

# 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

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

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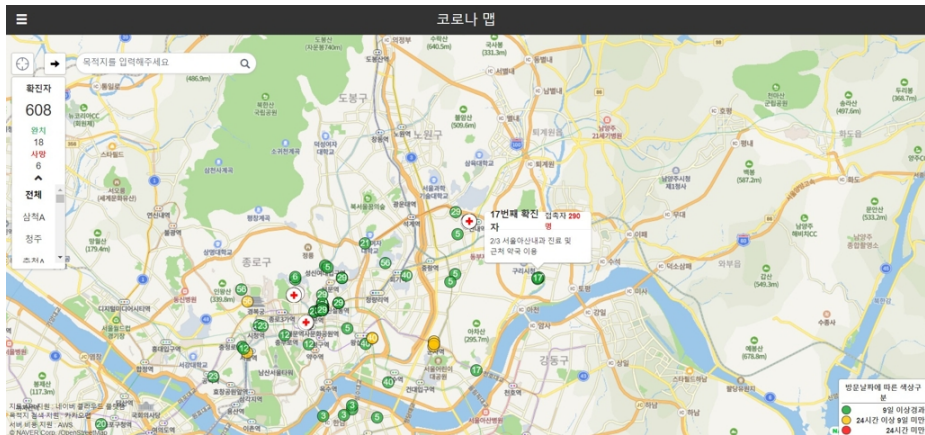
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January 24	Return trip from Wuhan without symptoms.
January 26	Merchandise store* at Seongbuk district at 11 am, fortune teller* at Seongdong district by subway at 12 pm, massage spa* by subway in the afternoon, two convenience stores* and two supermarkets*.
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.

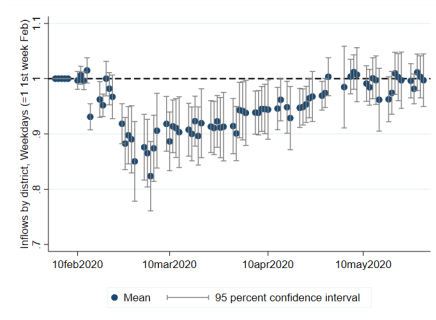
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Note: The \* denotes establishments whose exact names have been disclosed.

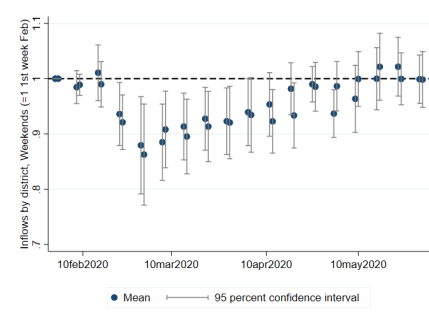
# Public Disclosure: Mobile App - February 24, 2020



# Change in Daily Inflows by Districts



(a) Weekdays



(b) Weekends

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

# Susceptible, Infected, Quarantined, Recovered

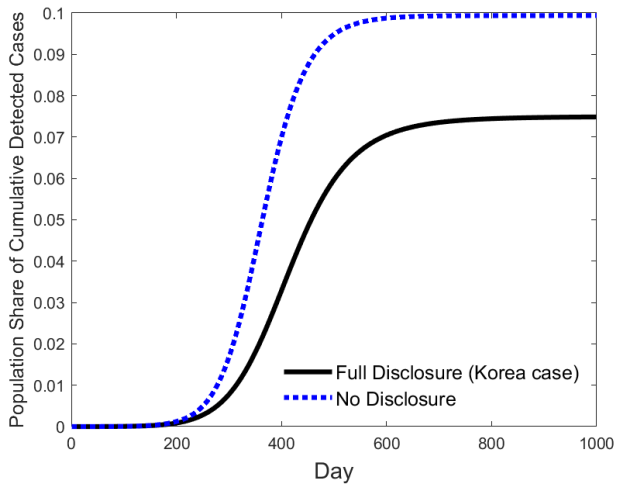
$$\Delta I_i^a(t) = \beta \sum_j \left[ \underbrace{\frac{\sum_{a,s} \pi_{sj}^a(t) I_s^a(t)}{\sum_{a,s} \pi_{sj}^a(t) N_s(t)}}_{\text{Share infected in } j} \times \underbrace{\pi_{ij}^a(t) S_i^a(t)}_{\text{\# of Susceptible from } i \text{ in } j} \right] - \gamma I_i^a(t) - d_I I_i^a(t)$$

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

# Spatial Model

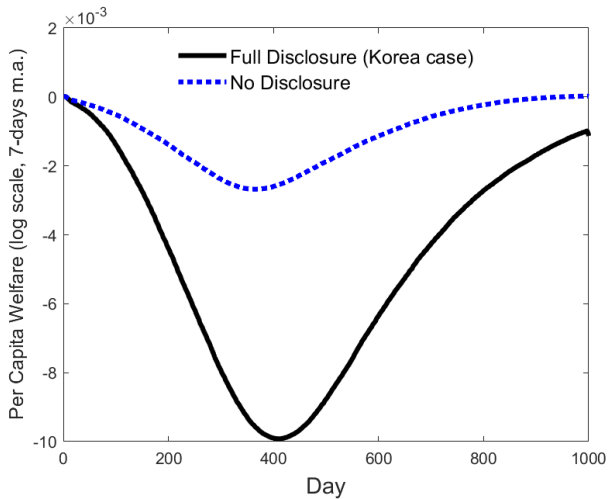
- Quantitative model of internal city structure.
  - Allow for heterogeneity across **age groups** (young and old).
  - Weeks are divided into **weekdays** ( $k = wd$ ) and **weekends** ( $k = wn$ ).
  - Districts differ in **productivity** (weekdays) or **amenities** (weekends)
  - Workers can choose 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.