP designation. These estimates show that there are no significant declines in visitors in response to a nearby park receiving NP designation.

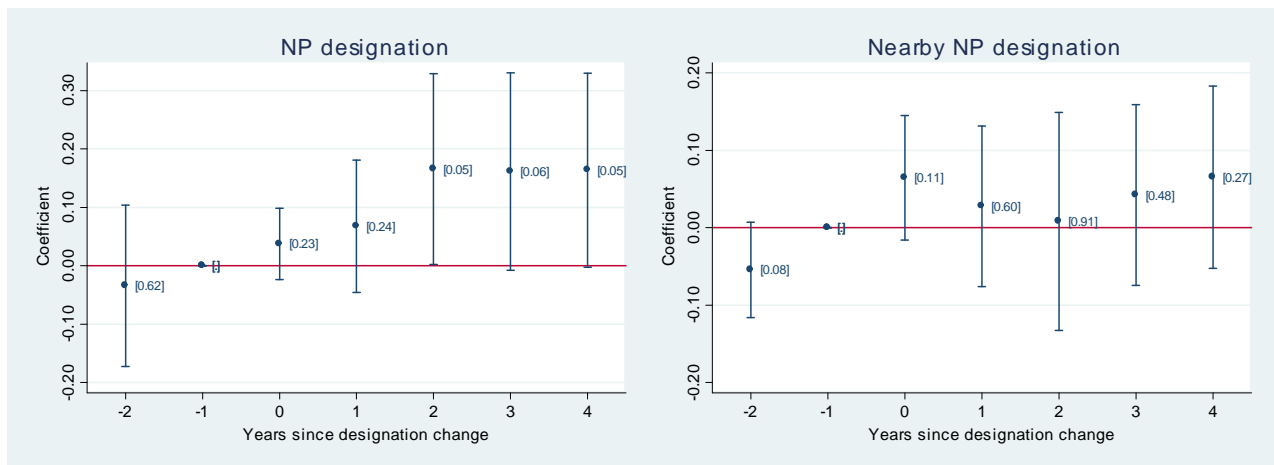


Figure A.24: The impact of NP designation of nearby parks on visitors

Event study coefficient estimates for the impact of NP designation, as well as NP designation of parks located within 100 miles, on log visitors. Years 1969-2017, balanced sample. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. $N = 9043$.

5 Specific industries

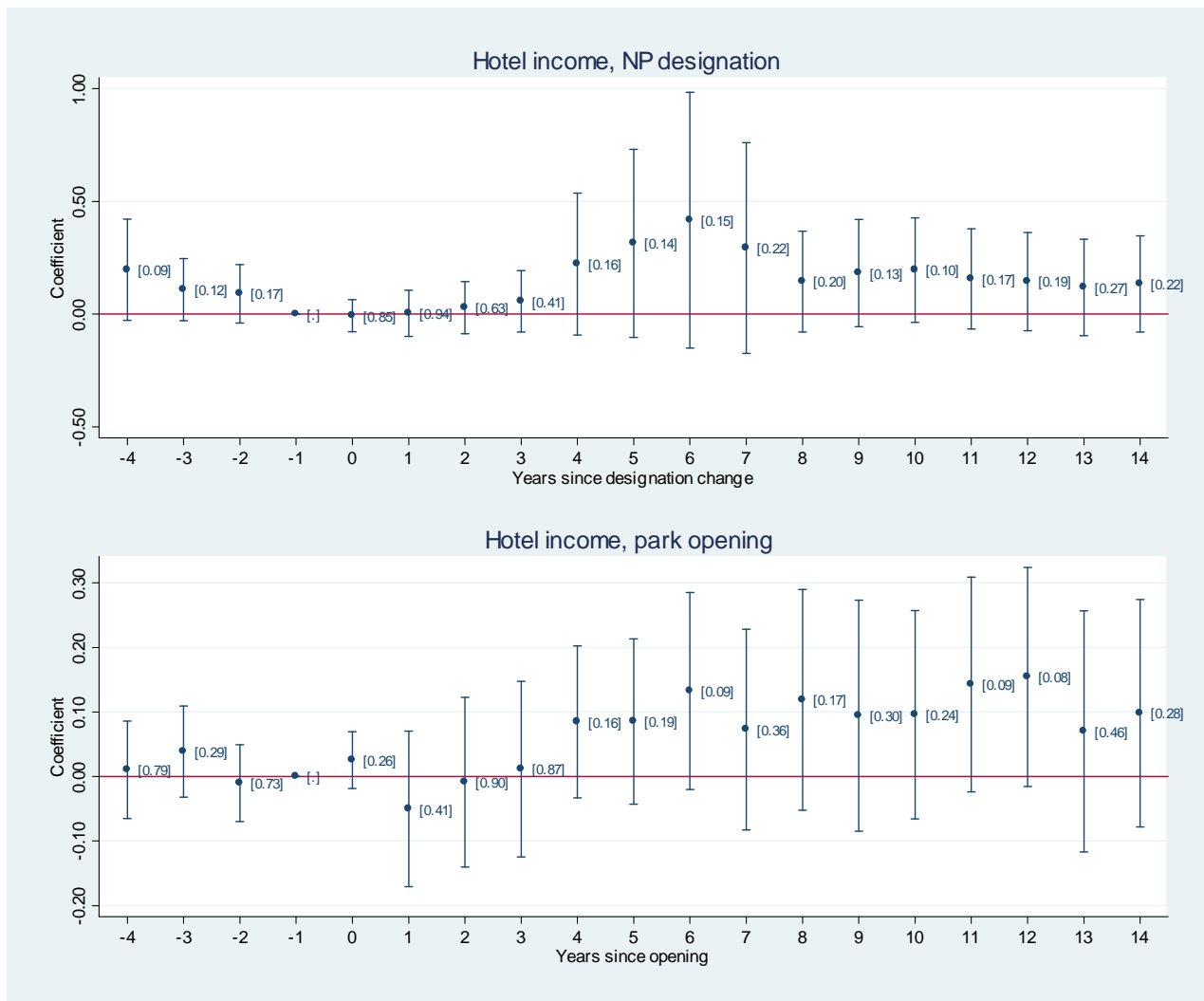


Figure A.25: Parks and hotel income in the long run

Event study coefficient estimates for the impact of NP designation and park opening on log hotel income. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. $N = 8287, 84725$.

Table A.26: Multiple inference adjusted p-values for industry outcomes

Years since NP designation	Hotel income		Retail income		Construction employment		Construction income	
	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval
0	0.73	0.73	0.61	0.73	0.47	0.73	0.58	0.73
1	0.99	0.99	0.06	0.08	0.06	0.08	0.01	0.04
2	0.67	0.89	0.91	0.91	0.07	0.14	0.01	0.04
3	0.45	0.6	0.65	0.65	0.06	0.12	0.003	0.01
4	0.19	0.25	0.76	0.76	0.09	0.18	0.01	0.04

Years since NP designation	Mining employment		Mining income		Forestry income		Farm employment		Farm income	
	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval
0	0.59	0.59	0.03	0.15	0.09	0.23	0.53	0.59	0.37	0.59
1	0.12	0.3	0.02	0.1	0.95	0.95	0.43	0.72	0.59	0.74
2	0.03	0.08	0.05	0.08	0.63	0.63	0.52	0.63	0.002	0.01
3	0.04	0.2	0.17	0.21	0.82	0.82	0.09	0.21	0.15	0.21
4	0.07	0.33	0.18	0.33	0.38	0.46	0.46	0.46	0.2	0.33

Years since park opening	Hotel income		Retail income		Construction employment		Construction income	
	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval
0	0.63	0.84	0.23	0.84	0.45	0.84	0.98	0.98
1	0.34	0.68	0.11	0.44	0.78	0.8	0.8	0.8
2	0.91	0.94	0.01	0.04	0.94	0.94	0.78	0.94
3	0.88	0.88	0.07	0.28	0.63	0.84	0.29	0.58
4	0.1	0.2	0.01	0.04	0.83	0.83	0.35	0.47

Years since park opening	Mining employment		Mining income		Forestry income		Farm employment		Farm income	
	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval	pval	adjusted pval
0	0.05	0.25	0.48	0.61	0.62	0.62	0.49	0.61	0.35	0.61
1	0.71	0.71	0.28	0.28	0.44	0.44	0.79	0.79	0.4	0.4
2	0.68	0.68	0.28	0.28	0.83	0.83	0.79	0.79	0.84	0.84
3	0.65	0.65	0.3	0.3	0.96	0.96	0.61	0.61	0.49	0.49
4	0.6	0.6	0.89	0.89	0.61	0.61	0.66	0.66	0.32	0.32

Notes: The table shows p-values for the industry employment and income regressions adjusted for multiple inference, along with the original unadjusted p-values. Adjusted p-values control for the false discovery rate (Benjamini and Hochberg, 1995; Anderson, 2008) in a group of hypotheses defined by event, industry group, and year relative to the event (for example, testing whether $\beta_0 = 0$ for the NP designation event for all "winner" outcomes).

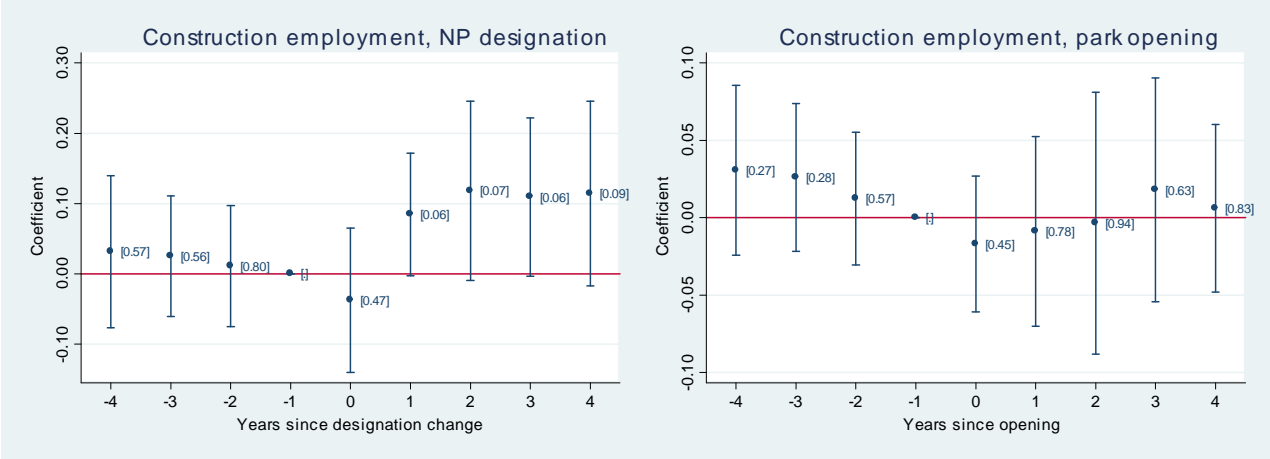


Figure A.27: The impact of parks on construction employment

Event study coefficient estimates for the impact of NP designation or park opening on construction employment. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8812, 122816.

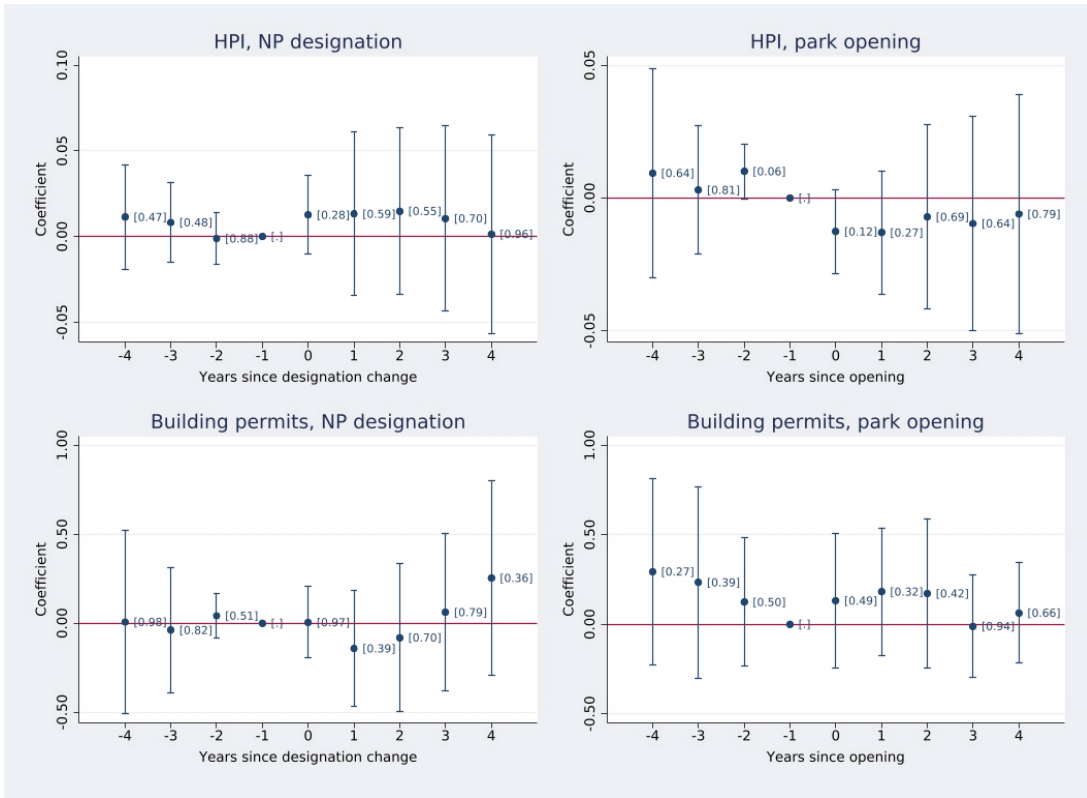


Figure A.28: House prices and building permits

Event study coefficient estimates for the impact of NP designation on house prices (1975-2017) and building permits (1990-2017). HPI is the FHFA house price index, number of building permits is from the US Census Bureau. See the Data Appendix for detailed sources and definitions. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. $N = 5054, 64983, 6563, 72157$.

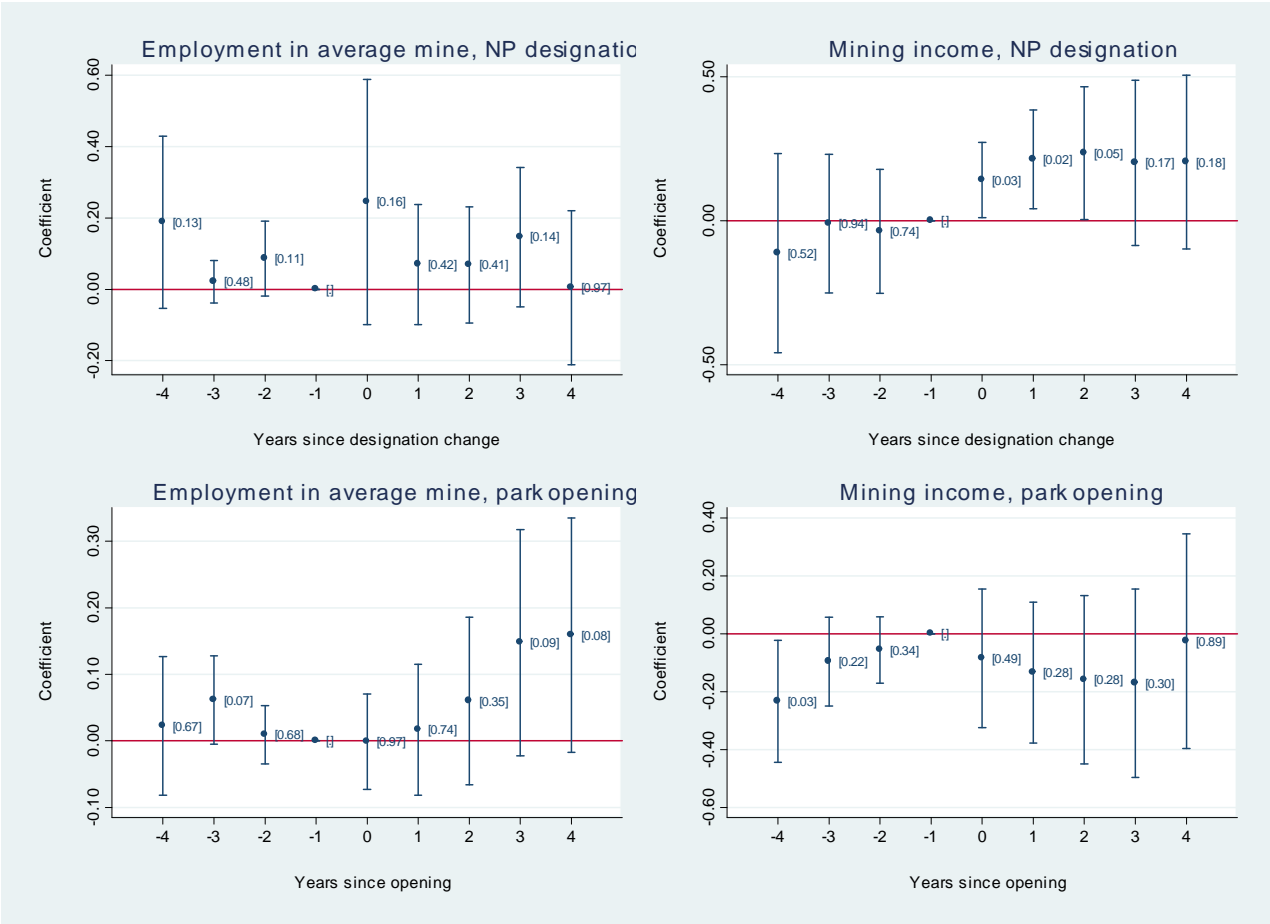


Figure A.29: The impact of parks on the mining sector, additional results
 Event study coefficient estimates for the impact of NP designation or park opening on log employment in the average mine in the county (using the mine-level data) and log income in the mining industry (using the BEA data). Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. The mine-level data begins in 1983. N = 6122, 7397, 73899, 88603.

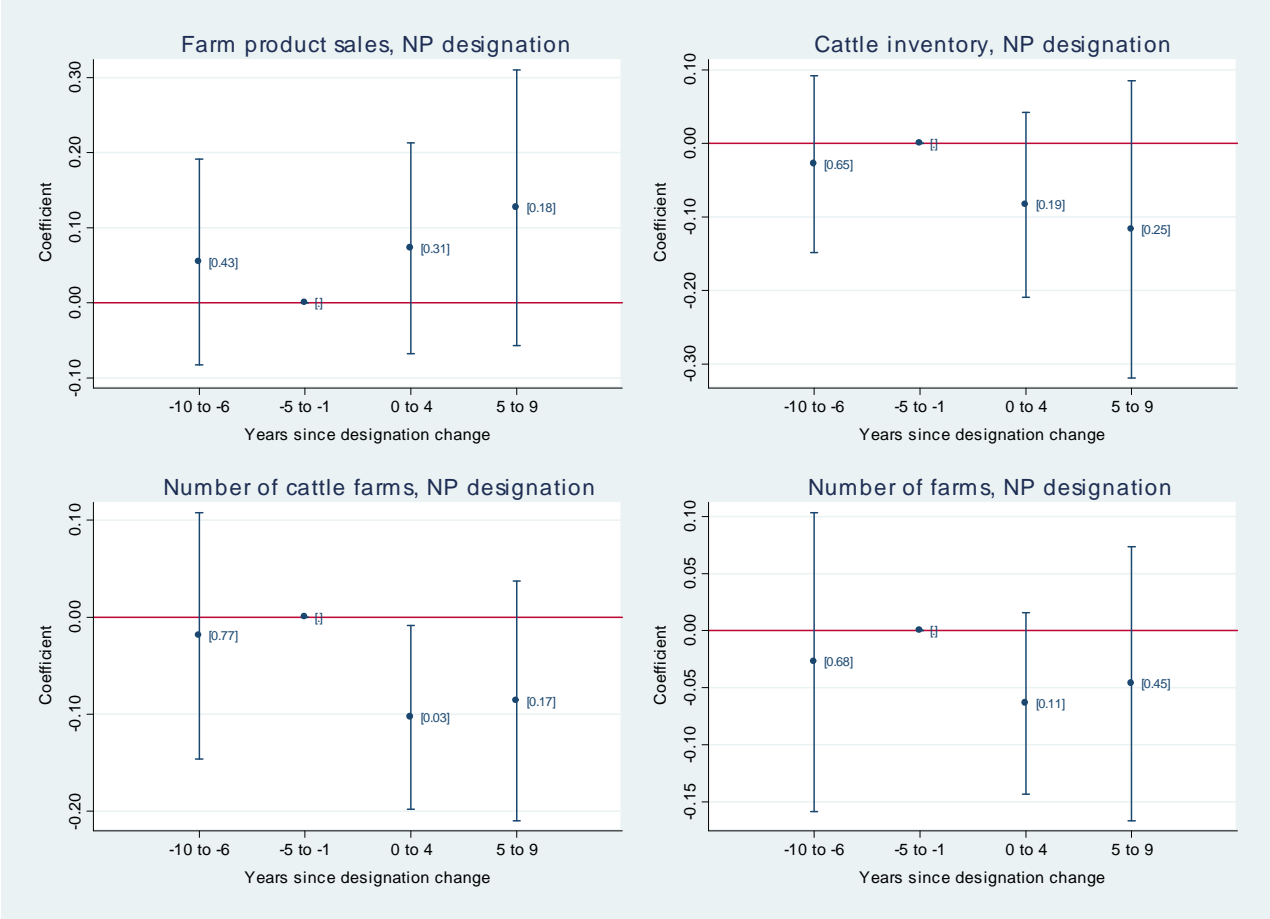


Figure A.30: NP designation and farms

Event study coefficient estimates for the impact of NP designation on farm product sales, cattle inventory, cattle farms, and the number of all farms (all in logs). Because this data from the USDA Census of Agriculture is only available every 5 years, we combine multiple pre and post periods. Estimates are relative to the period 1-5 years before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years: 1974-2017. N = 1844, 1828, 1859, 1860.

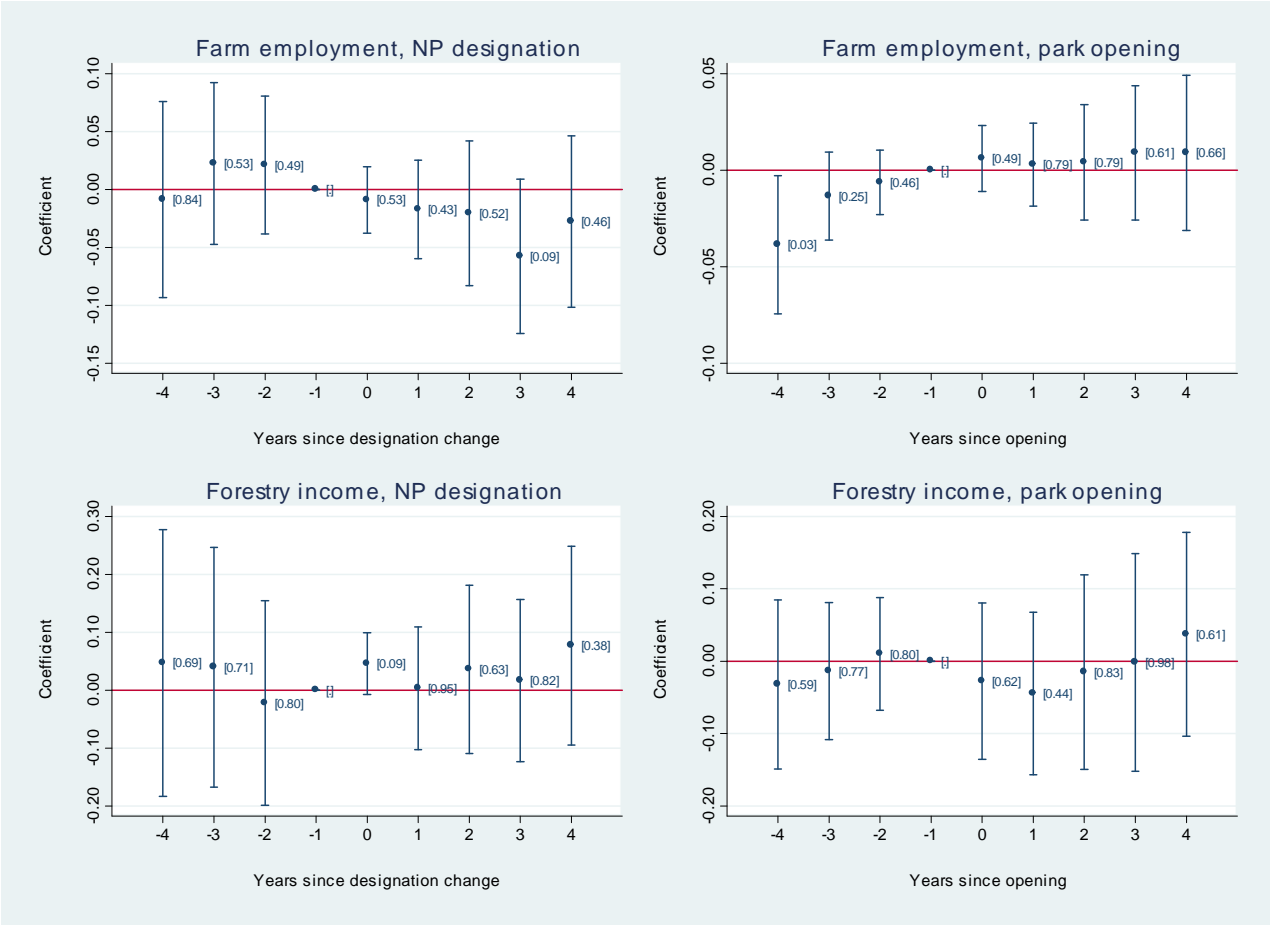


Figure A.31: The impact of parks on farms and forestry

Event study coefficient estimates for the impact of NP designation or park opening. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8832, 128635, 6468, 71819.

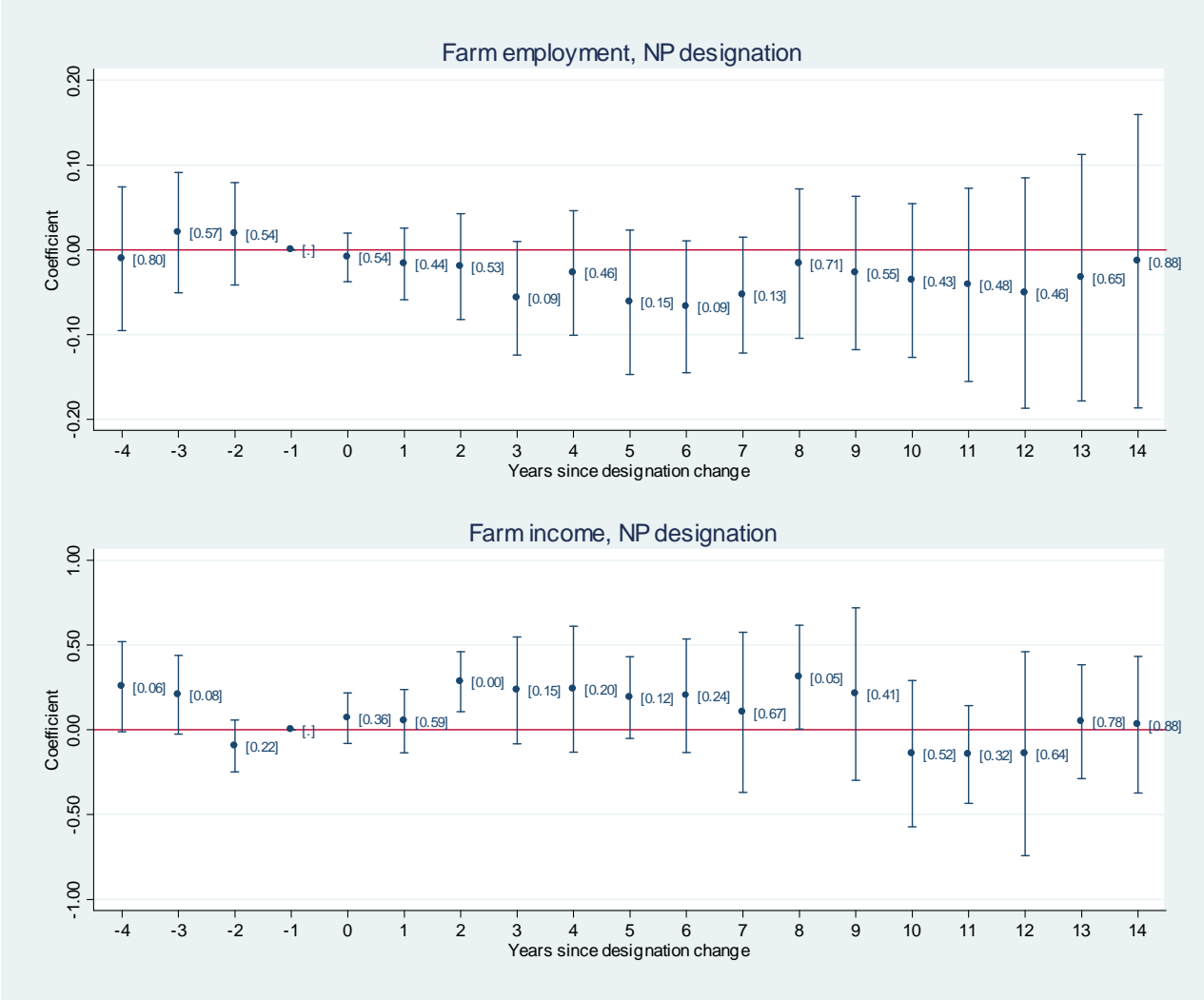


Figure A.32: The impact of NP designation on farm employment and income in the long run

Event study coefficient estimates for the impact of NP designation on farm employment and income. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8832, 8297.

6 Economic impacts of large park expansions

As an alternative measure of increased conservation, we use our acreage data to study the impact of large additions to a park’s area.

To allow for the fact that some parks may experience multiple events (multiple expansions), we extend specification (1) in the paper to

$$Y_{pt} = \sum_{j=-4, j \neq -1}^4 \beta_j \sum_k \mathbf{1}(\tau_{pt}^k = j) + \tilde{\beta}_5 \sum_k \mathbf{1}(\tau_{pt}^k \geq 5) + \tilde{\beta}_{-5} \sum_k \mathbf{1}(\tau_{pt}^k \leq -5) \quad (1)$$

$$+ \gamma \mathbf{X}_{pt} + \delta_p + \lambda_t + \varepsilon_{pt}.$$

Here τ_{pt}^k denotes time since the k th occurrence of the event. Assuming that the path of the effects is the same for a given park over time (for example, that the marginal effect of being 2 years after the first event is the same as the marginal effect of being 2 years after the second event) allows us to sum the $\mathbf{1}(\tau_{pt}^k = j)$ indicators and estimate a single coefficient β_j for each j . See Schmidheiny and Siegloch (2019) for a review of the different event study specifications used in the literature.

Figure A.33 shows the cumulative distribution of year-to-year additions in our sample, measured as the fraction of the current park’s area that was added since the previous year (for example, 0.5 on the horizontal axis indicates a doubling in size since the previous year). The figure shows all parks as well as excluding the smallest parks (under 10 acres) - the two distributions are nearly identical. As can be seen, approximately 10% of all additions account for a fifth or more of the park’s current area. A natural break in the distribution is visible at 60%, we therefore use this threshold to define “large” expansions.

Figure A.34 shows the results from estimating Eqn. (1) for visitors, park budgets, total employment and income. Point estimates for visitors are suggestive of a positive effect but none of the coefficients are statistically significant. Estimates for park budgets show a similar pattern. For employment, we see a statistically significant increase of 1.5% in the year of the expansion, but the effect disappears by year 3. There are larger gains for income, with the year of the expansion resulting in a 2.5% increase, which is maintained in years 1-3. Here too the gains seem to largely dissipate after year 4.

Overall, these patterns appear consistent with the narrative in the main text. Park expansions have some positive economic impacts. Any increase in visitors is weaker than those for NP designation, and correspondingly the economic impacts are also weaker.

To check if the estimates are sensitive to the 60% threshold, we present results for 50, 70, and 80% thresholds on Figure A.35 and A.36. In general, the higher the threshold, the more

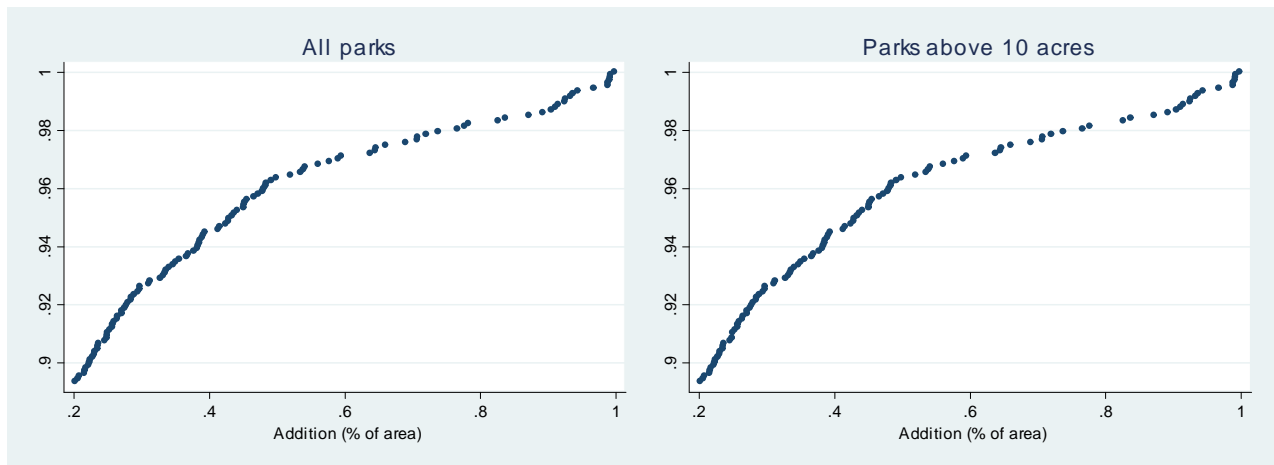


Figure A.33: Cumulative distribution of area additions

CDF of area additions in the sample for all parks (left) and parks with an average size of at least 10 acres over time (right). Additions are measured as the fraction of the park's area that was added since the previous year. 173 of the 188 parks (169 of the 183 parks larger than 10 acres) experienced some addition. Only additions above 20 percent are shown on the graph.

pronounced the effects are. This is exactly what one would expect if these large expansions of parks represent economically meaningful changes.

Because NP designation changes could be associated with increases in acreage, we also estimate an event study including both NP designation and park expansions as two separate events. The results for either NP designation or park expansions change very little (Figure A.37), which provides a further robustness check on the results reported in the paper.

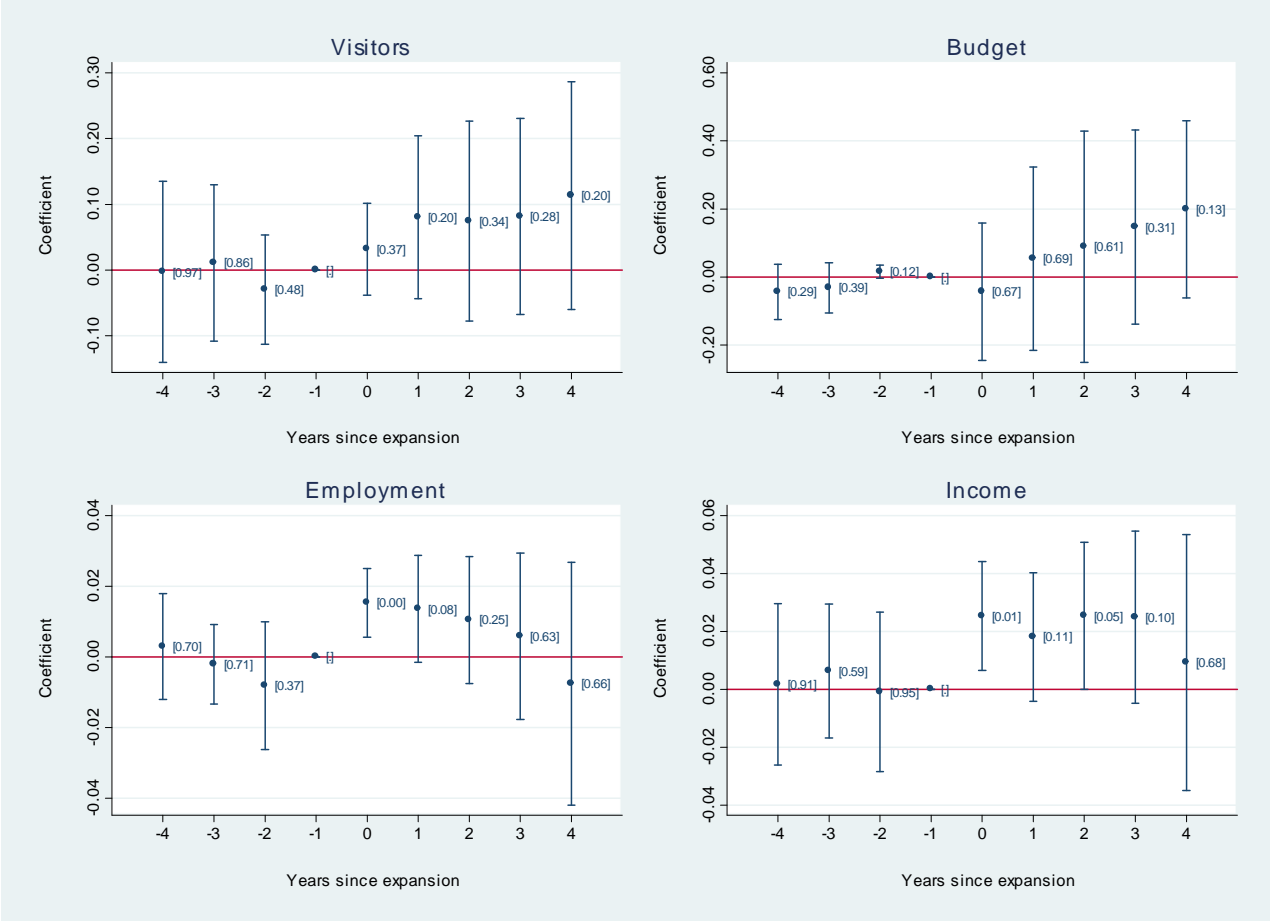


Figure A.34: The impact of park expansions

Event study coefficient estimates for the impact of park expansions. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8925, 8612, 9017, 9017.

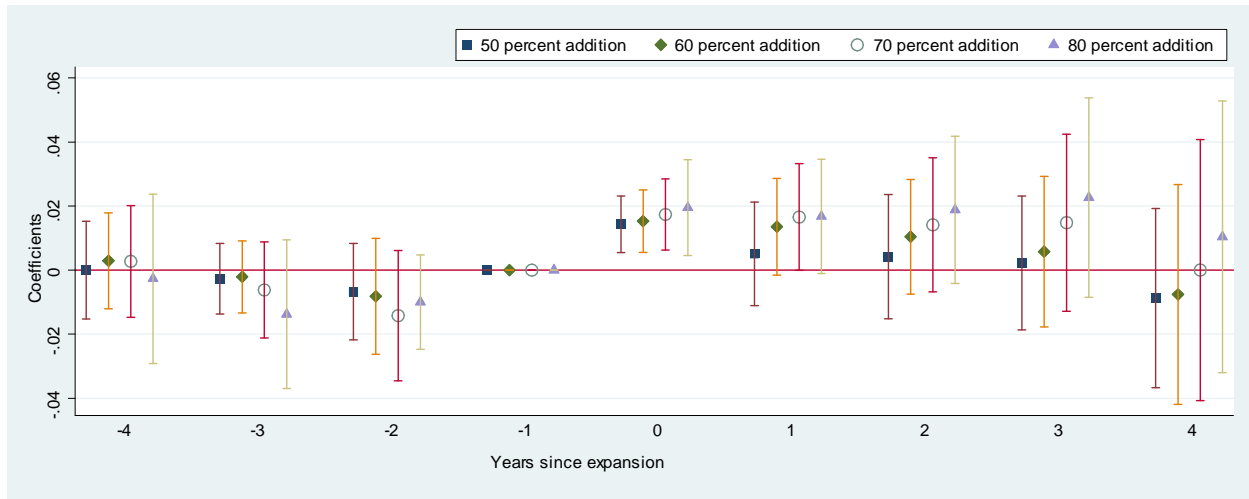


Figure A.35: Park expansions and employment, robustness

Event study coefficient estimates for the impact of park expansions on log employment, using different thresholds for the size of the area addition. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals.

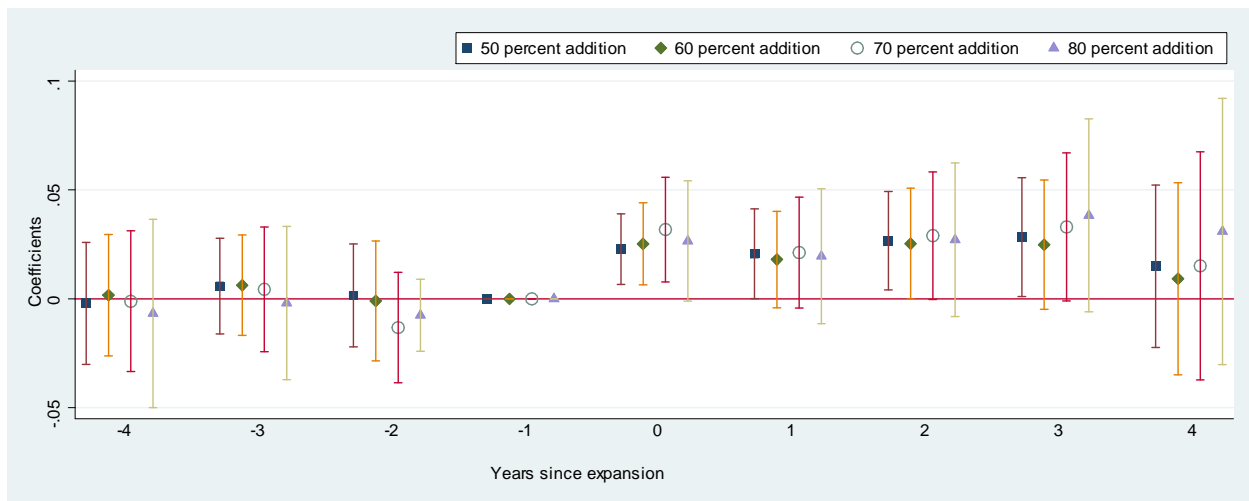


Figure A.36: Park expansions and income, robustness

Event study coefficient estimates for the impact of park expansions on log income, using different thresholds for the size of the area addition. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals.

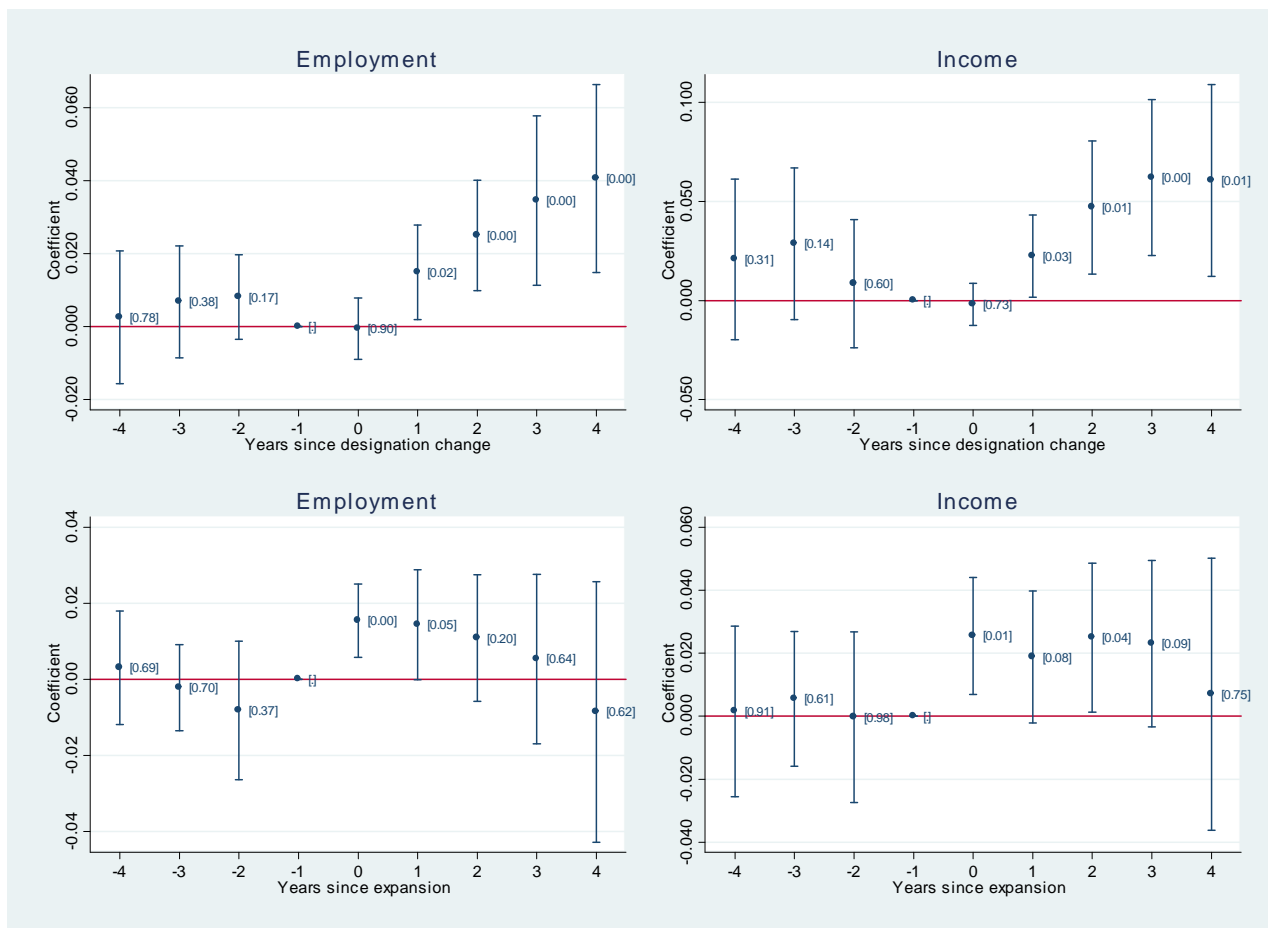


Figure A.37: The impact of NP designation and large expansions, joint estimates
 Event study coefficient estimates for the impact of NP designation and park expansions on employment and income. Both regressions include leads and lags for both events. The top panels show the designation change coefficients, the bottom panels the park expansion coefficients. Estimates are relative to the year before the change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8969.

For park expansions, it is possible to provide some results for years earlier than 1970. Although annual data on county outcomes is not available for this period, we can use the decennial census to obtain information on employment. On Figure A.38, we present estimates using county employment in 1940, 1950, and 1960, as well as the number of park visitors, for the impact of 19 large park expansions over this period.² We find similar impacts on visitors and employment: both are suggestive of an increase following park expansions, but both increases appear temporary.

²It is not possible to do this with the NP designation treatment because even if we include the 1930 census, we only have 1 observation in the 5 years before a treatment in the entire period before 1970.

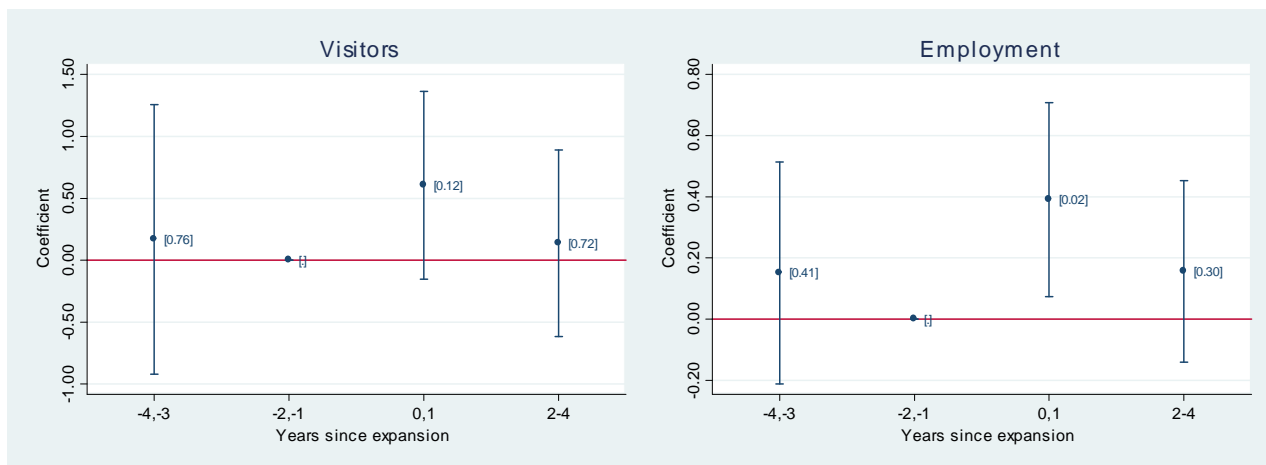


Figure A.38: The impact of park expansions, 1940-1960

Event study coefficient estimates for the impact of large park expansions on log visitors and employment. The outcomes are measured in Census years (1940, 1950, 1960). We combine multiple pre and post periods, and estimates are relative to the period 1-2 years before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. $N = 325$.

Investigating specific industries shows significant increases in income in the retail and the forestry sector (Figures A.39 and A.40). We find a 5% increase in retail income for 4 years following expansion, and a 15-20% increase in forestry income which appears more permanent.

To interpret the forestry results, recall that although some aspects of increased conservation may be costly for the forestry sector, others, such as increased demand for forest management services, are likely to be beneficial. The estimates suggest that for large expansions to already existing parks, the benefits outweigh the costs for the industry as a whole. To probe the validity of this interpretation, on Figure A.41 we look at the number of establishments in the logging sector as well as the broader forestry sector (using the Census Bureau's County Business Patterns dataset). The estimates confirm that these respond differently to park expansions: while the number of establishments in the forestry sector shows some increase, the number of logging establishments stays the same or declines. This provides support for the interpretation above, where parts of the forestry sector that rely less on resource extraction benefit from the expansion of parks.

We find little impact of park expansions on the hotel, construction, mining, or farming industry.

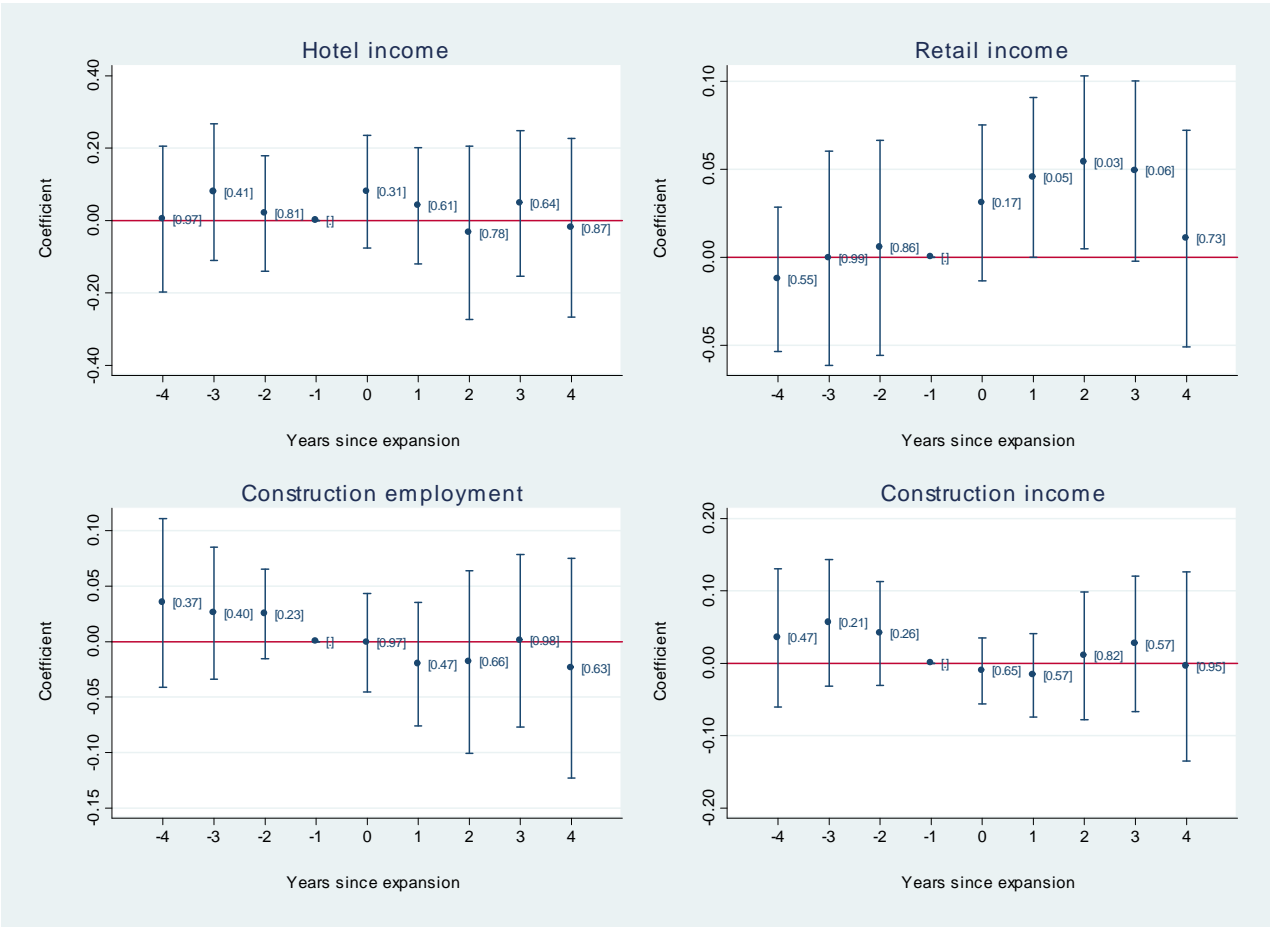


Figure A.39: The impact of park expansions on the hotel, retail, and construction sectors. Event study coefficient estimates for the impact of park expansions. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 8273, 8847, 8788, 8788.

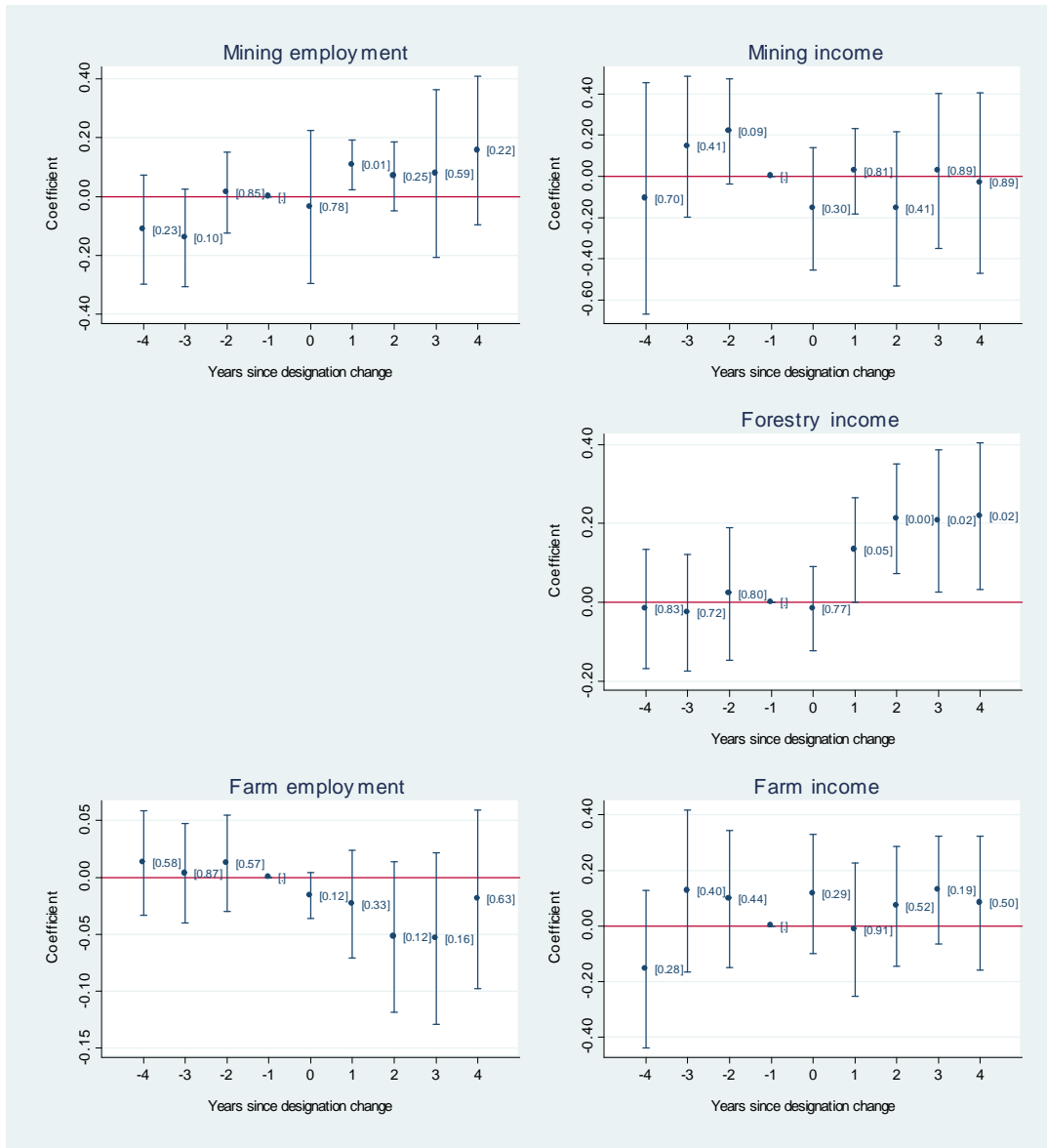


Figure A.40: The impact of park expansions on the mining, forestry, and farming sectors. Event study coefficient estimates for the impact of park expansions on log employment and income in the construction industry. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. N = 7540, 7370, 6434, 8825, 8286.

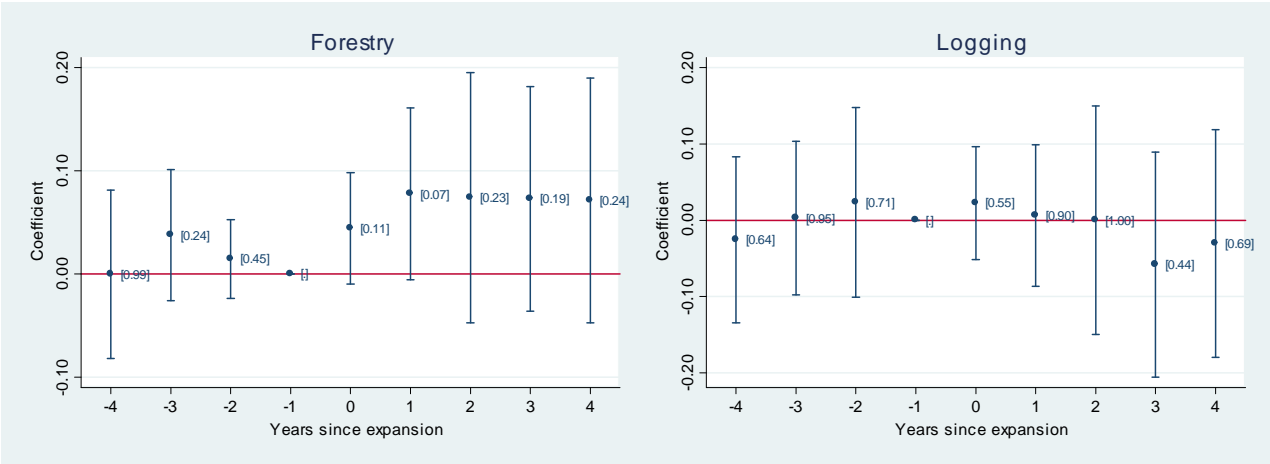


Figure A.41: The impact of park expansions on the number of establishments in the forestry sector

Event study coefficient estimates for the impact of park expansions on log number of establishments in the forestry sector (using the same sector definition as in the main analysis) and in the logging industry. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years: 1974-2016. N = 8084.

7 Potential negative externalities

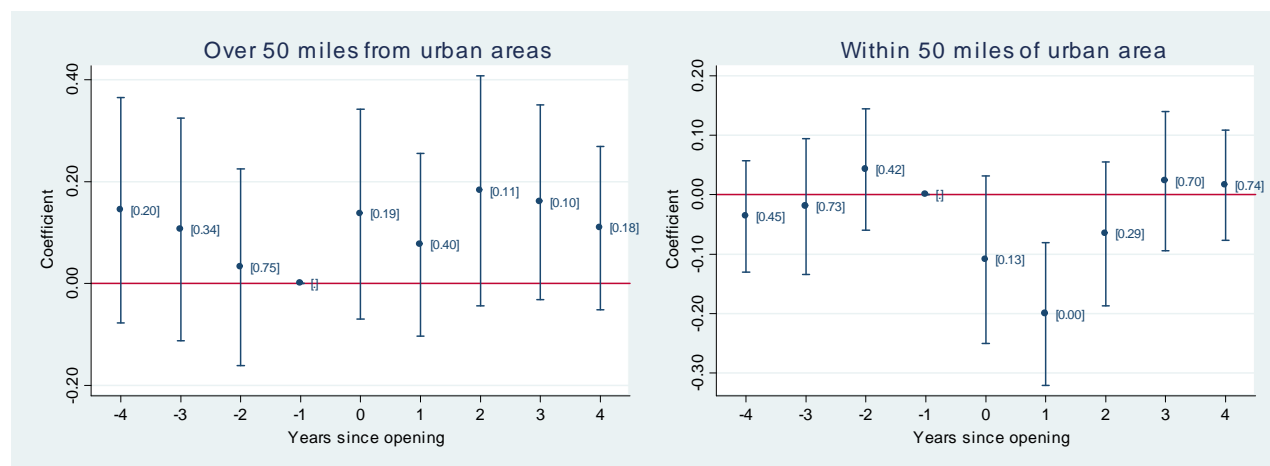


Figure A.42: The impact of park opening on traffic fatalities by closeness to urban areas. Event study estimates of park opening on log number of fatal accidents, separately for areas over/within 50 miles of large metropolitan areas (population over 1 million). Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years 1975-2017. N = 116,229.

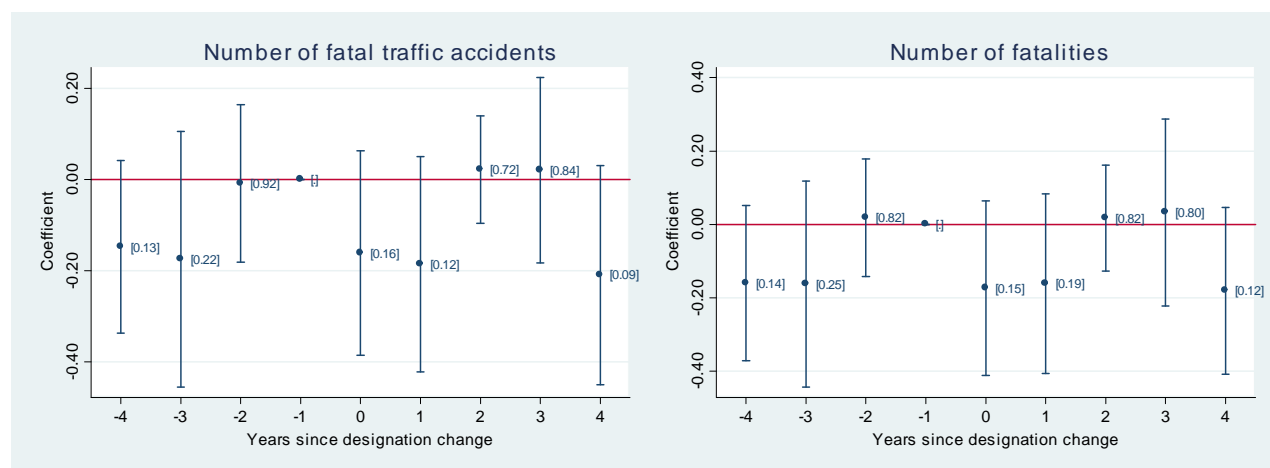


Figure A.43: The impact of NP designation on traffic fatalities. Event study coefficient estimates of NP designation on log number of fatal accidents and log number of traffic fatalities. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years: 1975-2017. N = 8084.

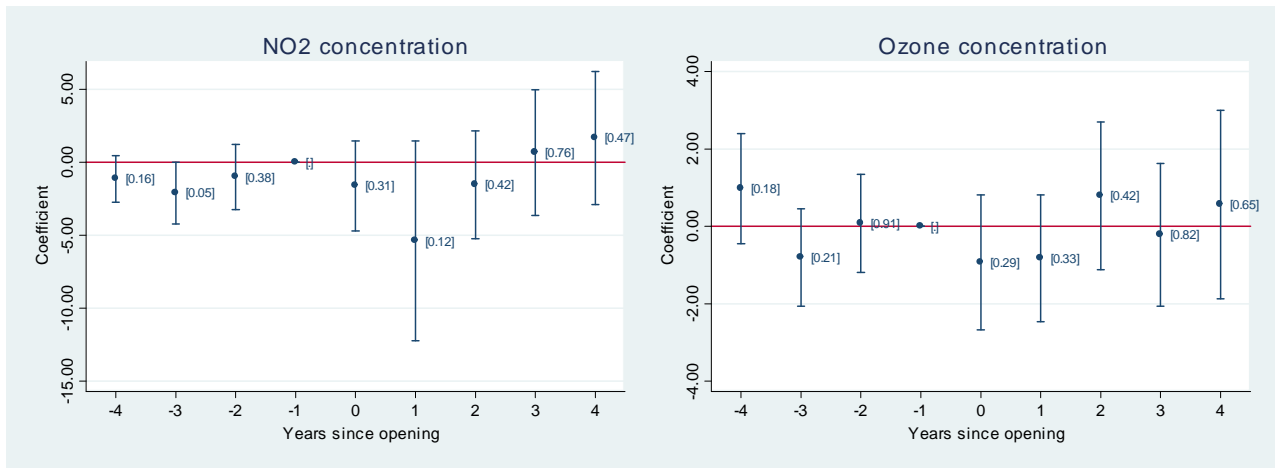


Figure A.44: The impact of park opening on air pollution

Event study estimates of park opening on NO₂ and O₃ concentration. Estimates are relative to the year before park opening. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years 1980-2017. N = 7221, 20173.

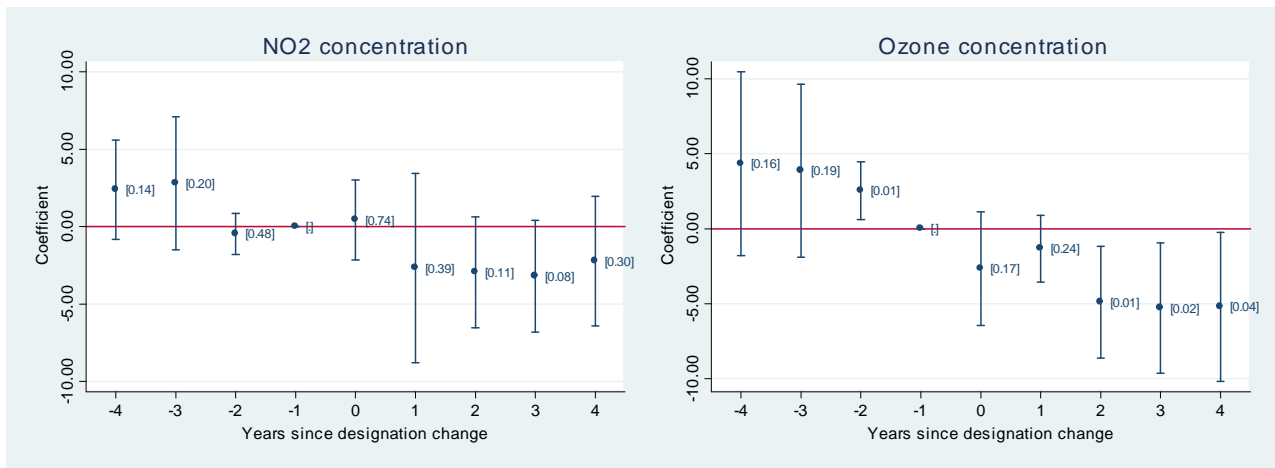


Figure A.45: The impact of NP designation on air pollution

Event study coefficient estimates on NO₂ and O₃ concentration. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years 1980-2017. N = 1928, 3801.

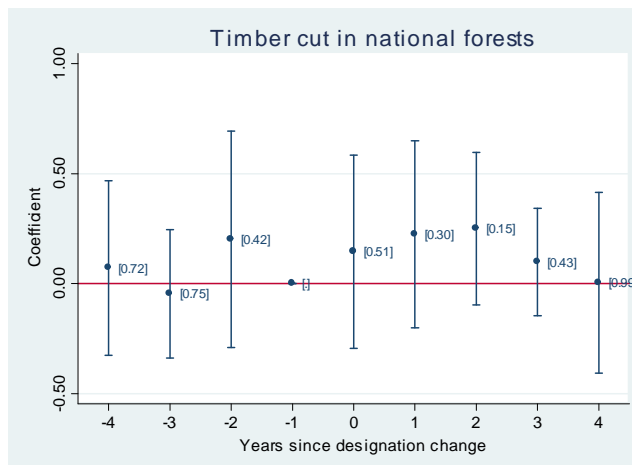


Figure A.46: The impact of NP designation on timber cut in adjacent national forests. Event study estimates of NP designation. Timber volume is measured in $\log(1000 \text{ board feet})$. Estimates are relative to the year before the designation change. Standard errors are clustered at the park level. Bars indicate 95 percent confidence intervals, p-values are in brackets. Years 1977-2017. $N = 3608$.

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