



# Transboundary Air Pollution and Hazy Accountability: Evidence from South Korea and China

Hailie N. Lee and Erik Voeten

October 24, 2023

# South Korea worst Air Pollution in OECD

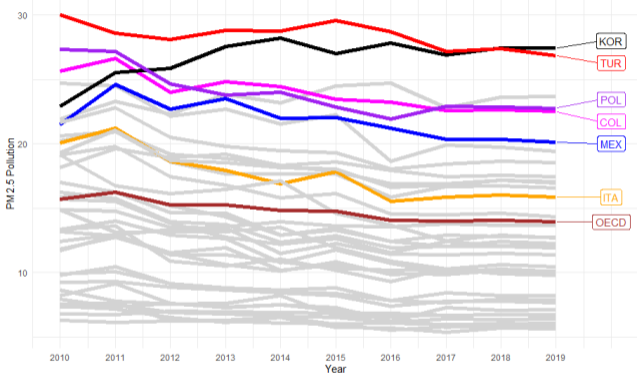


Figure: South Korean fine dust pollution compared to other OECD countries, 2010-2019

# Climate Policy and Coal in South Korea

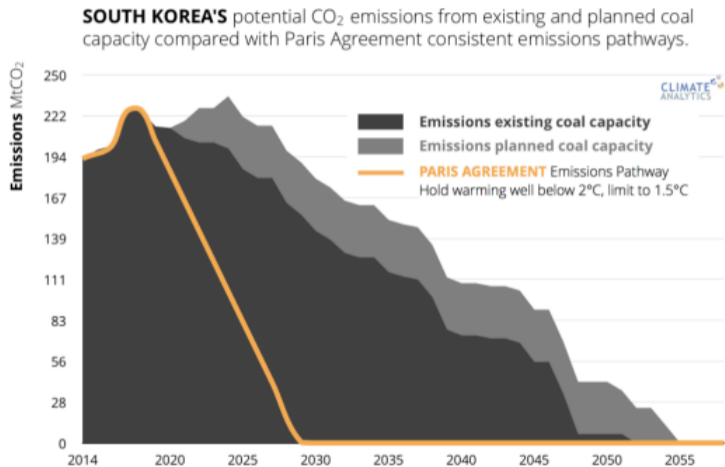
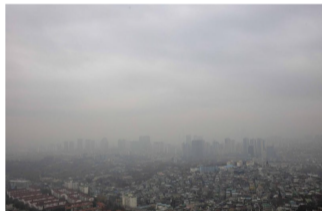


Figure 1 - Coal power plant emissions pathways for South Korea. Emissions from operating coal capacity are calculated based on proposed retirement age (30 years) and historical utilisation rates (81%), and reported emissions intensities per combustion technology and coal type. Paris Agreement compatible pathway for South Korea is a result of the downscaling of the results for the OECD from the IEA ETP B2DS scenario to South Korea with the SIAMESE model.

# Korean Air Pollution Caused by China?

## South Korea smothered in Chinese air pollution

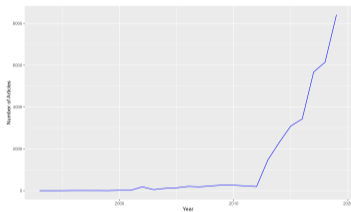
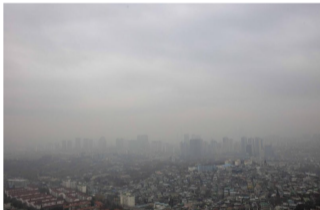
By Wooyoung Lee



# Korean Air Pollution Caused by China?

## South Korea smothered in Chinese air pollution

By Wooyoung Lee

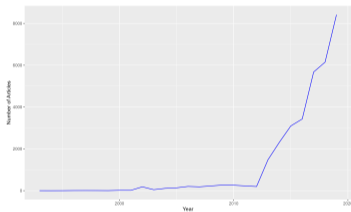
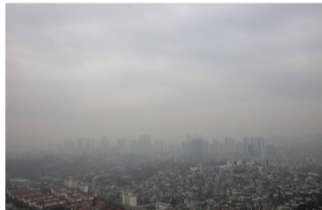


Media Mentions of China and Air Pollution

# Korean Air Pollution Caused by China?

## South Korea smothered in Chinese air pollution

By Wooyoung Lee



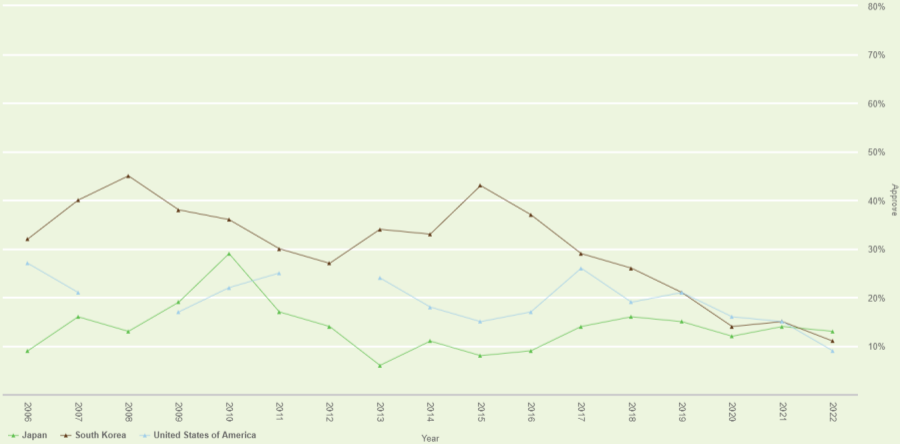
Media Mentions of China and Air Pollution

# South Koreans Have Worsening Views of China

## Approval of China's Leadership

Do you approve or disapprove of the job performance of the leadership of China?

Selected Demographics: Aggregate



SOURCE: GALLUP WORLD POLL, Copyright © 2023 Gallup, Inc. All rights reserved.



## Hazy Accountability

- | Exposure to air pollution lowers government satisfaction (Alkon and Wang 2018; Kim et al. 2020)

# Hazy Accountability

- | Exposure to air pollution lowers government satisfaction (Alkon and Wang 2018; Kim et al. 2020)
- | **H1:** Exposure to air pollution increases dissatisfaction with the governments' efforts to preserve the environment.

# Hazy Accountability

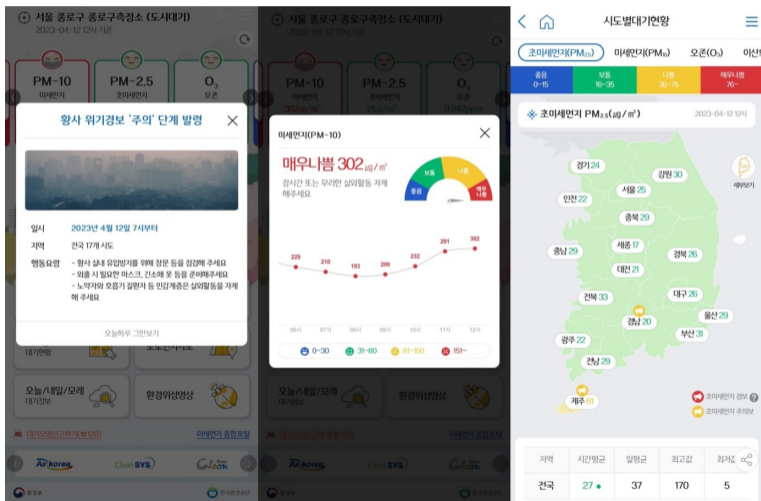
- | Exposure to air pollution lowers government satisfaction (Alkon and Wang 2018; Kim et al. 2020)
- | **H1:** Exposure to air pollution increases dissatisfaction with the governments' efforts to preserve the environment.
- | Importing pollution affects attitudes towards exporting jurisdiction

## Hazy Accountability

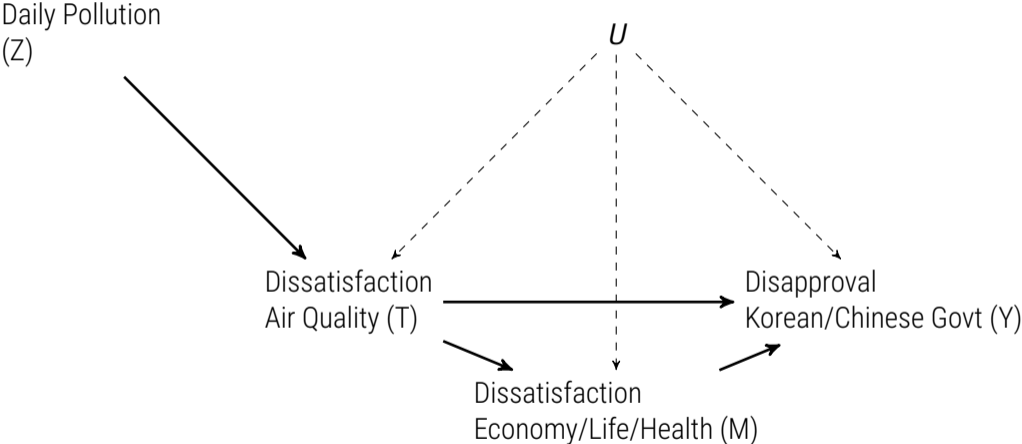
- | Exposure to air pollution lowers government satisfaction (Alkon and Wang 2018; Kim et al. 2020)
- | **H1:** Exposure to air pollution increases dissatisfaction with the governments' efforts to preserve the environment.
- | Importing pollution affects attitudes towards exporting jurisdiction
- | **H2:** Exposure to air pollution increases disapproval of China.

# Daily fluctuations in Air Quality as an Instrument

Figure: Air Korea Mobile Application with Real-time Air Quality Information



# Hazy Accountability Causal Diagram



# Data and Variables

- | Gallup World Poll (2015-2022)
- | Dependent Variables
  - | Satisfaction with government efforts to preserve environment.
  - | Approval of the leadership of China, Japan, South Korea, and the United States

# Data and Variables

- | Gallup World Poll (2015-2022)
- | Dependent Variables
  - | Satisfaction with government efforts to preserve environment.
  - | Approval of the leadership of China, Japan, South Korea, and the United States
- | Economic mechanism ("local economic confidence index")
  - | Rating of economic conditions in their city or area today
  - | whether economic conditions in their city or area as a whole are getting better or getting worse



# Data and Variables

- | Gallup World Poll (2015-2022)
- | Dependent Variables
  - | Satisfaction with government efforts to preserve environment.
  - | Approval of the leadership of China, Japan, South Korea, and the United States
- | Economic mechanism ("local economic confidence index")
  - | Rating of economic conditions in their city or area today
  - | whether economic conditions in their city or area as a whole are getting better or getting worse
- | Health and well-being mechanism ("daily experiences index" and the "personal health Index")
  - | whether people had a serious of positive or negative experiences on the day prior to the survey
  - | a battery of questions about general health problems as well as the health related questions

# OLS Regression: Dissatisfaction with Air Quality on Leadership Evaluations

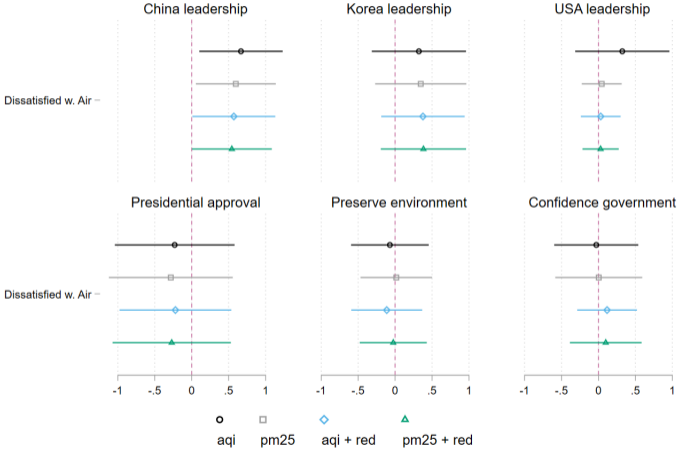
	Gvt Environment	China	USA	ROK	President	Gvt Confidence
	(1)	(2)	(3)	(4)	(5)	(6)
Dissatisfied w. Air	: ( : )	: ( : )	: ( : )	: ( : )	: ( : )	: <b>68</b> ( : )
Obs.	8 :	8:	6:	6 :	6 6:	:
Region/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .10$       Robust SE clustered on region

## First Stage Regression: AQI on Dissatisfaction with Air Quality

	(1)	(2)	(3)	(4)	(5)	(6)
Composite AQI (lag)	0.082 (0.016)		0.074 (0.015)			
AQI pm2.5 (lag)		0.072 (0.014)		0.062 (0.014)	0.086 (0.015)	0.073 (0.015)
Red Warning			0.028 (0.020)	0.036 (0.023)		0.045 (0.023)
Obs.	7743.00	7726.00	7743.00	7726.00	7751.00	7751.00
R2	0.16	0.16	0.16	0.16	0.13	0.14
Robust effective F	26.05	27.03	16.82	15.09	18.36	19.19
Critical F value	23.11	23.11	9.70	9.56	10.45	10.05
Region/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	No	No

# Instrumental Variables Estimates: Dissatisfaction with Air Quality on Leadership Evaluations



# Reduced Form Regressions: Air Quality and Dissatisfaction with Government

	Gvt Environment	China	ROK	USA	President	Gvt Confidence
	(1)	(2)	(3)	(4)	(5)	(6)
AQI pm2.5 (lag)	: ( : 8)	: ( : 8)	: ( : )	: ( : )	: ( : )	: ( : )
Obs.	6:	:	6:	8:	6 :	:
R2	:	:	:	:	:	:
Region/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Robust SE clustered on region

# Testing Mechanism: Health or Economy?

Individuals update their beliefs about the state of the local economy on bad air days

Table: Instrumental Variable Regressions of Perception of Air Quality with Subjective Evaluations of Economy, Daily Experiences, and Personal Health

	Nat Econ	Local Econ	Personal Econ	Daily Experience	Personal Health
	(1)	(2)	(3)	(4)	(5)
Dissatisfied w. Air	: ( : )	: <b>6</b> ( : <b>6</b> )	: <b>66</b> ( : )	<b>6</b> : ( : <b>6</b> )	: ( : )
Obs.	:	<b>8</b> :	<b>6</b> :	<b>6</b> :	<b>6</b> :
Region/Year FE	Yes	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes	Yes

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Robust SE clustered on region

# Conclusion

- | Transboundary pollution has two potentially social welfare reducing effects
  - | Reduces government incentives for combating pollution

# Conclusion

- | Transboundary pollution has two potentially social welfare reducing effects
  - | Reduces government incentives for combating pollution
  - | Can contribute to hostile interstate relations



# Conclusion

- | Transboundary pollution has two potentially social welfare reducing effects
  - | Reduces government incentives for combating pollution
  - | Can contribute to hostile interstate relations
- | The impact of air pollution primarily channeled through its influence on confidence in local economic conditions