Supplementary Material

Supplementary Tables

Supplementary Table S1 Granger causality test

	NOx_x	Soot(dust)_x	SO2_x	DALYs_x	PGDP_x
NOx_y	1	0	0	0	0
Soot(dust)_y	0.0005	1	0.0001	0	0
SO2_y	0	0	1	0.0015	0
DALYs_y	0.0001	0.0001	0	1	0
PGDP_y	0.0007	0.0007	0.0311	0	1

In the table, the index ends with y, indicating the response variable, and the column ends with x, indicating the prediction variable. If the p value is less than 0.05, it indicates that there is Granger causality.

Therefore, according to the test data, it is completely reasonable to use VAR model.

Supplementary Table S2 Economic loss of disease by age group

Age	YLLs (100 million yuan)	YLDs (100 million yuan)	Deaths (100 million yuan)	DALYs (100 million yuan)
0-14	7.94	1.53	0.18	10.75
15-44	6.63	4.78	1.64	46.21
45-59	18.54	5.62	2.39	52.13
60+	9.55	0.94	0.39	6.03

Supplementary Table S3 Economic loss of health from respiratory diseases 1990-2019

date	YLLs_IEB	YLDs_IEB	Deaths_IEB	DALYs_IEB
1990	267925442.5	11120070.81	14383491.87	535143353.6
1991	298645163.2	36457178.38	5050040.906	457976600.1
1992	348286557.5	4333984.937	24928809.85	667774659.6
1993	425432473.2	2077864.389	19023520.39	1482470778
1994	539474989.4	34412001.52	49681875.86	1010943592
1995	628307348.4	41430854.59	47714142.5	781676575.9

1996	674744991.9	33632183.65	98247360.52	1542587973
1997	681673556.2	47274671.44	20506444.01	758139489
1998	664396788.2	115887561	36047157.94	1825087829
1999	649527852.4	68797156.7	20605021.02	270672754.5
2000	661836135.4	80116086.34	28808978.91	1334849213
2001	669070142.6	121667488.7	79432972.56	1396318598
2002	677943247.1	14113594.08	50089177.64	1398272116
2003	709613973.1	143546912.4	29154638.84	2052442932
2004	796628350.7	116283493.8	24143477.43	946646927.1
2005	862729876.5	482432938.8	159479624	2062276470
2006	936792594.3	182180736.7	98990452.49	2335271697
2007	1075538004	174549356.9	99174235.73	2167534282
2008	1202383911	339463674.7	97913981.19	3328575589
2009	1219371635	442676270.2	167427211.8	1853673425
2010	1369296340	186386359.7	208641835.8	5471223600
2011	1539296328	516382616.2	204611376.8	6758520798
2012	1613370167	782551701.6	237149672.6	5759301784
2013	1671385504	396166603	199355881.5	2694050081
2014	1722397966	620512170.2	236486853.6	8878624166
2015	1787057077	1790714794	376346072.9	4080361939
2016	1884110763	518997392.1	118770754.1	6684498007
2017	2012102114	1458785499	352645869.4	8363690669
2018	2138785124	132432425	165044251.2	5773939079
2019	2268566586	756850468.2	175241917.5	3678207146

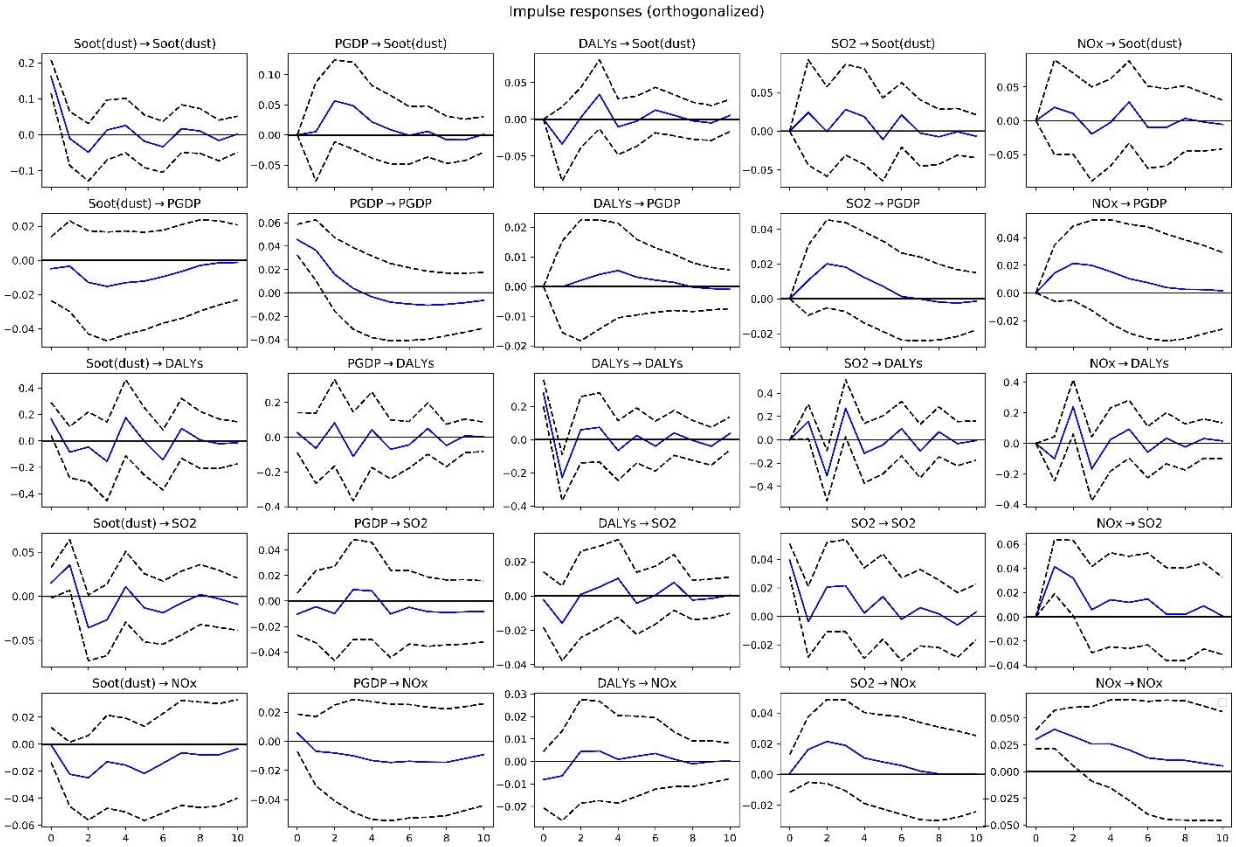
Supplementary Table S4 Results of VAR-VECM model from 1990 to 2015

Variable	Coefficient				
	NOx	**Soot (dust)**	**SO_2**	**PGDP**	**DALYs**
NOx		-2.53e-16**	2.109e-15**	2.221e-15**	2.655e-15**
Soot (dust)	-1.599e-15**		3.484e-16**	5.104e-15**	1.371e-15**
SO_2	6.793e-16**	5.175e-15**		3.545e-15**	4.089e-15**
PGDP	1.024-14**	1.081e-14**	5.346e-15**		5.112e-16**
DALYs	-3.716e-18**	-2.861e-15**	-1.408e-16**	-3.728e-15**	
$ECM_{1,t-1}$	-0.2272*	0.1097*	0.1110*	0.4174*	-0.5309*
$ECM_{2,t-1}$	-0.5207	0.3405*	0.0804	1.1786	-1.3020*
$ECM_{3,t-1}$	0.2095**	0.0545	0.1557*	-0.6851*	0.1571
$ECM_{4,t-1}$	-0.4149*	-0.1809*	-0.0899*	0.8568*	-0.0563

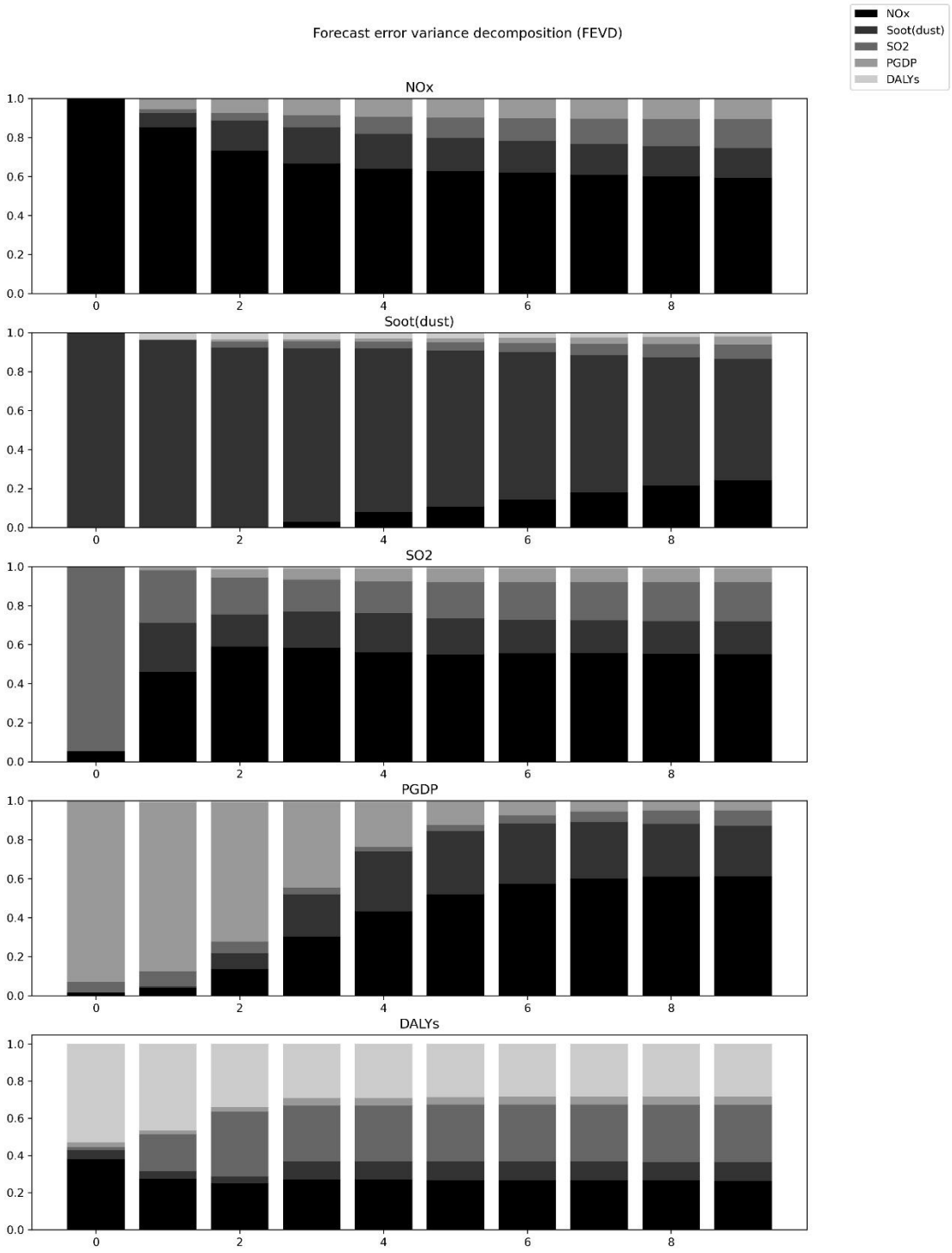
$ECM_{5,t-1}$	-0.8272	-0.3798	-1.3721*	4.5220*	-1.0303

Note: * means 0.05, and ** means 0.1.

Supplementary Figures



Supplementary Figure S1. Impulse response analysis of "three waste" emissions, PGDP growth and disease burden DALYs,1990-2015



Supplementary Figure S2. Variance decomposition results of 10 lag periods, 1990-2015