



# **aiQ Geo-location COVID19 Analysis Report**

**1<sup>st</sup> Jan 2019 ~ 29<sup>th</sup> Mar 2020**

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To investigate COVID-19 impact on economic activities in Japan, aiQ Corp., Ltd. publish analysis report using “aiQ geolocation” and focus on several areas such as J-REIT, Industrial Production and Downtown Population. aiQ Geolocation back-testing result is also provided in later this report.

### What's an aiQ Geolocation?

From NTT DOCOMO/mobile spatial statistics, aiQ build up big data analysis service for economic activities in Japan. Key features of the service are

- 78 million mobile phones covered with attributes such as generation and gender
- Data processing using deep learning, etc. to predict the correct Foot Traffic in certain locations such as factory, hotel, amusement parks etc
- Strict guidelines and processes to care both Privacy and Personal information

### aiQ J-REIT Foot Traffic Indices (Hotel REIT)



Hotel foot traffic especially saw significant declines, however, a few hotel properties experienced strong rises in foot traffic from Feb 2020

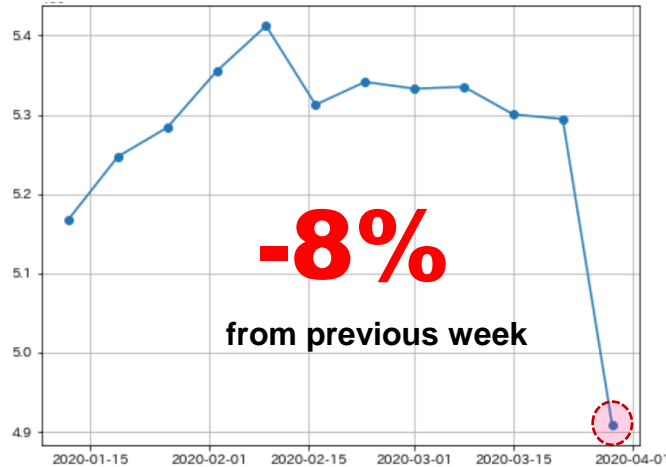
#### ■ Declining patterns:

- Okinawa: A risk aversion to air travel due to COVID19
- Short stay (Economy) Business Hotels : Due to announcements from authorities

#### ■ Foot Traffic Rise patterns:

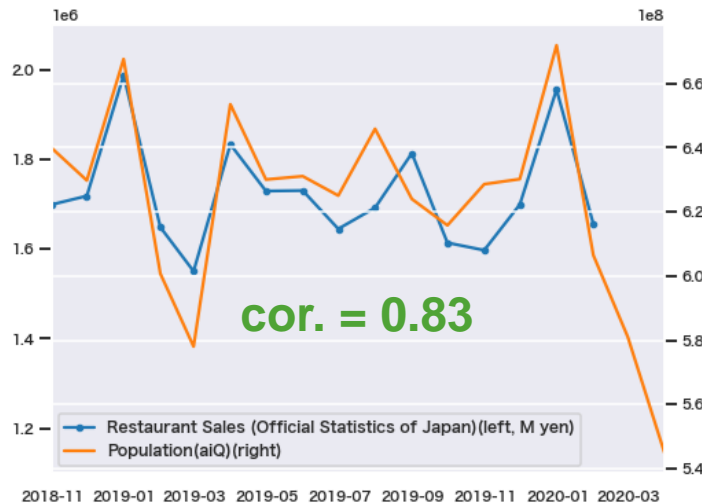
- Luxury Hotels: As an alternative to overseas trip
- Suburbs Location: Tourists may have thought travel by car can mitigate the risk

### aiQ Industrial Production Foot Traffic Indices (Automobile Industry)



- Reduction in foot traffic for certain locations appear consistent with firm's announcements for production line stoppages due to supply chain delay
- However, Foot Traffics of major industries don't suggest serious damage on production lines at each industry level
- In 4<sup>th</sup> week of Mar 2020, however, all industries declined Foot Traffic 5~8 percentage from previous week
- Potential damage must come from the demand side instead of supply chain side, so need to monitor change of Foot Traffic trends at the individual locations for each company

### Downtown Population Analysis



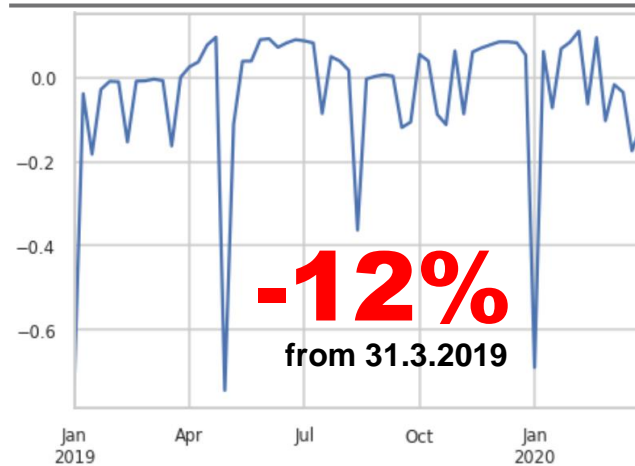
- The restaurant industry is expected to see a 28% drop in sales in March due to declining population in downtown.
- If the level at the end of March continues, it will fall to **-50%**. The consequences of an emergency declaration are even greater.
- As a result of comparing Hokkaido with other regions, the impact of the emergency declaration is expected to be about 2.5 times that of requests for self-restraint.
- By age group, the older the elderly, the greater the population decline in downtown areas.



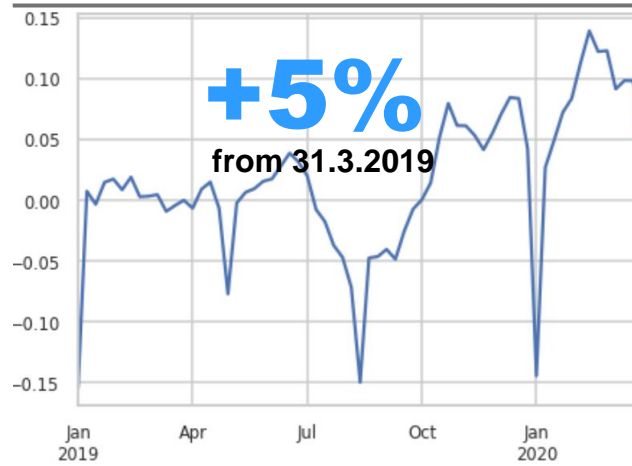
**J-REIT**

- J-REIT Foot Traffic indices show a downturn in many REIT types except residential REIT (as expected)
- Hotel and Retail Facility foot traffic especially saw significant declines
- However a few hotel properties experienced strong rises in foot traffic from Feb 2020 (see detail later page)

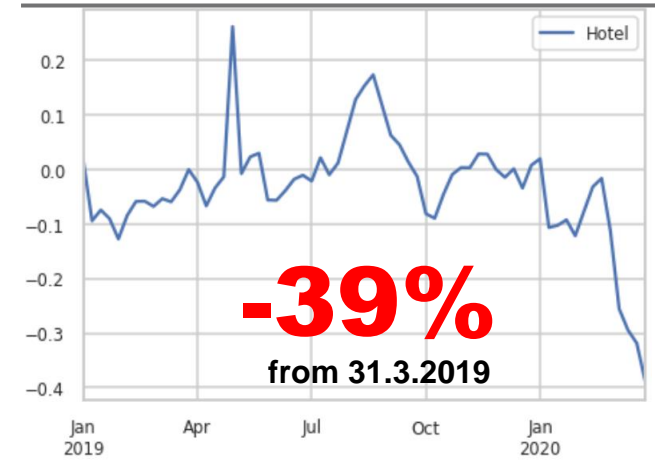
## Office REIT



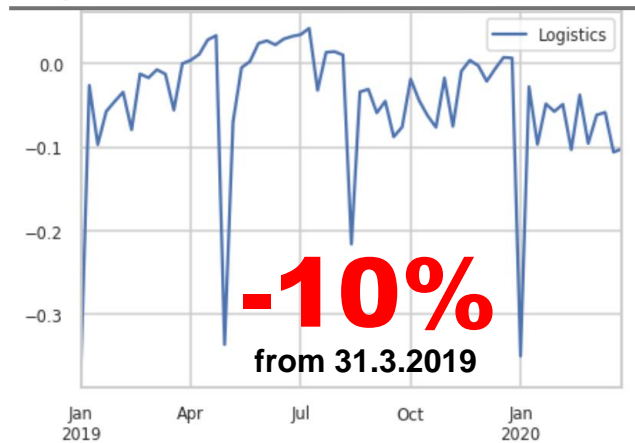
## Residential REIT



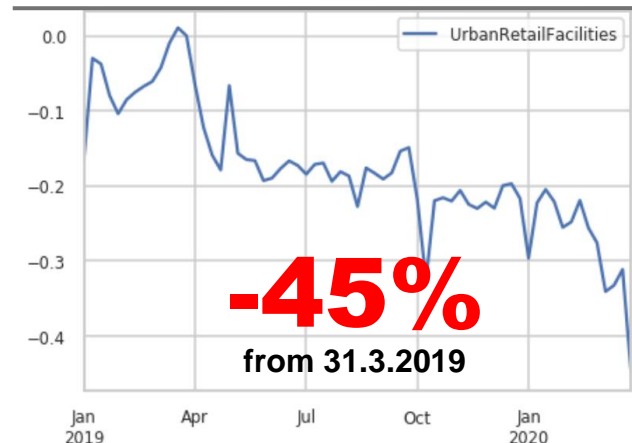
## Hotel REIT



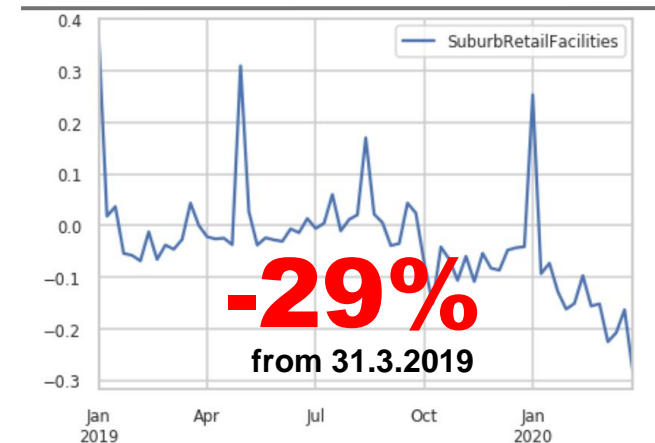
## Logistics REIT



## (Urban) Retail Facilities REIT

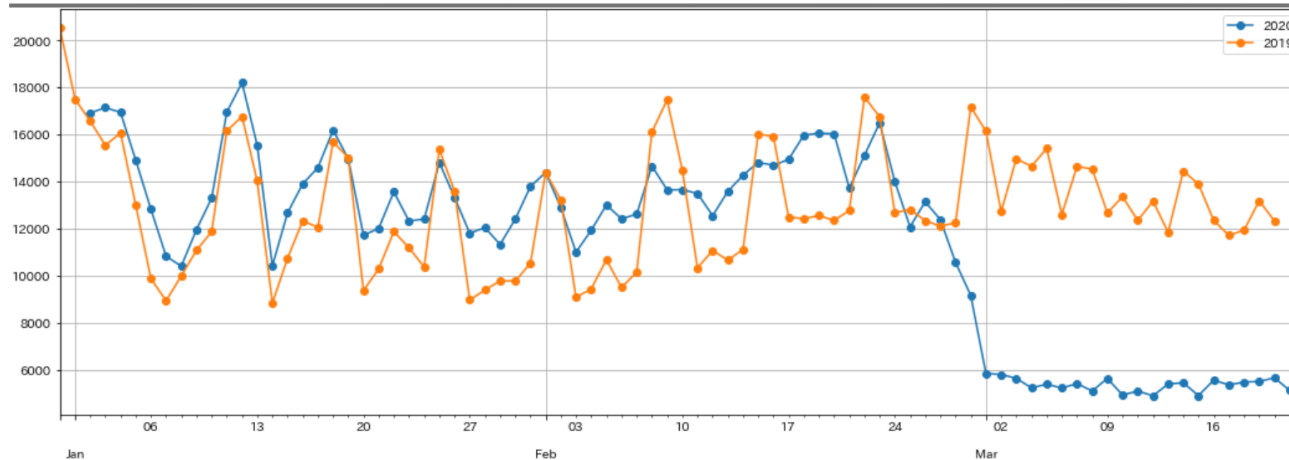


## (Suburb) Retail Facilities REIT



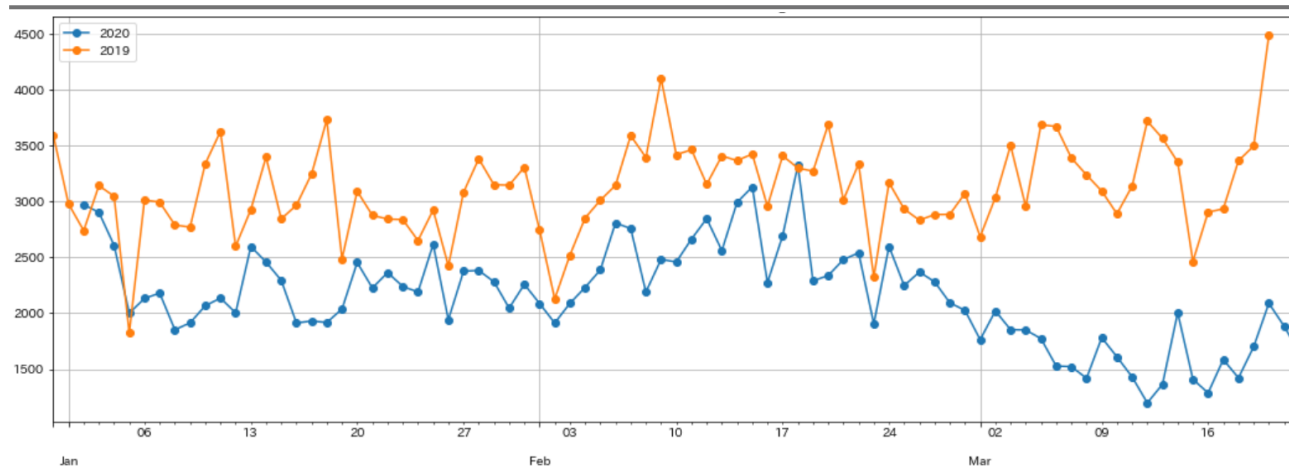
- Foot traffic declined in many hotels due to COVID-19 announcements from authorities
- Hotels for amusement parks, business trips and resorts in Okinawa are typical cases of FT downturn

### A Hotel around Disney Resort



- Tokyo Disney Resort closed the park temporary on the 29<sup>th</sup> Feb, then visitors to hotels around the park also declined

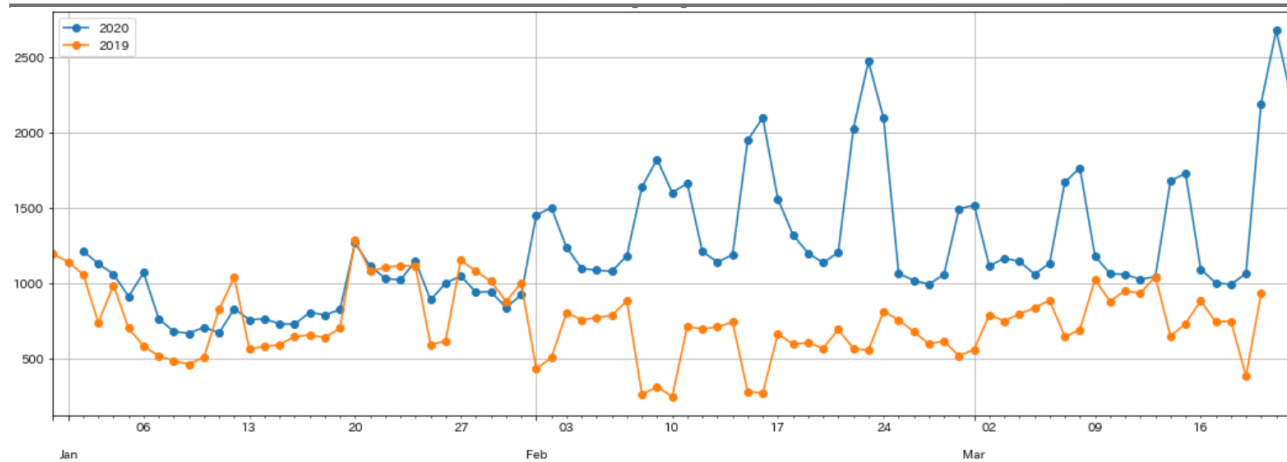
### A Hotel in Okinawa



- Many Hotels in Okinawa showed a similar foot traffic trend
- This can be considered as a risk aversion to air travel due to COVID19

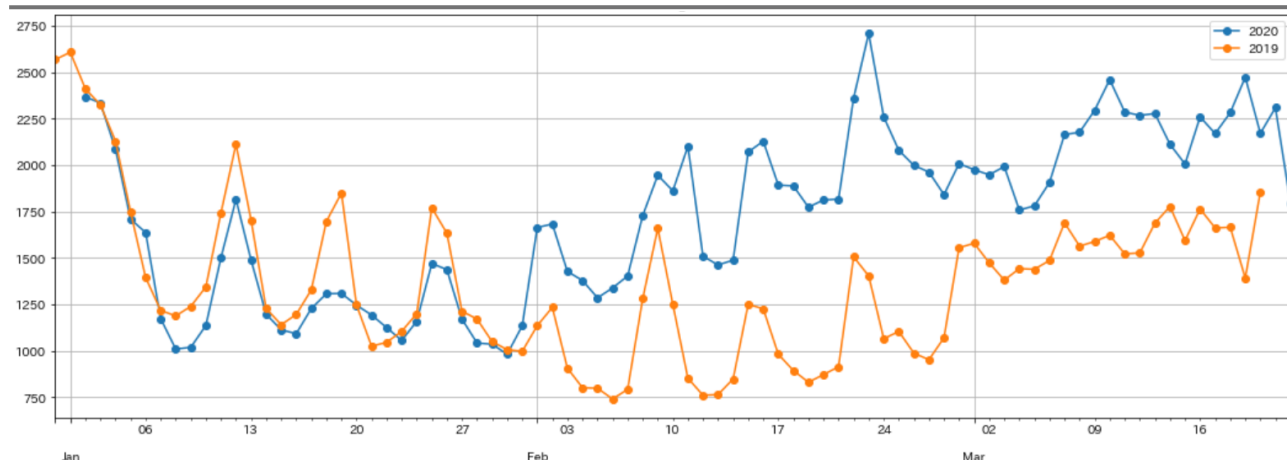
- Some Hotels however, showed an upward trend and positive Year on Year
- Tourists may have thought travel by car can mitigate the risk of COVID19 infection
- This Bi-polarization hasn't been incorporated in the financial market, i.e., J-REIT price

## A Luxury Hotel in Kinugawa



- Kinugawa is a popular tourism spot in Japan and it takes one and a half hours by car from Tokyo
- Many tourists needed to cancel overseas trip reservations due to COVID-19 risk and have instead reserved domestic luxury hotel & spa accommodation as an alternative
- Hotels of the same group showed similar foot traffic patterns where their core market is domestic customers

## A Hotel in Hakone



- Hakone is also a popular spa resort and takes an hour by car from Tokyo
- This hotel is owned by a different company from the example above. So the upward FT trend is not limited to a certain group

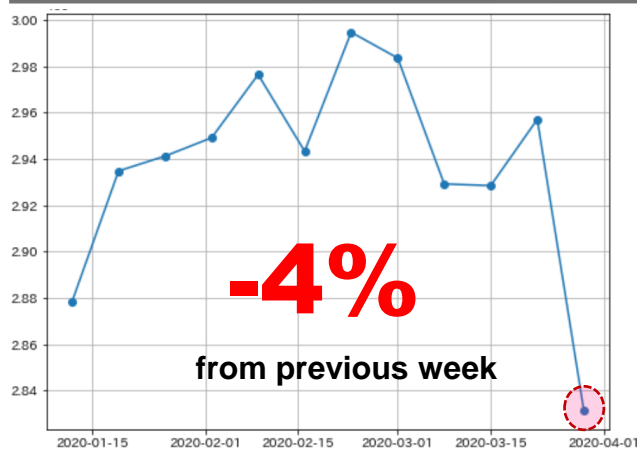


# **Industrial Production**

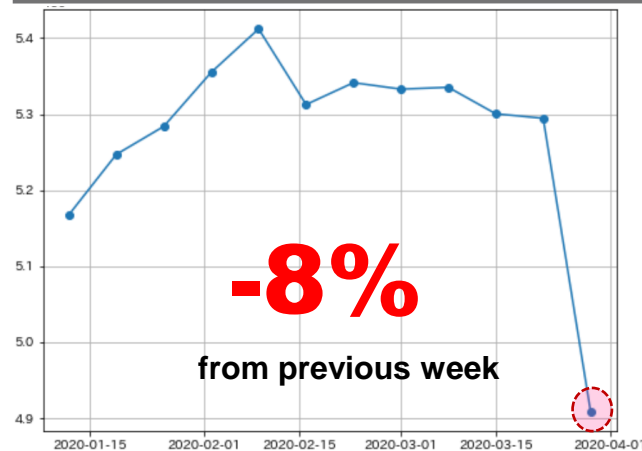


- Average of weekday foot traffic per each week look stable from early Feb to mid of Mar 2020.
- Foot Traffics of major industries don't suggest serious damage on production lines at each industry level
- In 4<sup>th</sup> week of Mar 2020, however, all industries declined Foot Traffic a few percentage from previous week

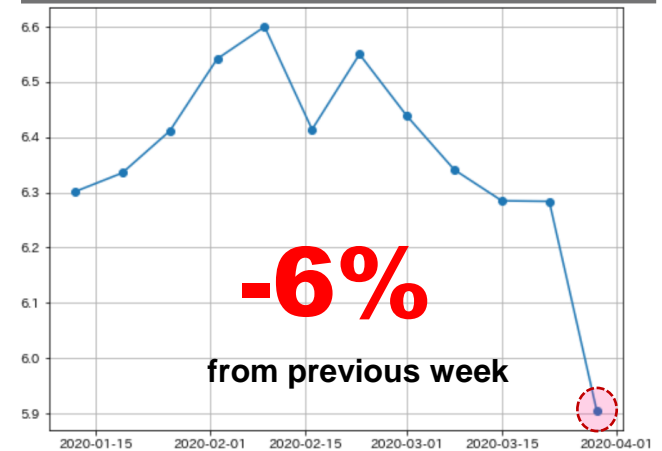
## Steel



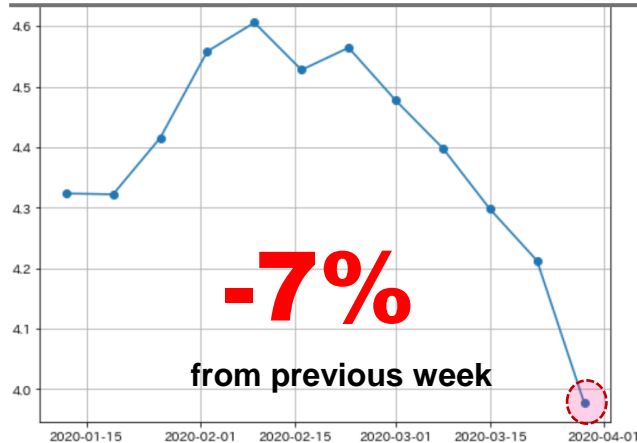
## Automobiles



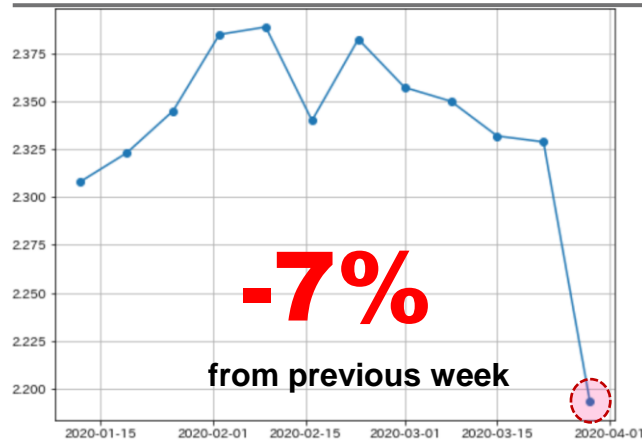
## Electronic Appliances



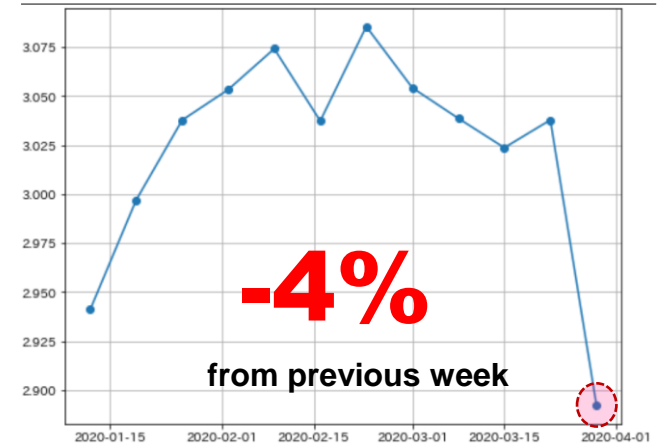
## Precision Instrument



## Machinery



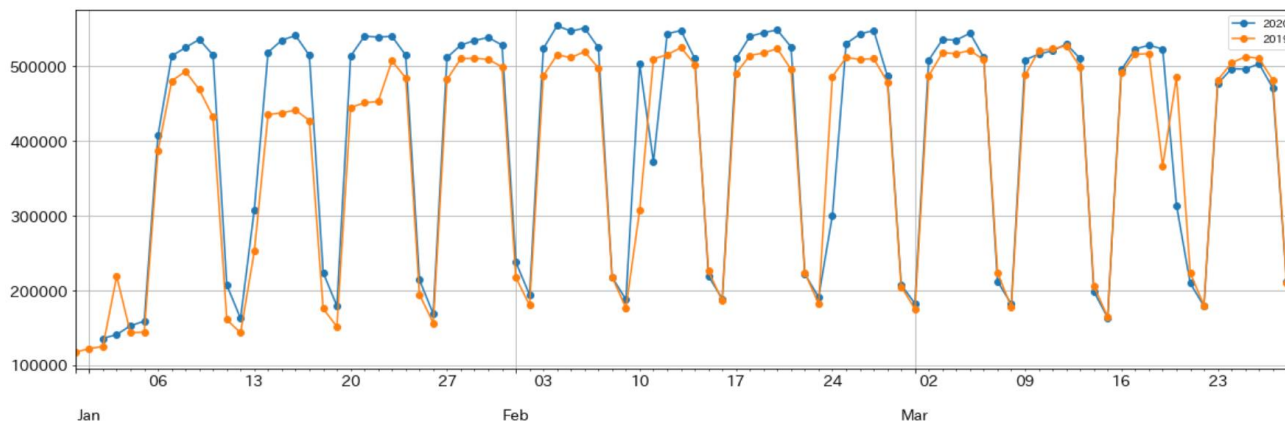
## Chemical



## Automobile Industry example

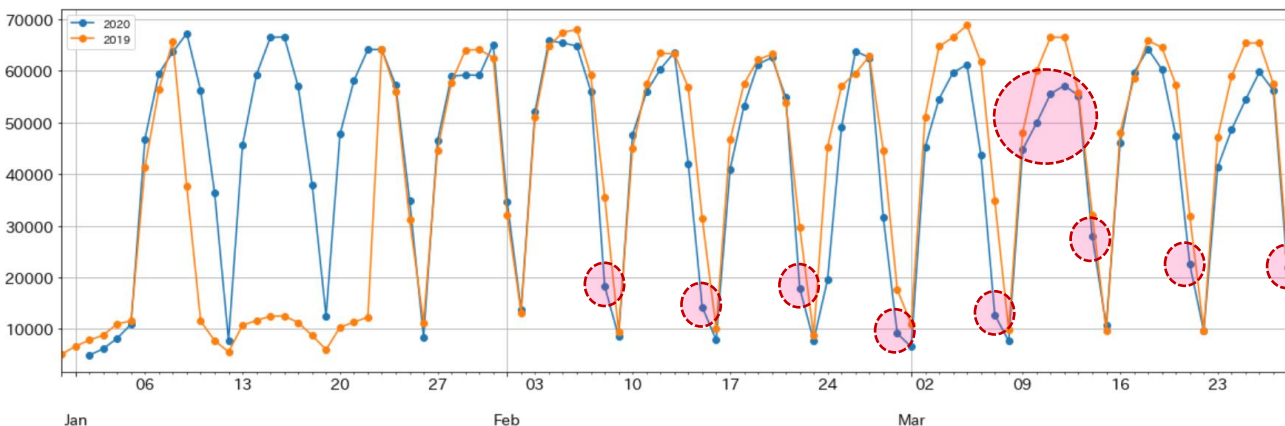
- Reduction in foot traffic for certain locations appear consistent with firm's announcements for production line stoppages due to supply chain delay
- Potential damage must come from the demand side instead of supply chain side, so need to monitor change of Foot Traffic trends at the individual locations for each company

### A firm level Foot Traffic (Automobile Large 70)



- Foot traffic in 2020 is slightly higher than last year for almost every week
- In the last week (23<sup>rd</sup> Mar to 29<sup>th</sup> Mar), weekday foot traffic declined by around 10% except for the 20<sup>th</sup> Mar 2020 holiday
- No announcements from the firm about material damage to the production line due to supply chain delay

### Kyusyu Factory of the above firm



- FT data is almost consistent with activity reductions due to supply chain delay

### Announcements for production lines

- Suspension of work: Every Saturday
- Night time stop: 3/9-11



## **Population Change in Downtown areas**

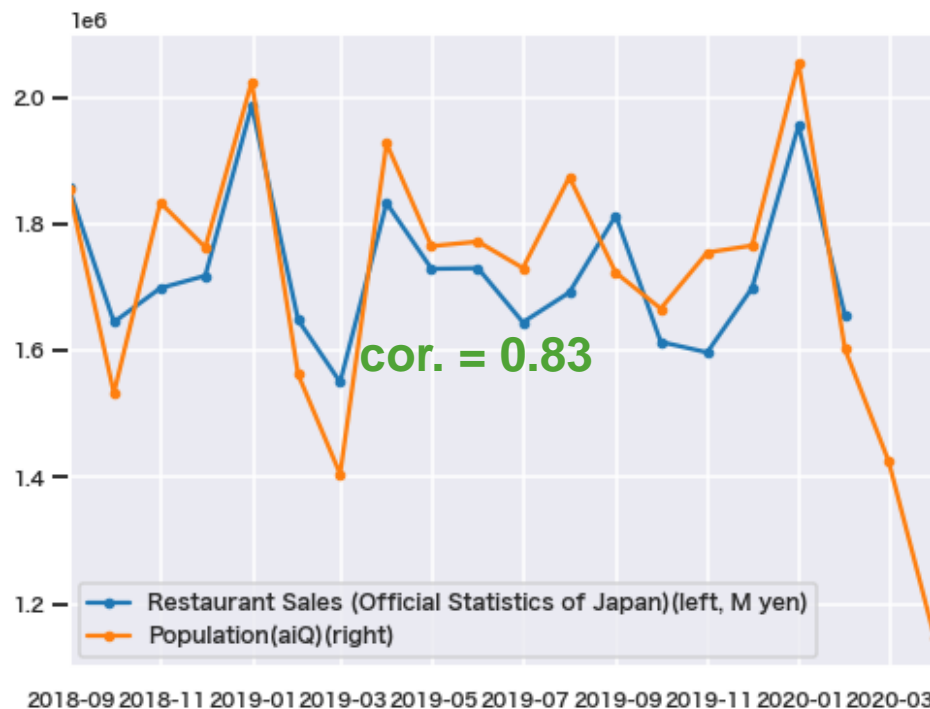


## Downtown population down sharply since early March

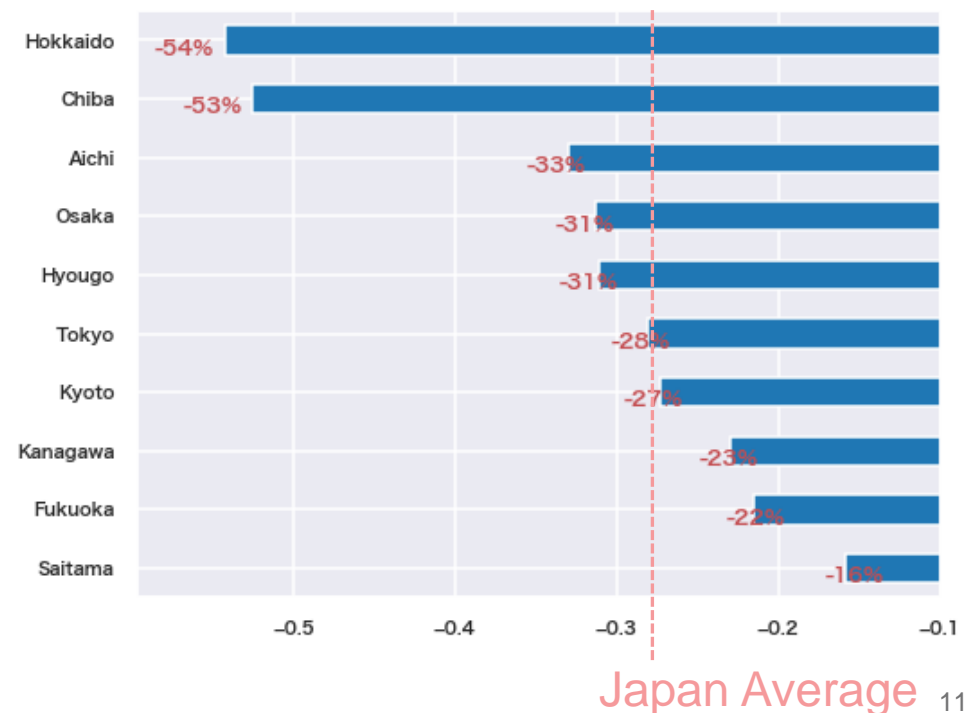
### Expected drop in restaurant sales is -28% year over year

- A study of population (foot traffic) changes caused by Covid-19 in 1,100 downtown (retail) areas across the country which have large numbers of restaurant employees
- Downtown's population dropped sharply after the week of March 2
- There is a high correlation of 0.83 between the total population of the 1,100 downtown areas and restaurant sales (Official Statistics of Japan)
- Given the above observations, the national restaurant sales decline predicted by the machine learning model is -28% (March, Year over Year)
- Hokkaido and Chiba are the regions expected to see the largest declines

Population in Downtown vs. Restaurant Sales



Population Change Rate (YoY, 2020 Mar.) in Major 10 Prefectures

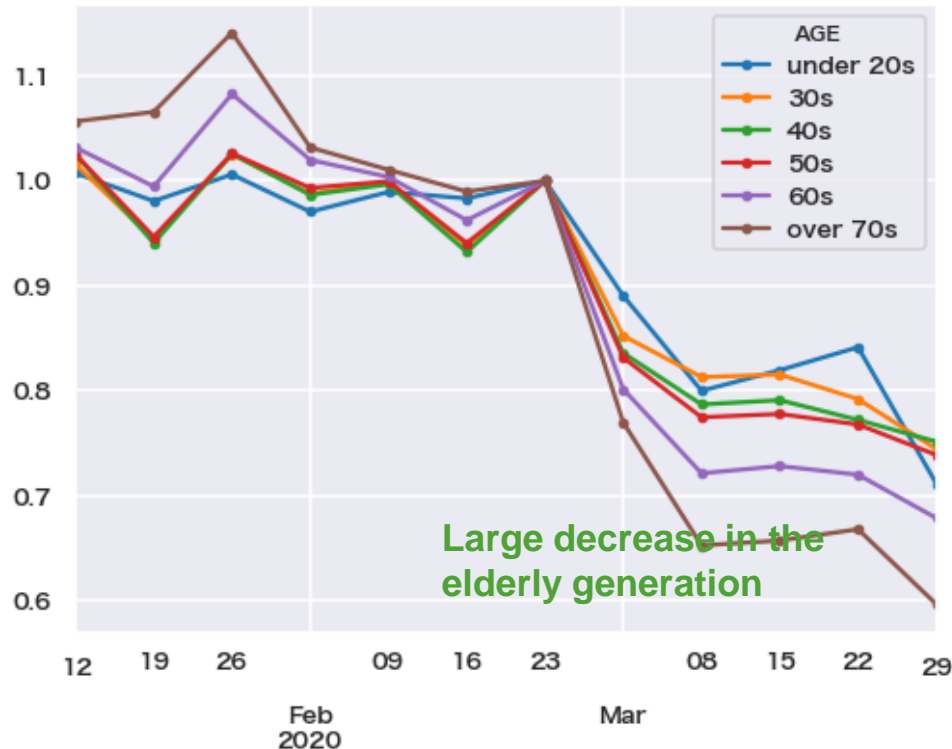


# The rate of population decline is higher in the 60s and 70s age groups

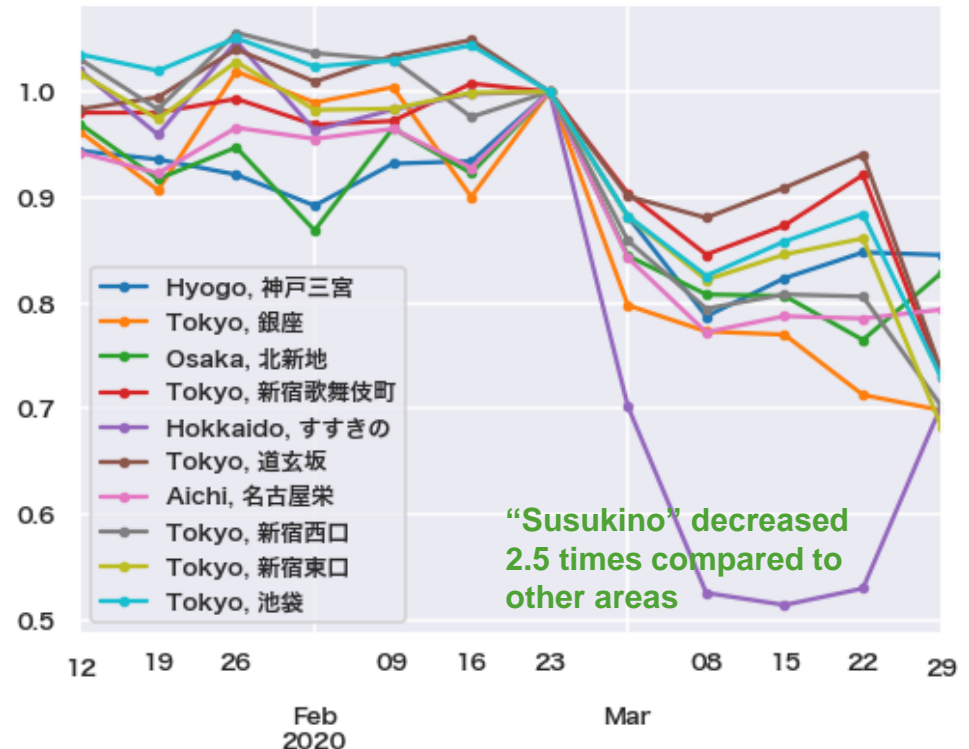
## The effect of the declaration of a state of emergency in Hokkaido was evident

- [left fig.] By age group, the rate of population decline is greatest in the 60s and 70s age groups, and comparatively the rate of decline is approx. 2 times higher than in the 50s and below age groups(\* there is almost no difference on weekends). This may be due to the high rate of serious illnesses and the fact that people are less likely to go out for work or other necessary activities
- [right fig.] Declining population rate by area (500m<sup>2</sup>) is shown for the top 10 areas by largest number of restaurant employees. The decline in Hokkaido Susukino is overwhelmingly large, suggesting that the declaration of a state of emergency on Feb. 28<sup>th</sup> – Mar. 18<sup>th</sup> had a certain effect. If a state of emergency is declared in other regions in the future, a similar decline could occur

Weekly Downtown Population by Age (week 2020-2-23 = 1)



Weekly Downtown Population by Area (week 2020-2-23 = 1)



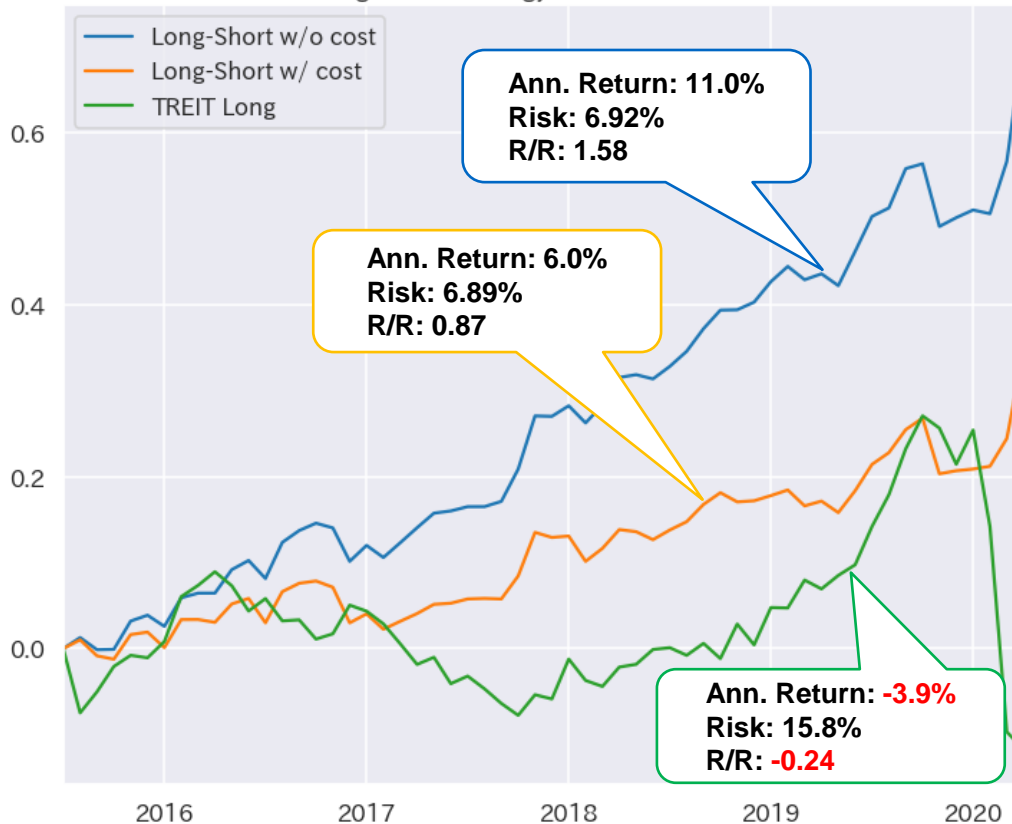


## **Back Testing Analysis**

- Simple long-short strategy outperforms a TREIT long strategy in terms of returns and portfolio risk
  - Universe is all of Japan REIT tickers.
  - Long tickers owning properties with soaring foot traffics and short the ones with declining foot traffics
- The outperformance of the long-short is most visible during the market crash in 2020-March.

## Returns: Long-Short vs TREIT Long

Long-Short Strategy: 1st - 5th Quantile



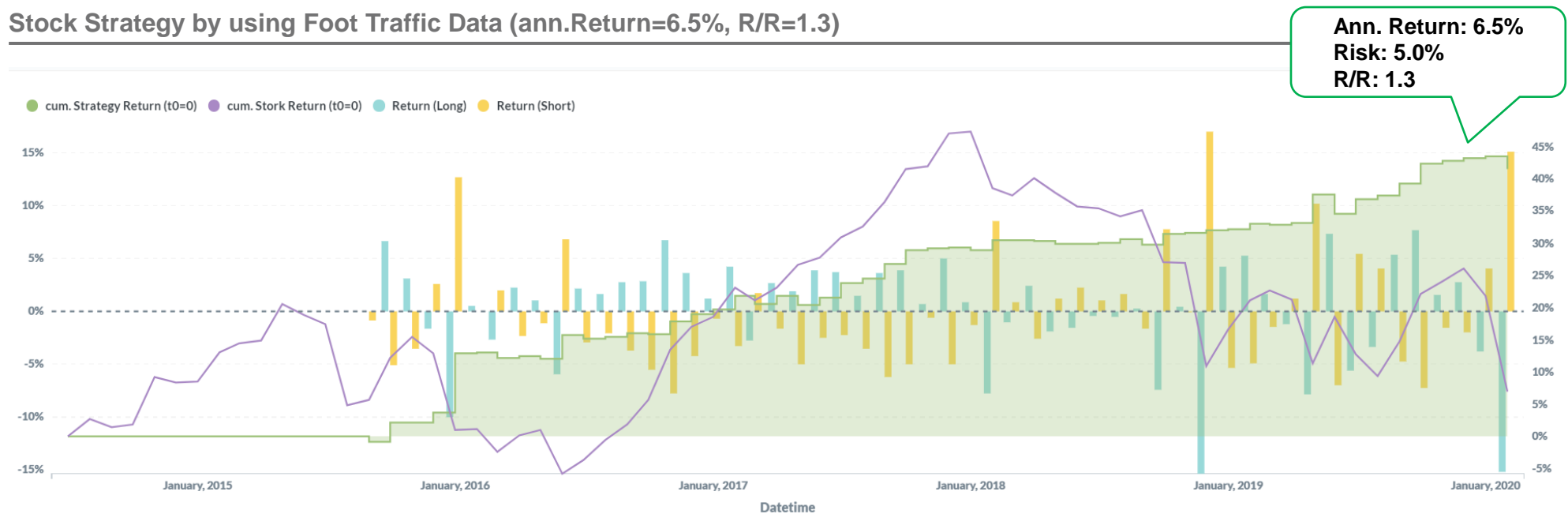
- Left Figure:
  - Blue: Long-Short Strategy without trading costs
  - Orange: Long-Short Strategy with trading costs factored in
  - Green: TREIT Long only
- Long-shorts outperform a TREIT long-only not only during the crunch time in 2020-March, but also during the other period.
- Long-Short Strategy relies solely on Foot Traffic data for generating trading signals.
- Long-Short Strategy Outline:
  - Initial Portfolio: 1 Billion JPY
  - Max daily market participation: 5% of total volume
  - Monthly Rebalancing
  - 5 Quantiles by YoY Foot Traffic measures:
    - Long: 1<sup>st</sup> Quantile
    - Short: 5<sup>th</sup> Quantile
- Trading cost estimations:
  - Long interest Rate: 1.5% per ann.
  - Short lending Cost: 2.0% per ann.
  - Market Impact: 50bps for 10% market participation per single name

## Stock Strategy by using Foot Traffic Data

ann. Return = 6.5%, R/R = 1.3

- Strategy: LONG a company with a factory population of + 5% over the previous year and SHORT a company with a -5%
- Period: 2015-7 ~ 2019-12
- Population: Manufacturing companies listed on the TSE1
- Rebalance: Monthly

Stock Strategy by using Foot Traffic Data (ann.Return=6.5%, R/R=1.3)







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