

Supplementary Materials: Two-Stage DEA Analysis of Water Resources Use Efficiency

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Table S1. The parameters of two-stage DEA model in 2004.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.54	0.60	0.17	0.10	0.20	0.38	1.76	0.41	0.58	0.54	0.59	1.02	0.50	0.40
E-Winput	10.06	2.51	0.53	1.47	6.03	28.18	12.73	4.25	2.40	2.61	1.85	2.76	20.22	17.87
P-out	174.93	296.99	67.44	17.96	46.31	97.17	305.07	193.66	270.93	222.93	256.69	347.78	193.11	127.81
GDP-out	126.33	62.65	21.81	44.44	85.53	122.25	504.65	42.50	63.38	96.34	108.31	125.47	108.02	99.60
PR-out	26.55	10.48	20.55	92.32	54.98	40.27	65.60	13.12	14.75	15.86	13.86	26.90	18.01	27.26
PRI-out	0.05	0.22	0.72	3.76	0.61	0.57	1.75	0.83	0.60	0.29	0.36	0.62	0.05	0.38
GR-out	85.07	58.32	65.25	97.75	93.09	78.06	95.92	65.34	66.14	74.35	78.72	82.10	67.62	65.59
GRI-out	19.93	11.78	16.94	39.88	57.92	14.58	14.67	14.43	20.29	19.51	20.76	16.17	20.01	18.91
Citypr	2.18	3.27	−0.35	5.34	1.96	−4.50	−1.11	0.88	6.61	1.14	0.74	3.95	1.59	0.11
STR	−1.20	−0.19	3.05	0.57	3.27	2.23	0.10	−3.51	−1.30	−0.30	−0.53	0.06	−3.08	0.71

Table S2. The parameters of two-stage DEA model in 2005.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.51	0.36	0.13	0.16	0.16	0.59	1.82	0.45	0.45	0.53	0.48	0.88	0.98	0.45
E-Winput	9.12	4.10	0.22	1.46	6.52	22.48	14.33	3.13	2.12	2.73	0.82	3.31	19.32	22.28
P-out	173.30	294.22	66.81	17.79	45.88	96.26	302.23	191.85	268.40	220.85	254.30	344.54	191.31	126.62
GDP-out	149.34	74.24	26.36	49.84	95.83	145.20	618.08	50.37	75.81	115.29	127.69	153.84	128.71	117.54
PR-out	27.38	10.80	21.19	94.10	56.69	41.53	67.72	13.53	15.21	16.35	14.29	27.74	18.57	28.12
PRI-out	−0.93	−0.93	−0.93	−0.95	−0.93	−0.94	−0.93	−0.93	−0.93	−0.93	−0.93	−0.93	−0.93	−0.93
GR-out	86.59	62.66	69.46	97.87	93.46	80.39	96.46	68.95	59.94	77.24	80.84	84.50	71.14	69.04
GRI-out	18.21	18.50	20.86	12.15	12.04	18.77	22.48	18.52	19.61	19.67	17.89	22.61	19.15	18.01
Citypr	3.14	3.15	3.13	1.93	3.12	3.14	3.23	3.13	3.14	3.14	3.12	3.13	3.12	3.14
STR	1.79	7.44	6.45	0.12	0.40	2.98	0.56	5.52	−9.37	3.89	2.69	2.92	5.21	5.26

Table S3. The parameters of two-stage DEA model in 2006.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.52	0.37	0.14	0.16	0.17	0.61	1.87	0.46	0.46	0.55	0.49	0.90	1.00	0.46
E-Winput	9.12	4.10	0.22	1.45	6.56	22.79	14.14	3.13	2.12	2.73	0.82	3.32	19.40	22.62
P-out	174.69	292.66	67.79	20.31	46.55	98.29	327.00	192.83	261.02	218.72	250.90	340.80	189.52	127.15
GDP-out	176.89	81.42	30.25	98.92	152.77	174.43	647.08	63.08	93.49	126.45	172.19	168.06	162.84	127.13
PR-out	26.86	10.88	21.17	97.78	53.86	38.34	67.34	14.91	15.67	16.87	13.31	28.18	18.11	27.67
PRI-out	0.80	−0.53	1.47	14.17	1.46	2.11	8.20	0.51	−2.75	−0.96	−1.34	−1.09	−0.94	0.42
GR-out	87.77	60.73	71.07	98.65	94.92	80.69	96.53	74.41	72.34	76.96	83.73	83.06	75.15	70.43
GRI-out	18.45	9.67	14.76	98.48	59.42	20.13	4.69	25.23	23.32	9.68	34.85	9.24	26.52	8.16
Citypr	−1.90	0.69	−0.12	3.92	−5.00	−7.70	−0.56	10.22	2.98	3.15	−6.84	1.57	−2.49	−1.59
STR	1.37	−3.07	2.32	0.79	1.56	0.37	0.08	7.92	20.69	−0.37	3.58	−1.70	5.64	2.02

Table S4. The parameters of two-stage DEA model in 2007.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.53	0.38	0.14	0.16	0.21	0.62	1.91	0.46	0.47	0.56	0.49	0.91	1.01	0.47
E-Winput	9.00	4.06	0.22	1.41	6.45	22.89	13.68	3.09	2.10	2.68	0.80	3.30	19.23	22.93
P-out	175.28	282.42	67.09	23.83	49.72	101.33	359.84	187.95	254.89	214.22	243.59	343.01	186.17	127.82
GDP-out	207.53	100.11	35.36	120.18	213.22	203.25	732.76	72.92	111.80	147.82	200.81	196.22	187.65	146.47
PR-out	31.56	13.29	25.20	98.24	59.43	43.83	72.13	18.04	18.91	20.31	16.16	33.00	21.73	32.44
PRI-out	0.34	−3.50	−1.03	17.33	6.81	3.09	10.04	−2.53	−2.35	−2.06	−2.91	0.65	−1.77	0.53
GR-out	87.13	61.93	71.30	98.76	95.77	81.15	96.44	73.40	72.36	75.79	83.85	81.75	74.44	69.84
GRI-out	17.32	22.96	16.89	21.49	39.57	16.52	13.24	15.60	19.58	16.90	16.62	16.76	15.24	15.21
Citypr	17.48	22.14	19.07	0.46	10.35	14.32	7.12	20.93	20.71	20.36	21.41	17.11	19.98	17.26
STR	−0.73	1.97	0.31	0.12	0.89	0.57	−0.10	−1.37	0.03	−1.51	0.14	−1.58	−0.95	−0.84

Table S5. The parameters of two-stage DEA model in 2008.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.55	0.39	0.14	0.18	0.22	0.64	1.98	0.48	0.28	0.58	0.51	0.95	1.05	0.49
E-Winput	8.54	3.85	0.24	1.45	6.30	22.81	13.69	3.06	1.73	2.65	0.81	3.25	18.94	22.78
P-out	175.12	293.51	68.03	20.98	47.29	101.32	331.01	195.44	261.79	219.58	252.16	342.59	191.14	128.16
GDP-out	244.29	105.65	43.41	144.07	192.26	248.02	846.15	78.59	121.62	177.83	248.51	226.59	210.09	169.66
PR-out	36.14	13.07	18.23	92.71	59.12	58.84	61.25	12.75	19.74	30.61	26.45	29.01	34.44	35.42
PRI-out	−0.09	3.93	1.40	−11.96	−4.89	−0.01	−8.01	3.99	2.71	2.50	3.52	−0.12	2.67	0.27
GR-out	87.60	63.87	70.40	98.83	94.99	82.60	96.69	76.23	70.73	77.79	84.44	81.33	76.66	71.10
GRI-out	17.71	5.53	22.77	19.88	−9.83	22.03	15.47	7.78	8.78	20.30	23.75	15.48	11.96	15.83
Citypr	4.59	−0.22	−6.98	−5.53	−0.31	15.02	−10.88	−5.29	0.83	10.30	10.29	−3.99	12.71	2.98
STR	0.54	3.13	−1.26	0.07	−0.81	1.79	0.26	3.86	−2.25	2.63	0.70	−0.51	2.98	1.80

Table S6. The parameters of two-stage DEA model in 2009.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.62	0.72	0.17	0.12	0.22	0.44	1.98	0.53	0.68	0.62	0.66	1.16	0.60	0.46
E-Winput	8.37	3.72	0.32	1.17	5.98	22.93	13.01	3.11	1.75	2.62	1.67	3.14	17.87	23.00
P-out	175.72	294.13	68.08	21.09	47.57	101.88	332.18	196.06	262.21	220.15	252.68	343.07	191.83	128.81
GDP-out	265.33	131.94	57.65	160.05	196.09	321.05	925.98	93.17	142.34	195.65	302.22	260.01	192.79	192.02
PR-out	33.05	13.78	28.45	78.71	60.21	44.66	78.92	19.52	20.67	21.31	15.82	35.86	21.82	35.21
PRI-out	0.34	0.21	0.07	0.52	0.59	0.55	0.35	0.32	0.16	0.26	0.21	0.14	0.36	0.51
GR-out	87.61	69.23	75.18	98.58	94.09	85.37	96.76	78.16	73.08	78.02	85.36	81.57	72.25	72.07
GRI-out	8.61	24.88	32.80	11.09	1.99	29.45	9.43	18.55	17.04	10.02	21.61	14.75	−8.23	13.18
Citypr	−8.56	5.46	56.09	−15.10	1.83	−24.10	28.84	53.13	4.75	−30.37	−40.18	23.62	−36.66	−0.59
STR	0.01	8.39	6.79	−0.25	−0.95	3.35	0.07	2.53	3.32	0.30	1.09	0.30	−5.75	1.36

Table S7. The parameters of two-stage DEA model in 2010.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.63	0.71	0.18	0.13	0.23	0.45	2.12	0.52	0.68	0.62	0.66	1.20	0.59	0.47
E-Winput	8.41	3.74	0.32	1.22	5.99	25.93	12.88	3.12	1.76	2.67	2.12	2.80	16.39	22.75
P-out	170.88	269.86	68.91	23.19	46.41	109.59	361.62	194.67	256.77	206.80	221.12	326.25	181.51	119.95
GDP-out	311.18	156.02	67.69	183.91	210.52	405.03	1100.39	106.38	169.42	231.89	357.62	300.22	228.77	212.69
PR-out	36.48	16.13	30.17	76.84	66.24	44.57	77.82	21.11	22.66	24.35	19.41	40.47	24.75	40.59
PRI-out	−2.75	−8.25	1.22	9.96	−2.44	7.57	8.86	−0.71	−2.07	−6.06	−12.49	−4.90	−5.38	−6.88
GR-out	87.90	69.41	76.53	98.66	94.69	86.62	96.93	77.38	73.70	78.18	85.73	79.95	73.58	70.69
GRI-out	17.28	18.25	17.42	14.91	7.36	26.16	18.84	14.18	19.02	18.52	18.33	15.46	18.66	10.76
Citypr	10.38	17.01	6.04	−2.37	10.02	−0.21	−1.39	8.11	9.62	14.26	22.68	12.87	13.44	15.27
STR	0.34	0.27	1.79	0.08	0.64	1.47	0.17	−0.99	0.85	0.21	0.44	−1.98	1.84	−1.92

Table S8. The parameters of two-stage DEA model in 2011.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.63	0.71	0.18	0.13	0.23	0.45	2.11	0.52	0.67	0.62	0.65	1.20	0.59	0.47
E-Winput	8.41	3.73	0.32	1.30	5.97	27.08	12.93	3.10	1.74	2.70	2.01	2.78	16.15	22.53
P-out	171.33	270.51	68.85	23.32	46.59	110.07	362.09	196.29	256.09	207.67	221.48	327.47	181.97	120.46
GDP-out	375.79	187.06	81.35	235.54	232.75	481.55	1360.03	128.78	197.68	276.19	454.08	357.55	272.85	256.60
PR-out	37.53	15.71	31.21	80.36	69.26	45.95	82.16	20.36	23.35	24.33	19.33	41.67	24.96	41.73
PRI-out	0.26	0.24	−0.09	0.56	0.39	0.44	0.13	0.83	−0.26	0.42	0.16	0.37	0.25	0.43
GR-out	88.82	71.66	76.64	98.68	94.84	87.75	97.06	79.04	74.71	79.36	87.23	81.26	75.44	71.94
GRI-out	20.76	19.89	20.18	28.07	10.56	18.89	23.60	21.06	16.68	19.10	26.97	19.10	19.27	20.65
Citypr	2.89	−2.58	3.46	4.58	4.57	3.11	5.58	−3.55	3.04	−0.10	−0.42	2.95	0.86	2.81
STR	1.04	3.24	0.16	0.02	0.16	1.30	0.13	2.14	1.36	1.51	1.74	1.63	2.54	1.78

Table S9. The parameters of two-stage DEA model in 2012.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.63	0.71	0.18	0.13	0.24	0.46	2.16	0.53	0.68	0.62	0.66	1.21	0.59	0.48
E-Winput	8.58	3.48	0.35	1.51	6.14	28.10	11.56	3.10	1.83	3.12	1.41	3.08	15.92	22.65
P-out	171.92	276.92	69.31	23.43	46.74	110.44	363.05	197.62	256.95	208.19	221.84	328.22	182.16	120.76
GDP-out	434.36	224.12	96.74	269.24	244.87	574.57	1564.41	151.89	229.60	325.36	530.29	413.88	341.55	291.89
PR-out	41.54	25.83	25.98	93.38	64.12	52.15	78.34	26.69	23.37	31.65	28.01	31.11	30.88	37.11
PRI-out	0.34	2.37	0.67	0.47	0.32	0.34	0.27	0.68	0.34	0.25	0.16	0.23	0.10	0.25
GR-out	88.68	69.41	77.51	98.59	93.93	87.85	97.11	78.87	73.44	78.68	86.06	80.82	75.78	71.29
GRI-out	15.59	19.81	18.92	14.31	5.21	19.32	15.03	17.95	16.15	17.80	16.78	15.75	25.18	13.75
Citypr	10.69	64.41	−16.75	16.21	−7.43	13.48	−4.65	31.09	0.08	30.10	44.92	−25.34	23.71	−11.08
STR	−0.16	−3.14	1.13	−0.09	−0.96	0.12	0.06	−0.22	−1.69	−0.86	−1.34	−0.54	0.45	−0.90

Table S10. The parameters of two-stage DEA model in 2013.

DUM	Baiyin	Dingxi	Gannan	Jiayuguan	Jinchang	Jiuquan	Lanzhou	Linxia	Longnan	Pingliang	Qingyang	Tianshui	Wuwei	Zhangye
S-Winput	0.54	0.65	0.20	0.10	0.17	0.53	1.90	0.47	0.58	0.52	0.55	0.67	0.53	0.50
E-Winput	9.37	3.25	0.55	1.68	7.03	30.57	10.71	3.73	1.35	2.17	1.48	3.11	15.06	22.28
P-out	171.22	277.07	69.79	23.55	46.86	110.83	364.16	198.88	257.52	208.67	222.27	329.29	181.02	121.05
GDP-out	464.49	252.22	108.89	226.29	252.83	642.66	1776.83	167.32	249.51	341.92	606.07	456.36	381.18	336.86
PR-out	43.23	27.16	26.34	93.38	65.58	53.64	79.71	28.01	24.69	33.04	29.59	32.42	32.34	38.71
PRI-out	−0.41	0.05	0.69	0.51	0.26	0.35	0.31	0.64	0.22	0.23	0.19	0.33	−0.63	0.24
GR-out	88.16	69.05	77.45	98.30	93.44	87.89	97.20	79.96	75.30	77.45	86.75	80.97	76.60	72.36
GRI-out	6.94	12.54	12.56	−15.95	3.25	11.85	13.58	10.16	8.67	5.09	14.29	10.26	11.60	15.41
Citypr	4.06	5.14	1.35	−0.01	2.27	2.87	1.75	4.96	5.63	4.39	5.62	4.19	4.74	4.32
STR	−0.59	−0.52	−0.08	−0.30	−0.52	0.05	0.09	1.39	2.53	−1.56	0.81	0.19	1.08	1.49

Note: S-Winput: Social subsystem water resources input (10^8 m^3); E-Winput: Economic subsystem water resources input (10^8 m^3); P-out: Population (10^4 p); GDP-out: GDP (10^8 yuan); PR-out: Urban population proportion (%); GR-out: Proportion of secondary, tertiary industry (%); GRI-out: Growth rate of GDP (%); Citypr: Growth rate of urban population (%); STR: Growth rate of secondary, tertiary industry (%).