

The Cost of Privacy: Welfare Effects of the Disclosure of COVID-19 Cases

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South Korea's Case

- Disclosure of detailed information of confirmed cases.
 - Text messages, official websites, mobile apps.
- Targeted social distancing: avoid places where transmission risk is high
- Self-selection into changing commuting: own cost-benefit analysis, exploit heterogeneity in the benefits and costs of social distancing.
- Reduce the transmission of virus and the costs of social isolation.

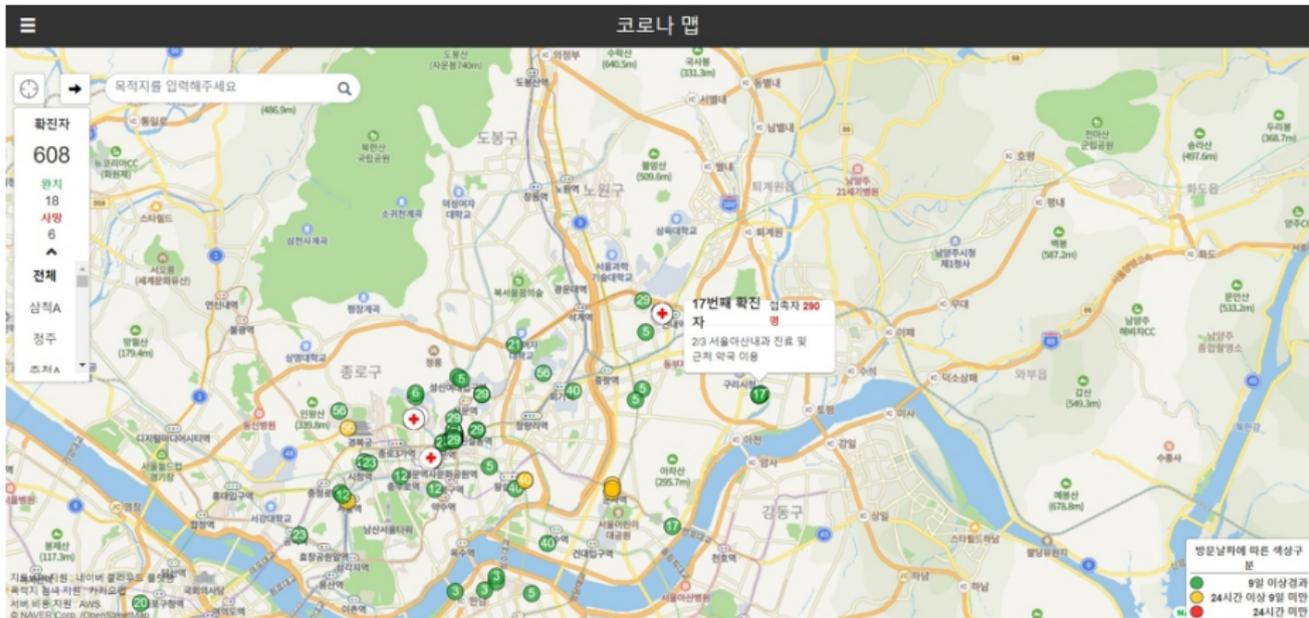
Public Disclosure: Official Website

Korean, male, born in 1987, living in Jungnang district.
Confirmed on January 30. Hospitalized in Seoul Medical Center.

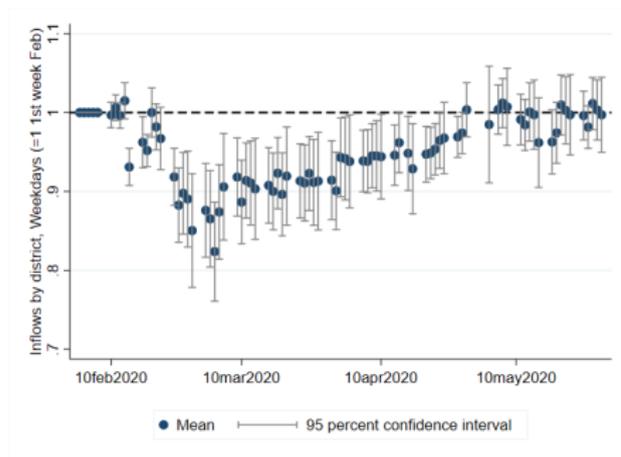
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- | | |
|------------|--|
| January 24 | Return trip from Wuhan without symptoms. |
| January 26 | Merchandise store* at Seongbuk district at 11 am,
fortune teller* at Seongdong district by subway at 12 pm,
massage spa* by subway in the afternoon,
two convenience stores* and two supermarkets*. |
| January 27 | Restaurant* and two supermarkets* in the afternoon. |
| January 28 | Hair salon* in Seongbuk district,
supermarket* and restaurant* in Jungnang district by bus,
wedding shop* in Gangnam district by subway,
home by subway. |
| January 29 | Tested at a hospital in Jungnang district. |
| January 30 | Confirmed and hospitalized. |
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Note: The * denotes establishments whose exact names have been disclosed.

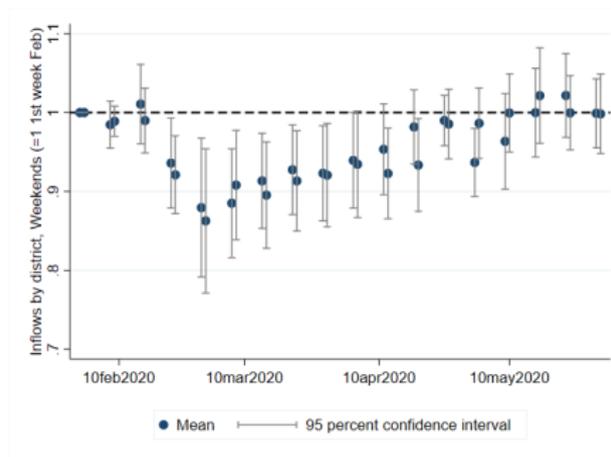
Public Disclosure: Mobile App - February 24, 2020



Change in Daily Inflows by Districts



(a) Weekdays



(b) Weekends

- Traffic **declines** in districts with a larger number of **cases**.

Susceptible, Infected, Quarantined, Recovered

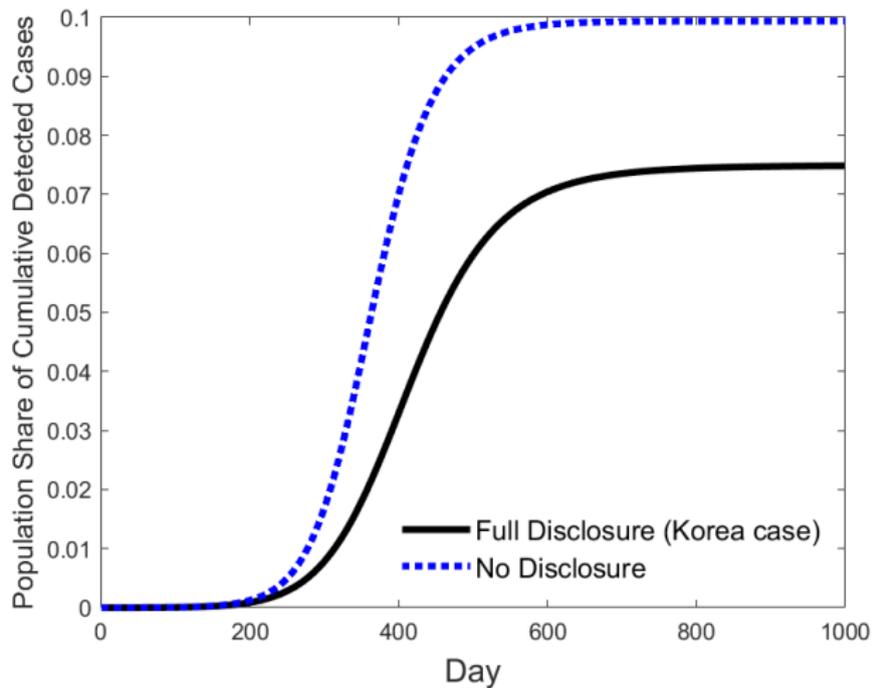
$$\Delta I_i^a(t) = \beta \sum_j \left[\underbrace{\frac{\sum_{a,s} \pi_{sj}^a(t) I_s^a(t)}{\sum_{a,s} \pi_{sj}^a(t) N_s(t)}}_{\text{Share infected in } j} \times \underbrace{\pi_{ij}^a(t) S_i^a(t)}_{\text{\# of Susceptible from } i \text{ in } j} \right] - \gamma I_i^a(t) - d_I I_i^a(t)$$

- $\pi_{ij}^a(t)$: people of age group a living in i 's probability of working in j at time t .
- β : transmission rate.
- γ : daily recovery rate.
- d_I : daily rate at which infectious individuals are detected.

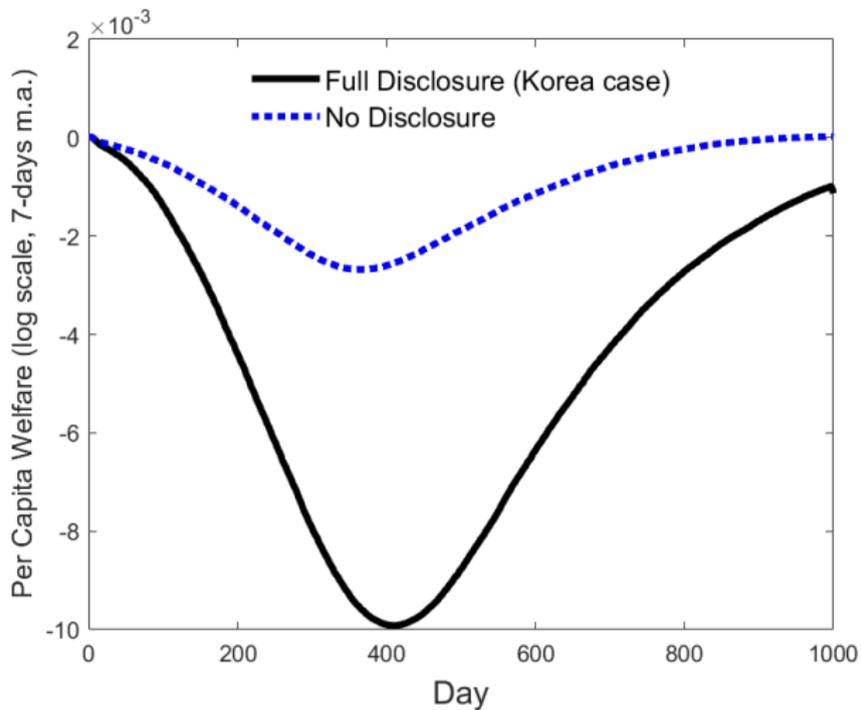
Spatial Model

- Quantitative model of internal city structure.
 - Allow for heterogeneity across **age groups** (young and old).
 - Weeks are divided into **weekdays** ($k = wd$) and **weekends** ($k = wn$).
 - Districts differ in **productivity** (weekdays) or **amenities** (weekends)
 - Workers can choose to work from **home**.
- Changes in commuting costs depend on local cases (from the data).
- Individual heterogeneity + local information \implies **Self-selection**

Disclosure Policy: Cases



Disclosure Policy: Welfare



Disclosure Policy and Lockdown: Cases and Welfare

	Full Disclosure	34% Lockdown
Total Cases	<u>602,999</u>	<u>604,223</u>
Total Death	12,435	13,797
age 20-59	5,003	4,894
age 60+	7,432	8,903
Welfare Loss per day	0.57	0.94
age 20-59	0.55	1.15
age 60+	0.67	0.28

- Disclosure: same cases and 40% lower welfare losses.

Conclusion

- Information disclosure:
 - Targeted social distancing.
 - Self-selection.
- Reduce the spread of the virus while minimizing costs of isolation.