

The Diffusion of Knowledge during the British Industrial Revolution

Appendix for Online Publication

Table A1: Descriptive statistics

England and Wales	Counties	Mean	Std. Dev.	Min	Max
Patents (per 100,000 people)	58	151.7	651.2	2.0	4955.2
Exhibitions (per 100,000 people)	58	26.4	31.2	2.2	220.1
Masonic lodges (per 100,000 people)	58	105.0	108.4	2.7	579.0
Latitude (decimal degrees)	58	-2.0	1.6	-5.2	1.0
Longitude (decimal degrees)	58	52.3	1.2	49.2	55.3
Coalfields (dummy)	58	0.4	0.5	0.0	1.0
Access to sea (dummy)	58	0.6	0.5	0.0	1.0
Occupation above age of 20 as a share of total occupation (%)	58	77.0	0.9	75.2	80.2
Steam engines (absolute number)	58	33.0	63.5	0.0	271.0
Sex ratios (%)	58	103.1	5.3	91.9	117.3
Schools as a share of total population (%)	58	2.8	0.8	0.8	5.5
England, Wales & Scotland					
Patents (per 100,000 people)	90	106.2	525.1	1.3	4955.2
Exhibitions (per 100,000 people)	90	25.0	28.3	2.2	220.1
Libraries ([per 100,000 people)	90	97.0	84.1	1.3	648.7
Book sellers (per 100,000 people)	90	10.9	12.3	1.2	106.6
Friendly Society lodges (per 100,000 people)	90	26.9	34.4	0.7	273.9
Latitude (decimal degrees)	90	-2.6	1.6	-6.0	1.0
Longitude (decimal degrees)	90	53.8	2.3	49.2	59.1
Coalfields (dummy)	90	0.4	0.5	0.0	1.0
Access to sea (dummy)	90	0.7	0.5	0.0	1.0
Occupation above age of 20 as a share of total occupation (%)	90	76.9	1.0	74.6	80.2
Steam engines (absolute number)	90	23.8	52.8	0.0	271.0
Sex ratios (%)	90	105.4	6.5	91.9	127.4
Number of schools as a share of total population (%)	90	2.5	0.8	0.8	5.5

Table A2: Impact of Informal Networks on Patents and Exhibits (not per capita adjusted)

	Masonic		Friendly		Libraries		Booksellers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unconditional	0.650*** (0.095)	0.834*** (0.063)	0.618*** (0.075)	0.720*** (0.071)	0.593*** (0.106)	0.777*** (0.092)	0.326*** (0.096)	0.373*** (0.098)
Conditional	0.582*** (0.169)	0.845*** (0.083)	0.196** (0.099)	0.480*** (0.095)	0.320** (0.129)	0.537*** (0.089)	0.325*** (0.086)	0.282*** (0.073)

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Impact of Informal Networks on Patents and Exhibits (division FEs)

	Patents				Exhibits			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Masonic	0.612** (0.276)				0.406*** (0.147)			
Friendly		0.332*** (0.107)				0.288** (0.131)		
Libraries			0.319 (0.206)				0.228 (0.141)	
Booksellers				0.321*** (0.107)				0.324*** (0.108)
Counties	58	90	90	90	58	90	90	90
Division fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Location controls	Y	Y	Y	Y	Y	Y	Y	Y
Socio-economic controls	Y	Y	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A4: Impact of Informal Networks on Patents and Exhibits (bootstrapping SE)

	Patents				Exhibits			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Masonic	0.461*** (0.162)				0.366** (0.158)			
Friendly		0.131* (0.074)				0.007 (0.117)		
Libraries			0.314** (0.134)				0.216* (0.122)	
Booksellers				0.325*** (0.073)				0.428*** (0.100)
Counties	58	90	90	90	58	90	90	90
Division fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Location controls	Y	Y	Y	Y	Y	Y	Y	Y
Socio-economic controls	Y	Y	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A5: Impact of Informal Networks on Patents and Exhibits (pop. weighted regressions)

	Baseline	Location controls	SES controls	Pop. weighted
	(1)	(2)	(3)	(4)
Friendly societies	0.634*** (0.117)	0.466*** (0.123)	0.398*** (0.144)	0.392*** (0.133)

*** p<0.01, ** p<0.05, * p<0.1

Table A6: Impact of Friendly Societies on Patents(Order of Oddfellows)

	Patents				Exhibits			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Masonic	0.480*** (0.168)				0.432** (0.170)			
Friendly		0.034 (0.081)				0.295** (0.131)		
Libraries			0.314** (0.122)				0.357*** (0.128)	
Booksellers				0.240** (0.098)				0.554*** (0.088)
Counties	58	90	90	90	58	90	90	90
Socio-economic controls	Y	Y	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A7: Impact of Informal Networks on Patents using a Logit Model and the Top 10-decile

	Patents				Exhibits				Libraries				Booksellers			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
<i>IN</i>	0.91*	1.10**	0.82*	1.00*	1.05***	1.07***	0.75*	0.57	1.59***	2.12***	1.49***	1.77***	0.61**	1.02***	0.86**	1.16***
	(0.47)	(0.47)	(0.43)	(0.47)	(0.35)	(0.40)	(0.39)	(0.47)	(0.54)	(0.75)	(0.51)	(0.55)	(0.28)	(0.35)	(0.35)	(0.43)
N	58	58	58	58	90	90	90	90	90	90	90	90	90	90	90	90

*** p<0.01, ** p<0.05, * p<0.1

Table A8: Impact of Informal Networks on Exhibits' Awards using a Logit Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Masonic	0.52 (0.66)	0.46 (0.54)						
Friendly			0.80*** (0.28)	0.32 (0.34)				
Libraries					0.56* (0.30)	0.55 (0.36)		
Booksellers							0.88*** (0.30)	1.47** (0.61)
Location controls	N	Y	N	Y	N	Y	N	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A9: Impact of Informal Networks on Patents' Quality

	Patents			Exhibits			Libraries			Booksellers		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Informal Network	0.357*** (0.152)	0.353** (0.153)	0.345 (0.230)	0.151 (0.097)	0.209* (0.113)	0.140 (0.124)	0.307** (0.133)	0.311** (0.132)	0.331** (0.150)	0.183* (0.106)	0.185 (0.155)	0.163 (0.128)
Counties	58	58	58	90	90	90	90	90	90	90	90	90
Location controls	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
SES controls	N	N	Y	N	N	Y	N	N	Y	N	N	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A10: Impact of Informal Networks on Patents' Quality (sources mentioned each patentee)

	Patents			Exhibits			Libraries			Booksellers		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Informal network	0.459*** (0.161)	0.450*** (0.159)	0.392* (0.208)	0.281*** (0.093)	0.220* (0.109)	0.044 (0.121)	0.379*** (0.119)	0.343*** (0.109)	0.308** (0.130)	0.206** (0.099)	0.224** (0.103)	0.140 (0.104)
Counties	58	58	58	90	90	90	90	90	90	90	90	90
Location controls	N	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
SES controls	N	N	Y	N	N	Y	N	N	Y	N	N	Y

*** p<0.01, ** p<0.05, * p<0.1

Table A11: Impact of informal networks on patents and exhibits by industry's use.

	Patents		Friendly		Libraries		Booksellers	
	Patents	Exhibits	Patents	Exhibits	Patents	Exhibits	Patents	Exhibits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Agriculture	0.083 (0.196)	-0.019 (0.128)	0.021 (0.104)	-0.075 (0.140)	0.405* (0.231)	0.095 (0.082)	-0.188 (0.150)	0.001 (0.141)
Chemicals	0.383* (0.210)	0.306* (0.154)	0.101 (0.092)	0.290** (0.131)	0.956*** (0.253)	-0.170 (0.188)	0.312*** (0.111)	0.294* (0.166)
Clothing	0.296 (0.243)	-0.150 (0.172)	0.272* (0.139)	0.063 (0.221)	0.315 (0.253)	-0.022 (0.117)	0.105 (0.089)	0.062 (0.160)
Construction	0.463** (0.220)	0.377** (0.151)	0.090 (0.104)	0.038 (0.164)	0.345 (0.238)	0.123 (0.151)	0.143* (0.084)	0.295* (0.158)
Engines	0.401** (0.148)	0.380*** (0.119)	0.168 (0.198)	-0.096 (0.177)	0.335 (0.213)	0.324*** (0.113)	0.348*** (0.113)	0.527*** (0.142)
Food	0.592** (0.218)	0.225 (0.149)	0.051 (0.111)	-0.300 (0.228)	0.382 (0.343)	0.270** (0.123)	0.298*** (0.110)	0.374** (0.160)
Furniture	0.424 (0.311)	-0.106 (0.152)	0.184 (0.139)	-0.111 (0.216)	0.369 (0.327)	0.084 (0.206)	0.204 (0.127)	0.201 (0.152)
Glass	0.256 (0.286)	0.063 (0.971)	0.107 (0.197)	0.137 (0.619)	0.839*** (0.209)	-0.364 (0.596)	0.062 (0.147)	0.236 (0.340)
Hardware	0.384 (0.269)	-0.049 (0.216)	0.099 (0.100)	0.098 (0.234)	0.844*** (0.277)	0.255 (0.224)	0.115 (0.101)	0.123 (0.225)
Instruments	0.602** (0.253)	0.403** (0.154)	0.081 (0.102)	0.199 (0.179)	0.915*** (0.286)	0.291** (0.141)	0.203* (0.111)	0.291 (0.227)
Leather	0.282 (0.298)	0.095 (0.177)	0.006 (0.135)	0.153 (0.174)	0.594* (0.345)	0.022 (0.204)	0.071 (0.115)	0.114 (0.204)
Metallurgy	0.210 (0.187)	-0.240 (0.185)	0.317** (0.139)	-0.381 (0.317)	0.139 (0.232)	0.257*** (0.616)	0.087 (0.086)	0.388*** (0.071)
Military	0.346 (0.307)	0.313* (0.180)	0.047 (0.152)	0.128 (0.170)	0.762** (0.306)	0.006 (0.122)	0.156 (0.096)	0.322 (0.212)
Mining	0.269 (0.339)	0.410*** (0.135)	0.003 (0.258)	0.326** (0.137)	0.492 (0.287)	0.183 (0.096)	-0.213 (0.227)	0.164 (0.117)
Paper	0.719** (0.306)	-0.188 (0.453)	0.128 (0.189)	0.129 (0.302)	0.689** (0.282)	0.183 (0.362)	0.282** (0.105)	0.499*** (0.120)
Textiles	0.298 (0.256)	0.133* (0.062)	0.189 (0.117)	0.536* (0.355)	0.459* (0.248)	0.448 (1.264)	0.172 (0.152)	0.054 (0.260)

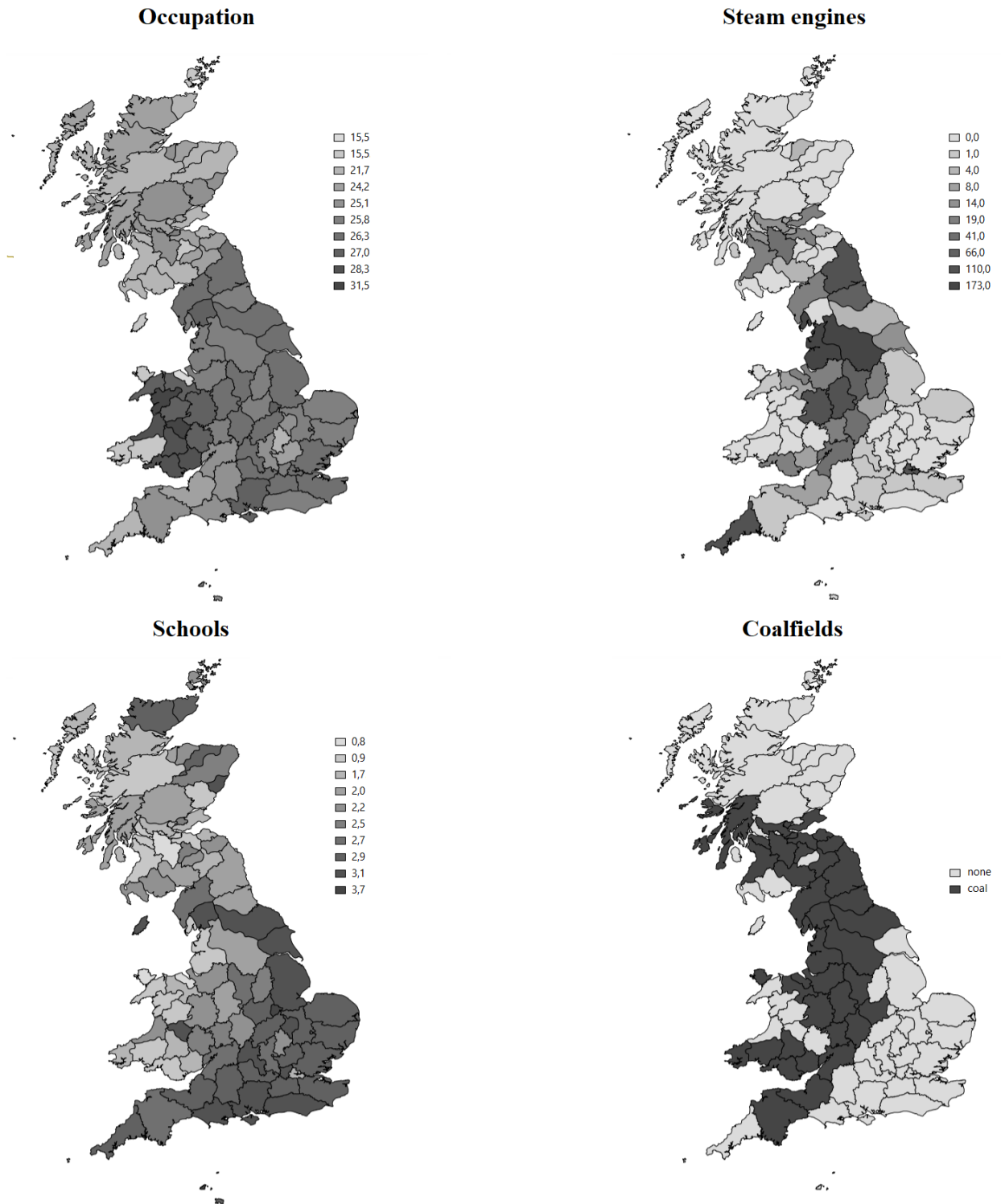
*** p<0.01, ** p<0.05, * p<0.1

Table A12: Impact of Informal Networks on Patents and Exhibits with industry FEs

	Patents		Friendly		Libraries		Booksellers	
	Patents	Exhibits	Patents	Exhibits	Patents	Exhibits	Patents	Exhibits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conditional correlations	0.487*** (0.052)	0.129*** (0.033)	0.136** (0.033)	0.149*** (0.039)	0.445*** (0.066)	0.120*** (0.038)	0.168*** (0.039)	0.112*** 0.039
Adding Industry FEs	0.496*** (0.050)	0.462*** (0.032)	0.125** (0.031)	0.115*** (0.040)	0.480*** (0.066)	0.133*** (0.037)	0.188*** (0.038)	0.142*** 0.038
Counties	712	619	836	860	836	860	836	860

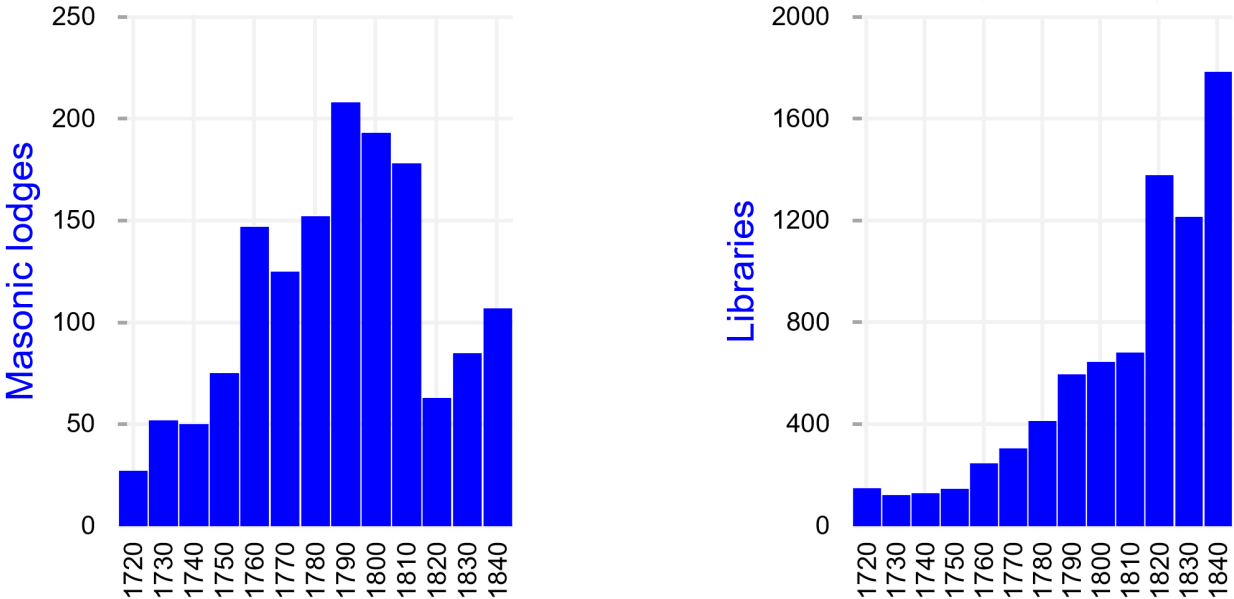
*** p<0.01, ** p<0.05, * p<0.1

Figure A1. County-level variation on key control variables.



These maps show the labor force as measured by the number of people working above the age of 20 as a share of the total occupation within each county, the number of steam engines according to the county in which they were erected per capita and within each county, the number of schools (adding private and public schools) as a share of the total population within each county and a dummy for proximity and use of coal if the county included more than 5% of coalfields' terrain..

Figure A2. Decadal number of new Masonic lodges and libraries in England, 1720-1849



Data are restricted to England. For sources see text.