

City	Province	Topography				Social-economic						River related		City designation
		EL	S	R	TR	UDP	UDA	ABD	AGS	GDP	GDP per capital	NR	MRW	LGC
		m	°	m	-	10 ⁴	km ²	km ²	km ²	10 ⁴ RMB	RMB	-	m	-
Bozhou	Anhui	39.47	5.89	36.74	1.0078	32.09	86.90	56.00	4.61	3318489	20136.5	7	500	2
Mingguang	Anhui	17.18	5.15	30.20	1.0055	15.98	40.00	24.95	2.20	1202101	18324.7	3	120	2
Tongcheng	Anhui	60.36	8.28	63.37	1.0156	16.77	91.56	26.60	2.05	2271328	29925.3	2	160	2
Tongling	Anhui	29.95	7.57	58.20	1.0148	47.53	180.60	75.88	7.65	7169364	135783.4	3	3600	3
Changle	Fujian	37.85	9.66	102.06	1.0273	22.05	176.37	22.00	0.67	5703646	79217.3	5	120	2
Longhai	Fujian	13.71	3.96	33.76	1.0065	19.89	27.00	21.08	5.09	6403575	72933.7	5	600	2
Nanping	Fujian	173.77	18.74	176.35	1.0758	35.30	199.51	41.24	5.64	4294087	46123.4	2	600	2
Putian	Fujian	53.20	6.26	63.18	1.0136	62.70	244.00	86.90	1.17	13454194	51254.1	22	80	3
Dunhuang	Gansu	1147.41	5.82	33.53	1.0075	11.58	19.86	15.01	6.16	1021740	45817.9	1	25	3
Jinchang	Gansu	1527.90	6.64	39.15	1.0095	19.36	52.30	42.17	5.01	1607042	64025.6	2	5	3
Linxia	Gansu	1911.28	8.26	58.29	1.0168	22.93	33.46	23.00	0.52	614250	15318.0	3	100	1
Jiangmen	Guangdong	25.37	7.23	54.99	1.0154	115.01	566.00	150.00	3.45	12138715	72949.0	7	1800	3
Luoding	Guangdong	56.16	7.33	48.74	1.0125	33.21	70.00	23.80	2.56	1777821	13665.0	1	120	0
Qingyuan	Guangdong	15.11	5.89	38.07	1.0083	60.35	311.03	63.22	7.97	6876542	39840.9	5	1200	3
Shantou	Guangdong	15.73	4.98	37.05	1.0081	253.37	607.88	253.60	10.66	18522561	32835.6	7	3500	3
Sihui	Guangdong	14.96	4.96	29.24	1.0054	22.50	50.00	25.67	3.51	5438884	107914.4	2	600	0
Xingning	Guangdong	102.51	8.57	55.66	1.0163	25.72	121.00	27.95	0.60	1527578	12869.2	3	88	1
Guilin	Guangxi	189.02	12.73	118.71	1.0519	94.01	612.63	98.51	15.36	7826658	57296.2	5	400	3
Guiping	Guangxi	56.75	9.93	90.62	1.0271	19.82	73.50	35.50	3.43	2954931	14774.7	2	650	0
Jingxi	Guangxi	755.17	9.84	100.06	1.0329	16.05	35.78	16.80	0.79	1274459	19136.0	3	80	2
Wuzhou	Guangxi	59.78	12.66	106.31	1.0417	60.79	485.01	55.96	3.01	5398235	58485.8	2	1300	3
Anshun	Guizhou	1389.82	13.92	107.33	1.0484	46.44	145.88	66.30	7.86	3504413	27879.2	2	25	3
Duyun	Guizhou	860.10	16.19	157.24	1.0612	23.80	300.00	32.00	1.10	1716712	33013.7	1	150	2
Qingzhen	Guizhou	1244.58	10.39	83.78	1.0239	17.21	51.60	19.00	0.13	2533349	43528.3	2	100	1
Danzhou	Hainan	143.64	7.27	50.87	1.0111	21.60	194.05	31.88	5.12	2317313	23743.0	2	30	3
Dongfang	Hainan	13.01	3.53	22.29	1.0028	13.28	37.08	18.83	0.43	1442700	28343.8	2	50	0
Anguo	Hebei	30.56	4.14	20.95	1.0036	10.35	81.00	13.12	0.42	1091507	25622.2	1	16	2
Langfang	Hebei	15.12	6.45	39.48	1.0098	54.00	292.00	66.28	12.54	7892526	78143.8	2	70	3
Qian'an	Hebei	43.98	5.63	29.55	1.0067	26.00	128.10	42.00	6.35	8910563	111661.2	2	1600	3
Xinji	Hebei	37.02	5.25	27.76	1.0060	17.80	137.10	29.19	1.06	3861339	58505.1	0	0	3
Zhangjiakou	Hebei	820.36	11.67	92.92	1.0359	89.50	376.27	86.00	9.80	5345487	54158.9	1	160	3
Bei'an	Heilongjiang	258.40	6.83	37.89	1.0101	13.53	57.31	22.61	1.96	875392	19197.2	1	6	1
Fujin	Heilongjiang	61.38	9.00	43.52	1.0183	12.35	17.90	16.20	0.50	1533301	36077.7	3	2000	2
Heihe	Heilongjiang	129.81	8.32	43.49	1.0179	14.54	27.88	20.00	2.91	301706	13967.9	2	850	3
Jiamusi	Heilongjiang	81.07	6.72	34.10	1.0106	60.00	96.98	96.98	3.78	4063243	52026.2	5	1500	3
Ning'an	Heilongjiang	256.38	6.66	37.51	1.0096	7.50	13.50	11.22	0.31	1981550	44529.2	1	350	0
Jiaozuo	Henan	119.27	8.08	50.46	1.0145	77.90	140.00	111.20	8.70	4318547	43533.7	4	300	3
Luoyang	Henan	161.78	6.12	40.78	1.0084	241.20	331.42	209.37	20.77	13231407	50598.1	6	800	3
Mengzhou	Henan	106.04	6.14	34.08	1.0077	15.25	113.37	15.60	2.30	2676271	68976.1	1	30	2
Xingyang	Henan	144.34	6.36	37.01	1.0085	15.62	25.35	23.45	2.24	6127512	84751.2	1	100	2
Xinzheng	Henan	108.46	5.36	31.08	1.0059	24.16	34.30	31.60	3.23	8769222	82185.8	3	300	2
Dangyang	Hubei	63.69	6.34	41.46	1.0093	18.31	220.30	22.12	3.14	4350361	87886.1	5	360	3
Huanggang	Hubei	25.30	6.20	41.75	1.0091	31.31	52.22	52.22	5.81	1886894	44293.3	3	2800	3
Macheng	Hubei	61.27	5.88	39.03	1.0081	23.76	251.27	35.68	5.30	2537815	21380.1	1	320	2
Qianjiang	Hubei	31.63	4.37	23.85	1.0040	41.48	311.25	50.30	4.86	5575660	54770.7	5	25	3
Xiaogan	Hubei	23.99	7.16	43.66	1.0117	50.20	90.40	50.00	0.71	2685575	29127.7	4	220	3
Chenzhou	Hunan	208.12	11.55	104.08	1.0286	62.69	580.00	77.23	13.99	5966477	66739.1	5	80	3
Hengyang	Hunan	73.04	6.22	41.76	1.0090	111.84	133.78	113.53	14.96	7525966	60644.4	5	700	3
Leiyang	Hunan	95.51	7.52	54.66	1.0130	51.70	49.65	43.00	4.03	3899472	23032.9	1	260	1
Liling	Hunan	83.87	8.24	71.90	1.0166	25.07	113.50	29.50	1.19	5315568	47333.6	1	270	2
Genhe	Inner Mongolia	717.63	8.99	49.37	1.0181	7.11	350.00	17.50	0.92	412394	58083.7	3	80	0
Holingol	Inner Mongolia	996.35	9.42	45.36	1.0183	12.66	36.04	17.00	1.46	2802800	220692.9	1	20	2
Ordos	Inner Mongolia	1307.34	6.09	40.68	1.0079	52.33	199.42	116.42	27.59	9625700	173749.1	4	700	3
Haimen	Jiangsu	8.66	3.66	20.02	1.0030	29.40	60.00	25.43	4.09	9150197	81844.3	9	60	2
Jiangyin	Jiangsu	11.49	2.80	20.55	1.0029	36.92	198.00	125.00	14.16	28808600	175021.9	34	3000	3
Lianyungang	Jiangsu	30.17	6.56	53.85	1.0148	105.12	718.50	206.00	8.32	11853400	48302.4	7	260	3
Rugao	Jiangsu	12.07	2.81	15.07	1.0017	32.90	108.16	37.20	4.88	8124608	55307.1	18	60	3
Suzhou	Jiangsu	12.60	3.53	23.97	1.0045	299.81	1523.88	458.29	56.10	74935800	170076.7	110	110	4
Ji'an	Jiangxi	58.85	5.76	43.39	1.0088	43.65	230.00	55.05	5.26	2099379	31664.8	3	1100	3
Leping	Jiangxi	23.51	6.00	38.55	1.0076	17.16	49.21	23.85	2.81	2650783	29355.3	2	600	1
Xinyu	Jiangxi	68.59	5.50	43.79	1.0084	46.94	230.00	76.00	6.37	7397643	80409.2	2	250	3
Zhangshu	Jiangxi	25.22	5.33	34.59	1.0074	26.34	46.34	26.12	2.90	3092753	49405.0	3	1300	2
Hunchun	Jilin	35.23	6.36	31.27	1.0084	20.13	125.39	17.89	3.12	1423353	55383.4	3	350	3
Liaoyuan	Jilin	275.08	7.27	49.47	1.0115	48.77	46.30	46.30	1.60	4095533	83924.9	4	150	2
Shulan	Jilin	241.62	7.48	48.44	1.0123	13.30	180.00	25.00	1.50	1998684	28430.8	2	40	2
Songyuan	Jilin	130.57	5.02	27.54	1.0058	49.50	81.50	50.08	10.65	5150738	81757.7	1	1800	3
Anshan	Liaoning	51.33	7.79	42.58	1.0151	158.20	624.29	170.90	8.56	10987311	59713.6	2	150	3
Linghai	Liaoning	25.67	5.98	31.80	1.0079	13.32	136.74	20.98	0.42	2542552	48063.4	1	150	1
Tieling	Liaoning	60.39	5.77	33.12	1.0074	45.10	203.65	57.00	5.25	1431155	23932.4	3	210	3

Zhuanghe	Liaoning	16.81	4.51	33.81	1.0081	33.98	239.00	42.20	3.52	6519470	74508.2	3	300	2
Qingtongxia	Ningxia	1123.40	5.54	34.54	1.0068	13.61	32.45	32.41	3.18	1293100	42817.9	4	70	3
Zhongwei	Ningxia	1227.23	4.17	22.44	1.0036	20.49	64.70	32.00	6.65	1462079	33922.9	2	400	3
Xining	Qinghai	2344.60	14.83	129.24	1.0565	128.75	380.00	90.00	5.40	8592329	59216.6	6	120	3
Hancheng	Shaanxi	430.17	5.75	38.13	1.0074	17.01	77.20	18.21	3.68	3112887	74293.2	1	20	1
Huayin	Shaanxi	349.97	4.18	28.96	1.0036	11.35	65.00	18.00	3.35	804221	30931.6	2	40	2
Weinan	Shaanxi	372.26	7.34	54.46	1.0127	54.00	267.00	62.70	13.32	3068115	22056.9	1	100	2
Dezhou	Shandong	22.85	6.27	34.91	1.0088	87.17	602.00	148.90	15.85	7775854	59222.0	7	200	3
Jining	Shandong	37.21	6.04	35.36	1.0082	139.88	883.87	193.84	20.85	11503100	56581.9	7	250	3
Pingdu	Shandong	52.10	7.55	45.65	1.0120	47.52	719.90	58.60	3.50	7792500	54077.0	4	25	1
Shouguang	Shandong	24.10	6.29	32.76	1.0084	34.25	328.30	39.30	6.18	8069400	66910.4	1	360	4
Tai'an	Shandong	193.66	9.09	76.01	1.0278	67.30	405.82	130.65	8.47	9494100	57926.2	9	140	3
Xintai	Shandong	210.44	6.52	44.87	1.0109	51.67	496.47	69.41	20.00	7744800	54387.6	3	50	3
Changzhi	Shanxi	933.47	6.70	38.50	1.0099	73.92	76.20	59.30	1.25	3561913	44973.6	3	55	3
Gujiao	Shanxi	1048.55	16.11	139.80	1.0586	16.66	22.47	16.66	0.10	219944	9164.3	3	130	2
Jincheng	Shanxi	731.47	7.22	51.03	1.0109	48.00	152.00	57.00	-	2399429	9989.3	1	40	3
Xiaoyi	Shanxi	754.40	5.45	30.25	1.0064	30.49	54.50	26.80	1.52	3351059	69959.5	3	10	3
Chongzhou	Sichuan	532.40	6.24	31.62	1.0079	16.00	63.42	31.07	1.13	2260951	30594.7	1	400	2
Emeishan	Sichuan	438.03	6.84	42.26	1.0098	15.56	90.20	20.60	2.27	2110344	47317.1	3	60	3
Mianyang	Sichuan	482.96	8.53	65.92	1.0166	124.30	465.00	125.00	8.60	8156824	49167.1	6	1000	3
Panzhihua	Sichuan	1206.21	18.01	212.21	1.0725	72.00	342.56	74.08	7.78	6808503	80478.8	1	250	3
Pengzhou	Sichuan	586.57	7.26	37.86	1.0112	30.66	133.80	23.00	1.05	3335497	39567.0	1	30	0
Lhasa	Tibet	3733.21	14.02	155.11	1.0651	49.97	351.40	90.72	4.54	1969334	34671.4	4	700	3
Aksu	Xinjiang	1113.60	5.11	27.23	1.0055	38.37	58.61	46.50	3.97	1727801	28140.1	1	80	3
Hami	Xinjiang	773.51	6.84	34.49	1.0099	20.99	71.17	41.39	2.67	3307375	77095.0	2	2	3
Kuytun	Xinjiang	478.27	5.10	30.12	1.0057	16.64	24.56	24.56	5.50	1203643	64023.6	1	5	3
Baoshan	Yunnan	1686.68	8.87	71.28	1.0200	30.80	68.00	32.00	7.33	2101937	20852.5	1	30	1
Dali	Yunnan	1997.85	10.10	96.09	1.0286	30.65	87.20	40.55	2.29	3379780	48145.0	2	90	3
Jinghong	Yunnan	550.29	8.52	64.25	1.0167	18.71	83.63	27.40	11.28	1768196	30966.7	3	700	3
Yuxi	Yunnan	1662.74	9.86	73.10	1.0216	29.93	88.12	30.17	9.52	6157729	96516.1	1	50	3
Huzhou	Zhejiang	12.12	3.47	26.72	1.0046	90.20	640.69	102.90	14.49	9277807	55890.4	16	300	3
Lanxi	Zhejiang	36.59	5.68	43.22	1.0094	25.98	206.30	34.90	2.40	2853557	39577.8	3	900	2
Wenling	Zhejiang	25.12	7.25	61.65	1.0170	28.90	121.90	34.01	2.76	8271472	63529.0	19	200	3
Zhoushan	Zhejiang	30.84	8.11	73.91	1.0235	57.82	579.99	62.15	7.82	8012264	102067.1	51	120	2
Zhuji	Zhejiang	20.18	5.89	42.33	1.0114	35.47	346.62	43.90	3.96	10266139	69085.7	6	130	3

Table S1. Data of the 13 independent variables used in the analyze. Note the climate data is not included, for the unpublishable demands of the data provider.