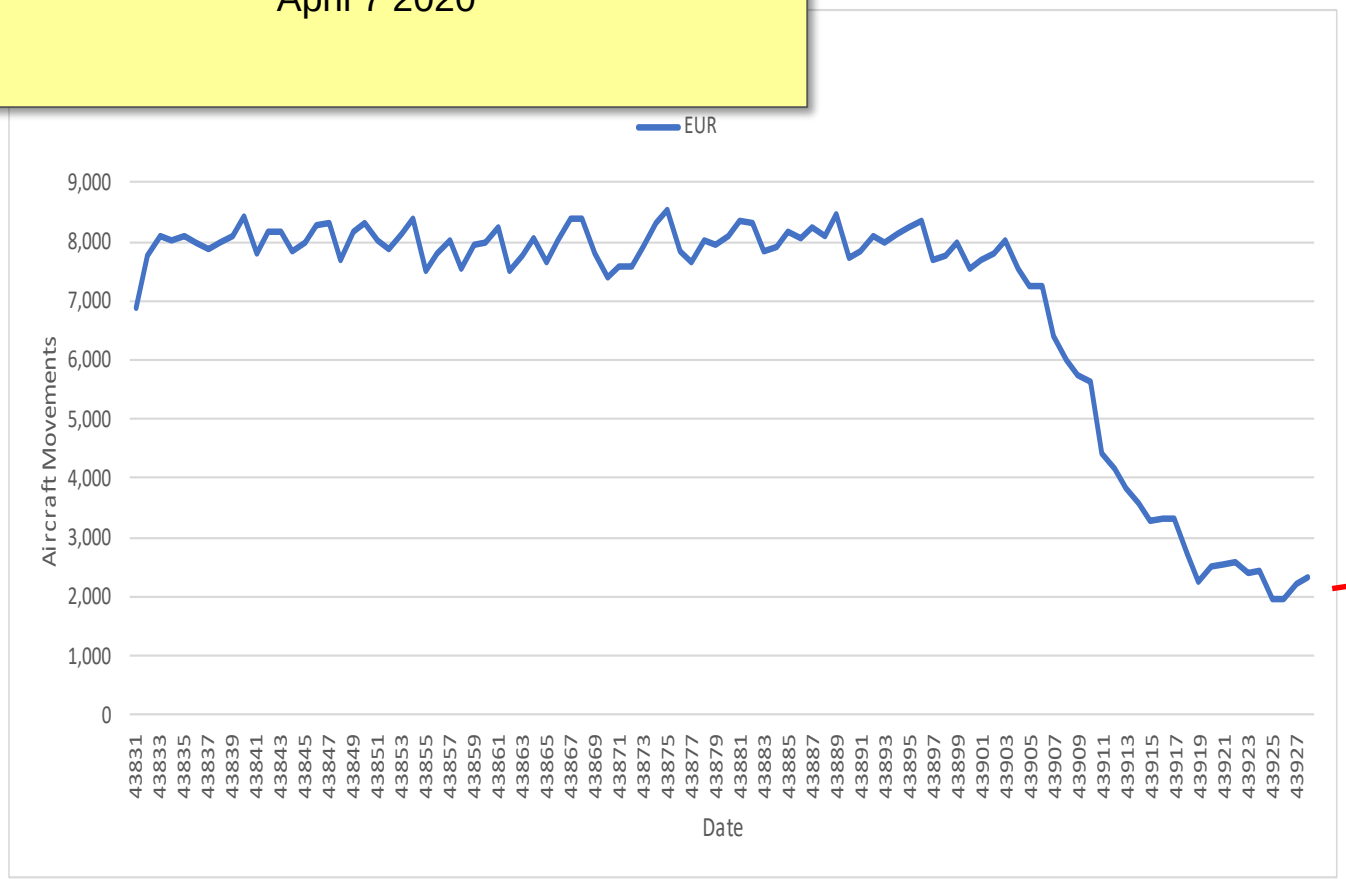
Recovery

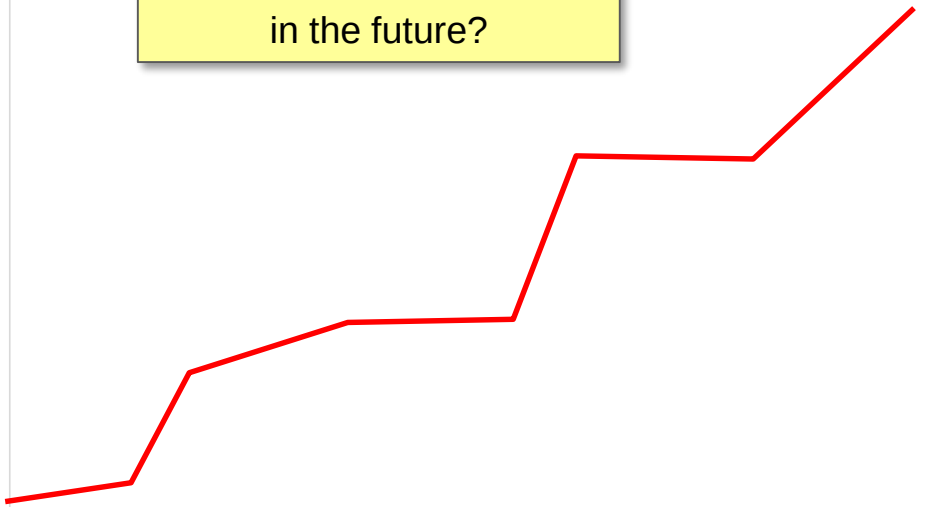
COVID-19
Air Traffic Demand Prediction during recovery

We know what happened – what now?

For example, here is European traffic, Jan 1 – April 7 2020



Forecast model: what does this pattern look like in the future?



Demand Prediction Modelling

Objective: Anticipate Traffic Demand during recovery

Data Input:

- AIREON records of flight departures worldwide
- OAG traffic compositions pre-COVID-19

Methodology (Past):

Reviewed worldwide scheduled flight data since early January

- Jan 5 – May 8
- 229 countries and territories

Traffic aggregated by week and by country pair

Looked for patterns of traffic decomposed into

- Domestic vs. international

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Developing Demand Prediction Analysis

Methodology (Future):

Recovery analysis consists largely of traffic decomposition

- Timing of when traffic will return is uncertain, but we determined the dependency of that timing on traffic in other countries
- If we know the percentage of traffic coming from and going to a country and country lifts restrictions we can start to anticipate demand
- E.g., In the USA majority of US traffic is domestic. Canada and Mexico are the 2 countries that contribute the most external traffic – when they open US can expect increase in demand

Outcomes:

- Merge anticipated demand with capacity data
- Model demand-capacity imbalances
- Prepare resources for the demand
- Balance demand and capacity

So what will drive demand?

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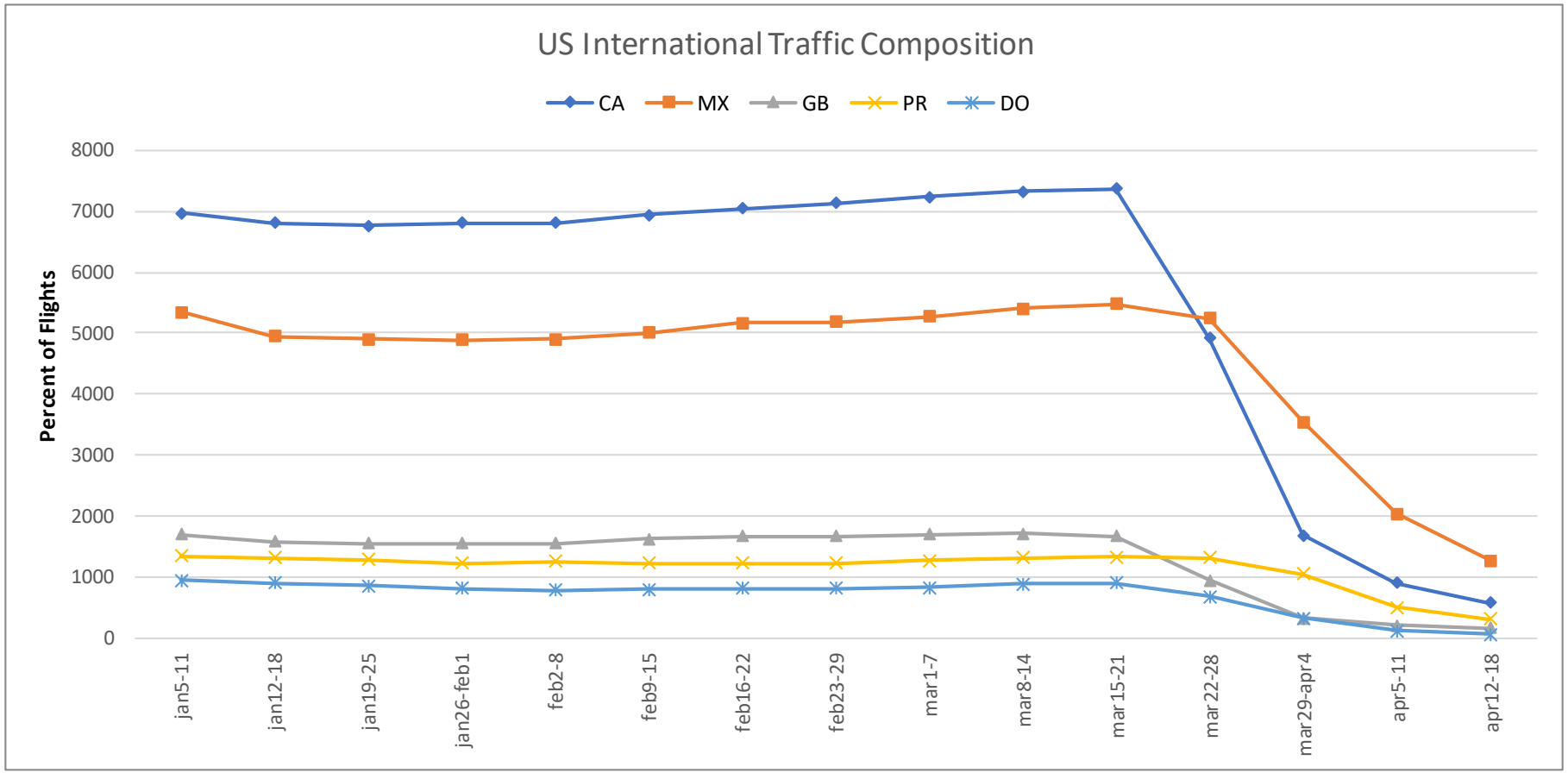
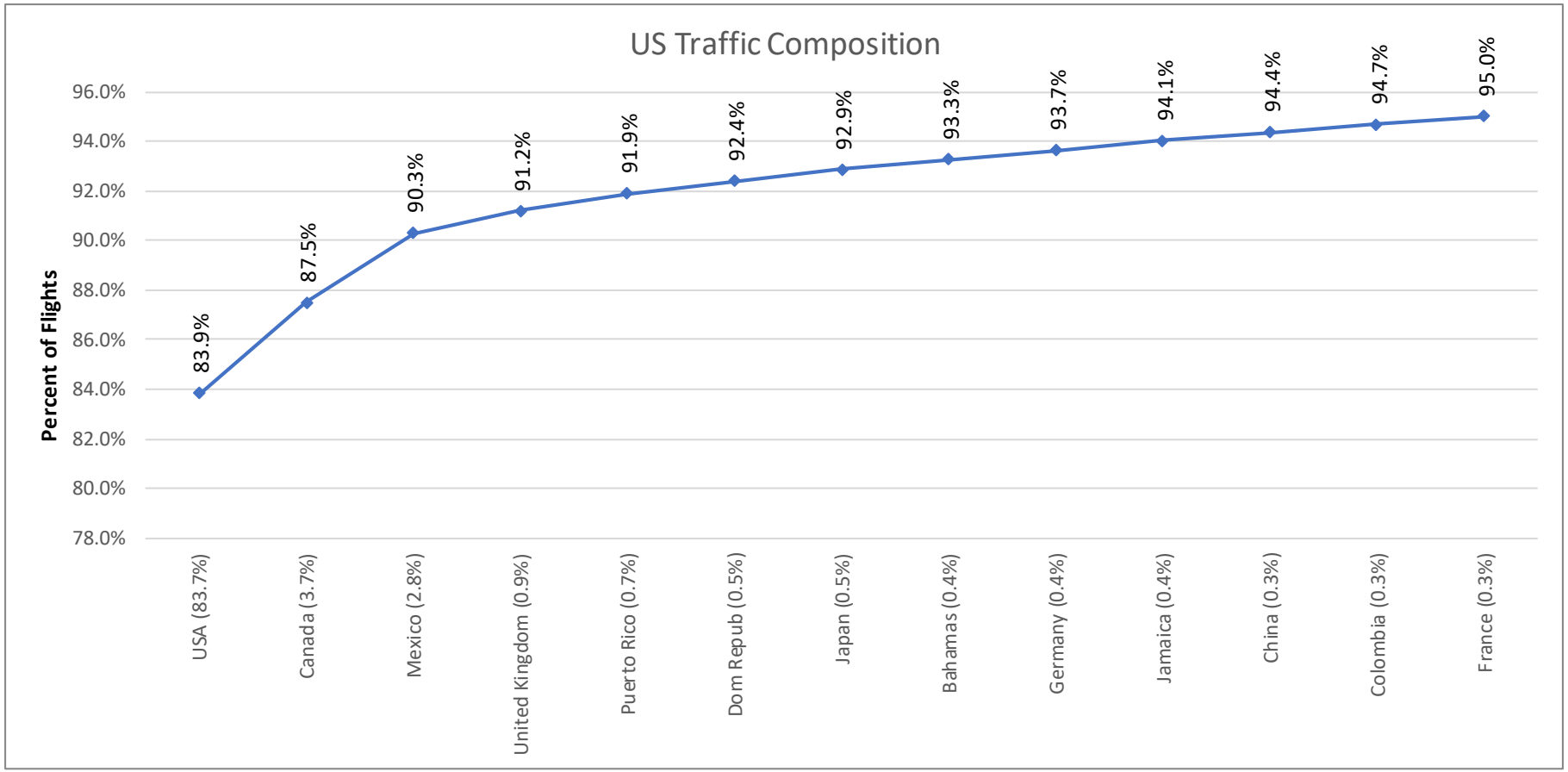
United States

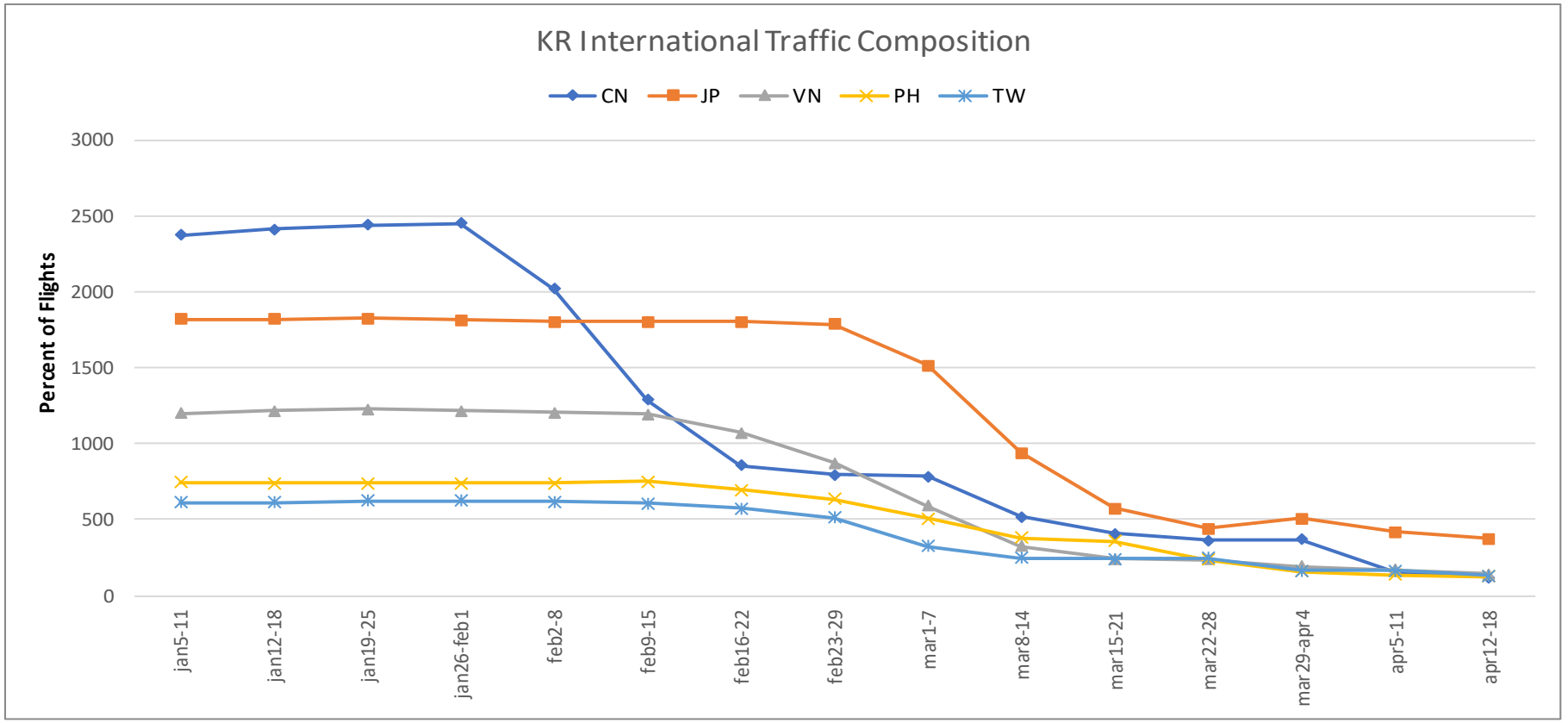


- Shows drop in international traffic was very uniform (mid-March), with Puerto Rico being a bit more gradual, and Mexico slightly later (March 22)

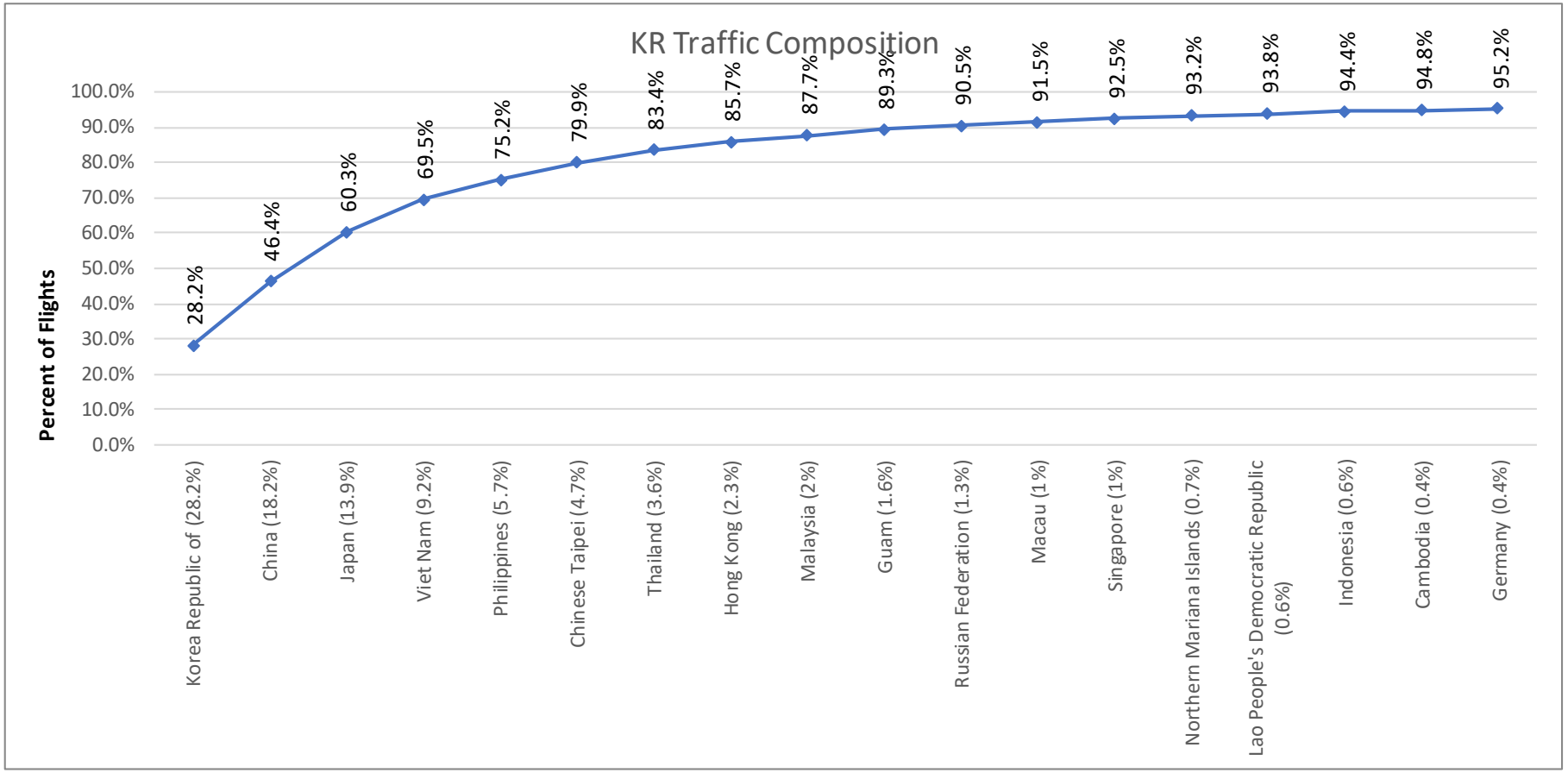


- US traffic is 83.7% domestic
- Adding Canada (3.7%) and Mexico (2.8%), we reach 90.3% of the traffic. Canadian/Mexican policies will likely be similar (in timing) to US policies. After Canada and Mexico, Each other country provides less than 1% of the traffic, so the order in which traffic resumes from/to other countries is not so critical, from overall traffic standpoint. (Of course, it matters greatly in terms of airline revenue)
- **Recovery for the US will be determined largely by timing of the return of domestic traffic**

Republic of Korea



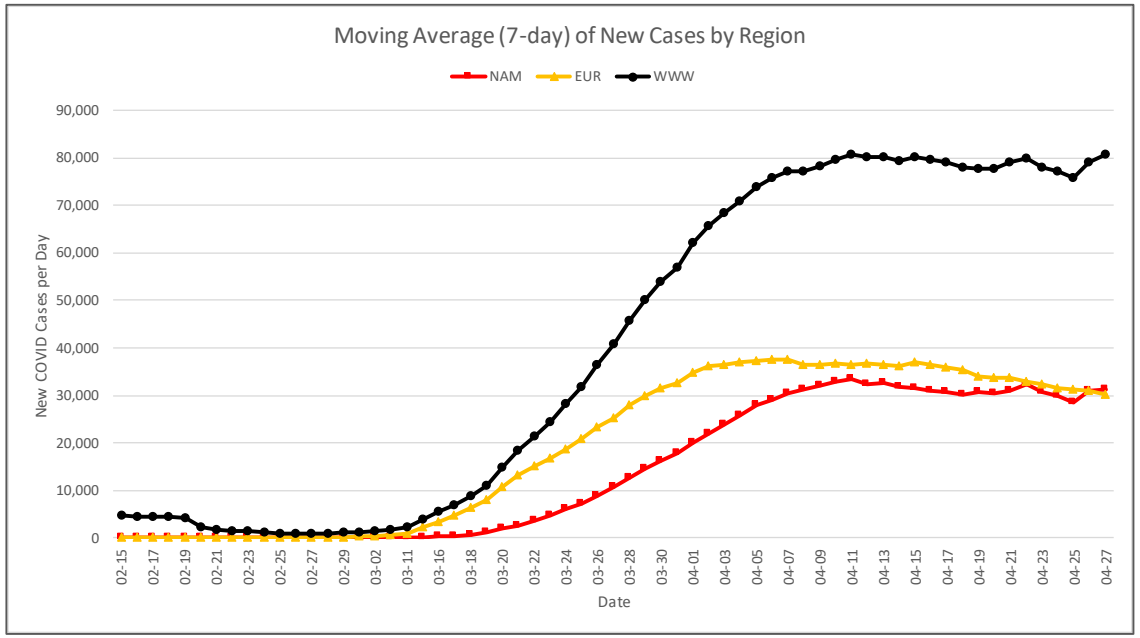
- Shows that the traffic drop in Republic of Korean was driven by three slightly different patterns:
  - China two-tiered drop (late Jan, then early March)
  - Japan one-tiered drop
  - Vietnam, Philippines, Taipei FIR one-tiered drop mid Feb

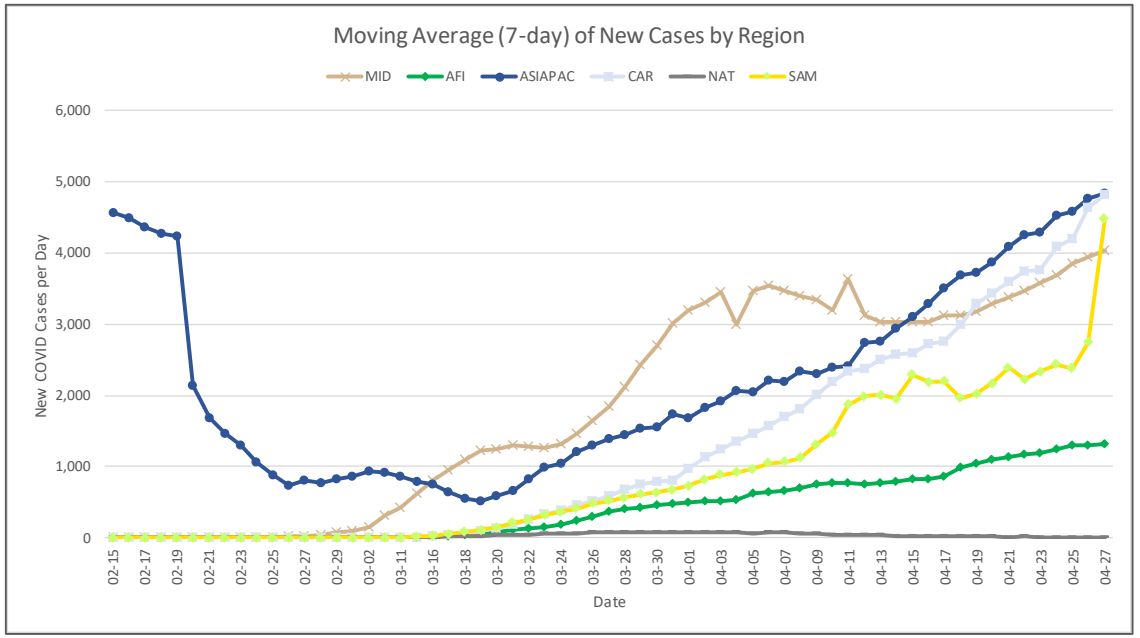


- For Republic of Korea, domestic traffic is 28.2% of overall traffic
- China (18.2%) and Japan (13.9%) are the next biggest contributors, which brings total traffic to 60.3%
- After that, each of the other countries contributes no more than 10%
- **So, recovery will be determined by domestic traffic, China, and Japan, with a slow gradual climb after that**

COVID Trends and Flight Forecasts

Number of new cases, by region (moving average)



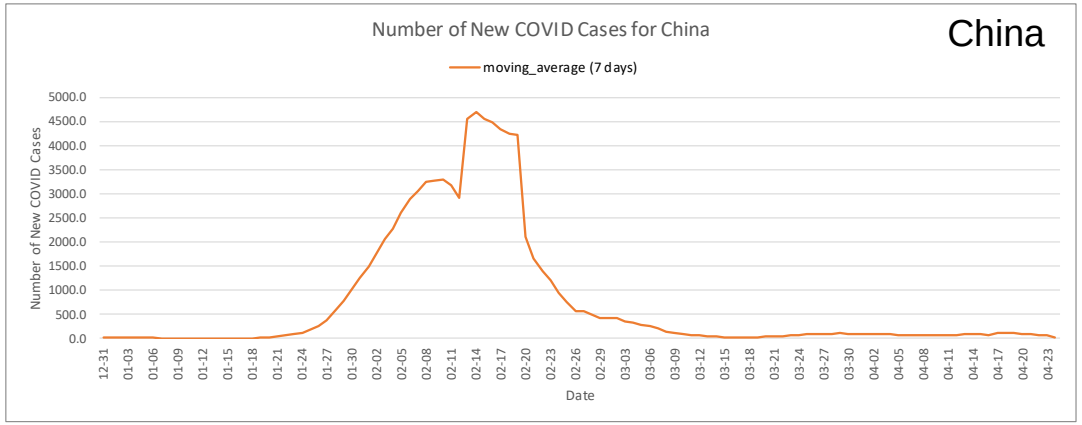


- The number of new cases is levelling off for:
  - Worldwide (WWW)
  - Europe (EUR)
  - North America (NAM)

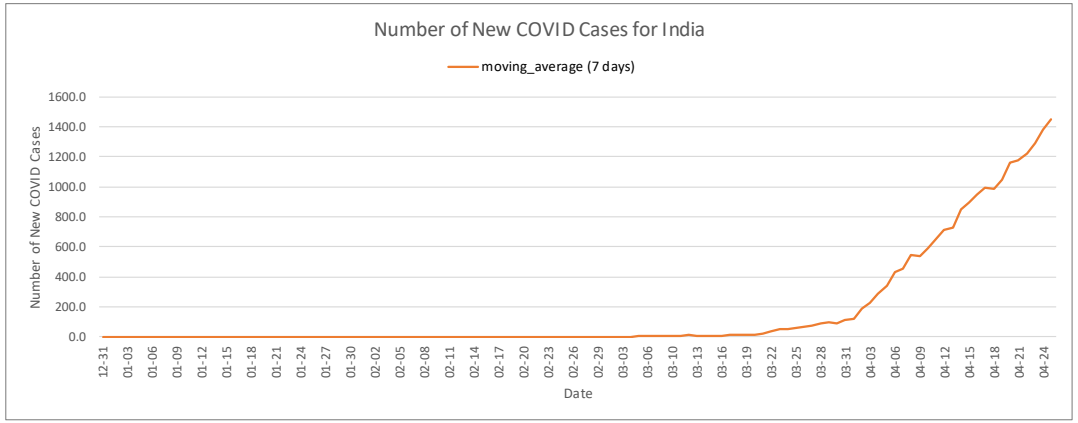
- The number of new cases is <u>not</u> levelling off for:
  - Asia Pacific (ASIAPAC)
  - Africa (AFI)
  - Middle East (MID)
  - Caribbean (CAR)
  - North Atlantic (NAT)
  - South America (SAM)

China dropped early on, but other countries in ASIAPAC are still climbing in new COVID cases

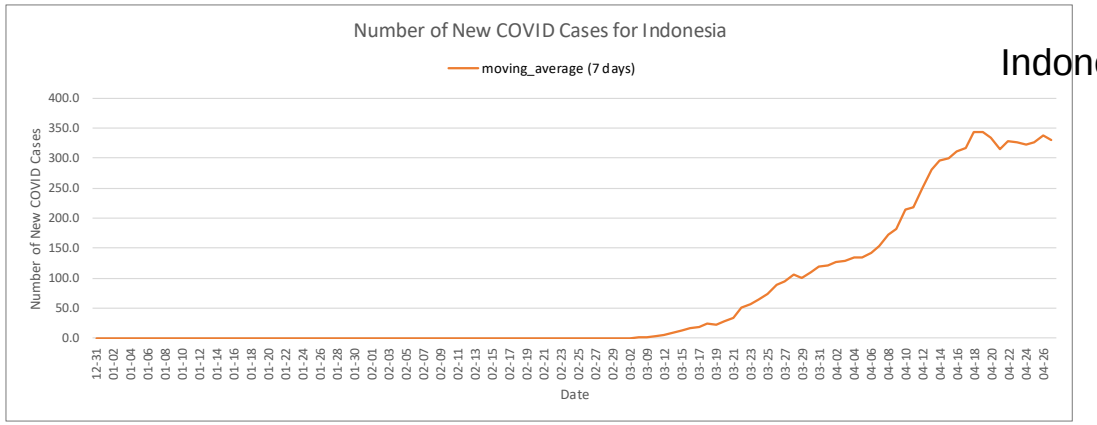
China vs. other countries in Asia Pacific region, number of new cases



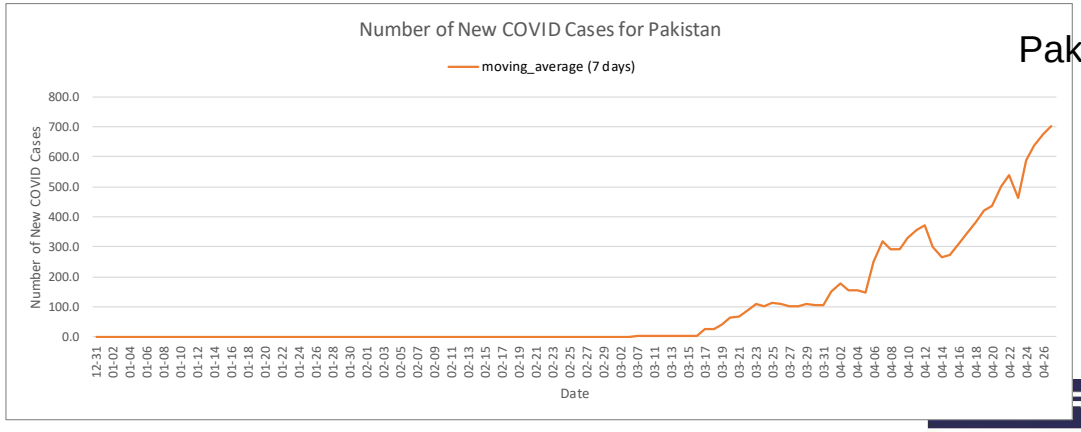
China



India



Indonesia



Pakistan

- The COVID pattern for China (e.g., total cases per million) has followed a very different pattern from other countries in the Asia Pacific region
- Therefore, China may have different timing of its travel policies

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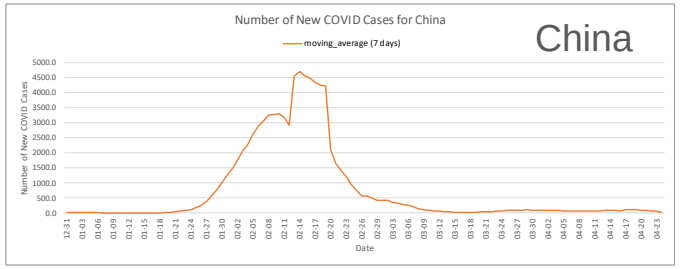
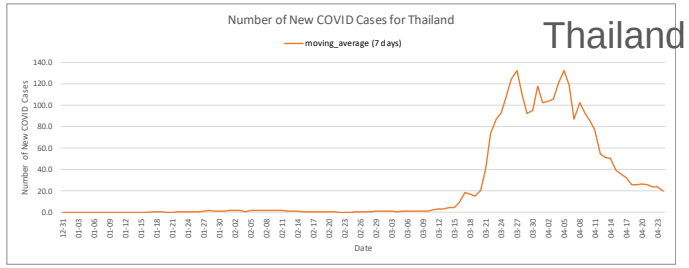
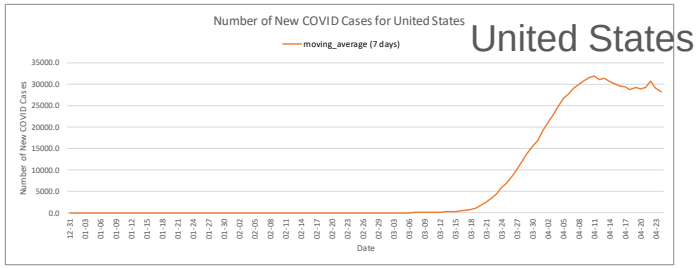
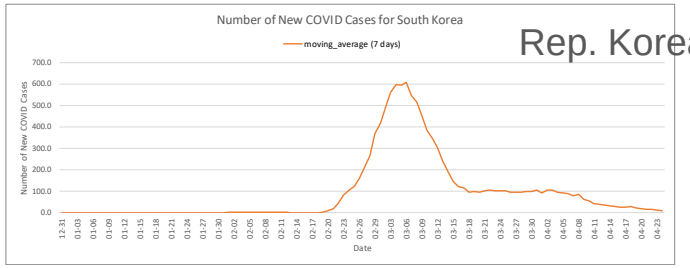
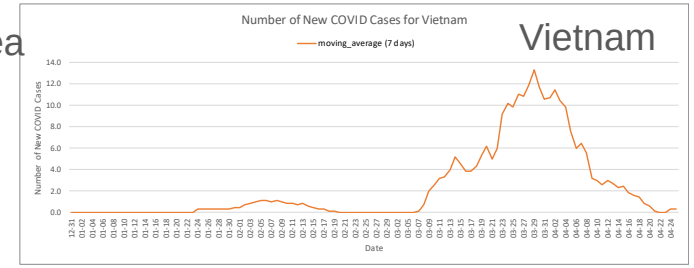
COVID trends, by major traffic contributors to Hong Kong China

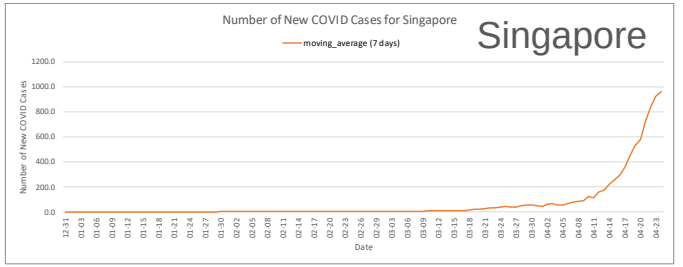


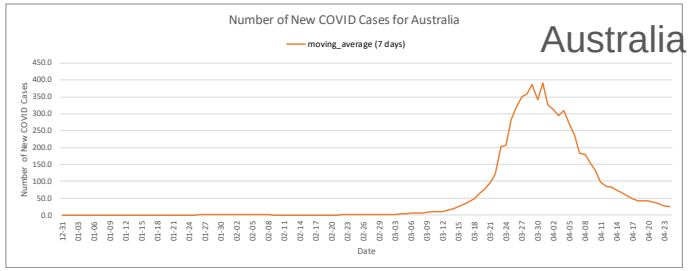


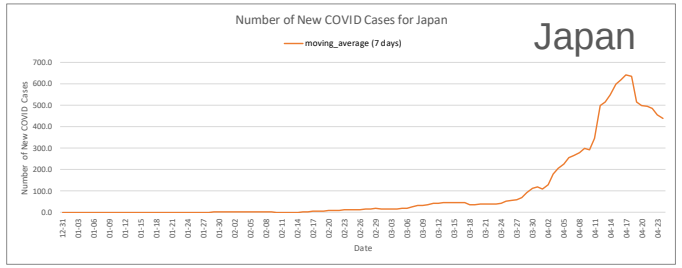


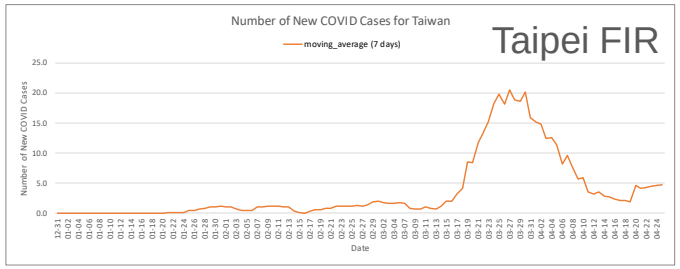


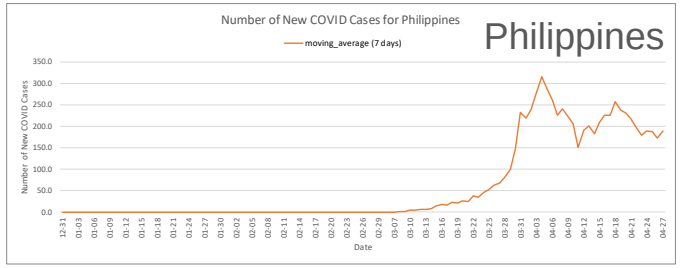








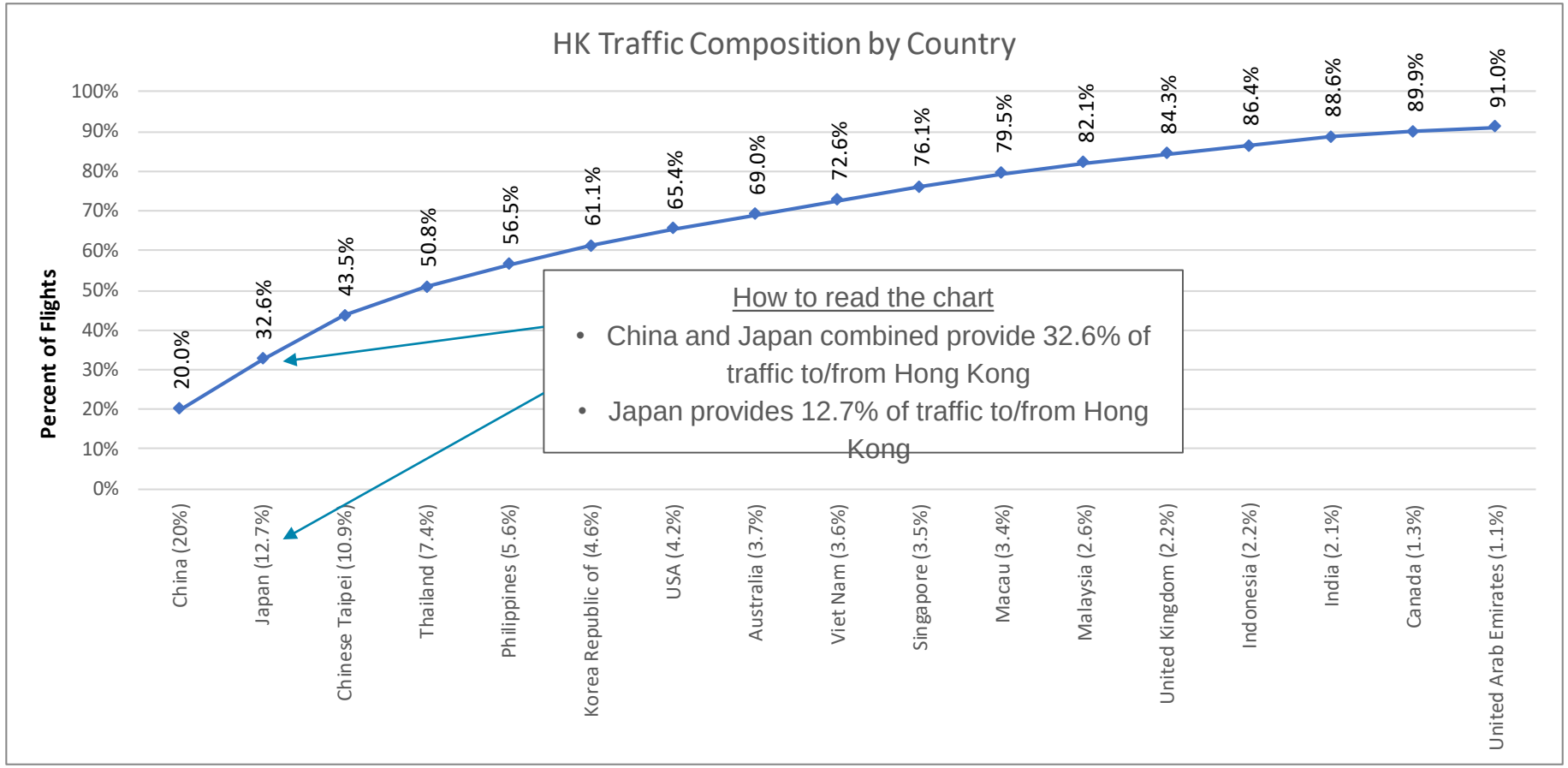




- These are numbers of new cases over time, from Jan 5 to April 27
- We arranged countries/territories by most recovered to least covered
- This suggests a possible ordering in which traffic may return

These are scheduled flights in/out of Hong Kong China. Data not available for overflights.

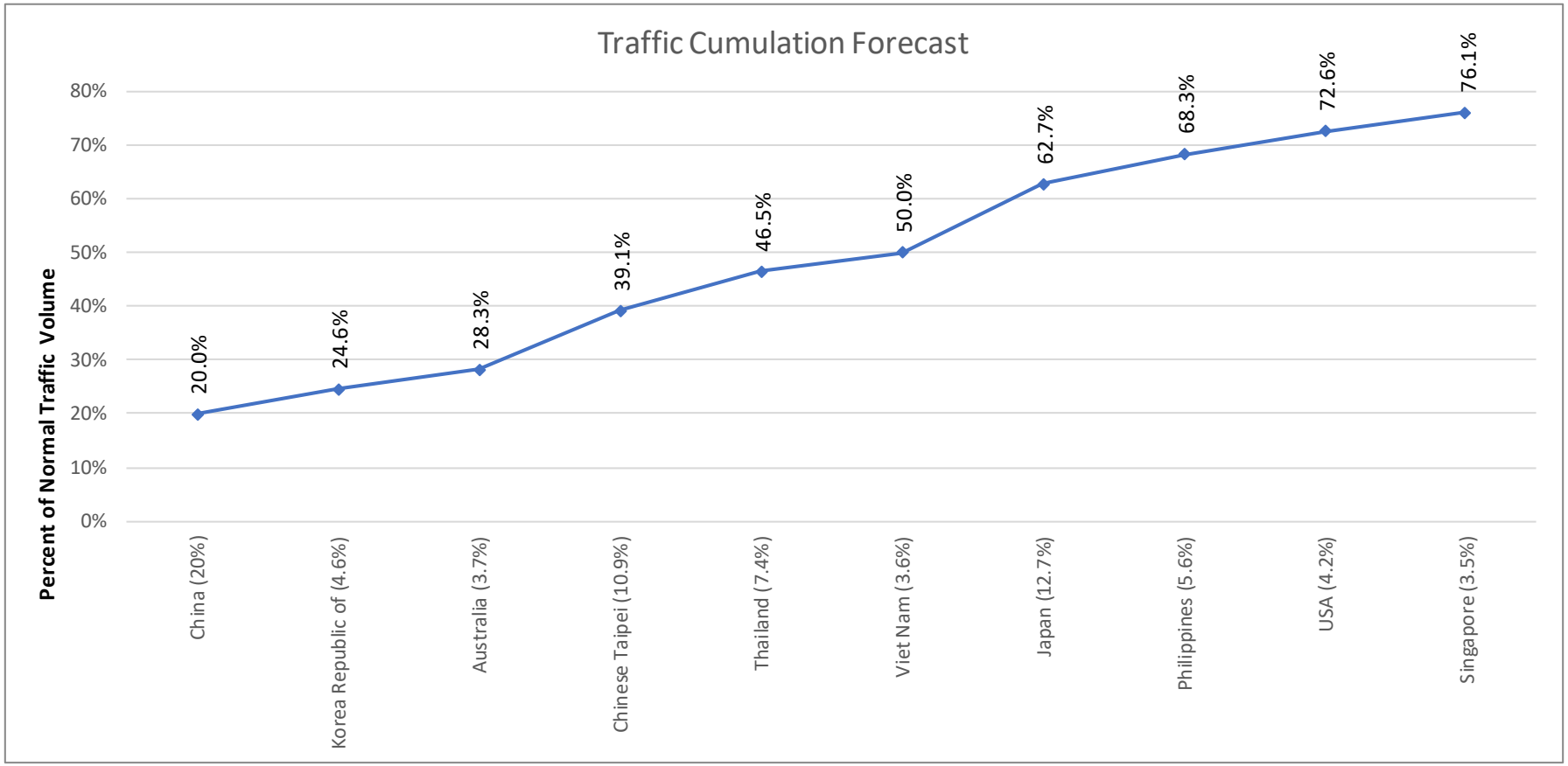
Traffic Composition: by Country/Territory – Hong Kong China



These are scheduled flights in/out of Hong Kong. Data not available for overflights.

- The most that any one country/territory contributes to Hong Kong China traffic is 20% (China)
- It takes 10 countries to reach over 75% combined contribution
- It takes 17 countries to reach over 90% combined contribution
- **During recovery, Hong Kong has <u>many countries</u> to monitor for returning traffic**

Possible Pattern of Recovery Hong Kong China (scheduled flights only)



- This assumes that countries/territories with more rapid COVID recovery will accept/send traffic sooner
  - This determined the ordering on the horizontal axis
- Forecast suggests a steady traffic growth, rather than a surge, as countries/territories resume traffic
  - Timing of how long this will take is difficult to determine

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Key Takeaways

- Generally COVID cases and cases/million are still on the rise in the APAC region
- Countries/territories within a given region are likely to follow similar policies on travel restrictions
- Because traffic is composed of many countries/territories, Asian ANSPs will have many countries/territories to monitor during recovery
- Each Country will need to do continued analysis to predict demand during recovery

This analysis can be done for any:

- Continent
- Region
- As individual countries

Add complexities to the modeling as we learn more (COVID-19 Infections and restriction relaxations)

Model will improve as more data becomes available during the recovery

CANSO/Metron Demand Prediction Partnership

CANSO and Metron formed partnership to supply Pre-Tactical and tactical demand prediction

- 36 hour Pre-Tactical and Tactical demand prediction at airports, defined airspace FIR and sector boundaries
- Common situational awareness
- Demand awareness to allocate resources
- Increase capacity as required
- Reduction in delays
- Rerouting of flights
- Informed decision making for all stakeholders

- Web Based
- OAG, FPL and ADS-B data integration
- On-line training and support
- Complimentary service until 31 October 2020
- Available to all ANSPs not only CANSO members

CANSO members to contact their Focal Point and cc Hai Eng Chiang – Hai.eng.chiang@canso.org

Non CANSO members to contact Stuart at stuart.ratcliffe@metronaviation.com and cc Hai Eng Chiang – Hai.eng.chiang@canso.org

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