

Online Appendix to “Ghost Towns and Big Cities:
Historical Mining and Economic Activity in the
American West”

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Table A1: Hazard Ratios for the Risk of Town Death: Quadratic Polynomials in Latitude and Longitude

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Near mining site	1.082 (0.091)	0.840** (0.064)	0.725*** (0.056)	0.841** (0.065)	0.862* (0.066)	0.764*** (0.062)	0.766*** (0.062)
Near mining site \times time	1.012*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.007*** (0.003)	1.010*** (0.003)	1.007*** (0.003)
<i>Geography:</i>							
Elevation (thsd. of feet)			1.513*** (0.097)				1.367*** (0.079)
Ruggedness			1.082*** (0.025)				1.049** (0.025)
ln(Distance to West Coast)			0.999 (0.040)				1.021 (0.042)
ln(Distance to river)			1.061** (0.032)				1.069** (0.031)
<i>Transportation and city:</i>							
ln(Distance to rail)				1.019 (0.014)			0.973** (0.014)
ln(Distance to city > 10K)				0.865*** (0.028)			0.810*** (0.028)
<i>Population:</i>							
ln(Population)					0.728*** (0.013)		0.721*** (0.013)
<i>Demographics:</i>							
Male						0.947 (0.227)	0.740 (0.165)
Median age						1.036*** (0.004)	1.008** (0.003)
Literacy rate						1.027 (0.120)	0.839 (0.090)
Mining employment						0.895 (0.138)	1.078 (0.160)
Geographic coordinates		✓	✓	✓	✓	✓	✓
Physiographic province FE		✓	✓	✓	✓	✓	✓
State FE		✓	✓	✓	✓	✓	✓
Log likelihood	-26,689	-26,341	-26,285	-26,323	-26,063	-26,289	-25,971
No. of observations	18,700	18,700	18,700	18,700	18700.000	18,700	18,700

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. There are 7,285 unique towns in the dataset. The variable ‘Near mining site’ is an indicator equal to one if a town is located within five miles of a gold or silver mining site and zero otherwise. Towns already exposed to mining in 1850 or that first appear in 1940 are excluded. Geographic coordinates include quadratic polynomials in latitude and longitude (a model with cubic polynomials failed to converge). For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 1940 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Hazard Ratios for the Risk of Town Death: Clustering at the Physiographic Province Level

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Near mining site	1.082 (0.099)	0.845 (0.089)	0.722*** (0.066)	0.845 (0.095)	0.864 (0.085)	0.766** (0.087)	0.763** (0.082)
Near mining site \times time	1.012*** (0.003)	1.011*** (0.004)	1.011*** (0.003)	1.011*** (0.004)	1.007* (0.004)	1.010*** (0.004)	1.007* (0.004)
<i>Geography:</i>							
Elevation (thds. of feet)			1.514*** (0.167)				1.370*** (0.136)
Ruggedness			1.081** (0.035)				1.049 (0.031)
ln(Distance to West Coast)			0.993 (0.014)				1.011 (0.019)
ln(Distance to river)			1.052* (0.030)				1.058 (0.037)
<i>Transportation and city:</i>							
ln(Distance to rail)				1.021 (0.023)			0.973 (0.019)
ln(Distance to city > 10K)				0.867*** (0.014)			0.812*** (0.033)
<i>Population:</i>							
ln(Population)					0.728*** (0.021)		0.720*** (0.017)
<i>Demographics:</i>							
Male						0.963 (0.260)	0.749* (0.128)
Median age						1.035*** (0.005)	1.007* (0.004)
Literacy rate						1.031 (0.156)	0.834* (0.079)
Mining employment						0.912 (0.201)	1.069 (0.219)
Geographic coordinates		✓	✓	✓	✓	✓	✓
Physiographic province FE		✓	✓	✓	✓	✓	✓
State FE		✓	✓	✓	✓	✓	✓
Log likelihood	-26,689	-26,345	-26,285	-26,327	-26,064	-26,292	-25,972
No. of observations	18,700	18,700	18,700	18,700	18,700	18,700	18,700

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. There are 7,285 unique towns in the dataset. The variable ‘Near mining site’ is an indicator equal to one if a town is located within five miles of a gold or silver mining site and zero otherwise. Towns already exposed to mining in 1850 or that first appear in 1940 are excluded. Geographic coordinates include latitude, longitude, and their interaction. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the physiographic province level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Hazard Ratios for the Risk of Town Death: Clustering at the State Level

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Near mining site	1.082 (0.076)	0.845** (0.065)	0.722*** (0.054)	0.845** (0.070)	0.864** (0.063)	0.766*** (0.074)	0.763*** (0.064)
Near mining site \times time	1.012*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.007** (0.003)	1.010*** (0.003)	1.007** (0.003)
<i>Geography:</i>							
Elevation (thds. of feet)			1.514*** (0.199)				1.370*** (0.155)
Ruggedness			1.081** (0.038)				1.049 (0.035)
ln(Distance to West Coast)			0.993 (0.024)				1.011 (0.011)
ln(Distance to river)			1.052*** (0.020)				1.058** (0.030)
<i>Transportation and city:</i>							
ln(Distance to rail)				1.021 (0.020)			0.973 (0.020)
ln(Distance to city > 10K)				0.867*** (0.032)			0.812*** (0.040)
<i>Population:</i>							
ln(Population)					0.728*** (0.029)		0.720*** (0.027)
<i>Demographics:</i>							
Male						0.963 (0.295)	0.749 (0.204)
Median age						1.035*** (0.007)	1.007* (0.004)
Literacy rate						1.031 (0.093)	0.834 (0.107)
Mining employment						0.912 (0.187)	1.069 (0.181)
Geographic coordinates		✓	✓	✓	✓	✓	✓
Physiographic province FE		✓	✓	✓	✓	✓	✓
State FE		✓	✓	✓	✓	✓	✓
Log likelihood	-26,689	-26,345	-26,285	-26,327	-26,064	-26,292	-25,972
No. of observations	18,700	18,700	18,700	18,700	18,700	18,700	18,700

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. There are 7,285 unique towns in the dataset. The variable ‘Near mining site’ is an indicator equal to one if a town is located within five miles of a gold or silver mining site and zero otherwise. Towns already exposed to mining in 1850 or that first appear in 1940 are excluded. Geographic coordinates include latitude, longitude, and their interaction. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Hazard Ratios for the Risk of Town Death: Clustering at the Census Place Level

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Near mining site	1.082 (0.084)	0.845** (0.066)	0.722*** (0.057)	0.845** (0.066)	0.864* (0.066)	0.766*** (0.063)	0.763*** (0.062)
Near mining site \times time	1.012*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.011*** (0.003)	1.007*** (0.003)	1.010*** (0.003)	1.007*** (0.003)
<i>Geography:</i>							
Elevation (thds. of feet)			1.514*** (0.074)				1.370*** (0.065)
Ruggedness			1.081*** (0.023)				1.049** (0.022)
ln(Distance to West Coast)			0.993 (0.032)				1.011 (0.031)
ln(Distance to river)			1.052** (0.027)				1.058** (0.026)
<i>Transportation and city:</i>							
ln(Distance to rail)				1.021** (0.010)			0.973*** (0.010)
ln(Distance to city > 10K)				0.867*** (0.018)			0.812*** (0.018)
<i>Population:</i>							
ln(Population)					0.728*** (0.009)		0.720*** (0.010)
<i>Demographics:</i>							
Male						0.963 (0.180)	0.749 (0.141)
Median age						1.035*** (0.003)	1.007** (0.003)
Literacy rate						1.031 (0.117)	0.834 (0.099)
Mining employment						0.912 (0.127)	1.069 (0.143)
Geographic coordinates		✓	✓	✓	✓	✓	✓
Physiographic province FE		✓	✓	✓	✓	✓	✓
State FE		✓	✓	✓	✓	✓	✓
Log likelihood	-26,689	-26,345	-26,285	-26,327	-26,064	-26,292	-25,972
No. of observations	18,700	18,700	18,700	18,700	18,700	18,700	18,700

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. There are 7,285 unique towns in the dataset. The variable ‘Near mining site’ is an indicator equal to one if a town is located within five miles of a gold or silver mining site and zero otherwise. Towns already exposed to mining in 1850 or that first appear in 1940 are excluded. Geographic coordinates include latitude, longitude, and their interaction. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the census place level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Hazard Ratios for the Risk of Post Office Closure

Independent variable	(1)	(2)	(3)
Near mining site	1.313*** (0.094)	1.214*** (0.076)	1.097 (0.067)
Near mining site \times time	0.999 (0.002)	0.999 (0.002)	0.999 (0.002)
<i>Geography:</i>			
Elevation (thds. of feet)			1.097*** (0.014)
Ruggedness			1.035** (0.017)
ln(Distance to West Coast)			0.995 (0.018)
ln(Distance to river)			0.985 (0.014)
Geographic coordinates		✓	✓
Physiographic province FE		✓	✓
State FE		✓	✓
Log likelihood	-72,815	-72,509	-72,463
No. of observations	394,819	394,819	394,819

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. The variable ‘Near mining site’ is an indicator equal to one if a post office is located within five miles of a gold or silver mining site and zero otherwise. Post offices already exposed to mining in 1850 or that first appear in 1940 are excluded. Geographic coordinates include latitude, longitude, and their interaction. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 1940 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Hazard Ratios for the Risk of Town Death: Dropping Towns with Population Gaps

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Near mining site	1.044 (0.120)	0.749*** (0.078)	0.645*** (0.068)	0.731*** (0.079)	0.762*** (0.079)	0.707*** (0.073)	0.708*** (0.077)
Near mining site \times time	1.018*** (0.006)	1.024*** (0.006)	1.025*** (0.006)	1.024*** (0.006)	1.020*** (0.006)	1.025*** (0.006)	1.021*** (0.006)
<i>Geography:</i>							
Elevation (thds. of feet)			1.702*** (0.102)				1.415*** (0.078)
Ruggedness			1.037 (0.024)				0.989 (0.022)
ln(Distance to West Coast)			0.951 (0.054)				0.994 (0.052)
ln(Distance to river)			1.020 (0.033)				1.004 (0.032)
<i>Transportation and city:</i>							
ln(Distance to rail)				1.195*** (0.018)			1.112*** (0.015)
ln(Distance to city > 10K)				0.950 (0.031)			0.893*** (0.029)
<i>Population:</i>							
ln(Population)					0.743*** (0.014)		0.772*** (0.014)
<i>Demographics:</i>							
Male						6.618*** (1.412)	1.966*** (0.372)
Median age						1.004 (0.004)	0.995 (0.004)
Literacy rate						0.431*** (0.049)	0.467*** (0.049)
Mining employment						1.022 (0.129)	0.956 (0.116)
Geographic coordinates		✓	✓	✓	✓	✓	✓
Physiographic province FE		✓	✓	✓	✓	✓	✓
State FE		✓	✓	✓	✓	✓	✓
Log likelihood	-22,674	-22,534	-22,476	-22,447	-22,337	-22,471	-22,256
No. of observations	12,056	12,056	12,056	12,056	12,056	12,056	12,056

Notes: Hazard ratios are shown using exponentiated coefficients from estimation of equation (2) in the main paper. The variable ‘Near mining site’ is an indicator equal to one if a town is located within five miles of a gold or silver mining site and zero otherwise. Towns already exposed to mining in 1850 or that first appear in 1940 are excluded. Also, towns showing population gaps between one census year and another are excluded. Geographic coordinates include latitude, longitude, and their interaction. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 1940 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Population Density Today and Historical Mining Sites: Cubic Polynomials in Latitude and Longitude

Independent variable	Dependent variable:							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		ln(Population density)						Population density
Near mining site	0.086 (0.124)	0.092 (0.121)	0.695*** (0.094)	0.688*** (0.079)	0.722*** (0.074)	-24.945 (18.070)	26.882* (12.204)	25.225* (10.722)
Geographic coordinates		✓	✓	✓	✓		✓	✓
Geographic controls			✓	✓	✓		✓	✓
Physiographic province FE				✓	✓			✓
State FE					✓			✓
Adjusted R^2	0.069	0.073	0.324	0.356	0.367	0.007	0.042	0.045
No. of observations	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456

Notes: The results are based on estimation of equation (3) in the main paper. Each observation is a census block and regressions are weighted by census block area. The dependent variable in columns (1)–(5) is (ln) population density where the value of one is added to the population level before calculating density (people per square mile). The dependent variable in columns (6)–(8) is population density in levels. Blocks within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include cubic polynomials in latitude and longitude. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. The mean and standard deviation of population density, weighted by census block area, are 58.19 and 819.80. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Population Density Today and Historical Mining Sites: Unweighted Regressions

Independent variable	Dependent variable:							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		ln(Population density)		Population density		Population density		
Near mining site	-0.010 (0.231)	0.150 (0.213)	0.797*** (0.128)	0.703*** (0.144)	0.512*** (0.099)	-487.995 (515.292)	651.878** (271.334)	449.398** (225.998)
Geographic coordinates		✓	✓	✓	✓		✓	✓
Geographic controls			✓	✓	✓		✓	✓
Physiographic province FE				✓	✓			✓
State FE					✓			✓
Adjusted R^2	0.000	0.062	0.296	0.310	0.337	0.000	0.048	0.054
No. of observations	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456

Notes: The results are based on estimation of equation (3) in the main paper. Each observation is a census block. The dependent variable in columns (1)–(5) is (ln) population density where the value of one is added to the population level before calculating density (people per square mile). The dependent variable in columns (6)–(8) is population density in levels. Blocks within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. The mean and standard deviation of population density, weighted by census block area, are 58.19 and 819.80. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Population Density Today and Historical Mining Sites: Alternative SE clustering

Independent variable	Dependent variable:							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		ln(Population density)						Population density
Near mining site	-0.115 (0.074)	-0.158 (0.075)**	0.639 (0.055)***	0.688 (0.054)***	0.708 (0.054)***	-12.263 (1.164)***	32.323 (2.280)***	20.852 (1.966)***
	(0.267)	(0.299)	(0.181)***	(0.135)***	(0.102)***	(30.063)	(22.448)	(20.845)
	[0.335]	[0.297]	[0.187]***	[0.107]***	[0.094]***	[22.207]	[18.615]	[15.045]
	{0.117}	{0.119}	{0.086}***	{0.076}***	{0.074}***	{12.111}	{12.072}***	{11.457}*
Geographic coordinates	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls			✓	✓	✓		✓	✓
Physiographic province FE				✓	✓			✓
State FE					✓			✓
Adjusted R^2	0.000	0.008	0.313	0.351	0.361	0.000	0.033	0.040
No. of observations	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456	2,232,456

Notes: The results are based on estimation of equation (3) in the main paper. Each observation is a census block. Regressions are weighted by census block area. The dependent variable in columns (1)–(5) is $\ln(\text{population density})$ where the value of one is added to the population level before calculating density. The dependent variable in columns (6) and (7) is population density in levels. Blocks within five miles of a historical mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, distance to the West Coast, and distance to the nearest river. The mean and standard deviation of population density, weighted by census block area, are 58.19 and 819.80. For more information on variable definitions, see the main text. Standard errors in angle brackets are clustered at the census block level, in parentheses at the physiographic province level, in braces at the state level, and in braces at the 30 mile grid level in the spirit of Bester, Conley, and Hansen 2011. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Population Density Today and Historical Mining Sites: Inverse Hyperbolic Sine

Independent variable	(1)	(2)	(3)
Near mining site	0.040 (0.066)	0.278*** (0.050)	0.270*** (0.044)
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓
Adjusted R^2	0.000	0.152	0.187
No. of observations	2,232,456	2,232,456	2,232,456

Notes: The results are based on estimation of equation (3) in the main paper. Each observation is a census block and regressions are weighted by census block area. The dependent variable is the inverse hyperbolic sine of population density (people per square mile). Blocks within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: Population Density Today and Historical Mining Sites: Zero-Inflated Poisson

Independent variable	(1)	(2)	(3)
Near mining site	0.146 (0.162)	0.222*** (0.085)	0.225*** (0.063)
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓
Pseudo R^2	0.001	0.265	0.298
No. of observations	2,232,456	2,232,456	2,232,456

Notes: The results are based on estimation of a zero-inflated Poisson model. Each observation is a census block. The dependent variable is population density (people per square mile). The same covariates are used to model both excess zeros (logit) and population density (Poisson). Blocks within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Nighttime Light Intensity and Historical Mining Sites: Estimated in Levels

Independent variable	(1)	(2)	(3)
Near mining site	-0.343 (0.245)	0.747*** (0.230)	0.641*** (0.211)
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓
Adjusted R^2	0.000	0.109	0.138
No. of observations	3,144,856	3,144,856	3,144,856

Notes: The results are based on estimation of equation (3) where the dependent variable is mean nighttime light intensity. Each observation is a grid cell that is roughly 1 km² in size. Cells within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. The mean of the dependent variable is 5.90 and its standard deviation is 8.19. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Nighttime Light Intensity and Historical Mining Sites: Cubic Polynomials in Latitude and Longitude

Independent variable	(1)	(2)	(3)
Near mining site	-0.025 (0.020)	0.059*** (0.017)	0.062*** (0.016)
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓
Adjusted R^2	0.000	0.185	0.224
No. of observations	3,144,856	3,144,856	3,144,856

Notes: The results are based on estimation of equation (3) in the main paper where the dependent variable is (ln) mean of nighttime light intensity. Each observation is a grid cell roughly 1 km² in size. Cells within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include cubic polynomials in latitude and longitude. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A14: Nighttime Light Intensity and Historical Mining Sites: Alternative SE clustering

Independent variable	(1)	(2)	(3)
Near mining site	-0.025	0.055	0.058
	$\langle 0.001 \rangle^{***}$	$\langle 0.001 \rangle^{***}$	$\langle 0.001 \rangle^{***}$
	(0.051)	(0.023)**	(0.021)**
	[0.044]	[0.026]*	[0.021]**
	{0.017}	{0.016}***	{0.015}***
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓
Adjusted R^2	0.000	0.139	0.185
No. of observations	3,144,856	3,144,856	3,144,856

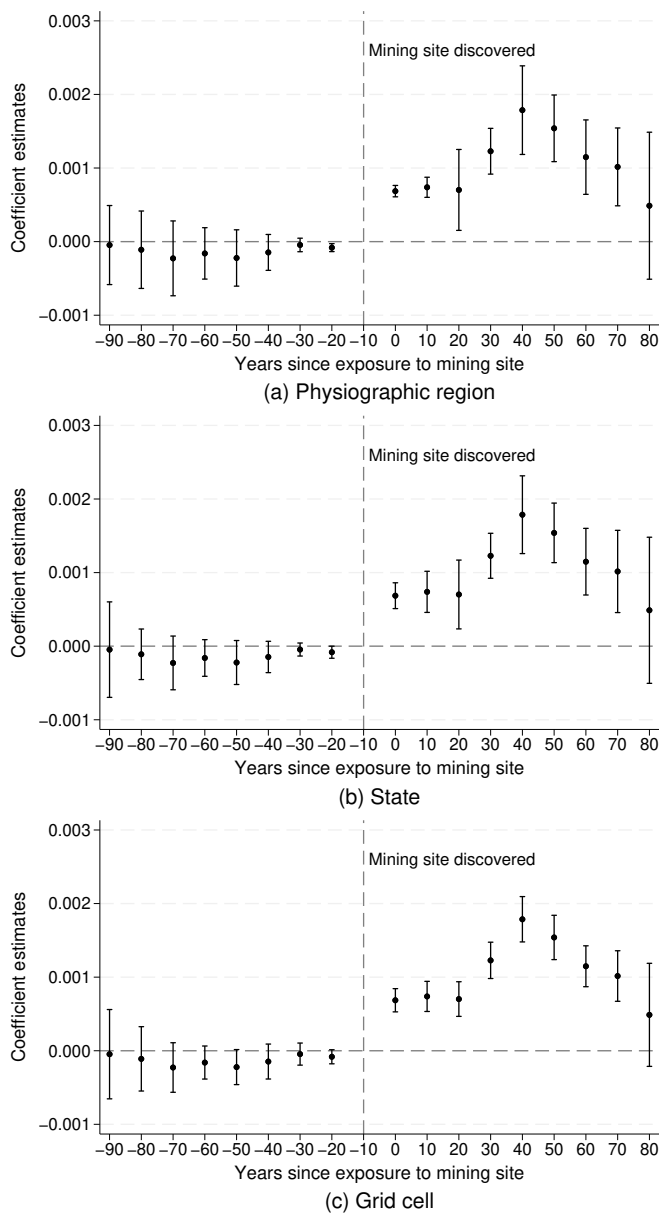
Notes: The results are based on estimation of equation (3) where the dependent variable is (ln) mean of nighttime light intensity. Each observation is a grid cell roughly 1 km² in size. Cells within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. For more information on variable definitions, see the main text. Standard errors in angle brackets are clustered at the grid cell level, in parentheses at the physiographic province level, in brackets at the state level, and in braces at the 30 mile grid level in the spirit of **Bester'spatial'2011**. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A15: Nighttime Light Intensity and Historical Mining Sites: Alternative Grid Cell Size

Independent variable	(1)	(2)	(3)
Near mining site (1 km ²)	-0.025 (0.020)	0.055*** (0.018)	0.058*** (0.016)
Adjusted R^2	0.000	0.139	0.185
No. of observations	3,144,856	3,144,856	3,144,856
Near mining site (0.25 km ²)	-0.025 (0.020)	0.055*** (0.017)	0.057*** (0.016)
Adjusted R^2	0.000	0.137	0.183
No. of observations	12,565,387	12,565,387	12,565,387
Near mining site (6.25 km ²)	-0.026 (0.020)	0.065*** (0.018)	0.067*** (0.016)
Adjusted R^2	0.000	0.149	0.196
No. of observations	504,739	504,739	504,739
Near mining site (25 km ²)	-0.025 (0.021)	0.069*** (0.018)	0.071*** (0.017)
Adjusted R^2	0.000	0.139	0.185
No. of observations	126,746	126,746	126,746
Geographic coordinates		✓	✓
Geographic controls		✓	✓
Physiographic province FE			✓
State FE			✓

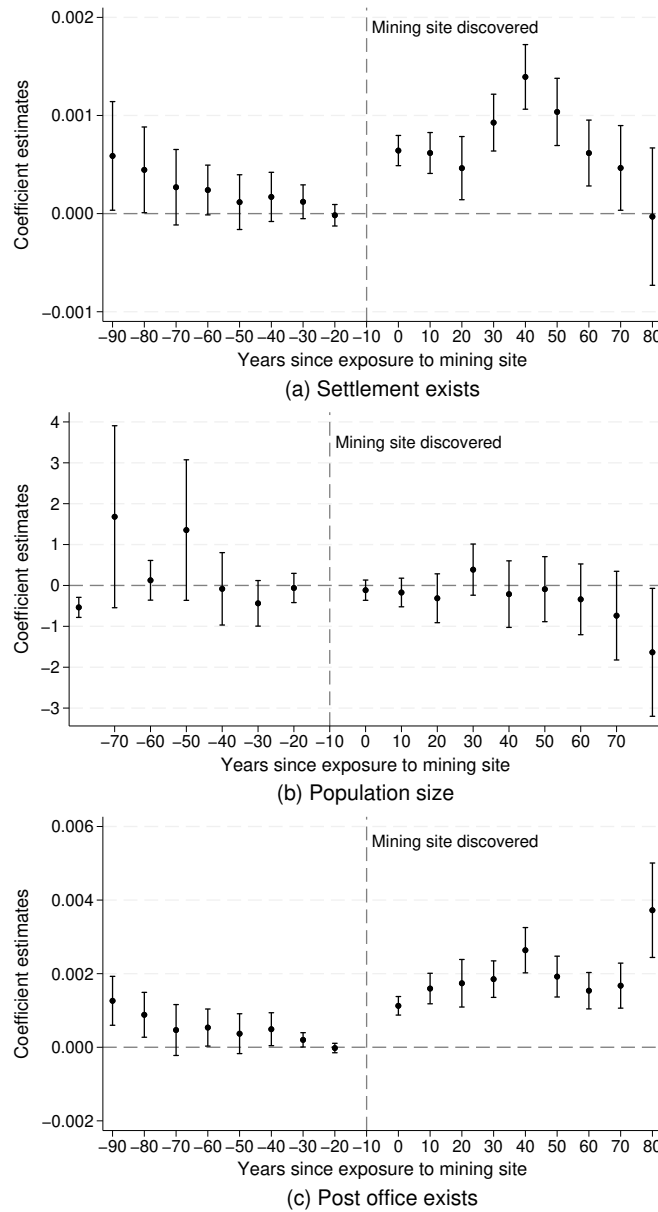
Notes: The results are based on estimation of equation (3) where the dependent variable is (ln) mean of nighttime light intensity. Each observation is a grid cell at the specified size. Cells within five miles of a mining site discovered by 1940 are considered to be located near a mining site. Geographic coordinates include latitude, longitude, and their interaction. Geographic controls include mean elevation, ruggedness, (ln) distance to the West Coast, and (ln) distance to the nearest river. For more information on variable definitions, see the main text. Standard errors, which are shown in parentheses, are clustered at the 2010 county level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A1: The Impact of Mining Activity on Town Settlement: Clustering at Different Levels



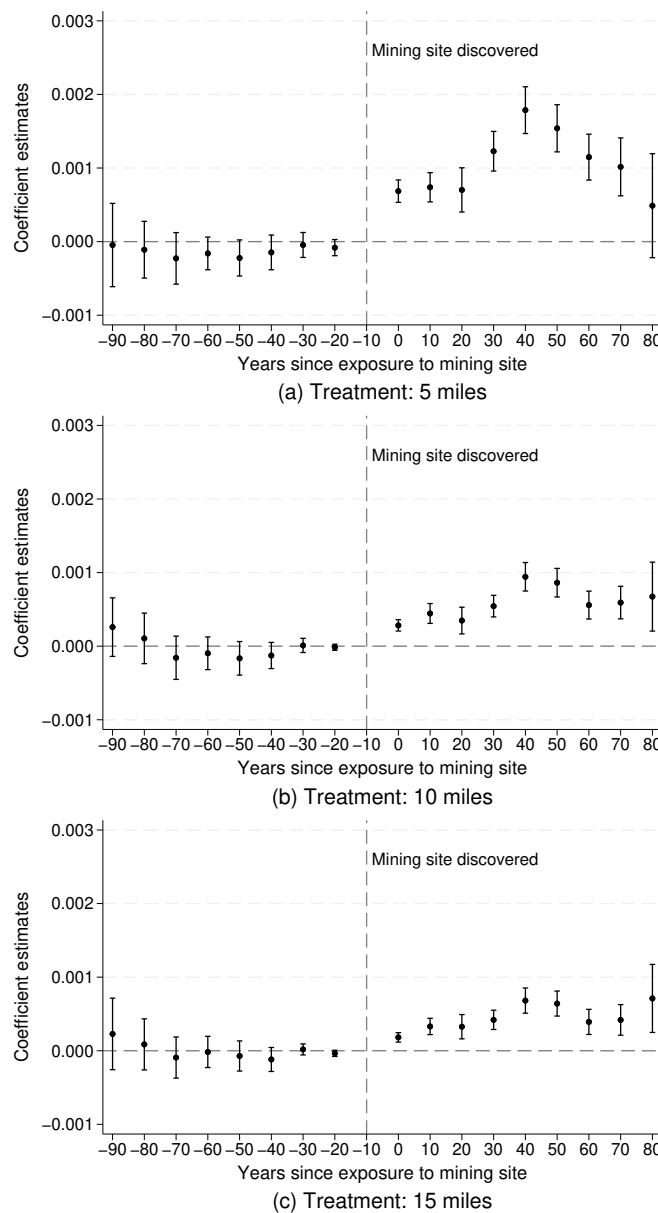
Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 1 km² in size. The outcome variable is an indicator for presence of a census place in a particular year and zero otherwise. Standard errors are clustered at the physiographic province level in panel (a); state level in panel (b); and grid cell in panel (c). Treatment and control observations are matched based on pre-existing geographic observables (elevation, ruggedness, (ln) distance to West Coast, (ln) distance to nearest river, latitude, longitude, and their interaction). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

Figure A2: The Impact of Mining Activity on Towns and Post Offices: Non-Matching Method



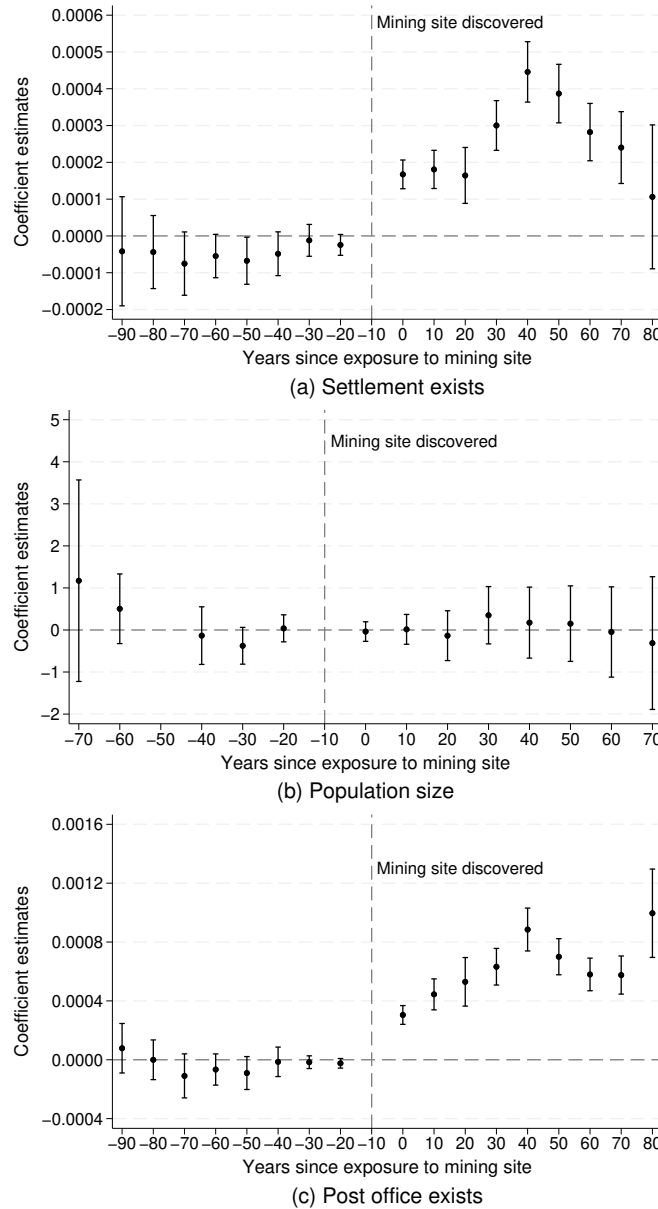
Notes: The figures show the estimated coefficients from equation (1) in the main paper and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 1 km² in size. The outcome variable is an indicator for presence of a census place in panel (a); $\ln(\text{population})$ in panel (b), excluding census places and locations with zero population; and presence of a post office in panel (c). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

Figure A3: The Impact of Mining Activity on Town Settlement: Different Treatment Thresholds



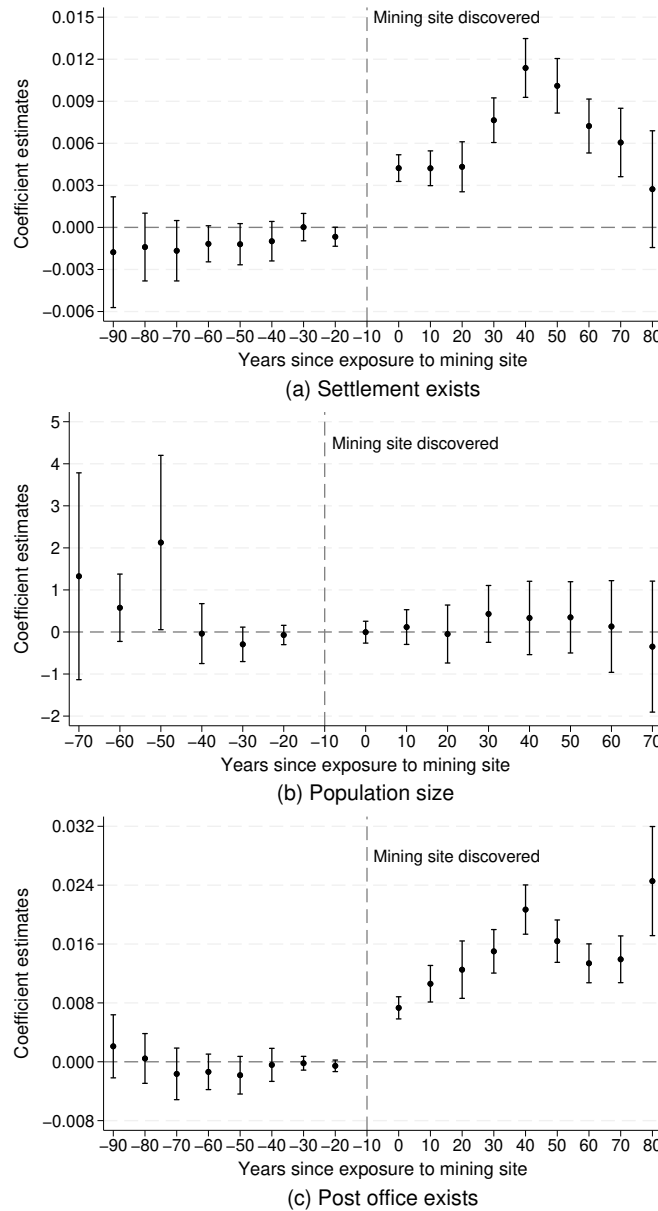
Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the doubly-robust methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 1 km² in size. The outcome variable is an indicator for presence of a census place in a particular year and zero otherwise. Treatment and control observations are matched based on pre-existing geographic observables (elevation, ruggedness, (ln) distance to the West Coast, (ln) distance to nearest river, latitude, longitude, and their interaction). Panel (a) shows the results using a treatment radius of 10 miles; panel (b) shows the results using a treatment radius of 15 miles. Treatment is measured as a binary indicator for mining site exposure—i.e., being within 10 or 15 miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to this date. Standard errors are clustered at the 1940 county level.

Figure A4: The Impact of Mining Activity on Town Settlement: 0.25 km² grid cells



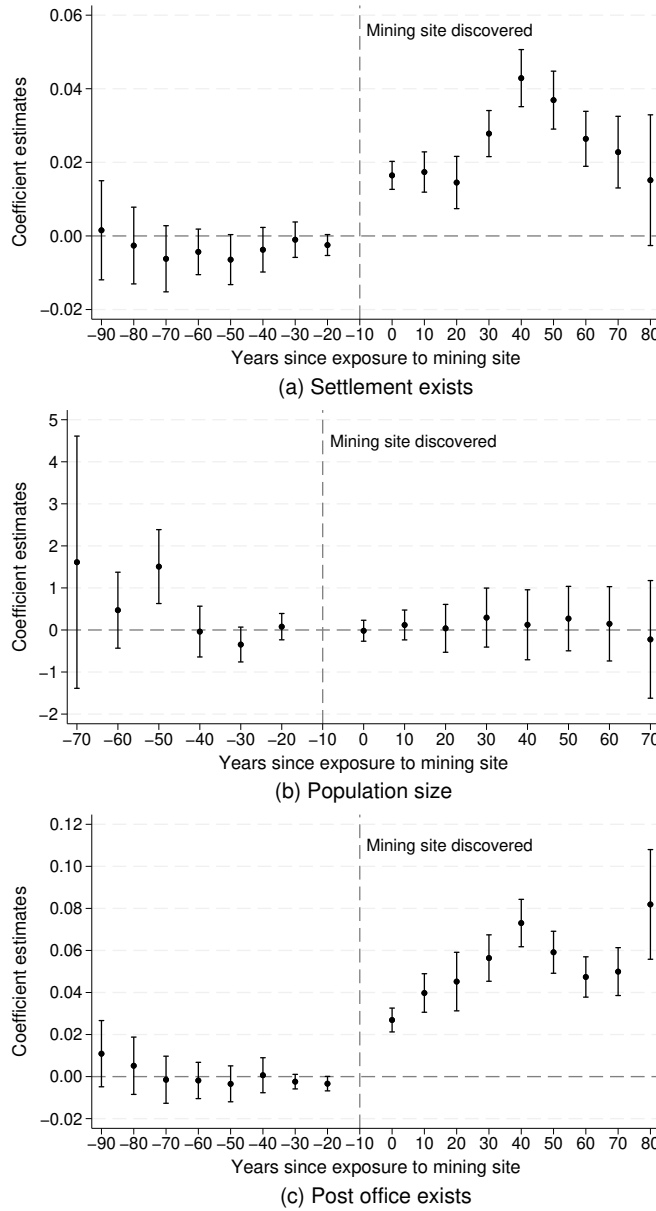
Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 0.25 km² in size. The outcome variable is an indicator for presence of a census place in panel (a); $\ln(\text{population})$ in panel (b), excluding census places and locations with zero population; and presence of a post office in panel (c). In each case, treatment and control groups are matched based on pre-existing geographic observables (elevation, ruggedness, \ln distance to West Coast, \ln distance to nearest river, latitude, longitude, and their interaction). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

Figure A5: The Impact of Mining Activity on Town Settlement: 6.25 km² grid cells



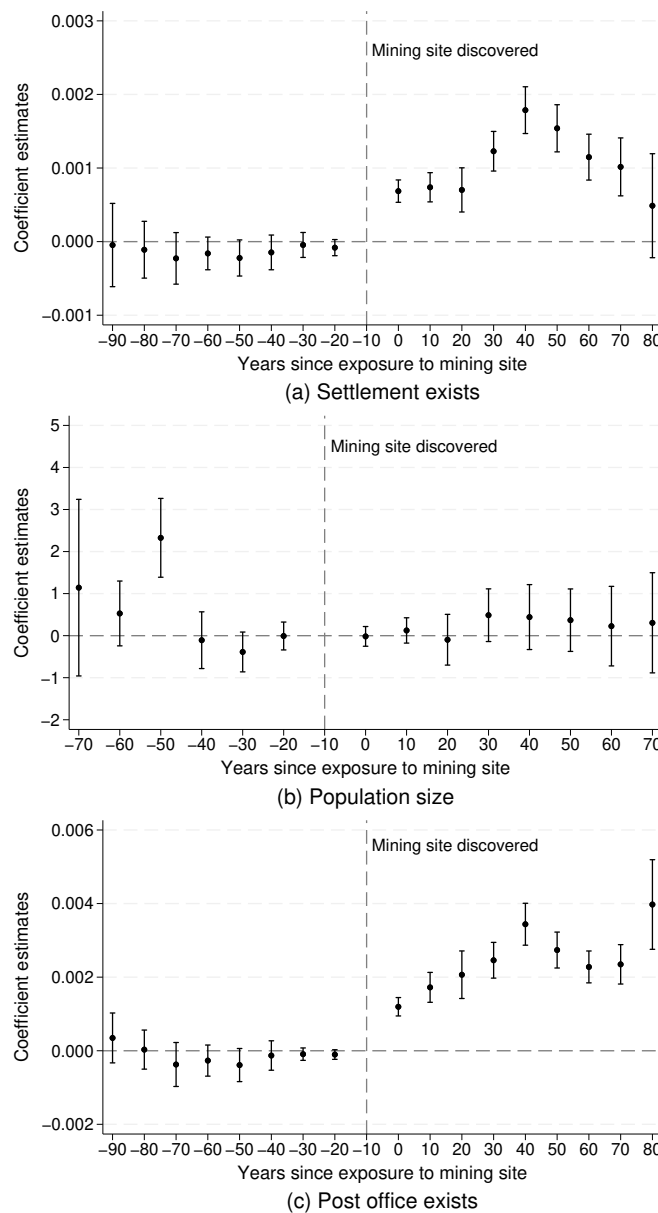
Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 6.25 km² in size. The outcome variable is an indicator for presence of a census place in panel (a); $\ln(\text{population})$ in panel (b), excluding census places and locations with zero population; and presence of a post office in panel (c). In each case, treatment and control groups are matched based on pre-existing geographic observables (elevation, ruggedness, \ln distance to West Coast, \ln distance to nearest river, latitude, longitude, and their interaction). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

Figure A6: The Impact of Mining Activity on Town Settlement: 25 km² grid cells



Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 25 km² in size. The outcome variable is an indicator for presence of a census place in panel (a); $\ln(\text{population})$ in panel (b), excluding census places and locations with zero population; and presence of a post office in panel (c). In each case, treatment and control groups are matched based on pre-existing geographic observables (elevation, ruggedness, \ln distance to West Coast, \ln distance to nearest river, latitude, longitude, and their interaction). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

Figure A7: The Impact of Mining Activity on Town Settlement: Including all of South Dakota



Notes: The figures show the estimated coefficients and 95 percent confidence intervals for the ATT estimated using the methods outlined in Callaway and Sant’Anna 2021. The sample consists of cells that are roughly 1 km² in size. The outcome variable is an indicator for presence of a census place in panel (a); ln(population) in panel (b), excluding census places and locations with zero population; and presence of a post office in panel (c). In each case, treatment and control groups are matched based on pre-existing geographic observables (elevation, ruggedness, (ln) distance to West Coast, (ln) distance to nearest river, latitude, longitude, and their interaction). Treatment is measured as a binary indicator for mining site exposure—i.e., being within five miles of a mining site. The date of treatment occurs at $t = -10$; all coefficients are interpreted relative to that date. Standard errors are clustered at the 1940 county level.

References

- Bester, C. Alan, Timothy G. Conley, and Christian B. Hansen. 2011. “Inference with Dependent Data Using Cluster Covariance Estimators.” *Journal of Econometrics* 165 (2): 137–151.
- Callaway, Brantly, and Pedro H.C. Sant’Anna. 2021. “Difference-in-Differences with Multiple Time Periods.” *Journal of Econometrics* 225 (2): 200–230.