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# Uncovering CO<sub>2</sub> emission drivers under regional industrial transfer in China's Yangtze River Economic Belt: a multi-layer LMDI decomposition analysis

This supporting information provides the details about total gross domestic product (GDP) and GDP per capita in the YREB (shown in Fig. S1), industrial structure in different regions during 2000–2017 (shown in Fig. S2), detailed industry classification (shown in Table S1), fossil fuel classification and emission factors (shown in Table S2), and details of decomposition results for regional-level CO<sub>2</sub> emissions (shown in Table S3–S5).

Received May 27, 2020; accepted Aug. 6, 2020

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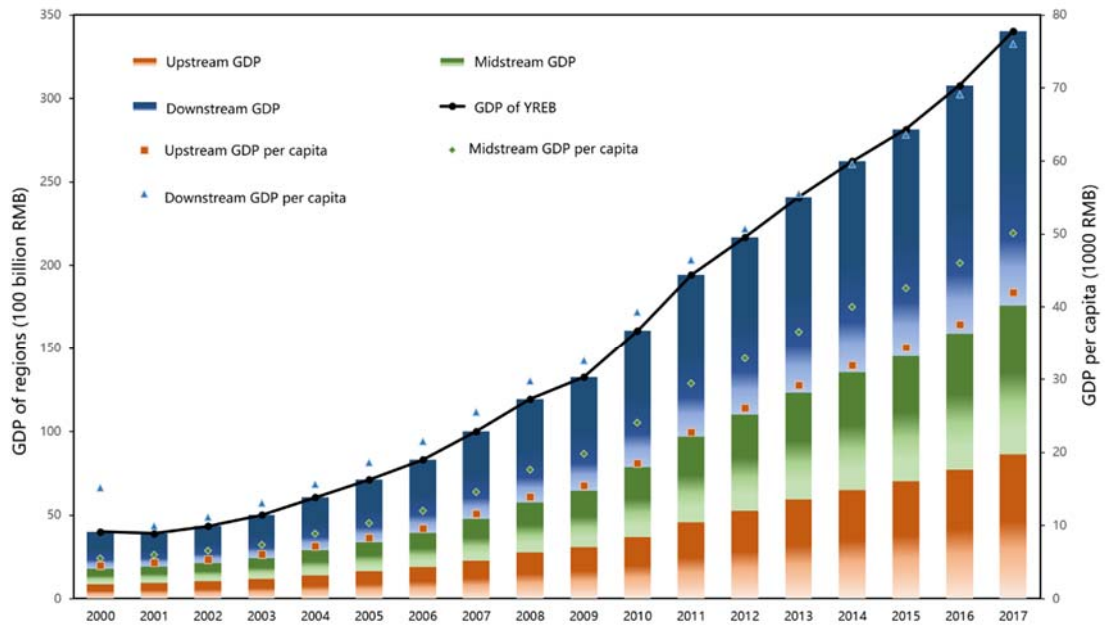
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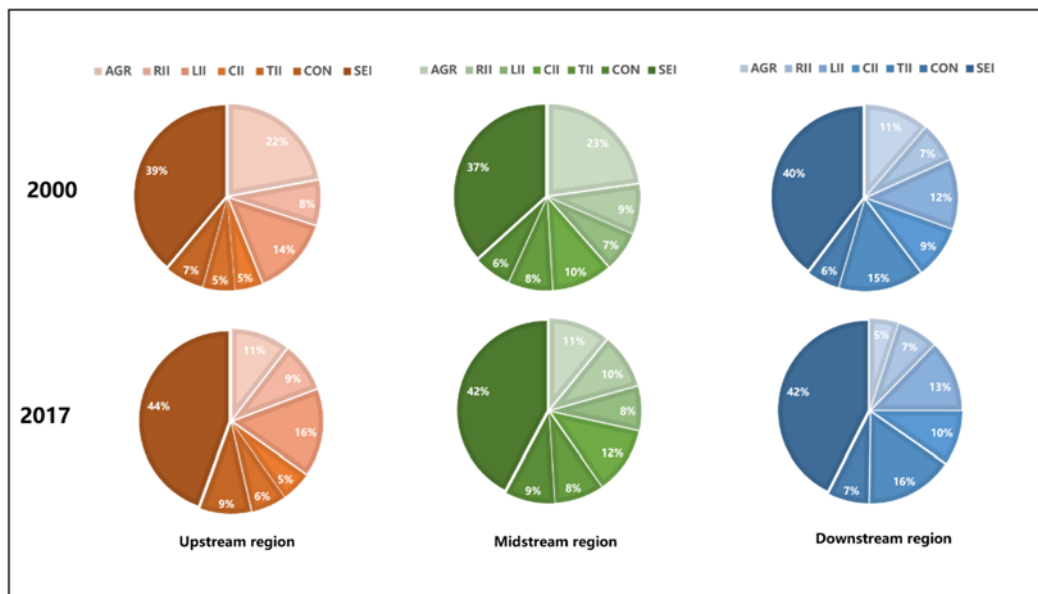
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**Fig. S1** Situation of total GDP and GDP per capita in the YREB [1]



**Fig. S2** Industrial structure in the upstream, midstream and downstream regions in the YREB during 2000–2017 [2]

**Table S1** Detailed industry classification [3, 4]

NO.(j)	Socioeconomic sectors		
1	Farming, Forestry, Animal Husbandry, Fishery and Water Conservancy	Agriculture (AGR)	
2	Coal Mining and Dressing	Resource-intensive industry (RII)	
3	Petroleum and Natural Gas Extraction		
4	Ferrous Metals Mining and Dressing		
5	Nonferrous Metals Mining and Dressing		
6	Non-metal Minerals Mining and Dressing		
7	Other Minerals Mining and Dressing		
22	Raw Chemical Materials and Chemical Products		
28	Smelting and Pressing of Ferrous Metals	Labor-intensive industry (LII)	
29	Smelting and Pressing of Nonferrous Metals		
8	Logging and Transport of Wood and Bamboo		
9	Food Processing		
10	Food Production		
11	Beverage Production		
12	Tobacco Processing		
13	Textile Industry		
14	Garments and Other Fibre Products		
15	Leather, Furs, Down and Related Products		
16	Timber Processing, Bamboo, Cane, Palm Fibre & Straw Products		
17	Furniture Manufacturing		
18	Paper making and Paper Products		
19	Printing and Record Medium Reproduction		
20	Cultural, Educational and Sports Articles	Capital-intensive industry (CII)	
21	Petroleum Processing and Coking		
25	Rubber Products		
26	Plastic Products		
27	Non-metal Mineral Products		
30	Metal Products		
39	Production and Supply of Electric Power, Steam and Hot Water		
40	Production and Supply of Gas		
41	Production and Supply of Tap Water		
23	Medical and pharmaceutical products		Technology-intensive industry (TII)
24	Chemical fibre		
31	Ordinary machinery		
32	Equipment for special purposes		
33	Transportation equipment manufacturing		
34	Electric equipment and machinery		
35	Electronic and telecommunications equipment		
36	Instruments, meters, cultural and office machinery		
37	Other manufacturing industry		
38	Scrap and waste		

42	Construction	Construction (CON)
43	Transportation, storage, post and telecommunication services	Service
44	Wholesale, retail trade and catering services	industry
45	Other service sectors	(SEI)

**Table S2** Fossil fuel classification and emission factors used in this study [5]

No. ( <i>t</i> )	Industry process	Category	NCV <sub><i>i</i></sub> /(PJ/10 <sup>4</sup> t, 10 <sup>8</sup> m <sup>3</sup> )	CC <sub><i>i</i></sub> (t CO <sub>2</sub> /TJ)
1	Raw coal	Coal	0.21	96.51
2	Cleaned coal		0.26	96.51
3	Other washed coal		0.15	96.51
4	Briquettes		0.18	96.51
5	Coke		0.28	115.07
6	Coke oven gas		1.61	78.80
7	Other gas		0.83	78.80
8	Other coking products		0.28	100.64
9	Crude oil	Oil	0.43	73.63
10	Gasoline		0.44	69.30
11	Kerosene		0.44	71.87
12	Diesel oil		0.43	74.07
13	Fuel oil		0.43	77.37
14	Liquefied petroleum gas (LPG)		0.51	63.07
15	Refinery gas		0.47	73.33
16	Other petroleum products	0.43	74.07	
17	Nature gas	Gas	3.89	56.17

**Table S3** Decomposition results of the entire YREB region during 2000–2017 (unit: Mt)

	$\Delta CE_{CC}$	$\Delta CE_{ES}$	$\Delta CE_{EI}$	$\Delta CE_{IS}$	$\Delta CE_{RS}$	$\Delta CE_{GP}$	$\Delta CE_P$	Total changes
10th 5YP	-21.97	13.32	90.64	58.99	-3.92	448.52	151.32	736.90
11th 5YP	28.02	13.90	-362.95	52.73	-8.87	872.80	243.57	839.20
12th 5YP	-7.74	-46.55	-705.60	13.64	-5.71	694.94	309.66	252.64
2015–2017	-0.86	-65.00	-242.75	-16.35	-2.37	34.01	329.34	35.78

**Table S4** Decomposition results of the upstream, midstream, and downstream regions during the different periods (unit: Mt)

	$\Delta CE_{CC}$	$\Delta CE_{ES}$	$\Delta CE_{EI}$	$\Delta CE_{IS}$	$\Delta CE_{RS}$	$\Delta CE_{GP}$	$\Delta CE_P$	Total changes
10th 5YP								
Upstream	1.24	3.59	30.94	18.63	-0.35	143.42	6.34	203.80
Midstream	-15.40	5.85	36.93	16.59	0.20	126.73	7.20	178.10
Downstream	-7.80	3.89	22.78	23.76	-1.74	105.32	208.80	355.00
11th 5YP								
Upstream	5.87	-0.14	-66.90	19.08	-1.09	282.08	9.81	248.70
Midstream	24.53	2.34	-83.25	17.90	-0.08	243.71	15.36	220.50
Downstream	-2.39	11.70	-212.80	15.76	-3.26	527.11	33.88	370.00
12th 5YP								
Upstream	5.19	-23.97	-229.37	6.61	-0.63	246.38	14.70	18.92
Midstream	9.00	-10.30	-203.09	5.72	-0.03	220.20	13.85	35.35
Downstream	-21.93	-12.29	-273.15	1.31	-2.82	473.88	33.36	198.37
2015–2017								
Upstream	7.45	-0.91	-85.47	-2.25	-0.20	86.01	6.34	10.97
Midstream	19.16	4.86	-45.23	-2.90	-0.01	78.23	6.05	60.17
Downstream	62.42	-10.21	-169.58	-11.43	-1.59	172.38	17.05	59.04

**Table S5** Decomposition results of the 11 provinces and provincial-level municipalities during the different periods (unit: Mt)

	$\Delta CE_{CC}$	$\Delta CE_{ES}$	$\Delta CE_{EI}$	$\Delta CE_{IS}$	$\Delta CE_{GP}$	$\Delta CE_P$	Total changes
10th 5YP							
Chongqing	-0.16	-0.31	-24.05	2.28	31.21	-1.17	7.80
Sichuan	-0.83	0.32	2.66	7.13	45.31	3.01	57.60
Guizhou	-1.17	0.49	18.23	5.33	39.54	-0.61	61.80
Yunnan	3.40	3.09	34.10	3.89	28.66	3.45	76.60
Jiangxi	2.66	0.39	3.94	3.73	23.62	2.26	36.99
Hubei	-11.63	1.11	-12.28	6.82	62.10	1.58	46.20
Hunan	-6.44	4.35	45.27	6.04	41.97	2.60	98.10
Shanghai	-2.89	-6.87	-15.33	1.81	17.01	44.58	39.01
Jiangsu	4.70	10.19	33.24	9.23	112.82	9.02	182.29
Zhejiang	2.64	0.48	22.78	4.24	72.52	3.54	178.94
Anhui	-12.25	0.09	-17.91	8.48	52.35	0.53	33.41
11th 5YP							
Chongqing	-5.80	1.06	5.82	0.61	46.32	2.79	52.80
Sichuan	9.40	-0.73	-9.82	7.36	87.57	7.51	107.90
Guizhou	2.64	-0.60	-36.75	6.63	83.22	-10.04	40.00
Yunnan	-0.36	0.12	-26.16	4.48	68.71	4.71	52.50
Jiangxi	0.11	-1.48	-9.32	3.62	47.76	3.41	44.10
Hubei	15.89	4.57	-25.64	6.04	113.52	0.52	114.90
Hunan	8.54	-0.76	-48.29	8.24	84.21	9.56	61.50
Shanghai	-12.83	-8.65	-42.77	-0.70	59.19	31.66	25.90
Jiangsu	8.39	14.23	-102.64	5.41	219.69	15.72	160.80
Zhejiang	-0.52	4.65	-56.86	2.66	132.90	8.07	90.90
Anhui	2.57	1.47	-10.53	8.39	95.29	-4.79	92.40
12th 5YP							
Chongqing	-1.54	-3.09	-32.59	0.08	41.41	5.53	9.79
Sichuan	13.02	-11.34	-79.96	2.46	88.91	2.75	15.85
Guizhou	-11.11	-0.01	-34.60	2.97	62.91	2.57	22.73
Yunnan	-3.61	-1.17	-82.07	1.08	51.77	4.54	-29.47
Jiangxi	9.22	0.39	-13.91	1.40	51.42	3.38	51.89
Hubei	-9.43	-11.58	-105.39	1.34	94.36	5.89	-24.81
Hunan	9.18	0.86	-83.78	2.98	74.36	4.60	8.20
Shanghai	8.49	-4.10	-71.58	-0.96	59.88	8.28	0.02
Jiangsu	-43.62	1.50	-61.73	-0.66	211.41	7.75	114.65
Zhejiang	-3.24	-5.85	-96.88	-0.42	112.45	8.24	14.30
Anhui	16.45	-3.84	-42.96	3.35	88.31	8.10	69.40
2015–2017							
Chongqing	0.99	3.18	-21.20	-0.64	14.39	2.51	-0.78
Sichuan	1.84	-2.48	-42.89	-1.55	31.61	0.31	-13.16
Guizhou	-2.28	-1.15	-8.68	0.38	22.09	2.81	13.17

Yunnan	6.89	-0.45	-12.69	-0.43	16.65	1.78	11.75
Jiangxi	5.15	0.85	-13.64	-1.54	21.01	2.24	14.07
Hubei	9.65	2.92	-28.78	-1.23	31.86	2.27	16.69
Hunan	4.35	1.09	-2.81	-0.13	25.26	1.64	29.41
Shanghai	-1.39	-3.30	-15.79	-0.87	23.59	0.22	2.45
Jiangsu	63.38	-7.05	-100.86	-6.32	78.75	4.31	32.21
Zhejiang	-2.12	-1.00	-29.99	-2.12	36.68	5.62	7.07
Anhui	2.55	1.14	-22.94	-2.12	33.17	5.50	17.31

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