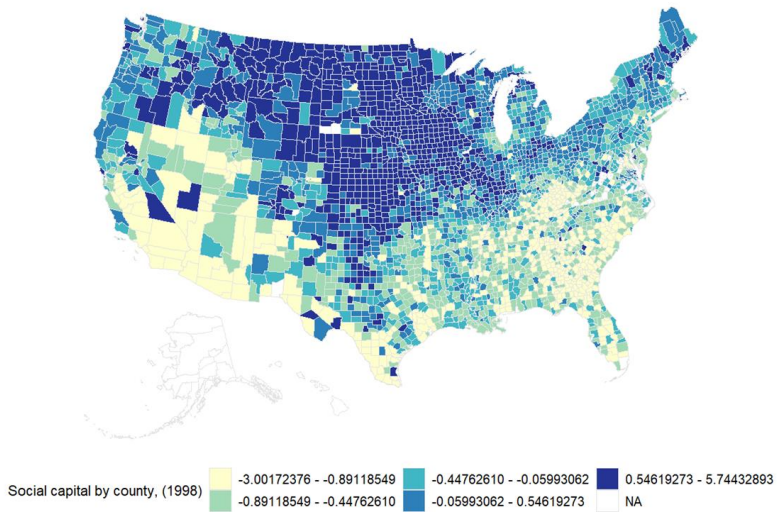
# Social Capital, Environmental Justice, and Carcinogenic Waste Releases:

# US County-level Evidence during 1998-2019

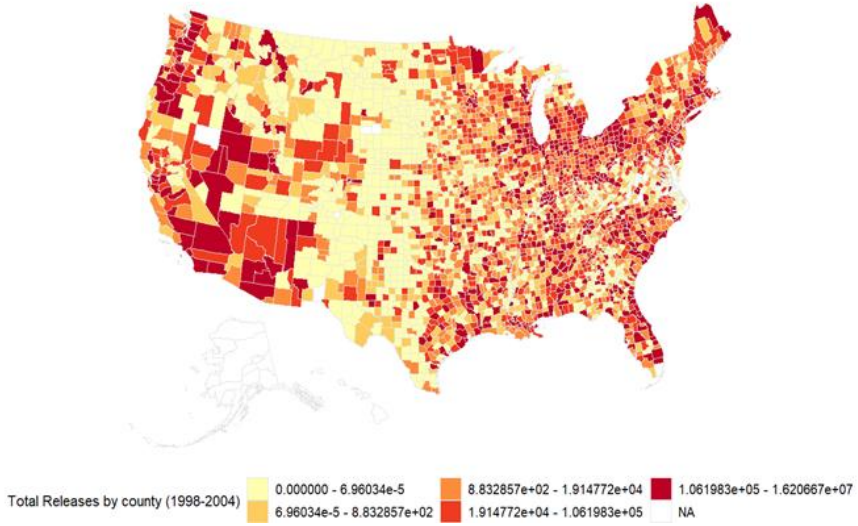
## Online Appendix

**Appendix A:** Geographical Distribution of Carcinogenic Releases and Social Capital in the US

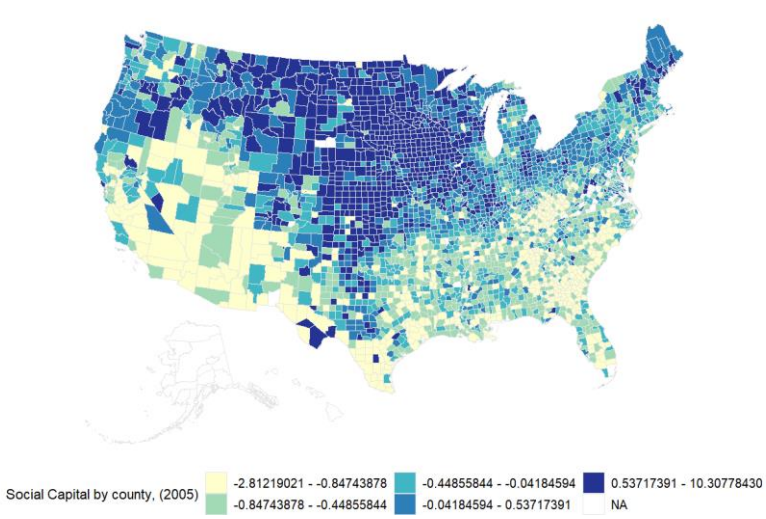
**(a1) Social Capital (1998)**



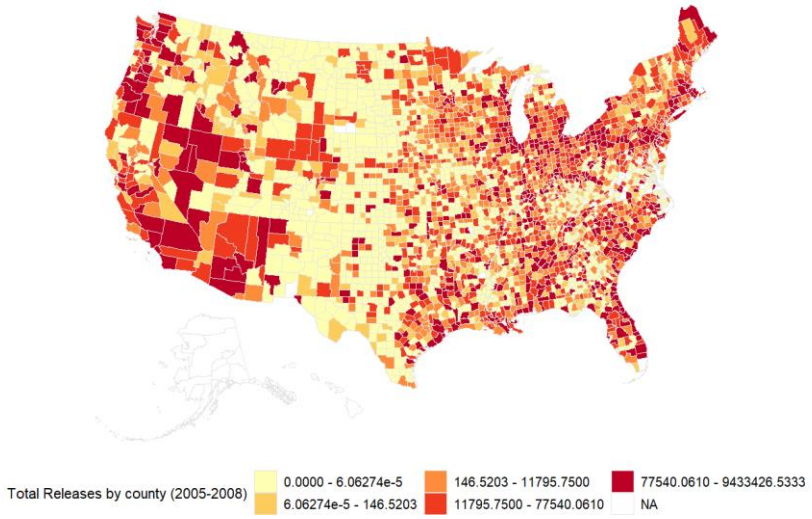

**(b1) Carcinogenic Releases (1998-2004)**



**(a2) Social Capital (2005)**




**(b2) Carcinogenic Releases (2005-2008)**



**(a3) Social Capital (2009)**

**(b3) Carcinogenic Releases (2009-2013)**

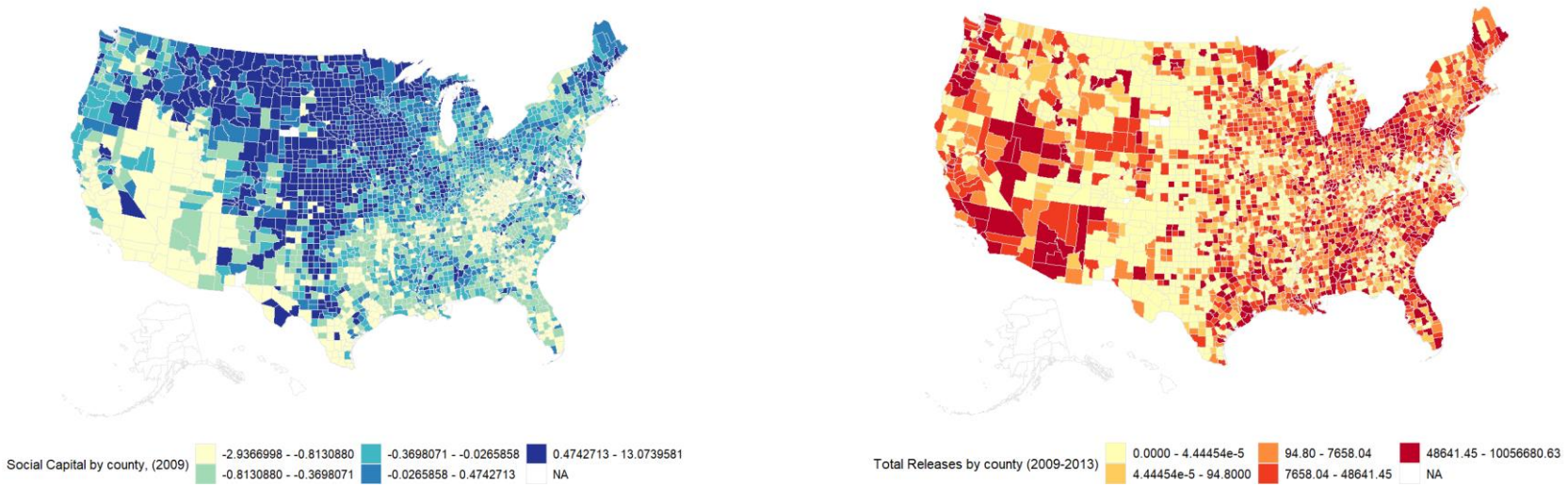



**Figure A.1:** Geographical Distribution of Carcinogenic Releases and Rupasingha et al.'s Social Capital Index in the US (1998-2019)

**Note:** The figures (b1), (b2), and (b3) use the annual average carcinogenic releases.
**Data Source:** https://aese.psu.edu/nercrd/community/social-capital-resources and the Toxic Release Inventory Program (TRI) Basic Data files of the US EPA

**(a) Social Capital (2018)**

**(b) Carcinogenic Releases (2014-2019)**

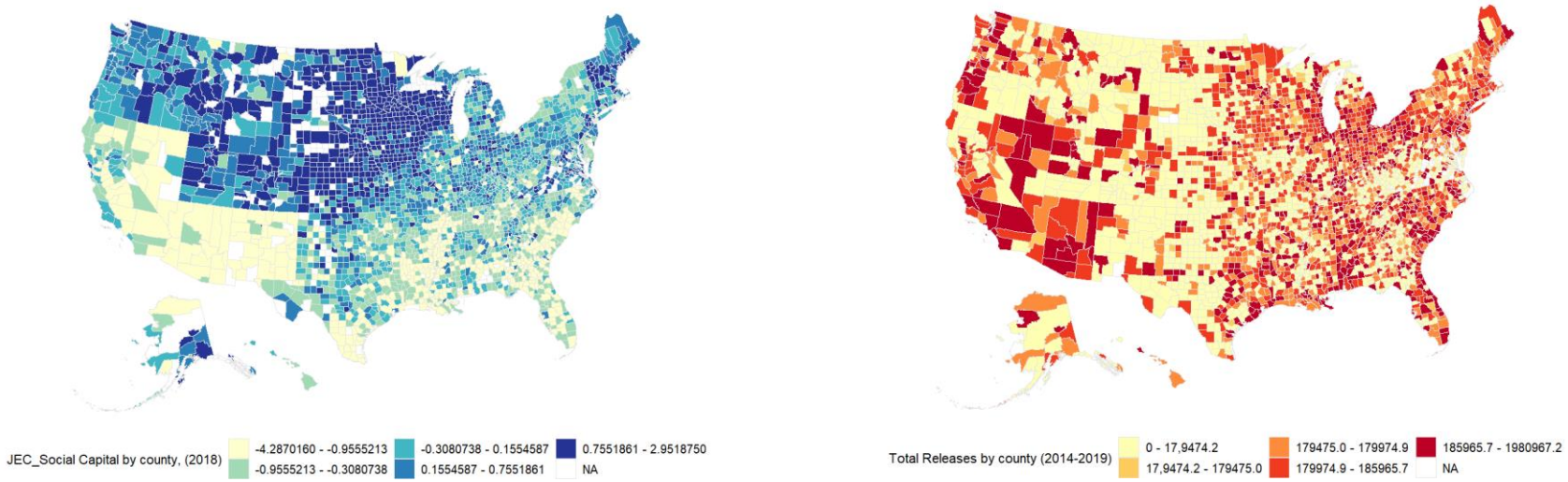



**Figure A.2** Geographical Distribution of the US Congress Joint Economic Committee County-Level Social Capital Index (2018) and the Carcinogenic Toxic Release (2014-2019)
**Note:** The figure (a) uses the 2018 social capital index from the US Congress JEC. The figure (b) uses the annual average carcinogenic releases for the period 2014 to 2019.
**Data Source:** https://www.jec.senate.gov/public/index.cfm/republicans/socialcapitalproject and the Toxic Release Inventory Program (TRI) Basic Data files of the US EPA

## Appendix B: Data Definition, Source and Summary Statistics

**Table B.1** List of variables and sources

| Name | Definition and Data Source |
|---|---|
| | ***US Environmental Protection Agency (EPA)*** |
| *Carcinogen_Total* | The total release (onsite and offsite) of chemicals classified as carcinogen by all facilities located in a county in a year listed in the Toxic Release Inventory database. |
| *Carcinogen_Onsite* | The onsite release of chemicals classified as carcinogen by all facilities located in a county in a year. This variable is the sum of fugitive air emissions, stack air emissions, surface water discharges, chemicals injected onsite to underground, and chemical released to onsite landfills, disposed and released onsite into surface impoundments. |
| *Carcinogen_Offsite* | The offsite release of chemicals classified as carcinogen by all facilities located in a county in a year. This variable is the sum of chemicals transferred to off-site locations for release or disposal. |
| *Facilities_Count* | The number of facilities in a county in a year that meet all three EPA's reporting criteria: i) being in a covered industry sector; ii) employs ten or more employees; and iii) manufactures, processes or uses a TRI-listed chemical in the quantities above threshold levels in a given yearn impoundments; and report at least one carcinogenic chemical. |
| *All_Chem_Total* | The natural logarithm of the total release (onsite and offsite) of chemicals by all facilities located in a county in a year. |
| *All_Chem_Onsite* | The natural logarithm of the onsite release of chemicals by all facilities located in a county in a year. |
| *All_Chem_Offsite* | The natural logarithm of the offsite release of chemicals by all facilities located in a county in a year. |
| | ***Pennsylvania State University***<br>https://aese.psu.edu/nercrd/community/social-capital-resources |
| *Social_Capital* | Social capital index developed by Rupasingha et al. (2006). The aggregate index is constructed using data on voter turnouts in presidential elections, response rates in US census surveys, the total numbers of ten types of social organisations (including bowling centers, physical fitness/recreational facilities, public golf courses, sports clubs, civic associations, business associations, political organisations, religious organisations and labour organisations, and non-profit organisations. |
| | ***US Congress Joint Economic Committee***<br>https://www.jec.senate.gov/public/index.cfm/republicans/2018/4/the-geography-of-social-capital-in-america#toc-006-backlink |
| *Social_Capital_JEC* | Social capital index developed by the Social Capital Project of the US Congress Joint Economic Committee. The aggregate index is constructed using data on family unity (share of births that are to unwed mothers, percentage of children living in single-parent families, percentage of women ages 35-44 who are married), membership organizations, non-religious non-profits organisations, congregations, informal civil society, response rate in 2010 census, voter turnouts in presidential elections, confidence in institutions, and violent crimes rate. |
| | ***Economic Research Service of the USDA***<br>https://www.ers.usda.gov/data-products/county-typology-codes/ |
| *Low_Emp* | An indicator variable that takes a value of 1 for a county with less than 65% of its residents aged 25-64 being employed, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |

| | |
|---|---|
| *Farming* | An indicator variable that takes a value of 1 for a county classified as farming-dependent, i.e. farming accounted for at 25% or more of the county's earnings or 16% or more of the employment, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Mining* | An indicator variable that takes a value of 1 for a county classified as mining-dependent, i.e. mining accounted for at 13% or more of the county's earnings or 8% or more of the employment, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Manufacturing* | An indicator variable that takes a value of 1 for a county classified as manufacturing-dependent, i.e. manufacturing accounted for at 23% or more of the county's earnings or 16% or more of the employment, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Government* | An indicator variable that takes a value of 1 for a county classified as government-dependent, i.e. government accounted for at 14% or more of the county's earnings or 9% or more of the employment, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Non_Specialized* | An indicator variable that takes a value of 1 for a county classified as non-specialised or service/recreational-dependent by the 2004/2015 Typology, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Metro* | An indicator variable that takes a value of 1 for a county classified as metro (urban) and 0 for a county classified as non-metro (rural). |
| *Retire_Destination* | An indicator variable that takes a value of 1 for a county with the number of residents aged 60 and older increased by 15% or more, and 0 otherwise. We use the 2004 US County Typology Codes for the period 1998-2008 and the 2015 US County Typology Codes for the period 2009-2019. |
| *Poverty* | An indicator variable that takes a value of 1 for a county with 20% or more of its residents being poor as measured by the decennial censuses and the American Community Survey estimates, and 0 otherwise. |
| | ***US Bureau of Economic Analysis*** |
| *Emp_Growth* | Annual growth of county-level employment. |
| *Income* | Natural logarithm of annual county-level per capita personal income in 2005 USD. |
| *Income_Growth* | Annual growth of county-level per capita personal income. |
| *Agri_pct* | Percentage of people employed in the agriculture sector in total county employment in a given year. |
| *Mining _pct* | Percentage of people employed in the mining sector in total county employment in a given year. |
| *Manu _pct* | Percentage of people employed in the manufacturing sector in total county employment in a given year. |
| *Gov _pct* | Percentage of people employed in the government sector in total county employment in a given year. |
| | ***County Business Patterns and EPA*** |
| *PollutingInd_Emp* | Percentage of employment of 2-digit NAICS industries that release carcinogenic toxics in the county total employment in a given year. |
| *PollutingInd_Payroll* | Percentage of wages of 2-digit NAICS industries that release carcinogenic toxics in the county total wages in a given year. |
| | ***County Health Ranking and Roadmaps*** |
| | https://www.countyhealthrankings.org |

| | |
|---|---|
| *Crash_Deaths* | Natural logarithm of total number of annual motor vehicle crash deaths. |
| | ***US Census*** |
| *Tot_Pop* | Total county population in a given year. |
| *White* | Percentage of whites in the county population in a given year. |
| *Black* | Percentage of blacks in the county population in a given year. |
| *Other_Races* | Percentage of other races in the county population in a given year. |
| *Hispanic* | Percentage of Hispanics/Latinos in the county population in a given year |
| *Non_Hispanic* | Percentage of non-Hispanics/Latinos in the county population in a given year. |
| *Age: 0-14 years* | Percentage of 0-14-year-olds in the county population in a given year. |
| *Age: 15-19 years* | Percentage of 15-19-year-olds in the county population in a given year. |
| *Age: 20-64 years* | Percentage of 20-64-year-olds in the county population in a given year. |
| *Age: 65+ years* | Percentage of 65 and above-year-olds in the county population in a given year. |
| *NoHighSchool* | Percentage of county population with no high school diploma. We use the 2000 education attainment for the period 1998-2010 and the 2015 for the period 2011-2019. |
| *HighSchool+* | Percentage of county population with high school diploma or some college education. We use the 2000 education attainment for the period 1998-2010 and the 2015 for the period 2011-2019. |
| *Bachelor+* | Percentage of county population with bachelor degree or above. We use the 2000 education attainment for the period 1998-2010 and the 2015 for the period 2011-2019. |

**Table B.2** Summary Statistics

| | *N* | *Mean* | *St. Dev.* | *Min* | *Pctl(25)* | *Pctl(75)* | *Max* |
|---|---|---|---|---|---|---|---|
| *Carcinogen_Total* | 67,197 | 78,741.11 | 529,283.30 | 0 | 0 | 29,766.40 | 51,681,622.00 |
| *Carcinogen_Onsite* | 67,197 | 67,309.30 | 505,339.90 | 0 | 0 | 22,284.20 | 51,681,622.00 |
| *Carcinogen_Offsite* | 67,197 | 11,431.81 | 108,854.30 | 0 | 0 | 398.6 | 12,322,780 |
| *Facilities_Count* | 67,197 | 4.004 | 10.229 | 0 | 0 | 4 | 295 |
| *All_Chem_Total* | 67,197 | 1,321,133 | 11,986,497 | 0 | 0 | 451,562.70 | 1,124,385,651 |
| *All_Chem_Onsite* | 67,197 | 1,148,412 | 11,868,721 | 0 | 0 | 313,261 | 1,124,385,632 |
| *All_Chem_Offsite* | 67,197 | 172,721 | 1,172,560 | 0 | 0 | 26,828 | 53,538,731 |
| *Social_Capital* | 67,197 | -0.0018 | 1.3559 | -4.3107 | -0.864 | 0.612 | 21.809 |
| *Social_Capital_JEC* | 2,992 | 0.004 | 1.004 | -4.315 | -0.652 | 0.670 | 2.971 |
| *Low_Emp* | 67,197 | 0.218 | 0.413 | 0 | 0 | 0 | 1 |
| *Farming* | 67,197 | 0.155 | 0.362 | 0 | 0 | 0 | 1 |
| *Mining* | 67,197 | 0.062 | 0.24 | 0 | 0 | 0 | 1 |
| *Manufacturing* | 67,197 | 0.226 | 0.419 | 0 | 0 | 0 | 1 |
| *Government* | 67,197 | 0.128 | 0.334 | 0 | 0 | 0 | 1 |
| *Metro* | 67,197 | 0.354 | 0.478 | 0 | 0 | 1 | 1 |
| *Retire_Destination* | 67,197 | 0.141 | 0.349 | 0 | 0 | 0 | 1 |
| *Poverty* | 67,197 | 0.119 | 0.324 | 0 | 0 | 0 | 1 |
| *Emp_Growth* | 67,197 | 0.006 | 0.033 | -0.458 | -0.01 | 0.022 | 0.995 |
| *Income* | 67,197 | 10.291 | 0.242 | 9.194 | 10.131 | 10.423 | 12.107 |
| *Income_Growth* | 67,197 | 0.016 | 0.054 | -0.589 | -0.005 | 0.033 | 1.387 |
| *Agri_pct* | 57,935 | 0.028 | 0.055 | 0 | 0 | 0.033 | 0.539 |
| *Mining _pct* | 57,935 | 0.09 | 0.077 | 0 | 0.031 | 0.129 | 0.719 |
| *Manu _pct* | 57,935 | 0.013 | 0.039 | 0 | 0 | 0.006 | 0.835 |
| *Gov _pct* | 57,935 | 0.166 | 0.07 | 0.014 | 0.121 | 0.193 | 0.908 |
| *PollutingInd_Emp* | 67,197 | 0.099 | 0.133 | 0 | 0 | 0.179 | 0.93 |
| *PollutingInd_Payroll* | 67,197 | 0.125 | 0.164 | 0 | 0 | 0.232 | 0.967 |
| *Crash_Deaths* | 43,954 | 2.075 | 0.959 | 0 | 1.372 | 2.596 | 6.772 |
| *Tot_Pop* | 67,197 | 97,070.46 | 313,705.00 | 55 | 11,103 | 65,322 | 10,105,708 |
| *White* | 67,197 | 0.866 | 0.157 | 0.08 | 0.823 | 0.969 | 1 |
| *Black* | 67,197 | 0.089 | 0.144 | 0 | 0.006 | 0.101 | 0.869 |
| *Other_Races* | 67,197 | 0.045 | 0.077 | 0 | 0.016 | 0.044 | 0.914 |
| *Hispanic* | 67,197 | 0.08 | 0.131 | 0 | 0.015 | 0.076 | 0.978 |
| *Age: 0-14 years* | 67,197 | 0.194 | 0.03 | 0 | 0.176 | 0.21 | 0.38 |
| *Age: 15-19 years* | 67,197 | 0.07 | 0.012 | 0 | 0.063 | 0.076 | 0.251 |
| *Age: 20-64 years* | 67,196 | 0.572 | 0.035 | 0.341 | 0.551 | 0.593 | 0.814 |
| *Age: 65+ years* | 67,197 | 0.164 | 0.045 | 0 | 0.133 | 0.19 | 0.582 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *NoHighSchool* | 67,197 | 17.846 | 8.982 | 1.1 | 11 | 22.7 | 73.6 |
| *HighSchool+* | 67,197 | 63.062 | 7.521 | 19 | 58.5 | 68.6 | 86 |
| *Bachelor+* | 67,197 | 19.093 | 8.951 | 0 | 12.8 | 22.9 | 75.3 |

## Appendix C: Results for Quantile Comparison (1998-2019)

**Table C.1** Results for Quantile Comparison (1998-2019)

| **Quantiles** | | **1998** | | **1999** | | **2000** | | **2001** | | **2002** |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* |
| **0.10** | 967.59 | 0.672 | 1301.07 | 0.722 | -562.13 | 0.876 | 3121.91 | 0.238 | 6172.11 | 0.006 |
| **0.25** | 8,982.88 | 0.232 | 8948.16 | 0.126 | 10753.65 | 0.046 | 14742.57 | 0 | 17300.91 | 0 |
| **0.50** | 43,143.68 | 0 | 53393.40 | 0 | 50813.42 | 0.002 | 54121.55 | 0 | 55061.99 | 0 |
| **0.75** | 187,773.82 | 0.002 | 182566.78 | 0 | 124834.58 | 0.018 | 122373.08 | 0 | 133483.20 | 0 |
| **0.90** | 989,859.94 | 0.002 | 603504.17 | 0 | 514666.35 | 0 | 443613.83 | 0 | 382351.79 | 0 |
| N (Q1- Counties) | 286 | | 289 | | 286 | | 290 | | 282 | |
| N (Q4- Counties) | 135 | | 133 | | 132 | | 142 | | 151 | |
| **Quantiles** | | **2003** | | **2004** | | **2005** | | **2006** | | **2007** |
| | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* |
| **0.10** | 6,558.41 | 0.002 | 2322.38 | 0.238 | 7250.97 | 0 | 7253.87 | 0.006 | 5627.60 | 0 |
| **0.25** | 15,267.06 | 0.002 | 16319.31 | 0.002 | 22889.26 | 0 | 16247.01 | 0 | 18688.98 | 0 |
| **0.50** | 53,692.98 | 0 | 47600.78 | 0 | 52144.19 | 0 | 45514.56 | 0 | 40619.28 | 0 |
| **0.75** | 125,447.25 | 0 | 125166.48 | 0 | 97422.23 | 0 | 95580.83 | 0 | 108646.32 | 0 |
| **0.90** | 442,260.50 | 0 | 362641.09 | 0 | 442032.34 | 0 | 474793.33 | 0.002 | 345571.38 | 0 |
| N (Q1- Counties) | 283 | | 290 | | 267 | | 269 | | 264 | |
| N (Q4- Counties) | 143 | | 142 | | 159 | | 154 | | 161 | |
| **Quantiles** | | **2008** | | **2009** | | **2010** | | **2011** | | **2012** |
| | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* |
| **0.10** | 2,579.15 | 0.014 | 2372.35 | 0.004 | 1962.45 | 0.016 | 2344.04 | 0.002 | 3063.92 | 0.002 |
| **0.25** | 11,350.98 | 0 | 5352.87 | 0.002 | 4899.90 | 0.01 | 6441.77 | 0.002 | 6827.81 | 0 |
| **0.50** | 27,890.52 | 0 | 19846.37 | 0 | 19176.58 | 0.008 | 21191.58 | 0.002 | 17886.47 | 0.008 |
| **0.75** | 92,321.19 | 0 | 62258.39 | 0 | 64490.76 | 0 | 84638.14 | 0 | 98408.99 | 0 |
| **0.90** | 256,429.13 | 0 | 156571.37 | 0.002 | 191788.11 | 0.022 | 237296.94 | 0.004 | 299386.55 | 0.002 |
| N (Q1- Counties) | 266 | | 268 | | 266 | | 260 | | 255 | |
| N (Q4- Counties) | 168 | | 148 | | 138 | | 139 | | 138 | |

| **Quantiles** | | **2013** | | **2014** | | **2015** | | **2016** | | **2017** |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* | *Low-High* | *p-value* |
| **0.10** | 3,115.30 | 0.002 | 1801.46 | 0.134 | 3288.92 | 0 | 3118.93 | 0.002 | 2214.10 | 0.048 |
| **0.25** | 6,695.77 | 0.002 | 4922.01 | 0.014 | 5982.11 | 0.002 | 6883.97 | 0.004 | 7661.08 | 0 |
| **0.50** | 23,069.67 | 0 | 30962.31 | 0.002 | 23829.52 | 0 | 20940.65 | 0 | 24838.28 | 0.004 |
| **0.75** | 102,152.18 | 0 | 113086.71 | 0 | 89570.83 | 0 | 109760.16 | 0 | 111187.43 | 0 |
| **0.90** | 286,697.10 | 0 | 312618.89 | 0 | 317038.14 | 0 | 397920.68 | 0.002 | 393331.77 | 0 |
| N (Q1- Counties) | 250 | | 258 | | 252 | | 245 | | 249 | |
| N (Q4- Counties) | 142 | | 150 | | 145 | | 141 | | 141 | |

| **Quantiles** | | **2018** | | **2019** |
|---|---|---|---|---|
| | *Low-High* | *p-value* | *Low-High* | *p-value* |
| **0.10** | 2699.25 | 0.002 | 3,459.12 | 0.002 |
| **0.25** | 7999.82 | 0.002 | 6,713.36 | 0.002 |
| **0.50** | 26258.73 | 0.002 | 22,800.73 | 0 |
| **0.75** | 104257.44 | 0 | 102,908.45 | 0 |
| **0.90** | 411588.20 | 0 | 426,370.66 | 0 |
| N (Q1- Counties) | 235 | | 234 | |
| N (Q4- Counties) | 142 | | 144 | |

*Notes:* Low-High is the difference between the $q^{th}$ quantile of carcinogenic releases in counties in the $1^{st}$ quartile of social capital and releases and the corresponding quantiles of carcinogenic releases in counties in the $4^{th}$ quartile of social capital.

## Appendix D: Additional Analysis

**Table D.1** Social Capital and Carcinogenic Toxic Release – *Share of Polluting Industries in Total County Employment*

| | Employment Share of Polluting Industries < 10% | | | Employment Share of Polluting Industries >= 10% | | |
|---|---|---|---|---|---|---|
| Dep. Var. | *Carcinogen_Total* | *Carcinogen_Onsite* | *CarcinogenOffsite* | *Carcinogen_Total* | *Carcinogen_Onsite* | *CarcinogenOffsite* |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Social_Capital* | -0.362*** | -0.470*** | 0.001 | -0.175*** | -0.219*** | -0.127*** |
| | (0.041) | (0.041) | (0.040) | (0.013) | (0.032) | (0.044) |
| *Low_Emp* | -0.426*** | -0.318*** | 0.070 | 0.490*** | 0.619*** | 0.561*** |
| | (0.064) | (0.065) | (0.062) | (0.059) | (0.061) | (0.084) |
| *Emp_Growth* | 0.918** | 1.140** | -0.549 | 1.137** | 1.150** | 0.048 |
| | (0.449) | (0.457) | (0.440) | (0.471) | (0.485) | (0.670) |
| *Income* | 3.132*** | 3.418*** | 1.402*** | 0.936*** | 0.464*** | 0.964*** |
| | (0.196) | (0.199) | (0.192) | (0.171) | (0.176) | (0.244) |
| *Income_Growth* | -1.279*** | -1.622*** | -0.824*** | 0.018 | -0.032 | -0.491 |
| | (0.323) | (0.329) | (0.317) | (0.301) | (0.310) | (0.428) |
| *Economic Dependence Indicators* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Other County Typology Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Race/Origin Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Age Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Education Attainment Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *County FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *N* | 37,862 | 37,862 | 37,862 | 29,335 | 29,335 | 29,335 |
| *R-sq.* | 0.005 | 0.007 | 0.0004 | 0.008 | 0.009 | 0.004 |

*Notes:* $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. All specifications are weighted with county population. County and year fixed effects are included.

**Table D.2** Social Capital and Carcinogenic Toxic Release – *Share of Polluting Industries in County Total Wages*

| | Wage Share of Polluting Industries < 10% | | | Wage Share of Polluting Industries >= 10% | | |
|---|---|---|---|---|---|---|
| Dep. Var. | *Carcinogen_Total* | *Carcinogen_Onsite* | *CarcinogenOffsite* | *Carcinogen_Total* | *Carcinogen_Onsite* | *CarcinogenOffsite* |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Social_Capital* | -0.382*** | -0.460*** | -0.095** | -0.188*** | -0.237*** | -0.104** |
| | (0.0428) | (0.043) | (0.041) | (0.030) | (0.031) | (0.043) |
| *Low_Emp* | -0.492*** | -0.347*** | 0.055 | 0.485*** | 0.590*** | 0.547*** |
| | (0.065) | (0.067) | (0.063) | (0.058) | (0.059) | (0.081) |
| *Emp_Growth* | 0.234 | 0.375 | -0.767* | 1.397*** | 1.493*** | 0.080 |
| | (0.457) | (0.468) | (0.442) | (0.460) | (0.473) | (0.648) |
| *Income* | 2.724*** | 3.165*** | 0.396** | 1.153*** | 0.553*** | 1.458*** |
| | (0.195) | (0.199) | (0.188) | (0.170) | (0.174) | (0.239) |
| *Income_Growth* | -1.349*** | -1.638*** | -0.623** | 0.005 | -0.019 | -0.719* |
| | (0.325) | (0.333) | (0.314) | (0.297) | (0.305) | (0.418) |
| *Economic Dependence Indicators* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Other County Typology Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Race/Origin Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Age Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Education Attainment Variables* | Yes | Yes | Yes | Yes | Yes | Yes |
| *County FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *N* | 35,980 | 35,980 | 35,980 | 31,217 | 31,217 | 31,217 |
| *R-sq.* | 0.004 | 0.006 | 0.000 | 0.010 | 0.011 | 0.005 |

*Notes:* $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. All specifications are weighted with county population. County and year fixed effects are included.

**Table D.3** Social Capital and Carcinogenic Toxic Release – Robustness check using sectoral employment share

| Dep. Var. | *Carcinogen_Total* | *Carcinogen_Onsite* | *Carcinogen_Offsite* |
|---|---|---|---|
| | (1) | (2) | (3) |
| *Social_Capital* | -0.220*** | -0.266*** | -0.096*** |
| | (0.024) | (0.024) | (0.030) |
| *Low_Emp* | 0.205*** | 0.348*** | 0.243*** |
| | (0.043) | (0.044) | (0.054) |
| *Emp_Growth* | 1.874*** | 2.281*** | -0.073 |
| | (0.326) | (0.334) | (0.411) |
| *Income* | 0.974*** | 0.624*** | 1.126*** |
| | (0.131) | (0.134) | (0.165) |
| *Income_Growth* | -0.302 | -0.524** | -0.804*** |
| | (0.206) | (0.211) | (0.260) |
| *Sectoral Employment Shares* | Yes | Yes | Yes |
| *Other County Typology Variables* | Yes | Yes | Yes |
| *Race/Origin Variables* | Yes | Yes | Yes |
| *Age Variables* | Yes | Yes | Yes |
| *Education Attainment Variables* | Yes | Yes | Yes |
| *County FE* | Yes | Yes | Yes |
| *Year FE* | Yes | Yes | Yes |
| *N* | 57,935 | 57,935 | 57,935 |
| *R-sq.* | 0.009 | 0.009 | 0.004 |

*Notes:* *p < 0.1; **p < 0.05; ***p < 0.01. Standard errors in parentheses. All specifications are weighted with county population. County and year fixed effects are included.

## Appendix E: Additional Results for Hurdle Model

**Table E.1** Tests for Overdispersion in the Hurdle Models

*Vuong Non-Nested Hypothesis Test-Statistic*: test-statistic is asymptotically distributed N(0,1) under the null that the models are indistinguishable.

| | Vuong z-statistic | $H_A$ | p-value |
|---|---|---|---|
| Raw | 25.1175 | model1 > model2 | 0.000 |
| AIC-corrected | 25.1175 | model1 > model2 | 0.000 |
| BIC-corrected | 25.1175 | model1 > model2 | 0.000 |

No Zero Hurdle Test Hypothesis Test-Statistic:

| | No Zero Hurdle Test -Statistic | p-value |
|---|---|---|
| Chi-sq. | 2,892.5 | 0.000 |

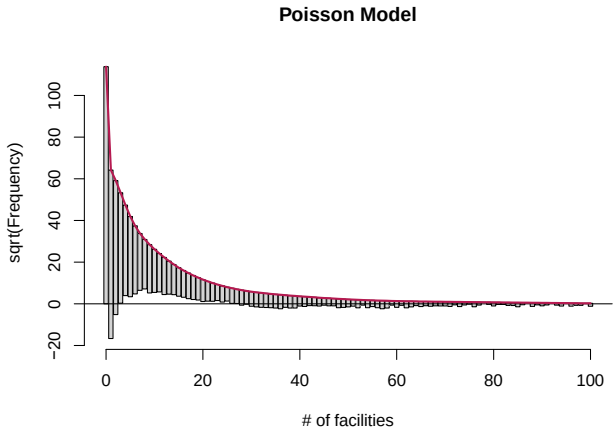



**Figure E.1** Poisson Distribution of Number of Carcinogenic Releasing Facilities at County Level in the US (1998-2019)

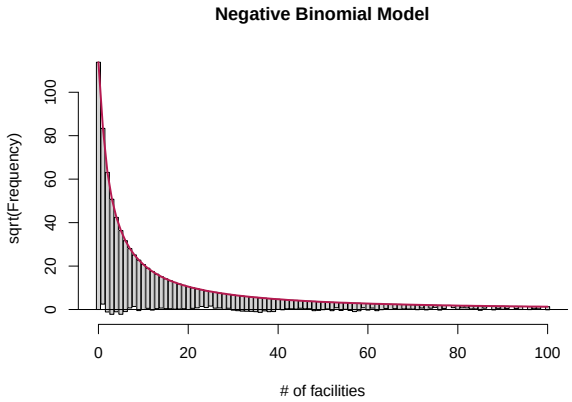



**Figure E.2** Negative Binomial Distribution of Number of Carcinogenic Releasing Facilities at County Level in the US (1998-2019)

Using Poisson distribution for the hurdle model could lead to very high under fitting. This is evident in the rootograms below in which the x-axis shows the number of facilities. The Poisson model does not predict counts very well compared to the Negative Binomial model, which indicates over-dispersion in data. Therefore, in the results presented in the main paper, we use the negative binomial model.