Airbnb, COVID-19 Risk and Lockdowns: Local and Global Evidence

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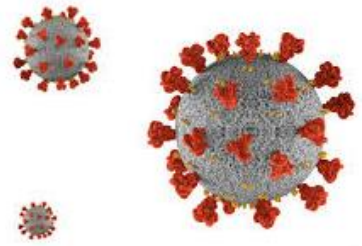# Fear of COVID-19 Outbreak?
Some still choose to party on….

Hong Kong's Shek O beach in May while social-distancing orders were still in force

Source: https://www.scmp.com/news/hong-kong/society/article/3094636/tired-coronavirus-youre-not-alone-and-experts-worry-pandemic

Research Question

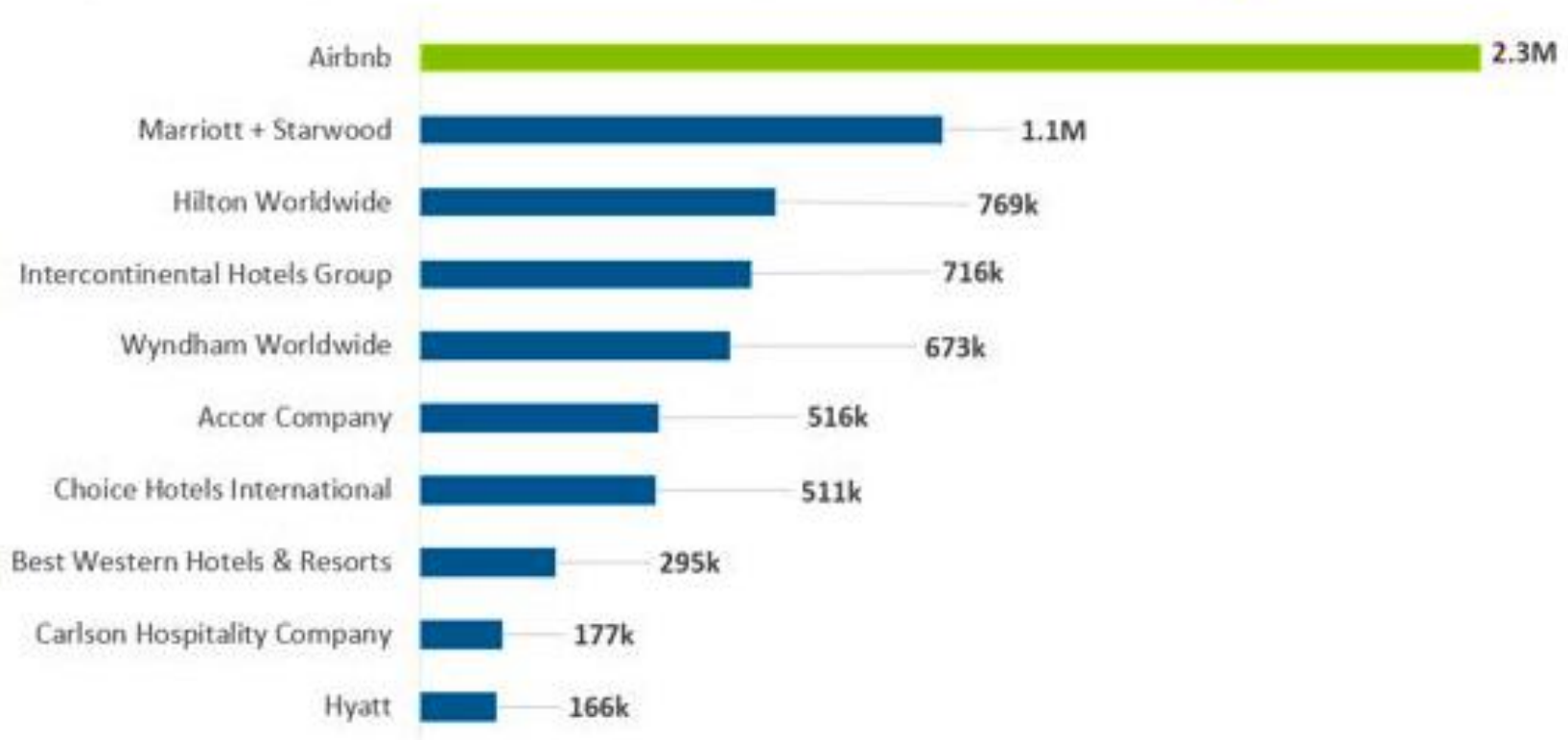What are the effects of COVID-19 on travel booking activity around the world, based on Airbnb data?

We study three main factors:

1) The initial shock from **Wuhan lockdown** (Jan 23, 2020)

2) Local COVID-19 Confirmed **Cases**

3) Government policies on **lockdown** and **travel bans**

Airbnb in the Travel Industry

Largest Lodging Companies by Rooms – Including All Airbnb

Company	Rooms
Airbnb	2.3M
Marriott + Starwood	1.1M
Hilton Worldwide	769k
Intercontinental Hotels Group	716k
Wyndham Worldwide	673k
Accor Company	516k
Choice Hotels International	511k
Best Western Hotels & Resorts	295k
Carlson Hospitality Company	177k
Hyatt	166k

Source: https://www.hotelnewsnow.com/Articles/77191/New-Airbnb-data-sheds-light-on-13-global-markets

Summary of **Global Evidence**

- **98** Airbnb markets across **30** countries
- Find significant impact of all three factors, with government policies on **lockdown** and **travel ban** being the strongest

1) Wuhan shock effect: **8.8% drop** in bookings globally

- Effect is largest in Asia (**51% drop**), but weaker elsewhere.

2) Local Covid-19 severity: cause greater drop in bookings

- **8.3%** drop in booking reviews and **26.6% increase** in cancelation rate for every doubling of daily newly confirmed cases.

3) Bookings drop by **57.8%**, and **cancellation rate** increases by **4.48 times** in response to government policies on **Lockdown and travel ban.**

Summary of **Local Evidence**
Airbnb Market in London, UK

Bookings drop at an increasing rate after the outbreak.

- Review drops **60%**, cancellation increase **13.1%** in the third week of outbreak.

Supply side Effect:
- No significant change in **listing volume**: stable supply
- **Listing prices** adjusted downward by **6%** after outbreak

Private room versus entire unit:
- Cancellation increases **30%** more for private rooms than entire units due to COVID-19
- Less discount of listing price for private rooms than entire Units:
  - Hosts demand 4% risk compensation for offering private rooms
- Consistent with the fear of infection in shared accommodations.

Contributions

- One of the first **global** studies of COVID-19's effect on travel booking activities

- Document **regional difference** in booking sensitivity

- Room type heterogeneity
  - Document COVID-19 risk concerns when sharing private rooms

- Shed light on market mechanism: **Demand drops** substantially while **supply** is moderately **stable.**

- COVID-19 management is crucial for effective economic recovery

Data

1) Airbnb travel booking activities

- Scraped data from the Airbnb webpage **insideairbnb.com**

- Monthly snapshots: listing characteristics, booking prices, reviews with date stamp.

- **98** Airbnb markets across **30** countries

- Daily reviews between **Jan 1, 2019** to **Mar 31, 2020**.

- Using reviews and cancellation as proxy for travel booking activities. *(Review rate: 67%,* based on Fradkin et al. (2015))

2) Covid-19 cases and government policies on lockdown and travel ban

- COVID-19 local stats from John Hopkins COVID Research Center, coronavirus.data.gov.uk

- Lockdown and travel ban dates from **Auravision**, **restrictions.info** and verified from hand collected news articles.

Illustration of Airbnb Listing

https://www.airbnb.com.au/rooms/31088934

Illustration of Airbnb Reviews

★ **4.87 (15 reviews)**

Cleanliness	4.8	Accuracy	4.8
Communication	5.0	Location	4.9
Check-in	4.6	Value	4.6

Reem
December 2019

It's a lovely, clean little apartment with and amazing garden view. Everything you need is provided for you including a washing machine and a dryer. It's so convenient that you ca...
read more

Harith
December 2019

Great place for stay. Communication is easy with Domus. Having a private parking is the best in busy town.

Georgia
October 2019

Absolutely beautiful apartment with beautiful views from the balcony. Really comfortable bed and a stylish apartment. Across the road from a beautiful park and walking distance to everything you need in a Box Hill.

Robert
October 2019

The apartment was spotless and was as described on Airbnb. It is literally a 5 minute walk to the tram stop and 10 minutes to the train station both having direct access to the Ci...
read more

Tania
September 2019

The host is amazingly helpful and kind. The flight delays and taxi driver didn't pick up made us late for key pick up. The host stayed until 2am to communicate with me which made my night in Melbourne a lot better.

Phoebe
August 2019

This apartment was lovely, the views were spectacular and it was well furnished

Show all 15 reviews

Airbnb Reviews and Cancellation vs. COVID cases
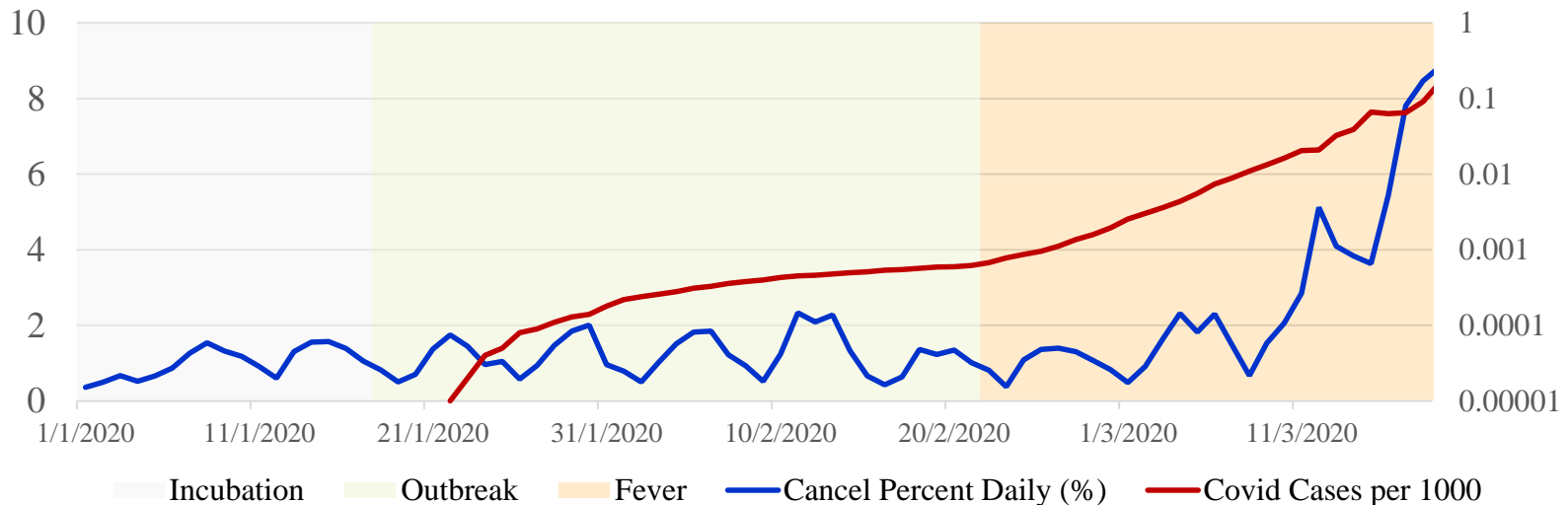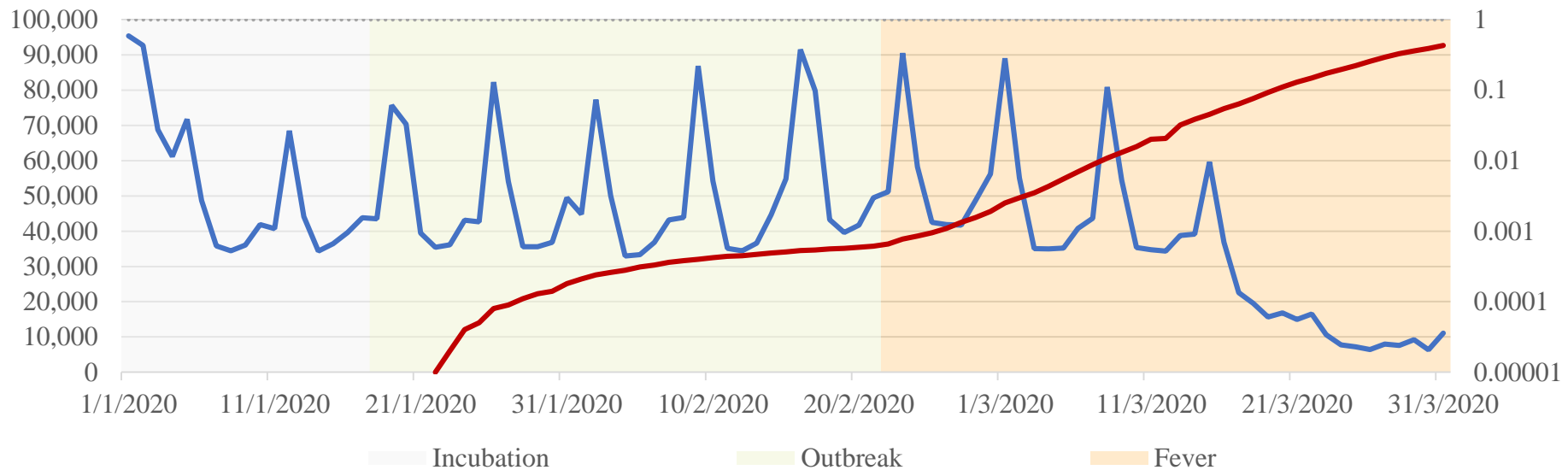
Periods are adopted from Ramelli and Wagner (RCFS 2020)

Reviews in Major Asian Market

Total Daily Reviews/Pre Average - Asia vs Rest of World
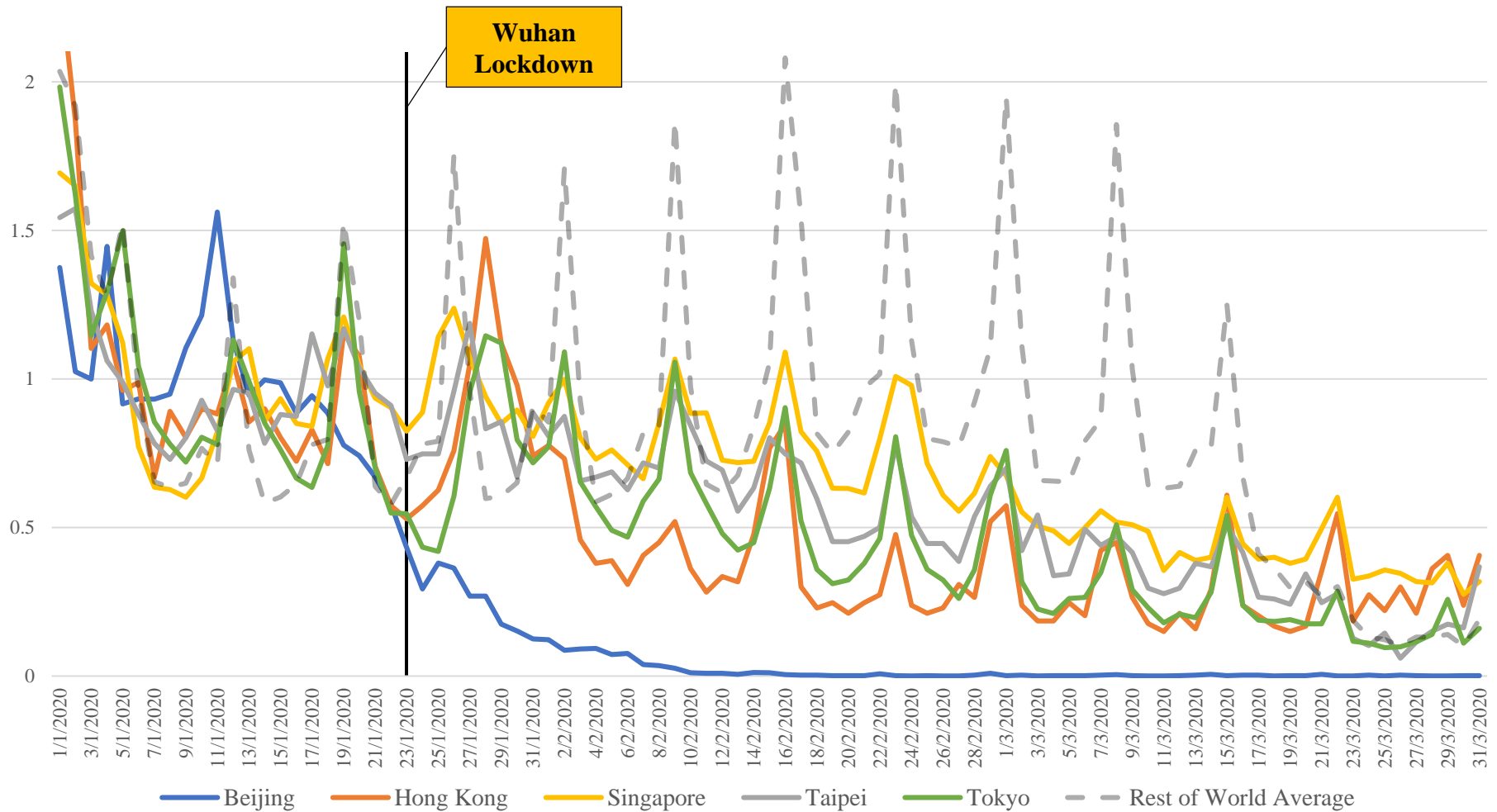
Coronavirus: The world in lockdown

Asia, Australia and New Zealand in lockdown
Dates and severity of restricted internal movement by country

■ First case ■ Localised recommendations ■ Localised lockdown
■ National recommendations ■ National lockdown

Wuhan Lockdown:
Jan 23, 2020

Hong Kong first case:
Jan 23, 2020
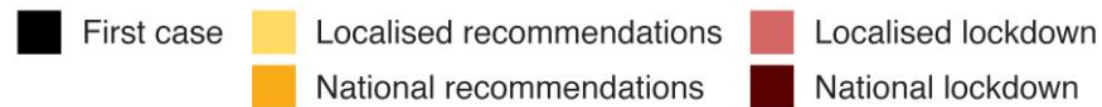
Diff-in-Diff Test
(Control for prior year in the same market)

Wuhan lockdown shock   **Local COVID-19 cases effect**

$$Y_i = a + \beta_0 Treat + \beta_1 Post_j + \beta_2 Treat * Post_j + \beta_3 Treat * Post_j * Log(1 + NewCase_{i,t-1})$$
$$+ \beta_4 Treat * Post_j * Lockdown_i + \mu_i + \tau_t + \varepsilon_{it}$$

Lockdown effect

- **Sample**: from Jan 2019 to Mar 2019 (control group) and from Jan 2020 to Mar 2020 (treatment group).

- Dependent variable Y_i is either the ***Reviews***, ***Adj_Reviews, Cancel_pct*** or ***Adj_Cancel_pct*** for Airbnb market *i* for day *t.*

    - ***Reviews*** is the sum of reviews on a given day *t for* Airbnb market *i* .

    - ***Cancel*** *is the sum of host cancellations divided by Reviews.*

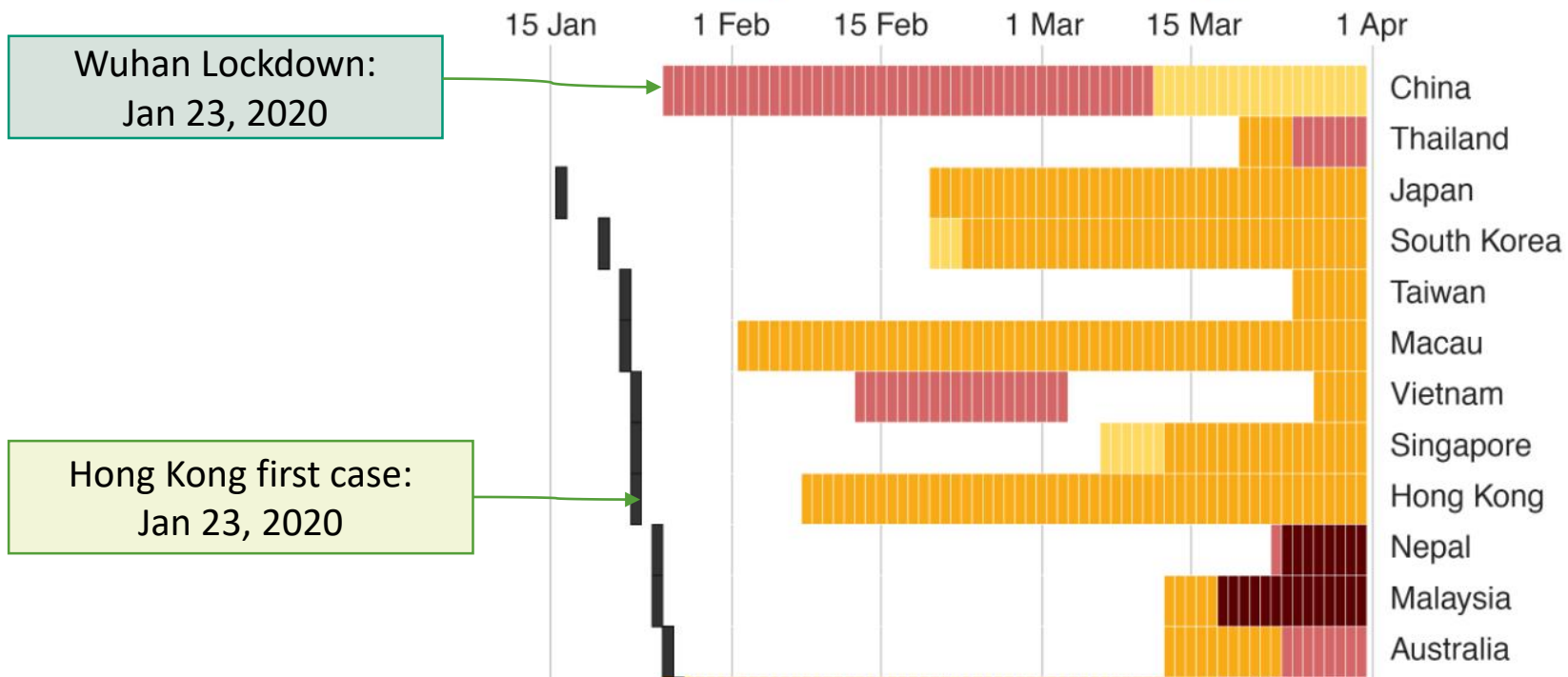   - ***Adj_Reviews*** *and* ***Adj_Cancel_pct***: scaled by average Y_i prior to Jan 23 of the same year.

- ***Treat*** is a dummy of 1 if the review was made in 2020, 0 otherwise.

- ***Post*** is after Wuhan lockdown date (Jan 23, 2020)

- ***Lockdown*** is the earlier date of either the start of lockdown orders or travel bans for market *i*.

Covid-19 Impact on Review and Cancellation

Y:	(1) Adj_Reviews	(2) Adj_Cancel_pct
Treat	-0.001	-0.005
	(0.017)	(0.082)
Post	-0.090***	0.302***
	(0.018)	(0.115)
Treat*Post	-0.088***	0.204
	(0.026)	(0.142)
Treat*Post*Log(1+NewCase)	-0.060***	0.223**
	(0.005)	(0.090)
Treat*Post*Lockdown	-0.578***	4.482***
	(0.028)	(0.580)
Region, Weekday, Month F.E.	Yes	Yes
Market-Year S.E.	Yes	Yes
Observations	17,738	16,660
Adj. R-squared	0.443	0.129

- *Treat*Post* coefficient = -0.088 implies about 9% drop in reviews due to Wuhan lockdown shock

- **Estimated lost bookings revenue : $634 Mil** (9.2 mil per day) due to the COVID-19 Wuhan lockdown shock.

- Back of the envelop calculation: -0.088 Post*Treat coefficient*69 days *235,142 bookings per day* $444.18 per booking = **634.2 mil**

- *Treat*Post*log(1+NewCase)* = -0.06 After doubling the cases in a city, review drop 4.16% (=ln(2)*(-0.06)).

- *Treat*Post*Lockdown* = -0.578 implies -57.8% drop in reviews due to government policy

The *Adj* prefix represents adjusted reviews where *Reviews* or *Cancel_pct* are divided by the daily pre-period average (before Jan 23, 2020 for 2020 sample and before Jan 23, 2019 for 2019 sample).

Regional Analysis: Five Markets

Legend: All · Asia · Asia Ex-China · Commonwealth · Europe · North America · South America

Wuhan Outbreak coefficient — -9%, -51%, -38%, X denotes not stat significant at 10% level

Local COVID-19 coefficient — -8%, -13%, -12%

Lockdown coefficient — -58%, -55%, -71%
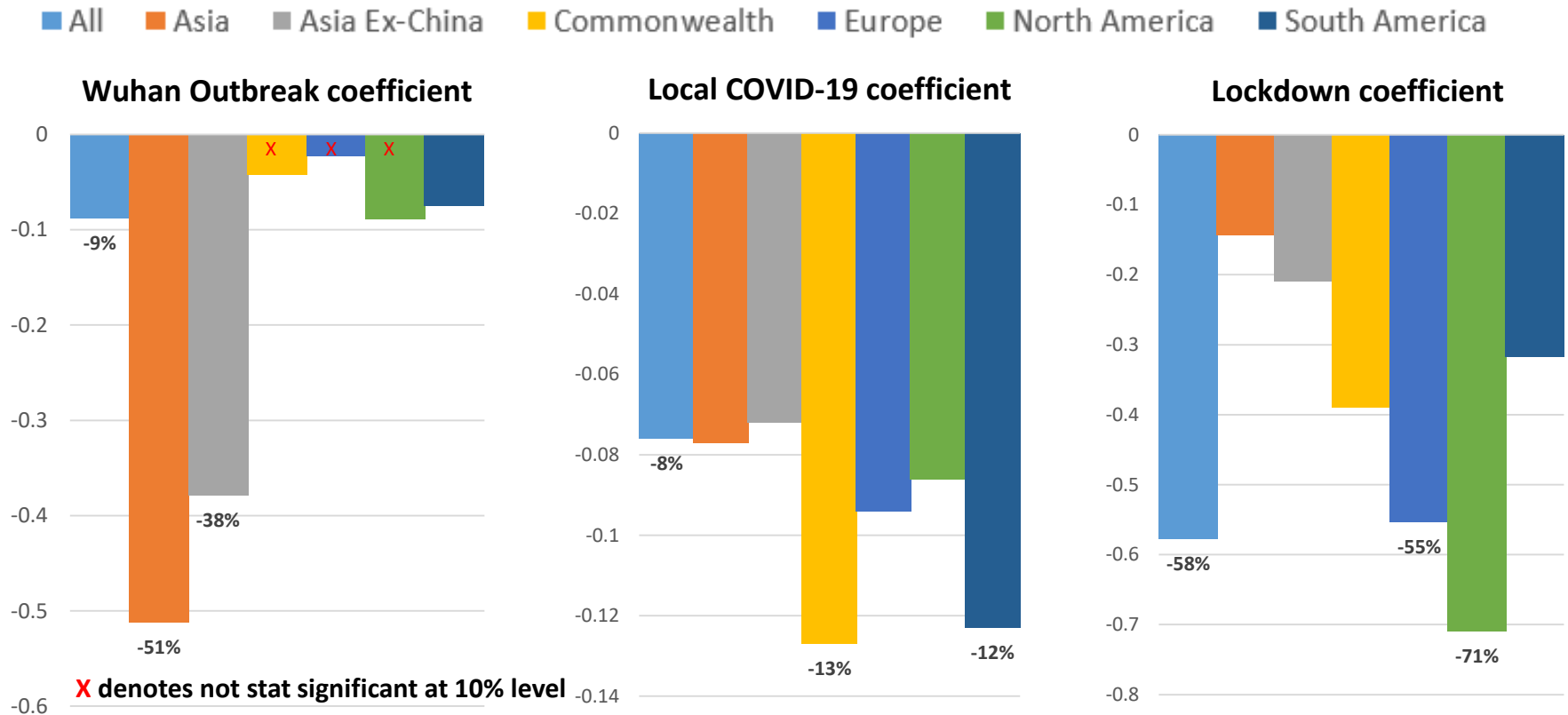
Potential channels:

- Distance to Wuhan: Booking is less sensitive to Wuhan lockdown the further away from Wuhan
- Airbnb activity sensitivity to local COVID-19 cases increases with
  - Higher **mobility** of a market (google mobility measure)
  - Government COVID-19 policy **stringency** (OxCGRT measure)

Local Evidence: Airbnb in London, UK

London Is the World's Airbnb Capital
Number of active Airbnb listings in selected major cities worldwide*

Active rentals	Average daily rate

City	Active rentals	Average daily rate
London	59,302	$184
Paris	38,522	$118
New York	35,083	$186
Moscow	30,601	$128
Rio de Janeiro	30,302	$58
Rome	25,753	$123
Sydney	21,216	$134
Barcelona	20,786	$182
Melbourne	19,031	$124
Los Angeles	18,237	$162
Madrid	16,294	$106
Berlin	15,709	$92
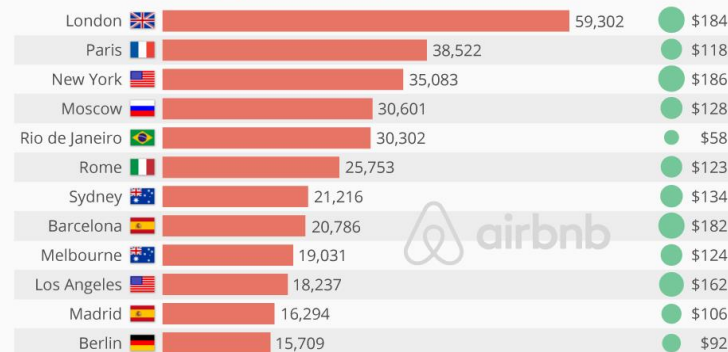
* as of August 6, 2018
@StatistaCharts   Source: AirDNA

statista

- World's Airbnb Capital
- No travel bans during sample period.
- Late local lockdown (Mar 21, 2020)
- Detailed COVID-19 data available at borough level

Reviews and Cancellations in London Market:
consistent with global evidence

	(1)	(2)	(3)	(4)
	Review		Cancel	
Week$_{-3-}$	-0.004	-0.004	-0.011	-0.011
	(0.045)	(0.045)	(0.031)	(0.031)
Week$_{-2}$	0.059	0.071	0.001	-0.001
	(0.049)	(0.048)	(0.037)	(0.037)
Week$_{-1}$	0.006	0.014	-0.005	-0.006
	(0.045)	(0.044)	(0.036)	(0.036)
Week$_1$	-0.186***	-0.002	0.031	-0.018
	(0.053)	(0.060)	(0.034)	(0.055)
Week$_2$	-0.385***	0.034	0.025	-0.129**
	(0.070)	(0.065)	(0.049)	(0.060)
Week$_{3+}$	-0.634***	-0.196	-0.023	-0.128**
	(0.095)	(0.139)	(0.052)	(0.055)
Week$_1$*log(1+NewCase)		-0.157***		0.043
		(0.050)		(0.038)
Week$_2$*log(1+NewCase)		-0.244***		0.101***
		(0.043)		(0.032)
Week$_{3+}$*log(1+NewCase)		-0.209***		0.055**
		(0.057)		(0.026)
Week$_1$*Private	0.021	0.047	0.047	0.084
	(0.066)	(0.085)	(0.052)	(0.070)
Week$_2$*Private	-0.135	0.074	0.112*	0.209***
	(0.112)	(0.108)	(0.059)	(0.078)
Week$_{3+}$*Private	0.061	0.340	0.307***	0.286***
	(0.156)	(0.206)	(0.071)	(0.100)
Borough, Weekday, Month F.E.	Yes	Yes	Yes	Yes
Borough-Year S.E.	Yes	Yes	Yes	Yes
Observations	5,412	5,412	5,412	5,412
Adj. R-squared	0.819	0.825	0.819	0.825

Pre-outbreak: no effect.

Review drop and Cancellation increases significantly after the outbreak at each borough

Reviews drop and cancel increases even more in boroughs with more newly infected cases.

Higher cancellations for private rooms than entire homes:
Consistent with the fear of infection in shared accommodations

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Impact of COVID-19 on Airbnb Supply

$$Log(N\_Active_{b,r})$$
$$= a + \beta_0 Treat + \beta_1 Post_j + \beta_2 Treat * Post_j + \beta_3 Treat * Post_j * \log(1 + NewCase_{b,t-1})$$
$$+ \beta_4 Treat * Private + \beta_5 Post_j * Private + \beta_6 Treat * Post_j * Private + \beta_7 Treat * Post_j * Private$$
$$* Log(1 + NewCase_{b,t-1}) + \rho_r + \mu_b + \tau_t + \varepsilon_{bt}$$

- Same Diff-in-Diff strategy using the listings in the prior year at the same borough as counterfactual.

- **Log (N_Active)** is the number of **active listings** in month *t* for borough *b* room type *r. Active listing has a review in past 3 months.*

- Note: We only have monthly snapshots of listings hence a monthly regression.

Airbnb Supply: No significant Change

Y:	(1) Log(N_Active)	(2) Log(N_Active)
Treat	0.077***	0.069
	(0.016)	(0.045)
Post	-0.043***	-0.059
	(0.009)	(0.045)
Treat*Post	0.001	0.021
	(0.021)	(0.053)
Treat*Post*Log(1+NewCase)	-0.001	0.043
	(0.029)	(0.060)
Treat*Private		0.016
		(0.092)
Post*Private		0.032
		(0.091)
Treat*Post*Private		-0.066
		(0.087)
Treat*Post*Private*Log(1+NewCase)		-0.029
		(0.070)
Constant	4.255***	4.266***
	(0.252)	(0.252)
Borough F.E.	Yes	Yes
Observations	396	396
Adj. R-squared	0.901	0.900

No effect on listing volume

Airbnb Supply does not change due to COVID-19 outbreak or infected cases.

Listing Price Adjustment Over Time

Cal_Gap= Percentage Change in Price between current month's booking price divided by prior month's booking price for the same calendar date, Use first 7 days.
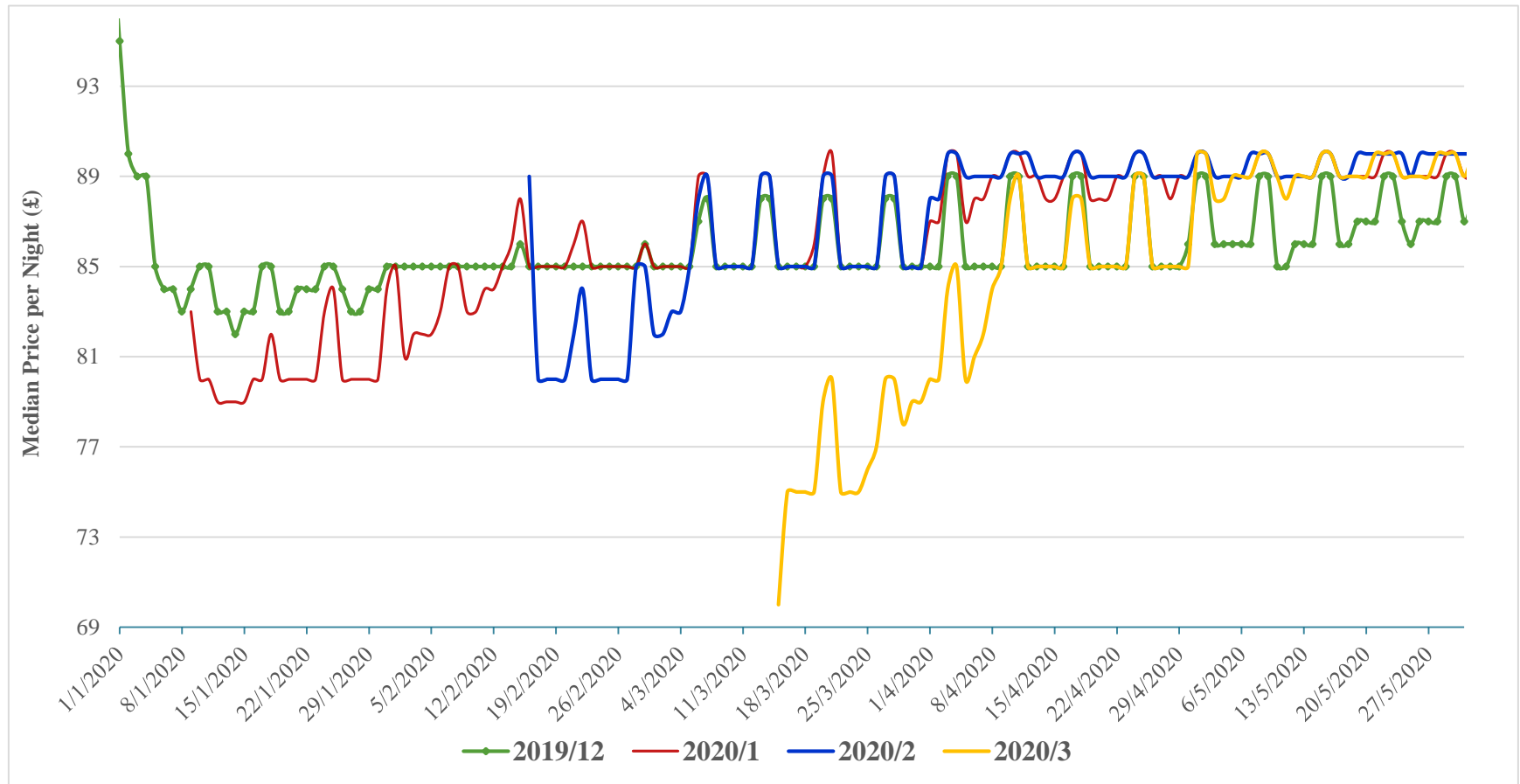
Each line represents a different monthly snapshot and the median booking price for a particular date in the future.

Covid-19's Impact on Listing Prices

- Use calendar listing prices each month to create a 'calendar gap' booking price difference.

- Run diff-in-diff using year 2019 as control.

$$Log(Cal\_Gap_{i,t,t+k})$$
$$= a + \beta_0 Treat + \beta_1 Post_j + \beta_2 Treat * Post_j + \beta_3 Treat * Post_j * log(1 + NewCase_{b,t-1})$$
$$+ \beta_4 Treat * Private + \beta_5 Post_j * Private + \beta_6 Treat * Post_j * Private + \beta_7 Treat$$
$$* Post_j * Private * Log(1 + NewCase_{b,t-1}) + \gamma X_{h,i} + \rho_r + \mu_i + \tau_t + \varepsilon_{it}$$

$\gamma X_{h,i}$ represents individual listing level characteristics including the experience of the host, whether the host is a superhost, the property type (apartment, house, etc.), number of persons the listing accommodates, number of beds and baths and a host of amenity dummies.

Listing Price Adjustments Regression

	Dependent variable: Log(Cal_Gap)			
Treat	0.021***	0.021***	0.033***	0.033***
	(0.005)	(0.005)	(0.006)	(0.006)
Post	0.032***	0.042***	0.052***	0.062***
	(0.006)	(0.007)	(0.006)	(0.008)
Treat*Post	**-0.061***	**-0.042***	**-0.084***	**-0.059***
	(0.009)	**(0.006)**	**(0.010)**	**(0.006)**
Treat*Post*Log(1+NewCase)		**-0.023***		**-0.030***
		(0.005)		**(0.007)**
Treat*Private			-0.027***	-0.027***
			(0.007)	(0.007)
Post*Private			-0.046***	-0.046***
			(0.009)	(0.009)
Treat*Post*Private			**0.052***	**0.041***
			(0.012)	**(0.007)**
Treat*Post*Private*Log(1+NewCase)				**0.015***
				(0.008)
Observations	1,438,319	1,438,319	1,438,319	1,438,319
R-squared	0.072	0.074	0.073	0.076

Prices: **adjust downward** after initial COVID-19 outbreak at borough level

Adjust further down if local Covid-19 situation is more severe

Discount *less* for **private** rooms after the outbreak.

Discount less for **private** rooms when Local COVID-19 is more severe.

- The positive Treat*Post*Private and Treat*Post*Private*Log(1+NewCase) coefficients imply private rooms adjust prices less due to COVID-19 than entire homes.
- **Suggests reluctance of hosts to attract guests by lowering prices for private rooms.**

Conclusion
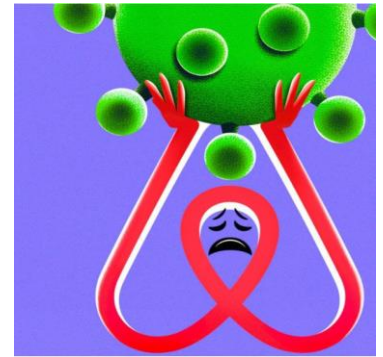
- Airbnb Booking activity is sensitive to COVID-19 risk, displaying regional variation.

    - Lockdown and travel ban have the greatest effect.

    - New infected cases also cause more drop in bookings

    - Wuhan Lockdown is only significant in Asian region.

- Local analysis of COVID-19 risk at borough level in London, UK.

- Supply is stable while demand dropped substantially.

- Show room-type heterogeneity: reveals greater fear of infection risk when sharing private rooms.

- Overall, COVID-19 needs to managed strategically for the recovery of travel industry.