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Research article

Effects of inter-industry agglomeration on environmental pollution: Evidence from China

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Abstract: Industrial pollution comes not only from within industries, but also from between industries that are strongly linked. From the perspective of agglomeration, this study explores the mutual transmission of pollution between different manufacturing industries. We found that there is an inverted U-shape relationship between inter-industry agglomeration and environmental pollution among 20 Chinese manufacturing industries. Energy intensity, which is an important transmission path from agglomeration to pollution, is positively related to the energy consumption of industries with some degree of agglomeration. Besides, the expansion of production scale caused by inter-industry agglomeration leads to more energy consumption and pollution. Furthermore, the innovative technology resulting from inter-industry agglomeration reduces environmental pollution but does not have a significant impact on energy consumption.

Keywords: inter-industry agglomeration; environmental pollution; scale effect; energy; innovation

Appendix

Table A1. Classification of manufacturing industry types.

Type	Industry code and name	
Labor-intensive	C13 Agricultural and sideline food processing industry	C16 Tobacco products industry
	C14 Food manufacturing	C17 Textile industry
	C15 Wine, beverage and refined tea manufacturing	C22 Paper and paper products industry
Capital-intensive	C25 Petroleum processing, coking and nuclear fuel processing industries	C34 Metal products industry
		C35 General equipment manufacturing
	C31 Furniture manufacturing and nonmetal mineral products	C36 Special equipment manufacturing industry
	C32 Ferrous metal smelting and calendaring industry	C41 Instrumentation and cultural manufacturing
	C33 Nonferrous metal smelting and calendaring industry	
Technology-intensive	C26 Chemical raw materials and chemical products manufacturing	C37 Transportation equipment manufacturing industry
		C39 Electrical machinery and equipment manufacturing
	C27 Pharmaceutical manufacturing	C40 Computer, communication and other electronic equipment manufacturing industry
	C28Chemical fiber manufacturing industry	

Table A2. Classification of industrial agglomeration.

Low intra-industry agglomeration (r < 0.02)	Medium intra-industry agglomeration (0.02 <r < 0.05)	High intra-industry agglomeration (r > 0.05)
C14 Food manufacturing	C13 Agricultural and sideline food processing industry	C28 Chemical fiber manufacturing industry
C15 Wine, beverage and refined tea manufacturing	C17 Textile industry	C40 Computer, communication and other electronic equipment manufacturing industry
C16 Tobacco products industry	C22 Paper and paper products industry	C41 Instrumentation and cultural manufacturing
C26 Chemical raw materials and chemical products manufacturing	C25 Petroleum processing, coking and nuclear fuel processing industries	
C27 Pharmaceutical manufacturing	C32 Ferrous metal smelting and calendaring industry	
C31 Furniture manufacturing and nonmetal mineral products	C33 Nonferrous metal smelting and calendaring industry	
C34 Metal products industry	C35 General equipment manufacturing	
C36 Special equipment manufacturing industry	C37 Transportation equipment manufacturing industry	
	C39 Electrical machinery and equipment manufacturing industry	

Table A3. Average coagglomeration levels of 20 manufacturing industries.

wij	C13	C14	C15	C16	C17	C22	C25	C26	C27	C28	C31	C32	C33	C34	C35	C36	C37	C39	C40	C41
C13	0.054	0.037	0.035	0.07	0.062	0.048	0.058	0.037	0.039	**0.162**	0.035	0.054	0.038	0.064	0.027	0.027	0.058	0.071	0.109	**0.12**
C14	0.037	0.019	0.017	0.053	0.044	0.058	0.041	0.019	0.021	**0.144**	0.018	0.036	0.02	0.047	0.01	0.01	0.04	0.053	0.09	**0.102**
C15	0.035	0.017	0.015	0.051	0.042	0.065	0.039	0.017	0.019	**0.142**	0.016	0.034	0.018	0.045	0.008	0.008	0.038	0.051	0.088	**0.1**
C16	0.07	0.053	0.051	0.086	0.078	0.109	0.074	0.053	0.055	**0.178**	0.051	0.07	0.054	0.08	0.043	0.043	0.074	0.087	0.126	**0.136**
C17	0.062	0.044	0.042	0.078	0.069	0.055	0.066	0.044	0.046	**0.169**	0.043	0.061	0.045	0.071	0.034	0.034	0.065	0.078	0.116	**0.127**
C22	0.048	0.03	0.028	0.064	0.055	0.164	0.052	0.03	0.032	**0.156**	0.365	0.048	0.032	0.058	0.021	0.021	0.051	0.065	0.102	**0.113**
C25	0.058	0.041	0.039	0.074	0.066	0.052	0.062	0.041	0.043	**0.166**	0.039	0.058	0.042	0.068	0.031	0.031	0.062	0.075	0.113	**0.124**
C26	0.037	0.019	0.017	0.053	0.044	0.206	0.041	0.019	0.021	**0.145**	0.017	0.036	0.02	0.047	0.009	0.009	0.04	0.053	0.091	**0.102**
C27	0.039	0.021	0.019	0.055	0.046	0.218	0.043	0.021	0.023	**0.146**	0.02	0.038	0.022	0.048	0.011	0.011	0.042	0.055	0.092	**0.104**
C28	**0.162**	**0.144**	**0.142**	**0.178**	**0.169**	**0.355**	**0.166**	**0.145**	**0.146**	**0.270**	**0.143**	**0.162**	**0.146**	**0.172**	**0.135**	**0.135**	**0.167**	**0.179**	**0.221**	**0.227**
C31	0.035	0.018	0.016	0.051	0.043	0.365	0.039	0.017	0.02	**0.143**	0.016	0.035	0.019	0.045	0.008	0.008	0.038	0.052	0.089	**0.101**
C32	0.054	0.036	0.034	0.07	0.061	0.393	0.058	0.036	0.038	**0.162**	0.053	0.053	0.038	0.064	0.027	0.027	0.057	0.071	0.108	**0.119**
C33	0.038	0.02	0.018	0.054	0.045	0.405	0.042	0.02	0.022	**0.146**	0.038	0.038	0.022	0.048	0.043	0.011	0.041	0.055	0.092	**0.103**
C34	0.064	0.047	0.045	0.08	0.071	0.443	0.068	0.047	0.048	**0.172**	0.064	0.064	0.048	0.074	0.069	0.037	0.068	0.081	0.119	**0.13**
C35	0.059	0.042	0.04	0.075	0.067	0.477	0.063	0.042	0.044	**0.167**	0.027	0.059	0.043	0.069	0.032	0.032	0.063	0.076	0.114	**0.125**
C36	0.046	0.028	0.026	0.062	0.053	0.497	0.05	0.028	0.03	**0.154**	0.027	0.045	0.03	0.056	0.032	0.019	0.049	0.063	0.1	**0.111**
C37	0.058	0.04	0.038	0.074	0.065	0.535	0.062	0.04	0.042	**0.167**	0.057	0.057	0.041	0.068	0.03	0.049	0.061	0.074	0.113	**0.124**
C39	0.071	0.053	0.051	0.087	0.078	0.585	0.075	0.053	0.055	**0.179**	0.071	0.071	0.055	0.081	0.044	0.063	0.074	0.088	0.127	**0.137**
C40	0.109	0.09	0.088	0.126	0.116	0.697	0.113	0.091	0.092	**0.221**	0.108	0.108	0.092	0.119	0.08	0.08	0.113	0.127	0.168	**0.177**
C41	**0.12**	**0.102**	**0.1**	**0.136**	**0.127**	**0.799**	**0.124**	**0.102**	**0.104**	**0.227**	**0.119**	**0.119**	**0.103**	**0.13**	**0.092**	**0.092**	**0.124**	**0.137**	0.177	0.185

Note: The value on the diagonal represents the inter-industry agglomeration, namely, i=j, and the value on the off-diagonal represents the level of cooperative agglomeration between different industries, namely, i≠j and $W_{ij}=W_{ji}$;