



COVID Risk Level Dataset and Zero Covid Policy in China

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for presentation at the

Graduate Student Brownbag Seminar @ UC Riverside

Outline

1. Introduction
2. Contribution
3. Background
4. Data
5. Preliminary Findings
- 6.

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PART ONE

Introduction

Context

The zero-COVID strategy taken by the Chinese government since the very initial outbreak of the pandemic has been in place in China for more than two years.

Problem statement & motivation

While this approach aims for “control and maximum suppression” (A. Llupia et al., 2020) of the virus immediately after the outbreak

It remains doubtful that the stringency of the containment measures was sustained at a high level for all the time during the period.

Significance

Our risk level indicators dataset offers the most complete and detailed measurement of the risk level index in China at daily frequency and county level. (Source: State Council of PRC)

a crucial index that could trigger the zero-COVID policy and the corresponding anti-contagious measures.

This granularity could provide new insights and a solid instrument for later research to better understand the economic and political consequence happened in China during the pandemic.

Preview of Findings

- the *risk level* indicator has significant correlation with COVID cases, (heterogeneity for different promotion incentive)
- significant and large effects on mobility (traffic restriction)
- effects on pollution are trivial. (incentive of promotion)
- Big Picture: economic growth? performance against COVID !

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PART TWO

Contribution

Contribution 1

The most comprehensive and unique dataset regarding China's COVID policy.

- He et al. (2020) : starting dates for lockdowns in early 2020
Source: local government, Wikipedia and news
- Chen et al. (2022) : lockdowns between April 2020 and January 2022
Source: news scraping from search engine (38 prefectures in sample)
- Gong, Yan and Yu (2022): instrument with 14- day observation window
- Our dataset: the risk level index in China at **daily frequency** and county level.
2853 counties (only one missing) , **368 prefectures** (including some county level cities)

Source: State Council of PRC

Contribution 2

— Risk Level is an enforced trigger of full spectrum of zero-COVID policy

- Detailed definition of high / mid risk area since, June 27 2022
- Corresponding quadrantile and COVID test policy regrading with risk area and people travel from risk area

--- The prevention and control of 2019 Novel Coronavirus Pneumonia (National Health Commission)

- Local government use this guideline as policy benchmark

Contribution 3

Examine the New Target of Promotion Tournament

- Target setting in prefecture governments in China (Li, Liu, Weng and Zhou, 2018)
- Strong promotion Incentive: Age 54 to 57
(Shi, Xi, Zhang and Zhang, 2021) (Xi, Yao and Zhang, 2018)
- Target before 2012: economic performance
- Target after 2012: Loyalty; Environment (He, Wang and Zhang, 2020)
- Target after 2020: COVID control
the officials with strong incentive of promotion are more likely to be over-reacted to COVID case spike.

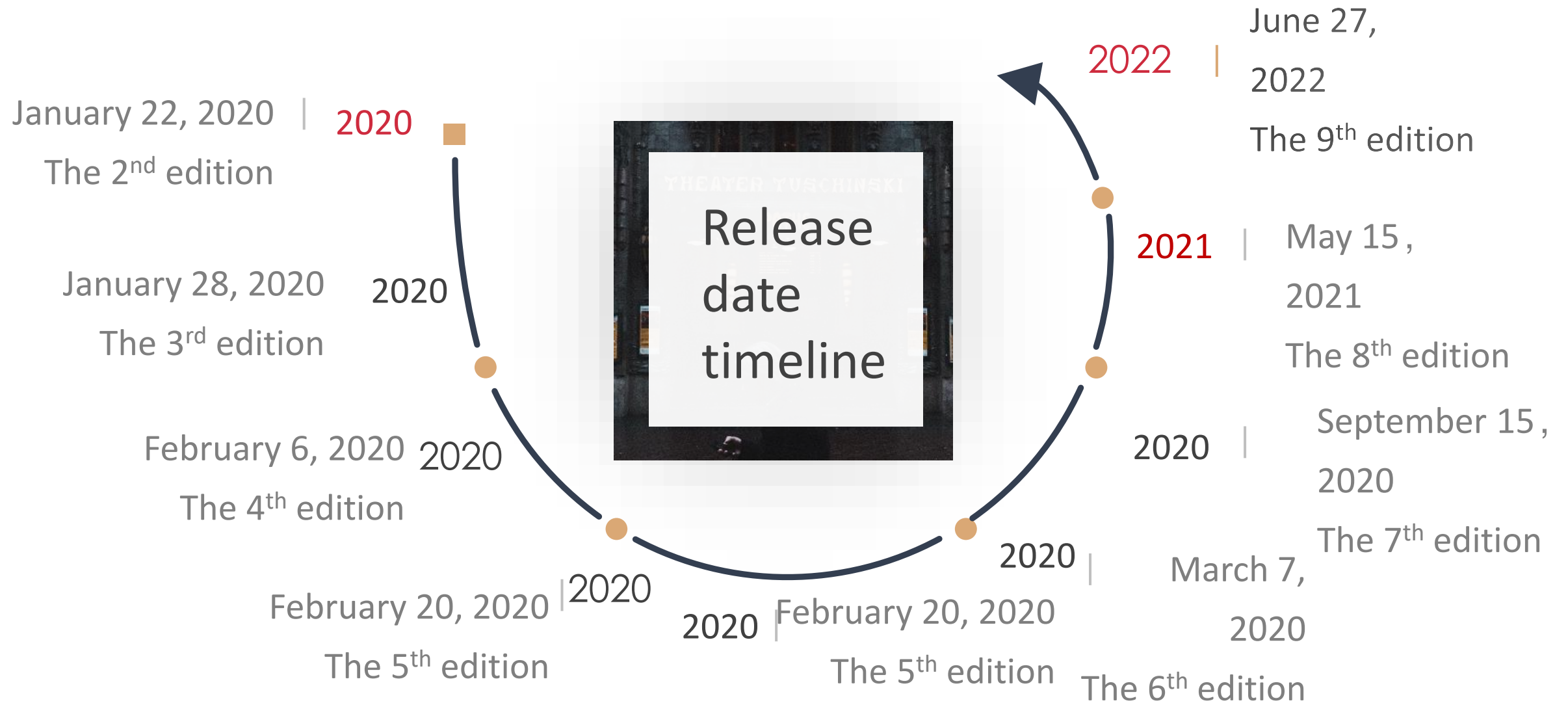
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PART Three

Background

Timeline: *The prevention and control of 2019 Novel Coronavirus Pneumonia (COVID-19)*

Published by the National Health Commission of the People's Republic of China



China's COVID-19 risk level system (e.g. Mar23,2020, NHC)

Low risk

Areas with no confirmed cases or no new confirmed cases in the past 14 days.

Medium risk

Areas with no more than 50 new confirmed cases, in the past 14 days and no cluster outbreak in the past 14 days.

High risk

Areas with more than 50 confirmed cases or a recorded cluster outbreak in the past 14 days.

Zero COVID Policy (May 15, 2021, 8th NHC)

Tracker

health and travel QR code (test result, geology information in past days)

Quarantine
requirements for
domestic arrivals

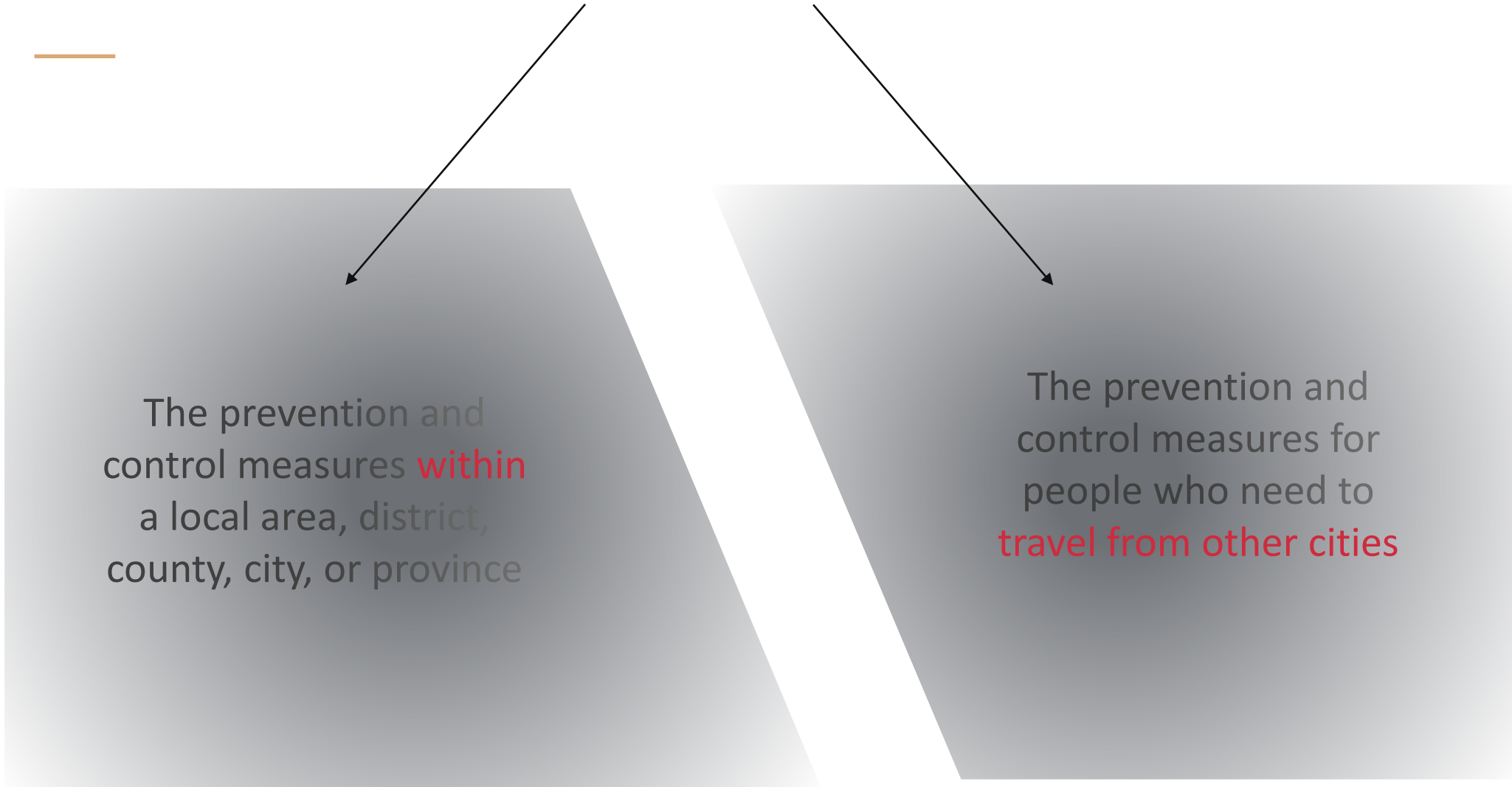
From **high-risk areas/ medium-risk areas** : will be required to undergo 14/ 7 days of centralized quarantine

From **low-risk areas**: not be required to quarantine, although regular COVID-19 tests may be required.

Zero COVID policy of risk
areas

For **high-risk areas/ medium-risk areas** :
e.g. Lockdown (limited entry and 0 exit),
school and hospital shutdown
(possibility of over-reaction)

Zero COVID policy

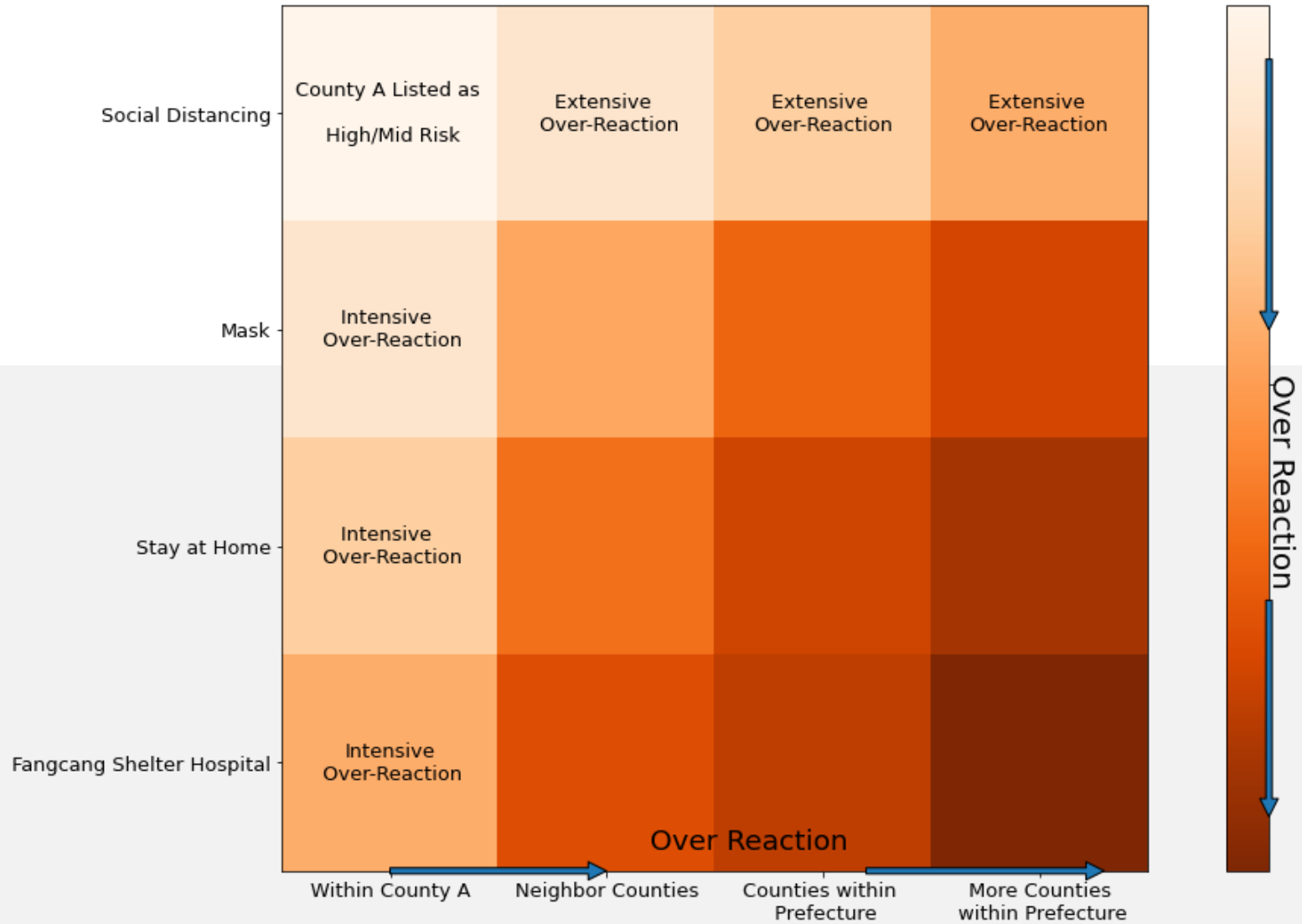


The prevention and control measures **within** a local area, district, county, city, or province

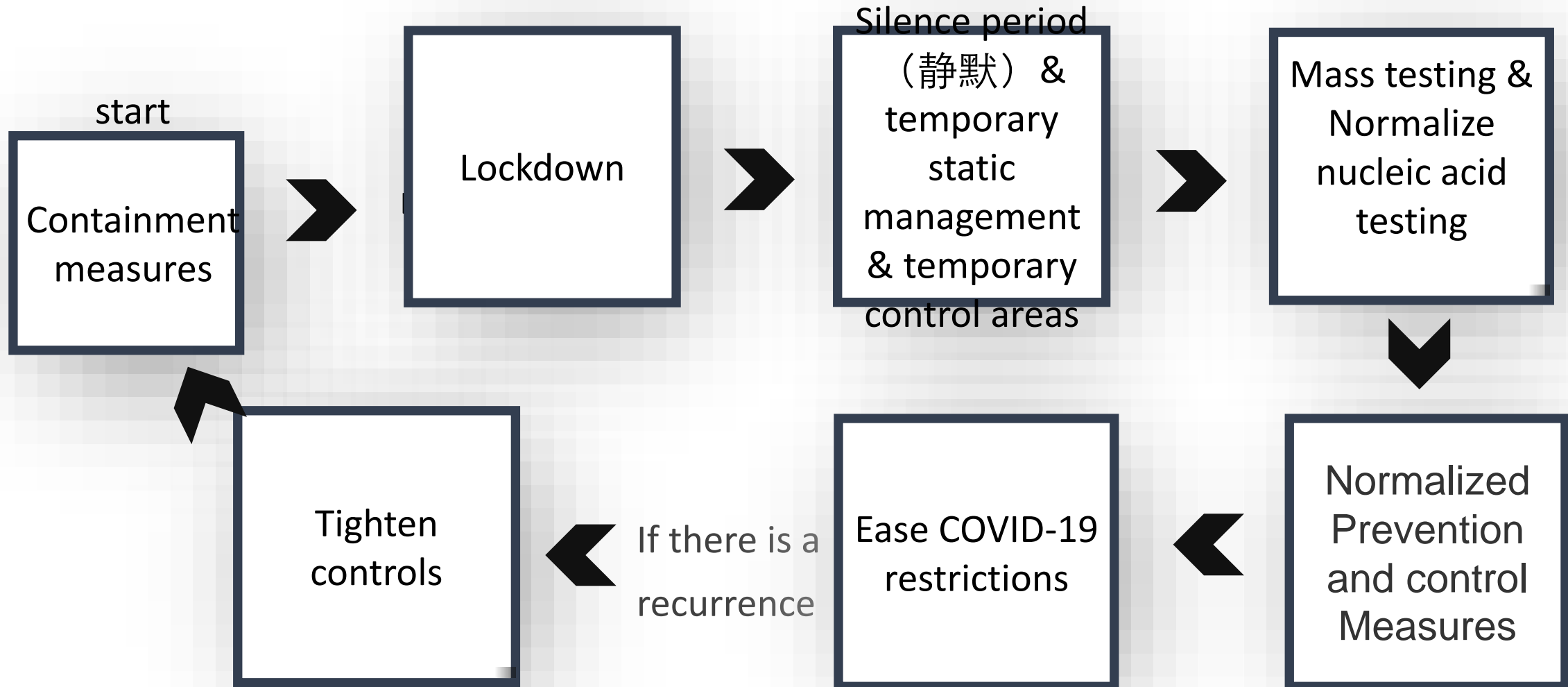
The prevention and control measures for people who need to **travel from other cities**

Policy Over-Reaction

Policy Over-Reaction --- Prefecture Level



General control measures change from high risk to low risk



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PART THREE

Data

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Gong, Shang, Yan and Zhang

Data Source --- COVID Risk Level Dataset



截至2022-11-09 17时, 全国疫情:

High Risk Area
高风险区 (3511)

Mid Risk Area
中风险区 (2877)

Low Risk Area
低风险区 (447)

北京市 朝阳区 双井街道 Beijing, Chaoyang District, Street

垂杨柳南里9号楼	高风险
百子湾南二路76号院6号楼	高风险

北京市 朝阳区 望京街道

世安家园104号楼	高风险
银领国际小区128号楼	高风险

北京市 朝阳区 亚运村街道

安苑北里14、15、16、17、18、19号楼	高风险
安慧里一区21号楼	高风险
安苑北里11号楼	高风险

北京市 朝阳区 六里屯街道

六里屯北里12号楼	高风险
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北京市 朝阳区 高碑店(地区)乡

大黄庄9号	高风险
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注: 其余未列出地区均为常态化防控区域

本服务由国家卫生健康委提供

由国家卫生健康委每日汇总各地报送疫情风险等级数据

智能问答

Data Collection, Cleaning and Structure

- The website of State Council update the nationwide risk level indicator at daily frequency (2 to 3 times everyday) Since March 2020.
- Our data collection started from April 1st 2021 and is still on going
- Before July21,2022, the website only listed *High / Mid* risk area. The unlisted areas are *Low Risk* area (no risk).

Post July21,2022, the website list High / Mid / Low risk area.

The *Low risk* areas (risky!) are defined as low risk *areas* in a *county* with High/Mid risk areas.

Unlisted areas are defined as *regular epidemic prevention and control* area (no risk).

- covers all the counties and prefectures in China (can locate at street level if you want !)
- In this research, we use panel from April 1st 2021 to Oct19th 2022.

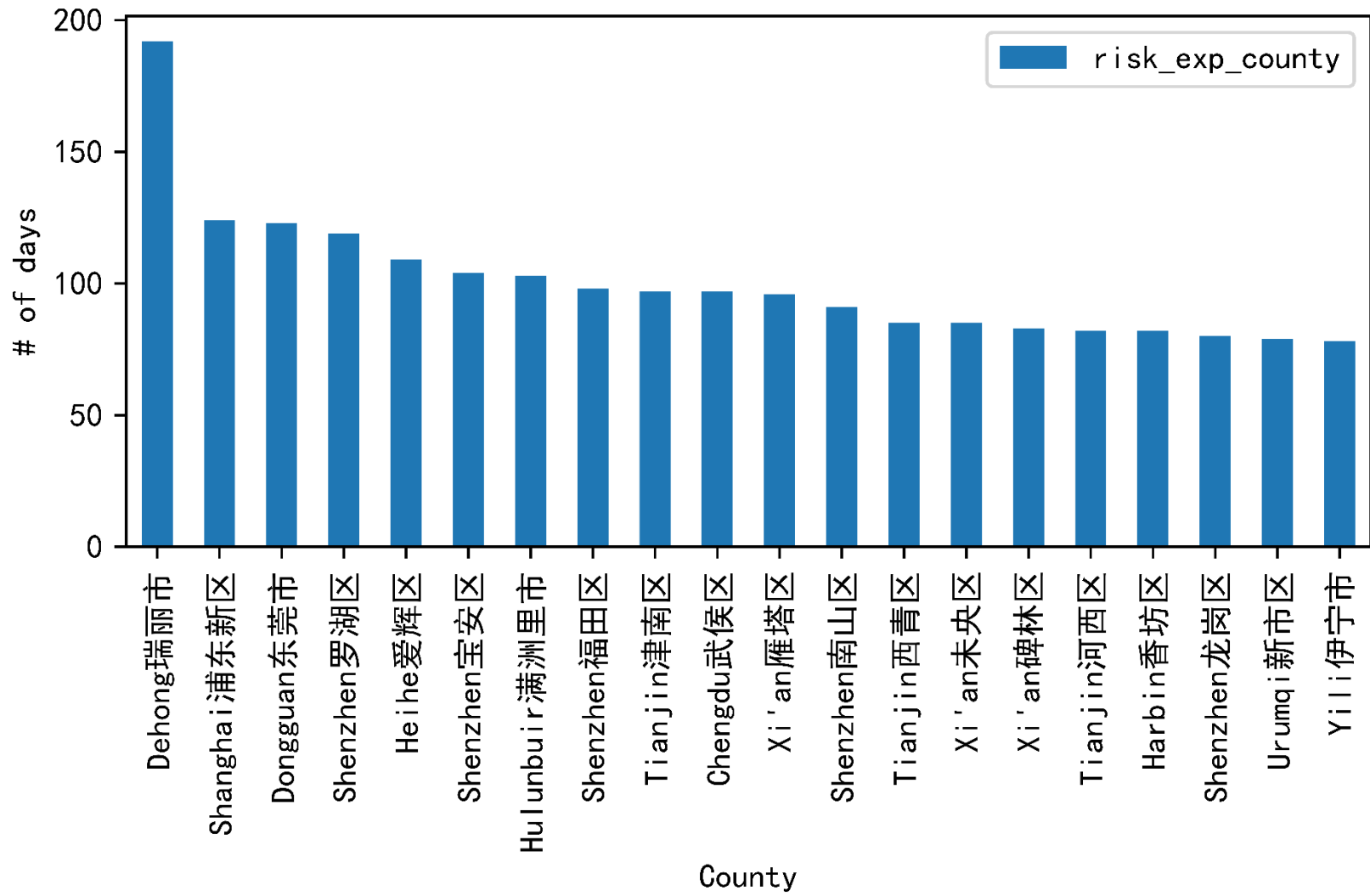
Other Data Sources

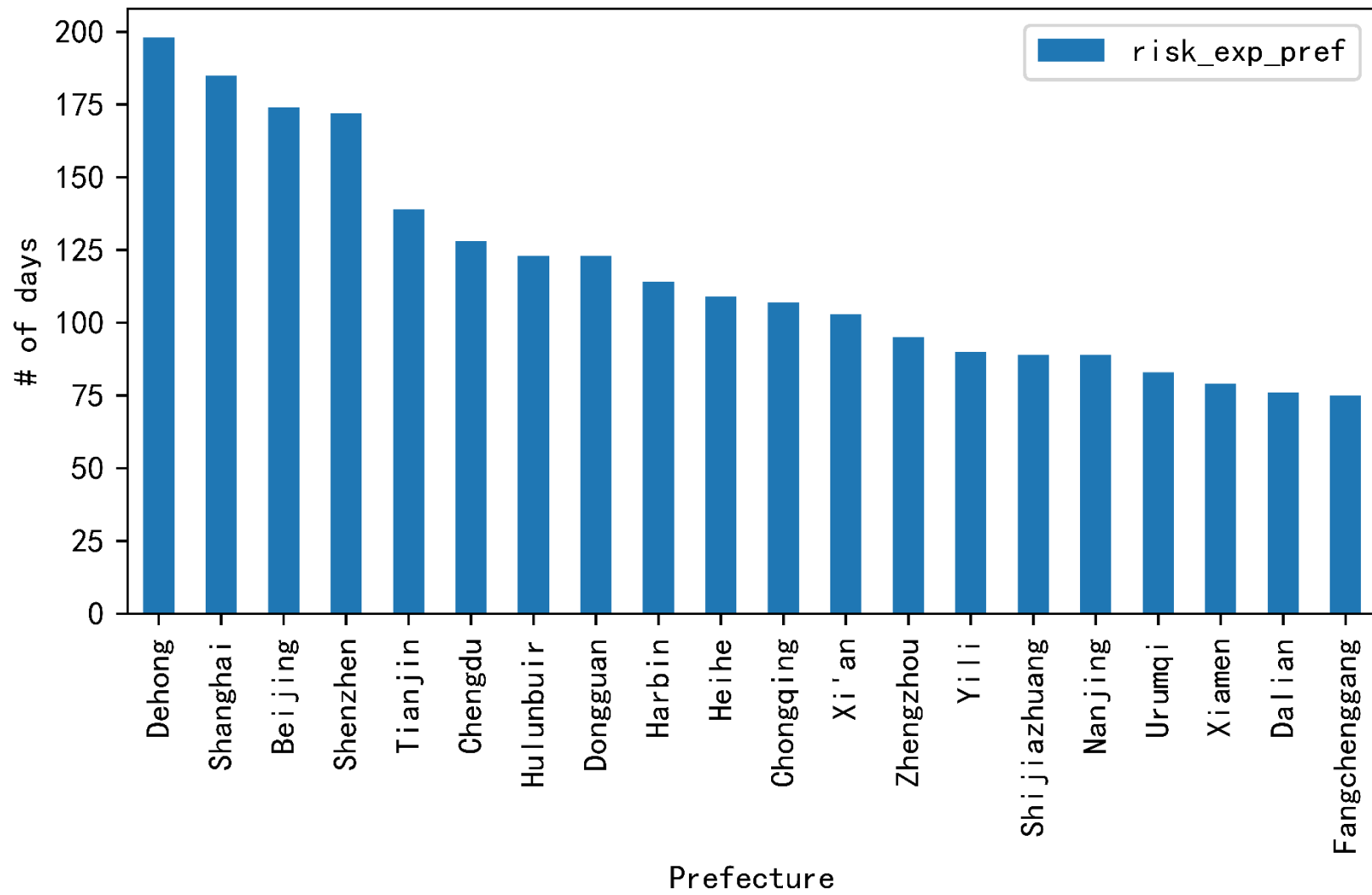
- COVID Case Data: *Dingxiangyuan*
prefecture level 01 Aril 2021 to 19 Oct 2022
- Baidu Mobility Index: Hu et al (2020).
mobility index between prefectures, 02 Sep 2021 to 21Apr2022
- Pollution: M2T1NXAER satellite data from NASA

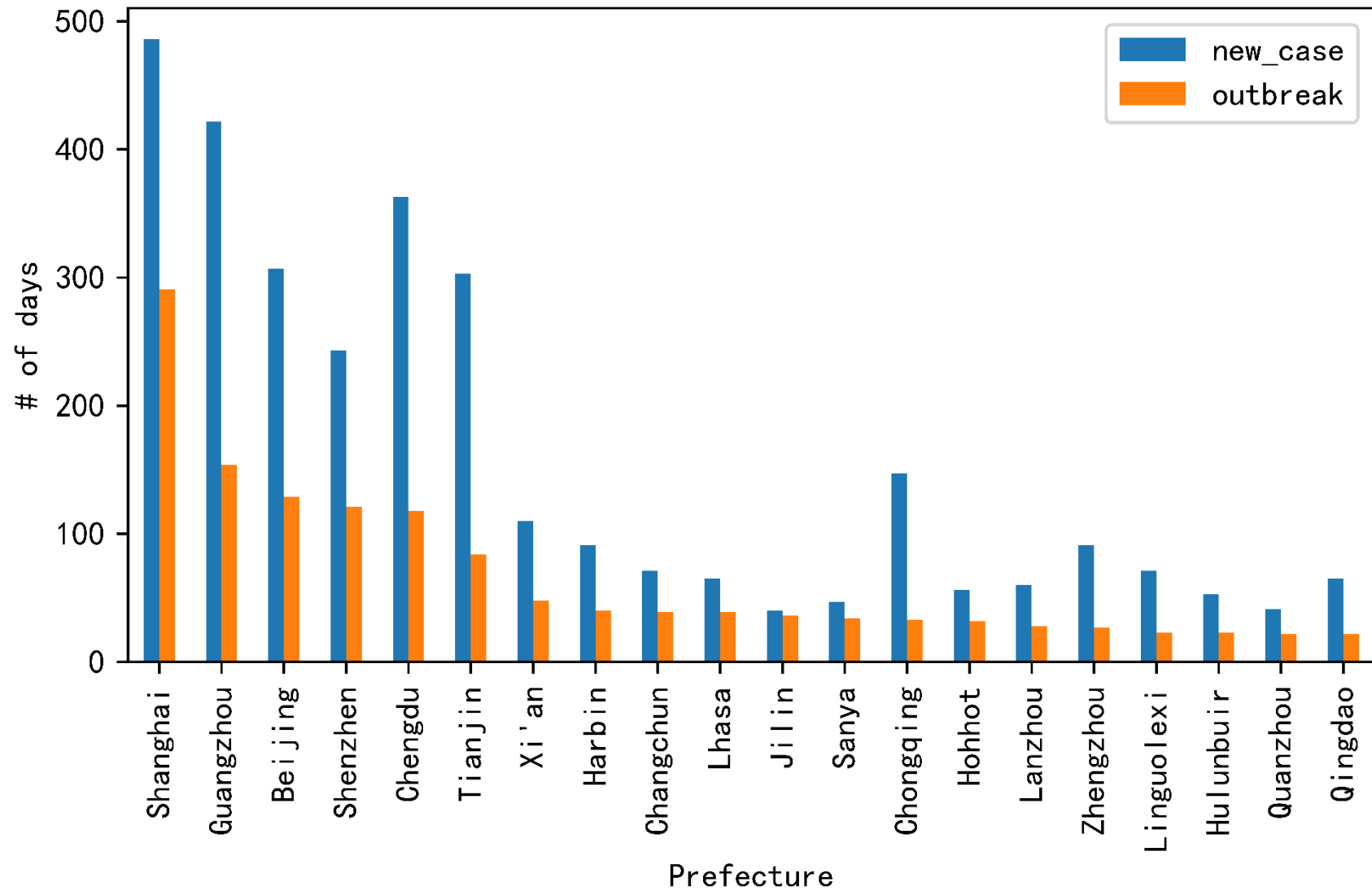
aggregate hourly and pixel data into prefecture level, 01 July 2021 to 20 June 2022
- Prefecture Party Secretary Information
birth year, gender, ethnicity, experience
Collected from Baidu Wiki (Baidu Baike), 05 Nov 2022

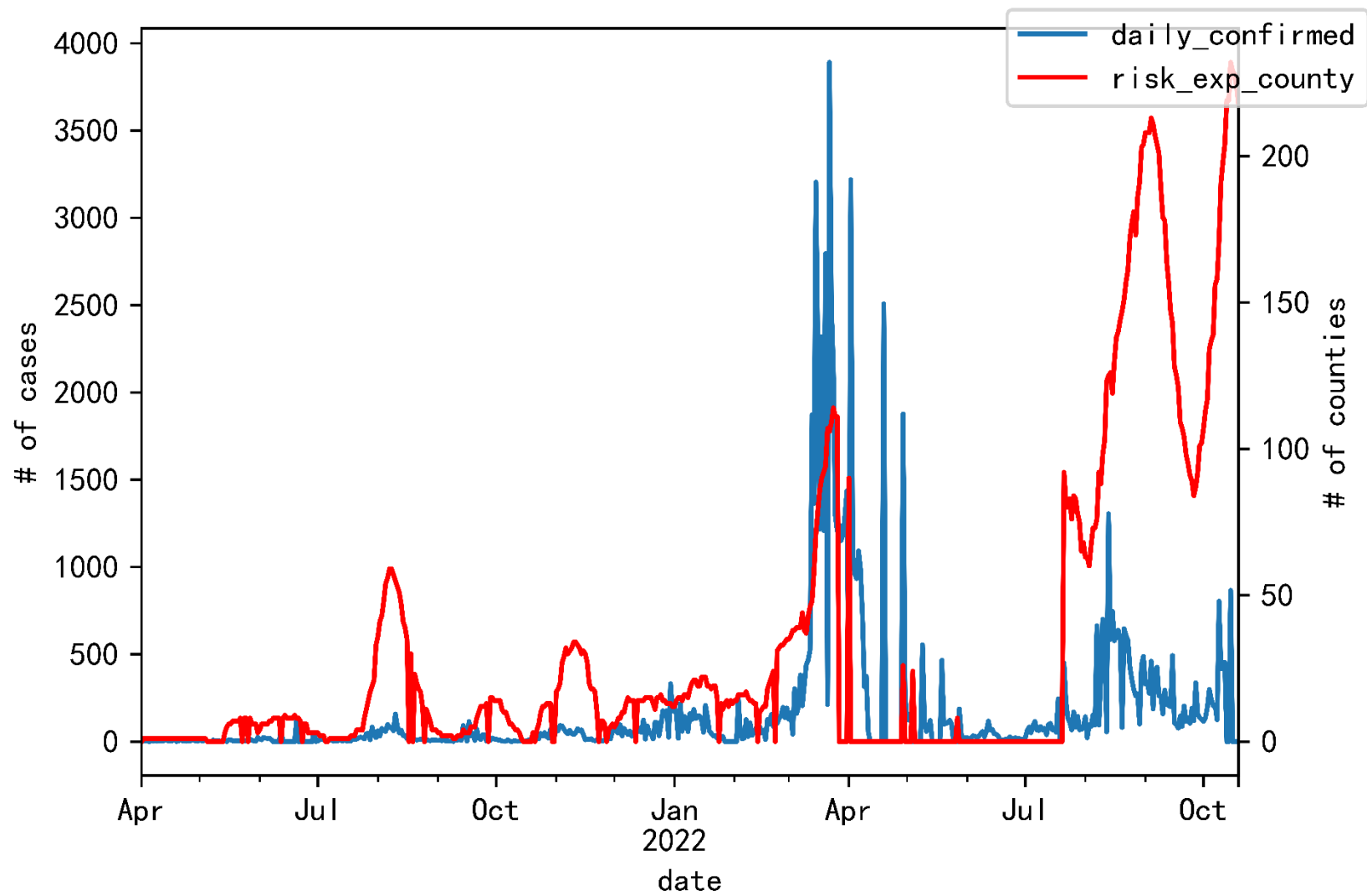
Statistic Summary

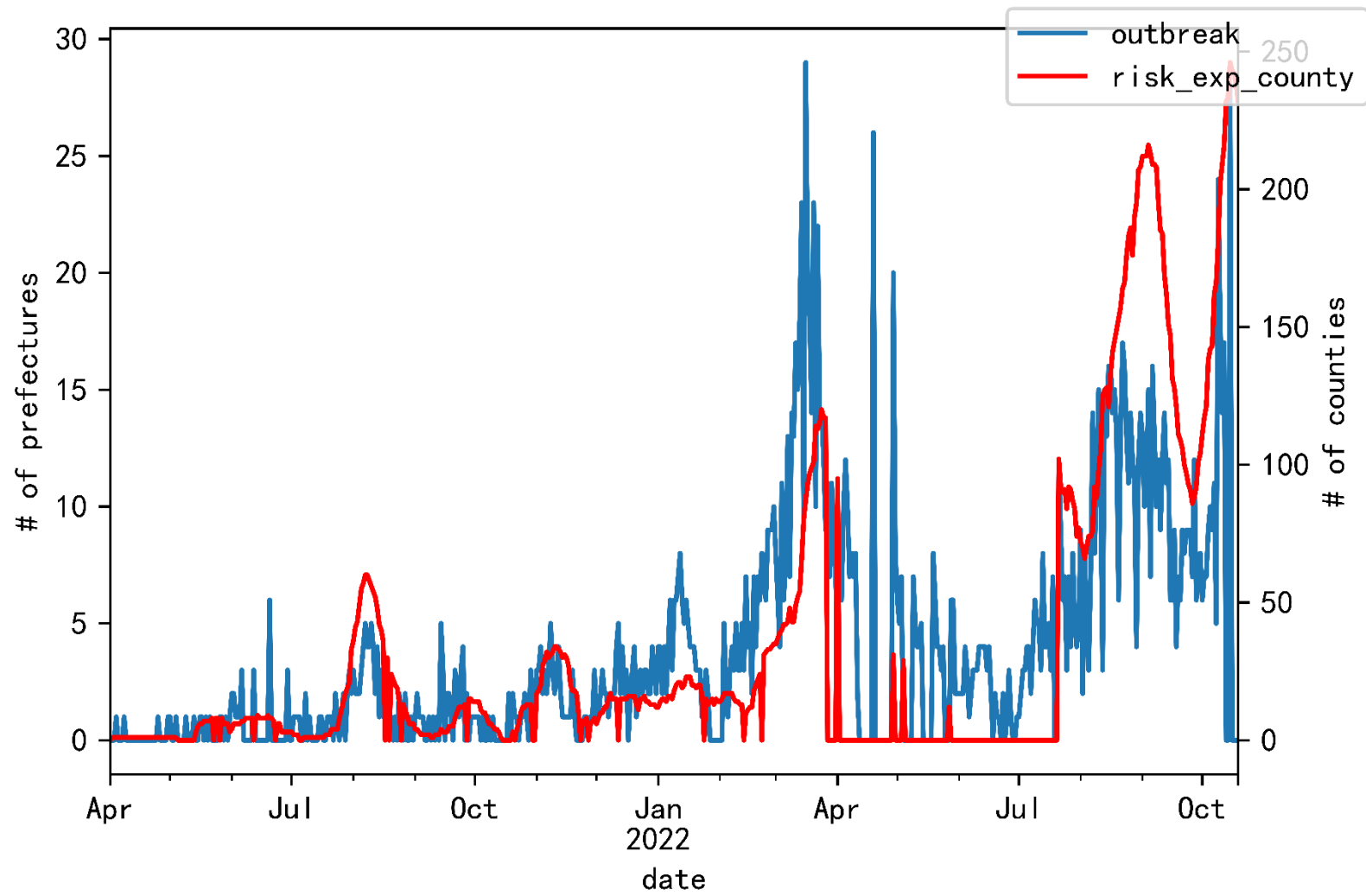
Column1	Column	Column	Column	Column	Column	Column7
	Obs	Mean	Std.Dev	Min	Max	Date
Panel A: County Panel						
exposed to risk (county)	1617651	0.012	0.108	0	1	01Apr2021 to 19Oct2022
Panel B: County by Oct19						
cumulative days exposed to risk (county)	2853	6.663	14.296	0	192	19-Oct-22
Panel C: Prefecture Panel						
exposed to risk (pref)	208656	0.043	0.203	0	1	01Apr2021 to 19Oct2022
shareof counties exposed to risk (pref)	208656	0.013	0.081	0	1	01Apr2021 to 19Oct2022
num of counties exposed to risk (pref)	208656	0.091	0.588	0	18	01Apr2021 to 19Oct2022
daily_confirmed	199017	0.789	73.66	0	23718	01Apr2021 to 19Oct2022
daily_dead	199017	0.003	0.769	0	327	01Apr2021 to 19Oct2022
mobility_in	77815	0.284	0.313	0	4	02Sep2021 to 21Apr2022
mobility_out	77809	0.284	0.314	0	3	02Sep2021 to 21Apr2022
pm25	134320	0.634	12.842	-354.3	428	31Jul2021 to 30Jun2022
so2	134320	-0.167	15.11	-167.7	142	31Jul2021 to 30Jun2022
dust	134320	2.025	55.474	-1548.6	2070	31Jul2021 to 30Jun2022
Panel D: Prefecture by Oct19						
cumulative days exposed to risk (pref)	368	24.481	29.886	0	198	19-Oct-22
city_confirmedCount	351	697.419	4633.342	0	64230	19-Oct-22
city_deadCount	351	14.869	209.034	0	3869	19-Oct-22
Panel E: Prefecture Party Secretary						
strong promotion incentive	364	0.44	0.497	0	1	5-Nov-22
secretary birth year	364	1968.066	3.385	1955	1978	5-Nov-22
party_y_sec	341	1990.965	4.315	1975	2003	5-Nov-22
work_y_sec	357	1989.877	4.406	1973	2004	5-Nov-22
gender_sec	366	0.06	0.238	0	1	5-Nov-22

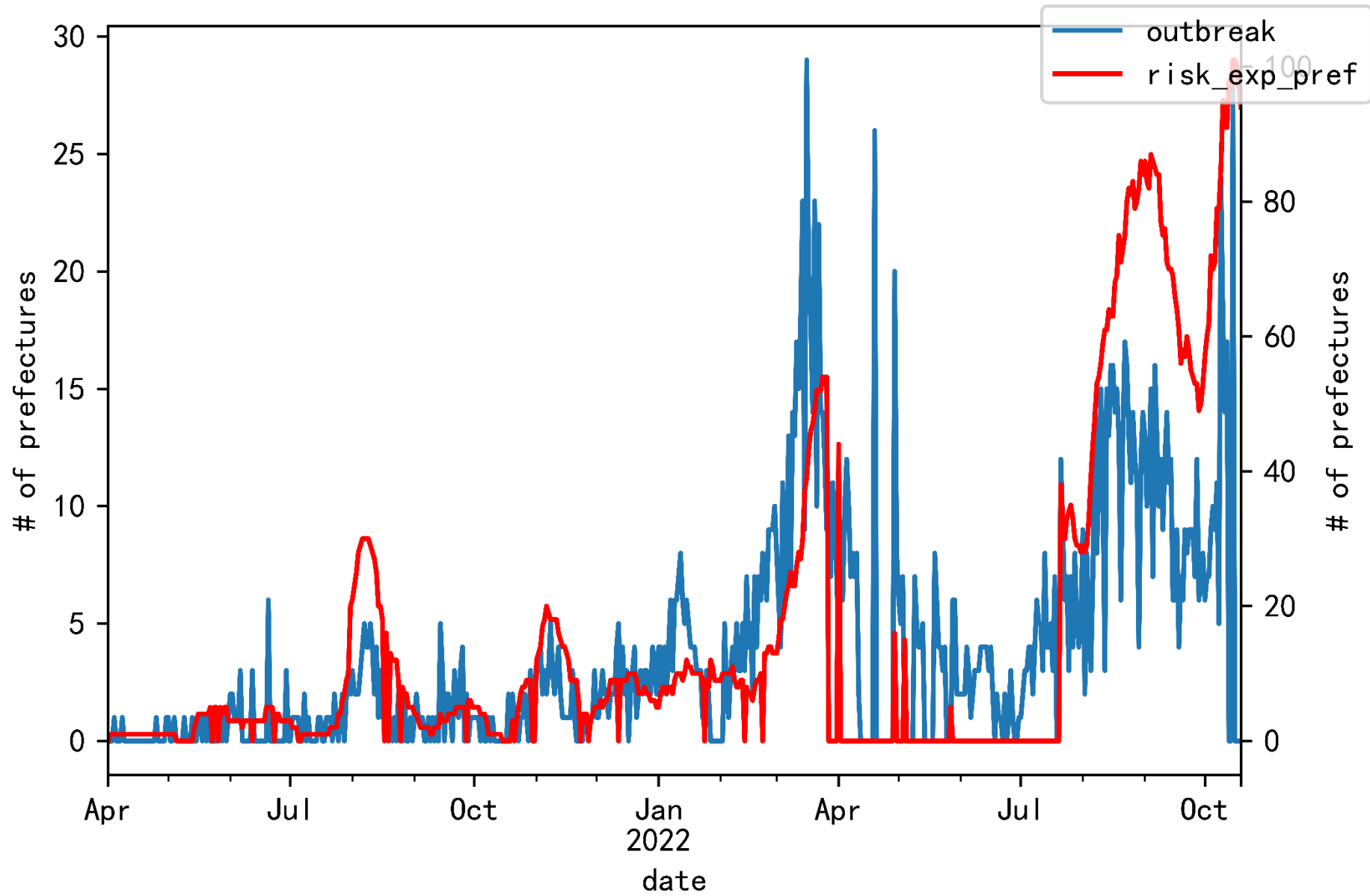


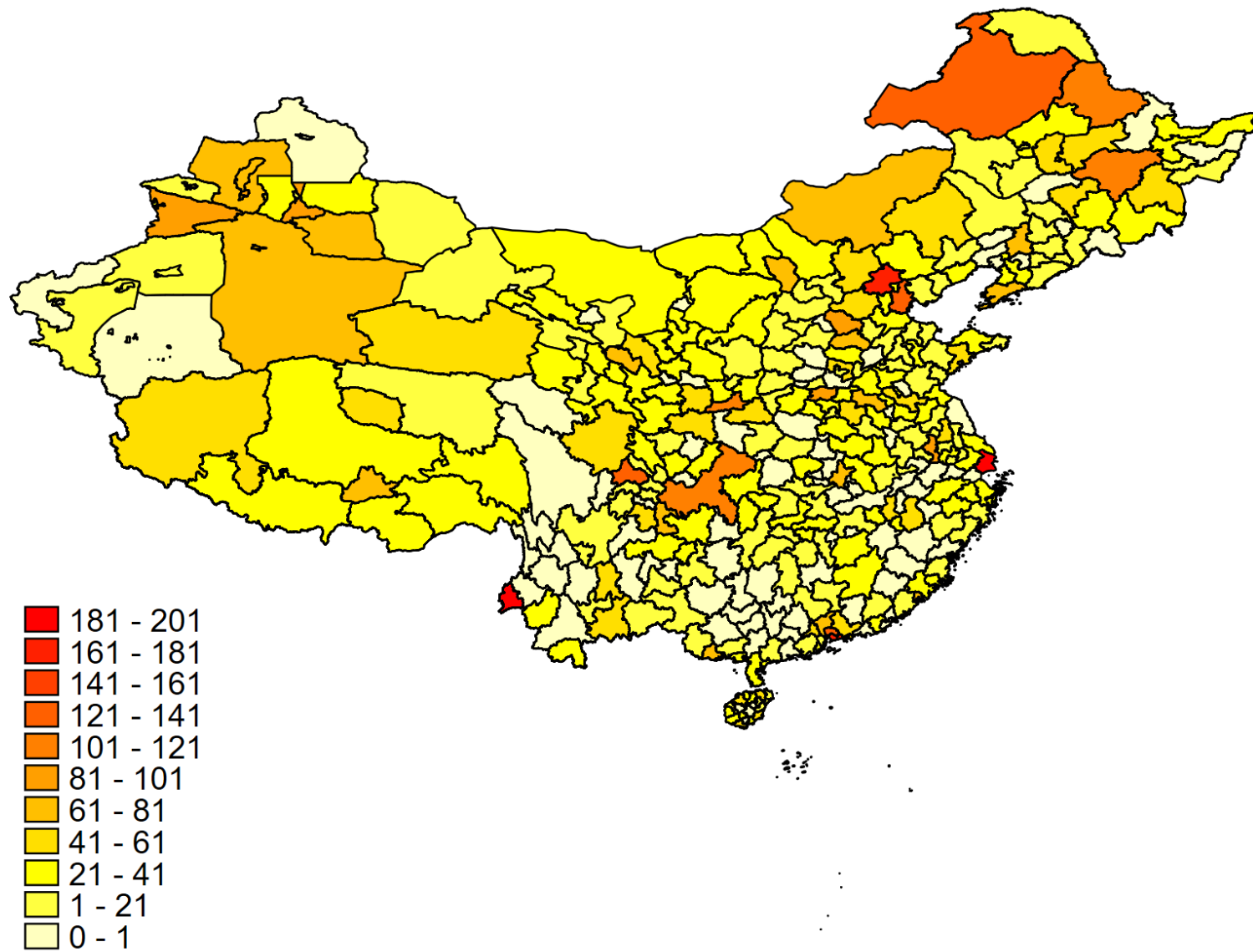




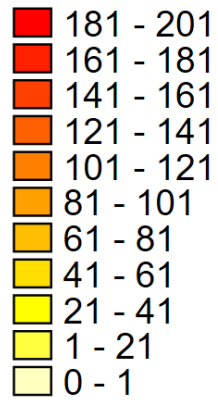
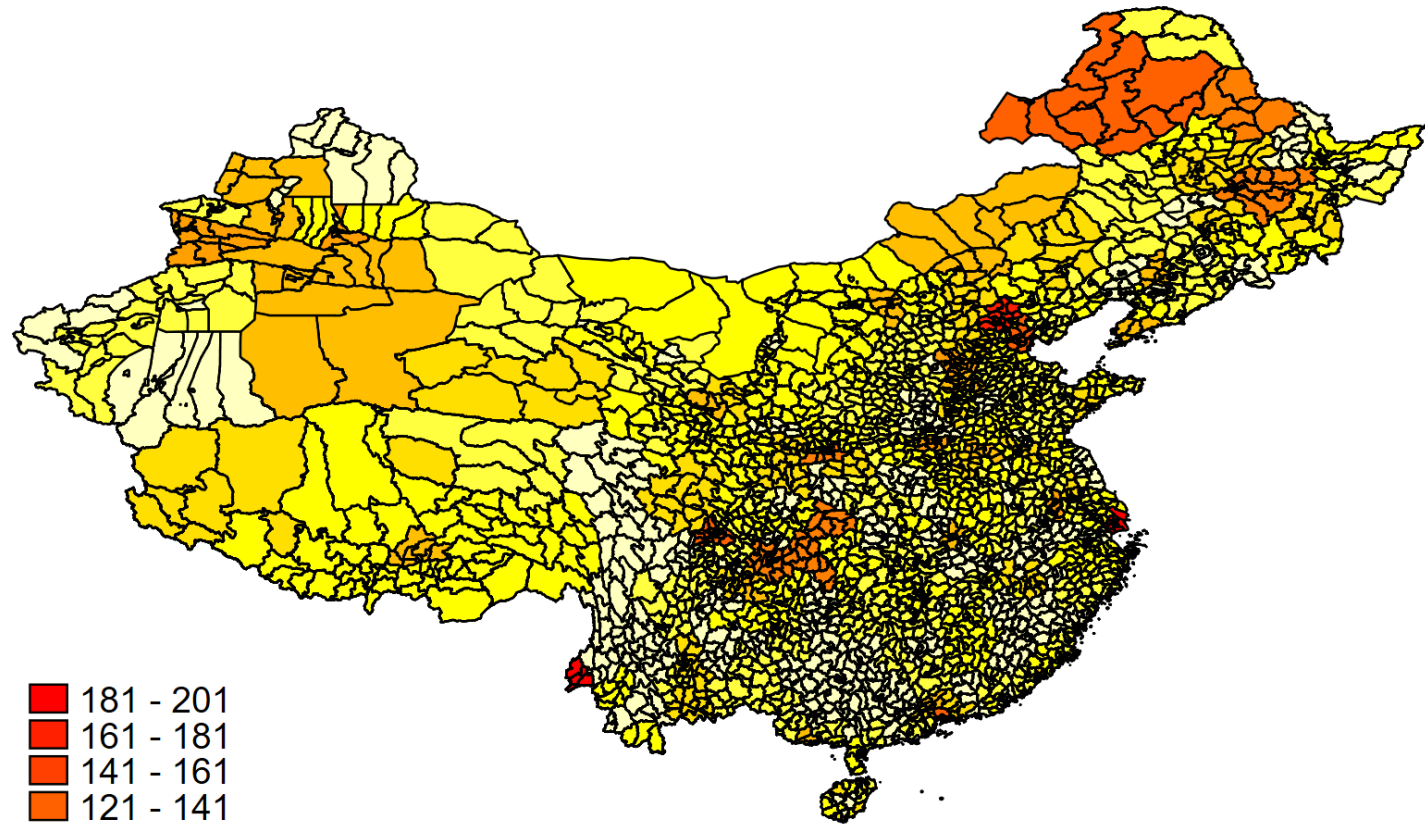








Cumulative Days Exposed to Risk, by Oct 19 2022



Cumulative Days Exposed to Risk, by Oct 19 2022

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PART FOUR

Preliminary Results

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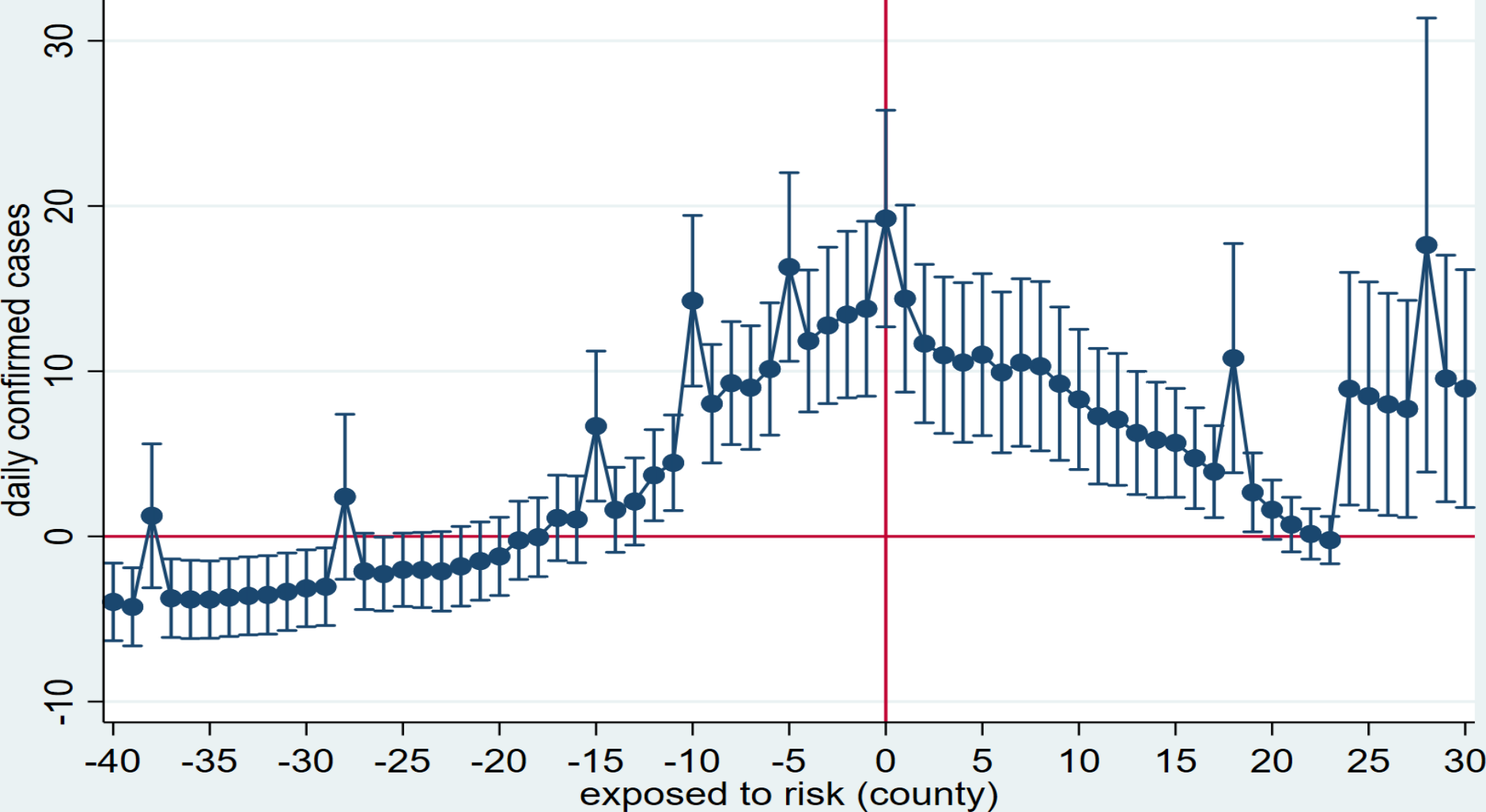
Gong, Shang, Yan and Zhang

COVID Case and Local Risk Level Decision

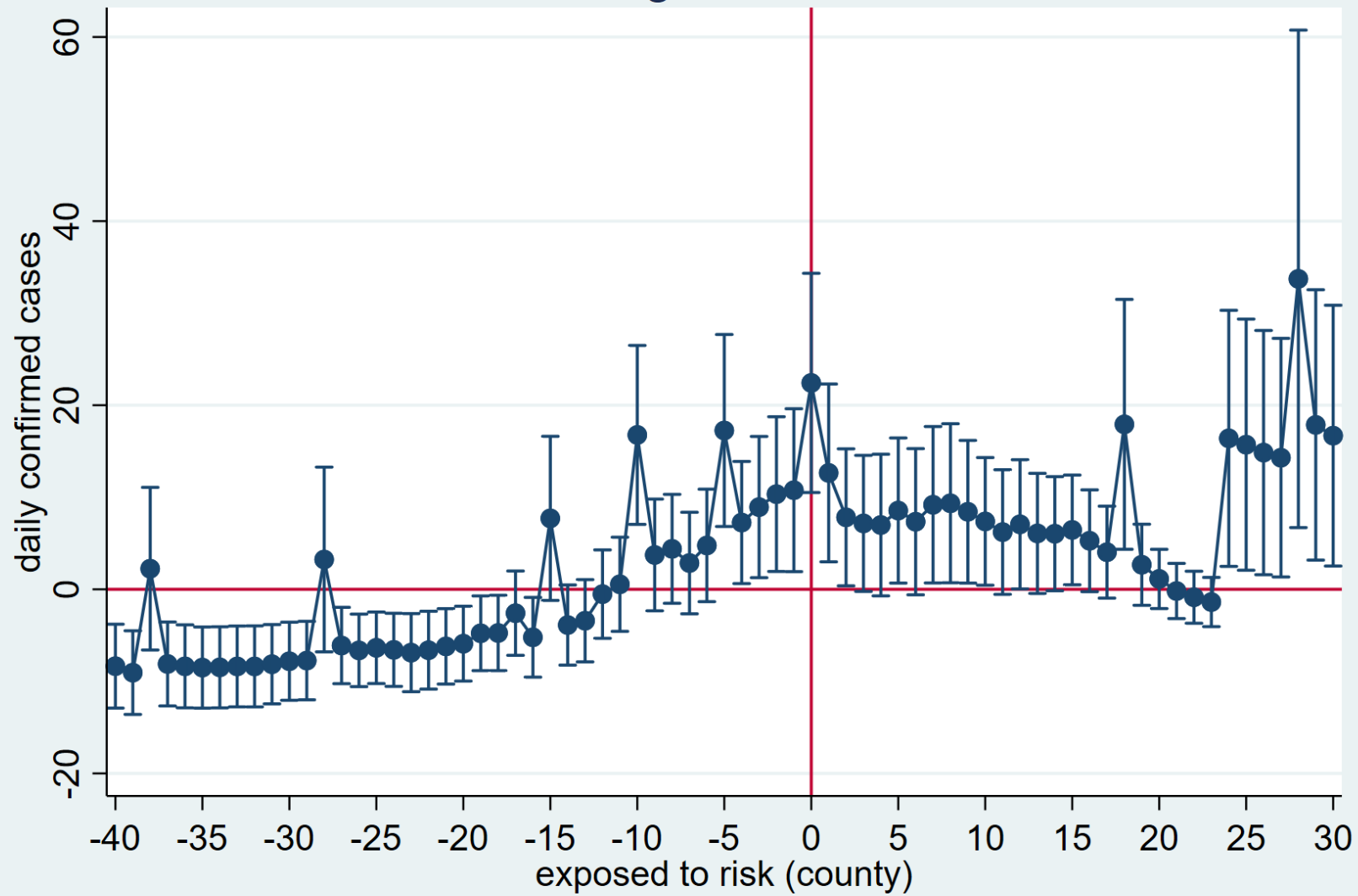
$$Case_{i,p,t+n} = \beta_n X_{i,p,t} + \alpha_i + \theta_t + \epsilon_{i,t}$$

- $Case_{i,p,t+n}$ is daily confirmed cases at county i of prefecture p , at period $t + n$, where n takes value from $[-40, 30]$
- $X_{i,p,t}$ is a dummy variable for whether county i of prefecture p is exposed to middle- or high-risk level at period t
- α_i is the county-level fixed effect for county i
- θ_t is the time fixed effect at period t

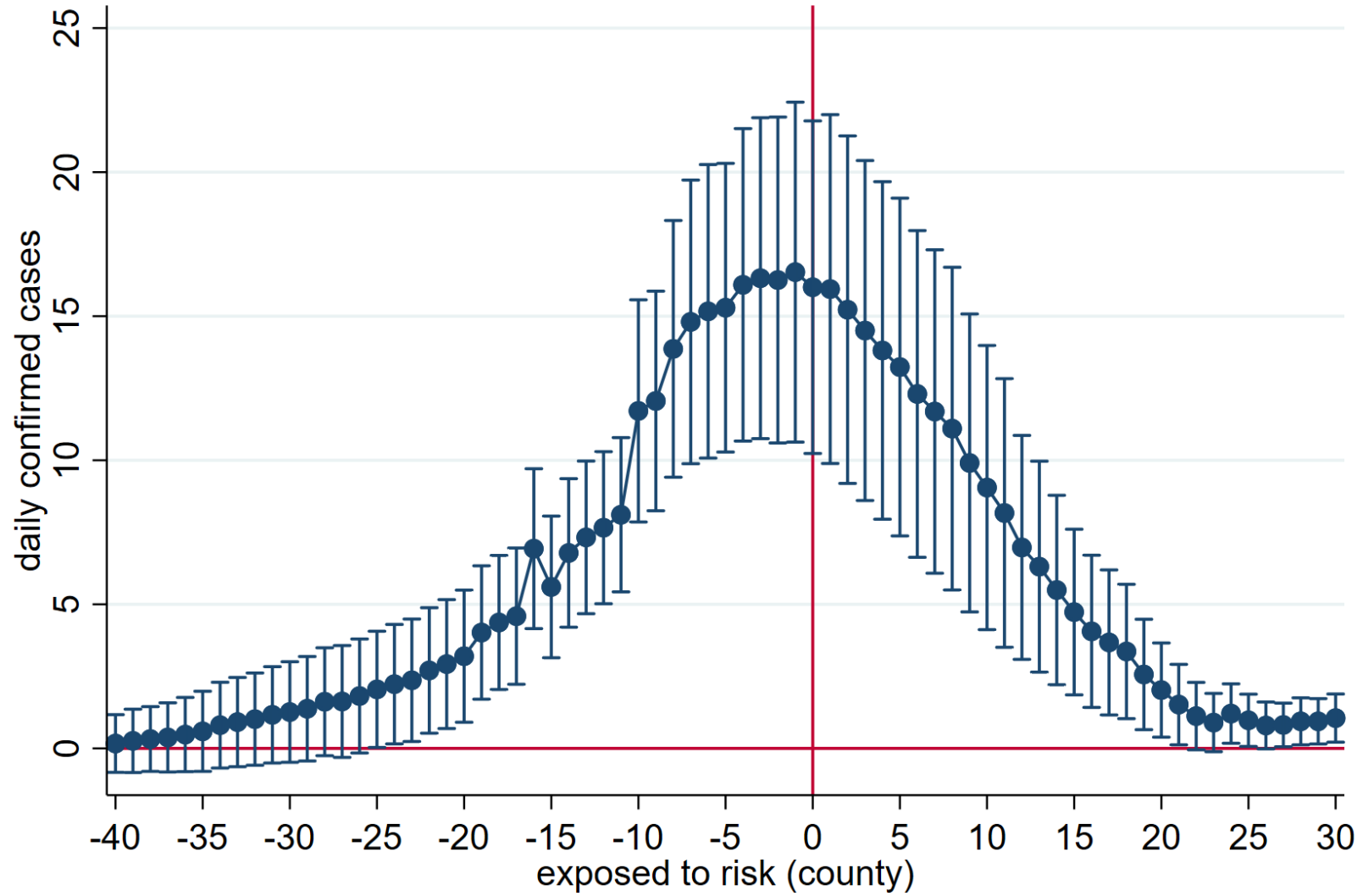
whole sample



Officials: Strong Promotion Incentive



Officials: Weak Promotion Incentive



Risk Level Effect on Mobility

$$Mobility_{p,t} = \beta X_{p,t} + \alpha_p + \theta_t + \epsilon_{p,t}$$

- $Mobility_{p,t}$ is the mobility measure for prefecture p at period t
- $X_{p,t}$ is the **share of counties** that are exposed to middle- or high-risk level in prefecture p at period t
- α_p is the prefecture-level fixed effect for prefecture p
- θ_t is the time fixed effect at period t

Mobility_Out and Risk Level

	(1)	(2)	(3)	(4)	(5)
	Whole Sample	Age 54-57	Age>57	Age<54	Whole Sample
share of risk counties (pref)	-0.619***	-0.729***	-1.307	-0.464***	-0.494***
	(0.128)	(0.243)	(0.749)	(0.0954)	(0.0982)
share of risk * I(Age 54-57)					-0.234
					(0.257)
R-squared	0.919	0.907	0.899	0.938	0.919
Observations	77809	35074	2541	39501	77116
Prefecture FE	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes
Standard errors in parentheses					
=* p<0.10	** p<0.05	*** p<0.01"			

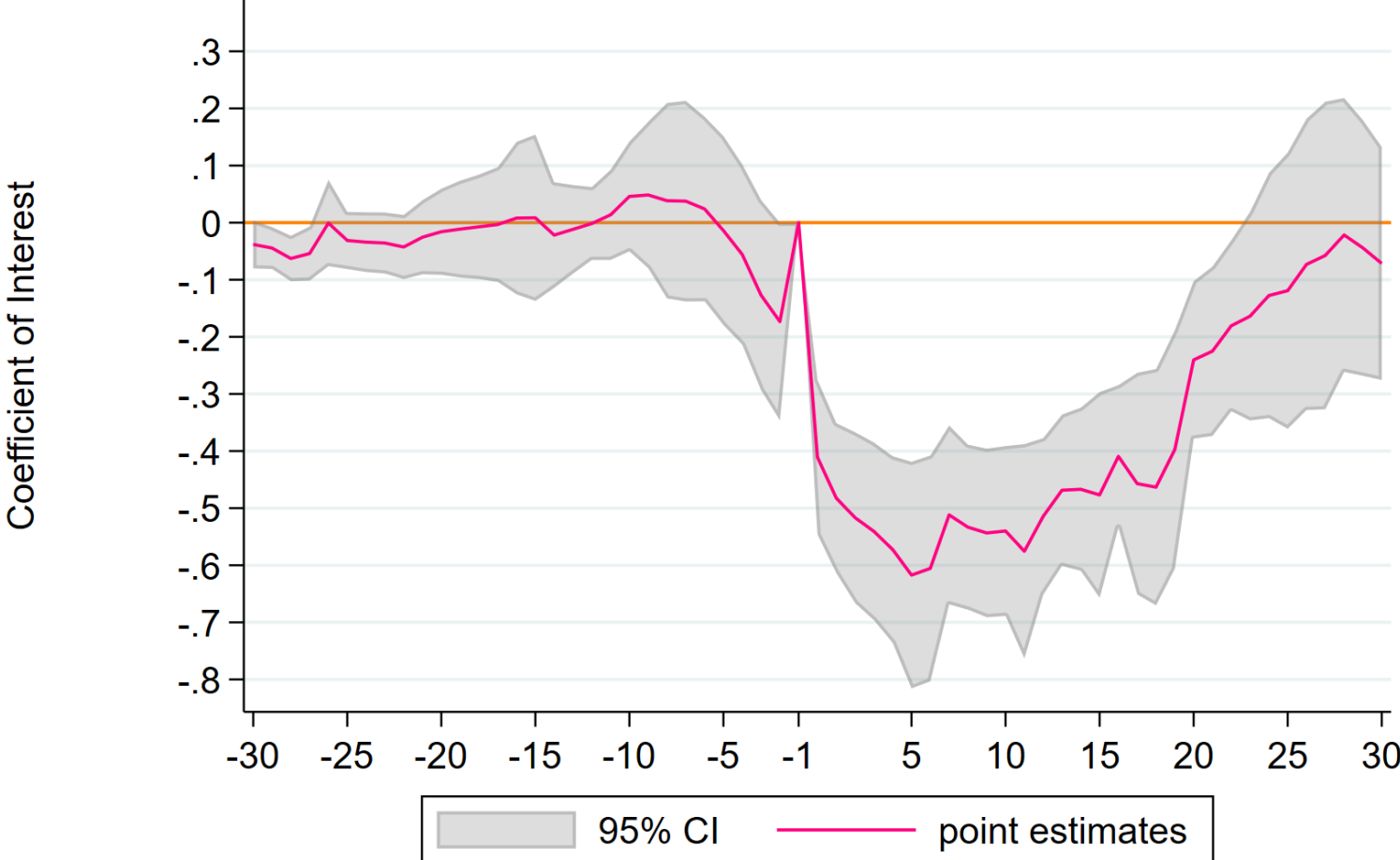
Mobility_In and Risk Level

	(1)	(2)	(3)	(4)	(5)
	Whole Sample	Age 54-57	Age>57	Age<54	Whole Sample
share of risk counties (pref)	-0.538***	-0.670***	-1.090**	-0.364***	-0.392***
	(0.118)	(0.209)	(0.487)	(0.121)	(0.121)
share of risk * I(Age 54-57)					-0.273
					(0.237)
R-squared	0.920	0.907	0.902	0.938	0.920
Observations	77815	35080	2541	39501	77122
Prefecture FE	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes
Standard errors in parentheses					
=** p<0.10	** p<0.05	*** p<0.01"			

Mobility_Out Dynamic Effect

(use the first time when prefecture exposed to risk as treatment time point)

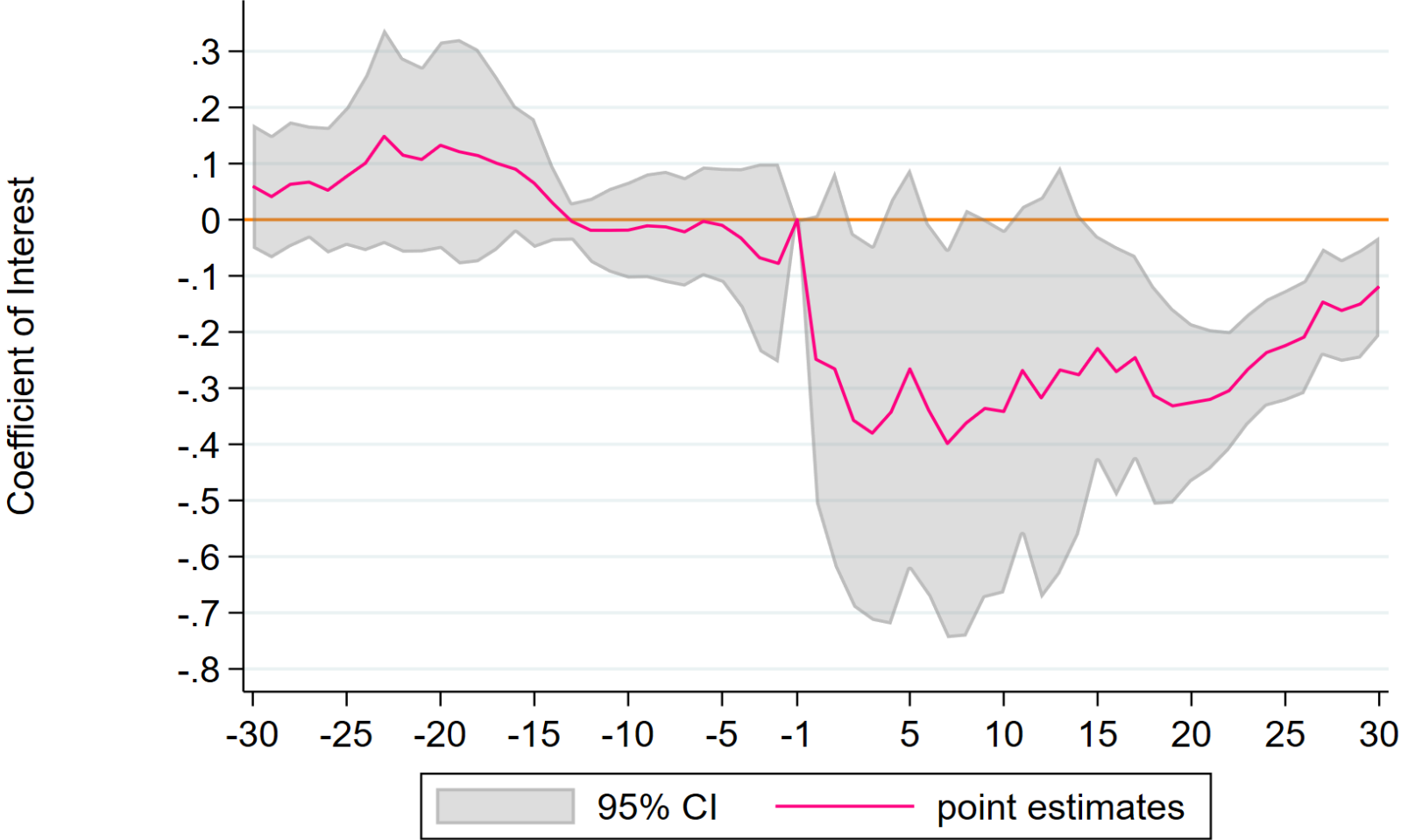
Outcome: mobility_out
Treatment: share of risk counties (pref)



Mobility_in Dynamic Effect

(use the first time when prefecture exposed to risk as treatment time point)

Outcome: mobility_in
Treatment: share of risk counties (pref)



Risk Level Effect on Pollution

$$Pollution_{p,t+1} = \beta X_{p,t} + \alpha_p + \theta_t + \epsilon_{p,t}$$

$$Pollution_{p,t+1} = \beta X_{p,t} + \gamma X_{p,t} \times Z_p + \alpha_p + \theta_t + \epsilon_{p,t}$$

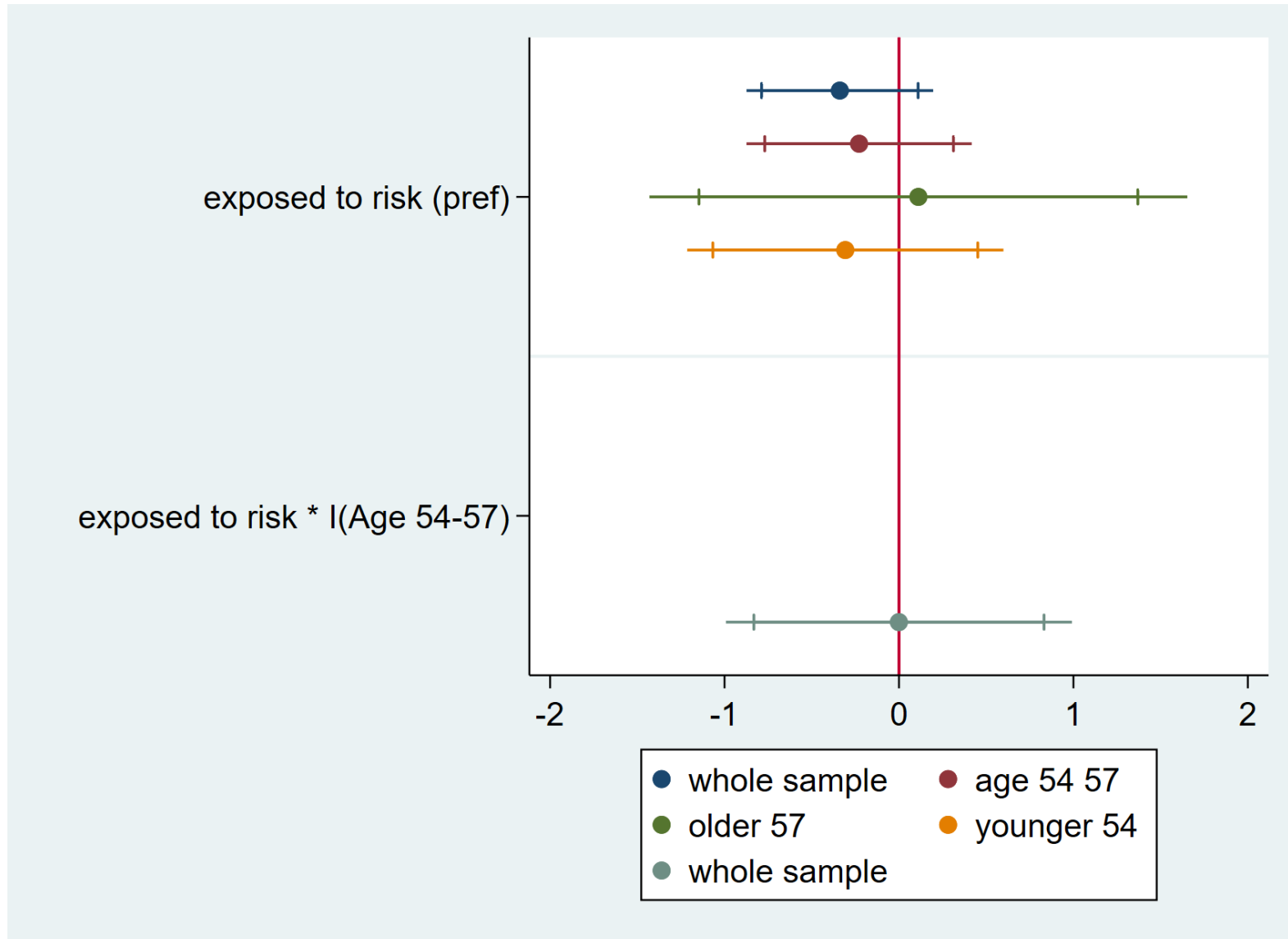
- $Pollution_{p,t+1}$ is the pollution level for prefecture p at period $t + 1$
- $X_{p,t}$ is the **share of counties** that are exposed to middle- or high-risk level in prefecture p at period t

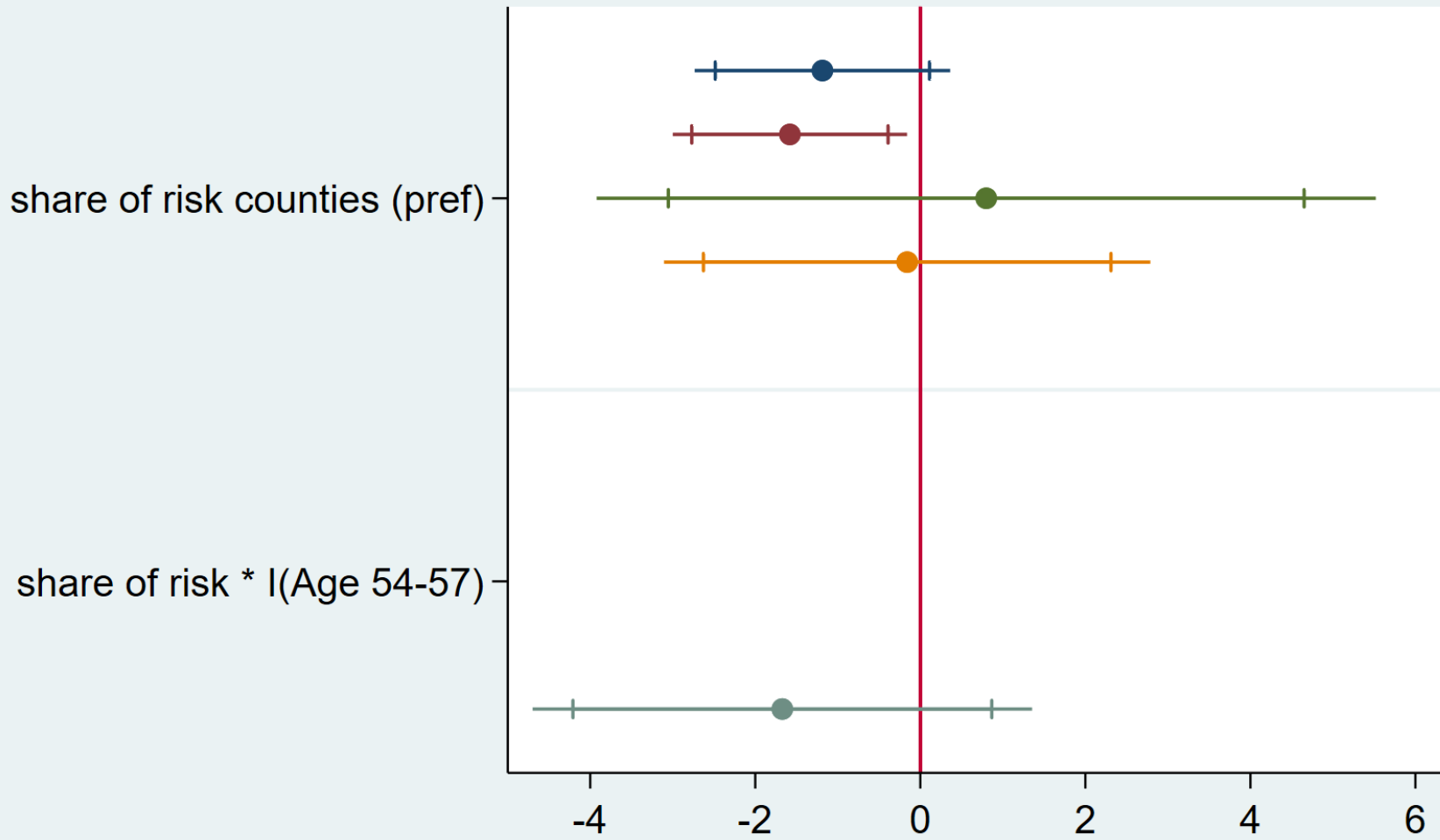
Or

($X_{p,t}$ is a dummy variable for whether prefecture p has at least one county exposed to middle- or high-risk level at period t)

- Z_p is a dummy variable for whether prefecture p is governed by an official who has strong promotion incentive
- α_p is the prefecture-level fixed effect for prefecture p
- θ_t is the time fixed effect at period t

PM25

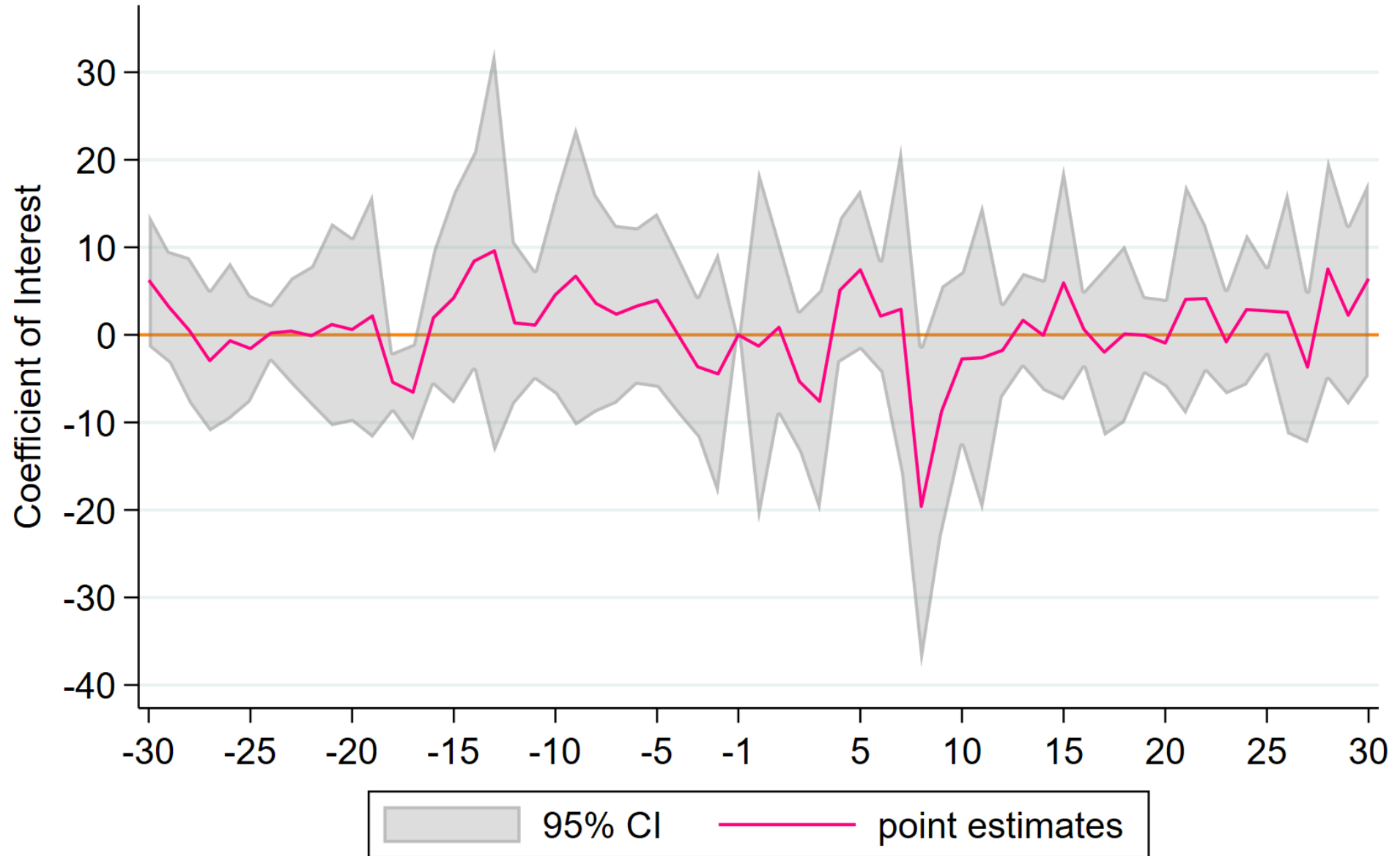




- whole sample
- age 54 57
- older 57
- younger 54
- whole sample

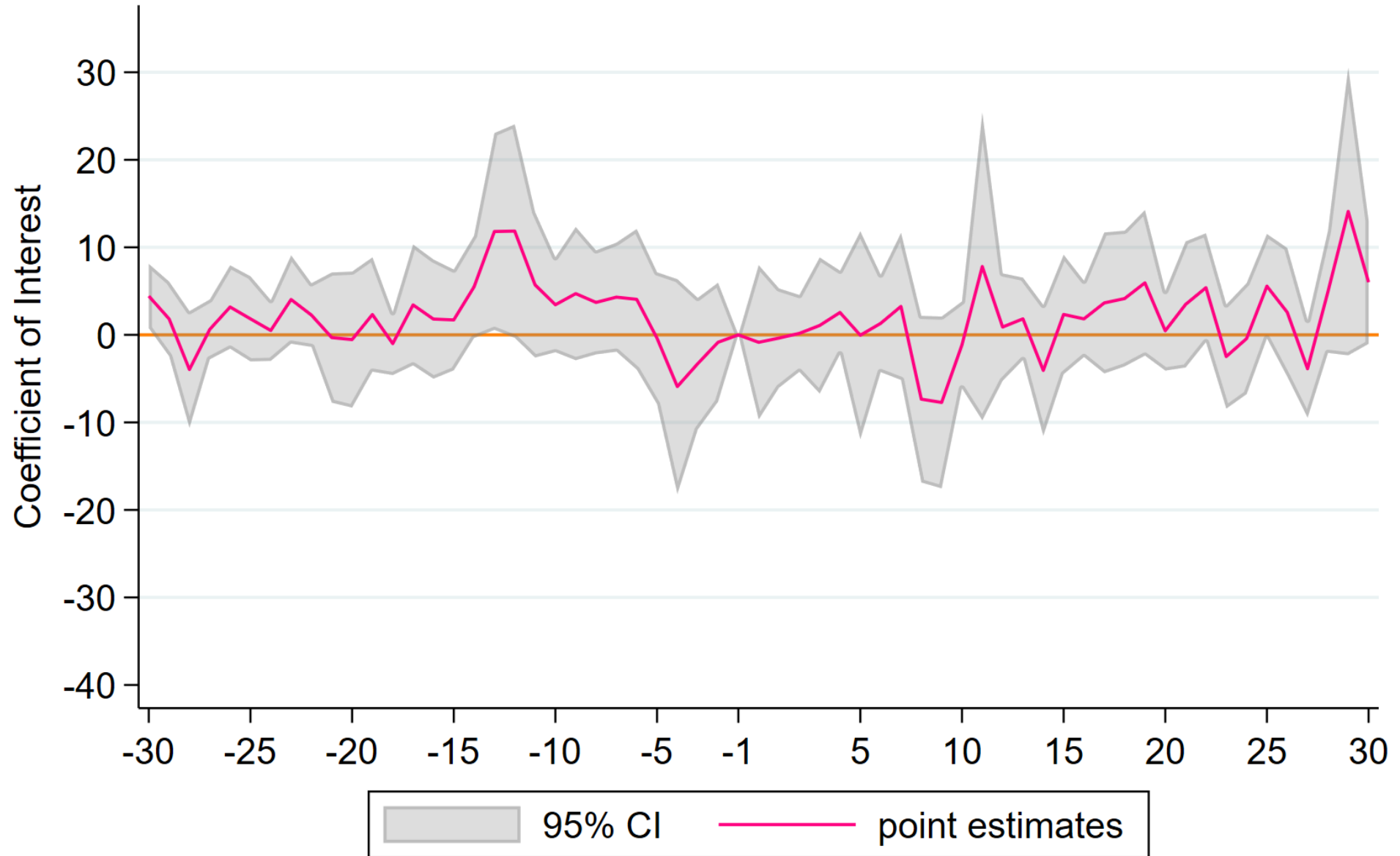
Strong promotion
intensive Officials

Outcome: PM2.5 $\mu\text{g}/\text{m}^3$ Treatment: share of risk counties (pref)



Whole Sample

Outcome: PM2.5 $\mu\text{g}/\text{m}^3$
Treatment: share of risk counties (pref)



Conclusion

- The most comprehensive and unique dataset regarding China's COVID policy.
- the *risk level* indicator has significant correlation with COVID cases, but show different patterns between prefecture leaders with different promotion incentive .
- the *risk level* indicator has significant effect on mobility
- the *risk level* indicator has ambiguous effect on pollution.
(possible explanation: zero COVID is less stringent with manufacturing sector)

The China's COVID Risk Level dataset will be **public available** soon!

If You are interested in our dataset or have any questions

Please email us!

THANKS

FOR YOUR ATTENTION

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