STATISTICS

Using flight data to build a High-Frequency global Passenger Capacity Index

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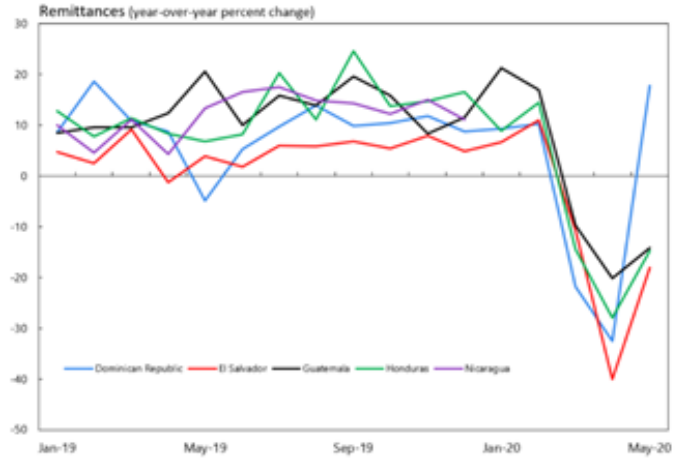
The economic impact of COVID-19 on tourism

- Many countries have taken strong containment measures, such as border closures and lockdowns, to “flatten the curve” of infection.
- International arrivals declined by 74% in 2020, translating to a loss of USD 1.3 trillion in export revenues (UNWTO).
- Economies of tourism-dependent countries have been hit harder
- Policymakers face daunting challenges in assessing of the economic impact of travel restrictions
  - Countries moving at different speeds between higher and lower levels of restrictions on travel
  - Timely official data related to travel in short supply
  - For tourism-dependent economies, it also hampers the ability to catch turning points in the recovery.

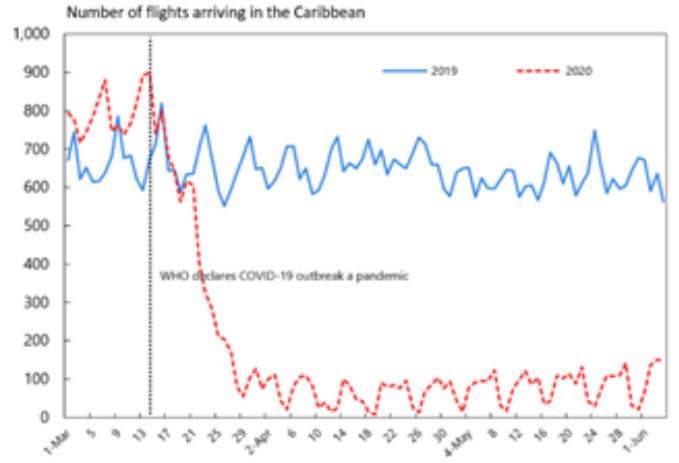
No help from abroad

Remittances and tourism arrivals fell sharply.



Sources: FlightRadar24 database; and IMF staff calculations.

Sources: Haver Analytics and national authorities.



INTERNATIONAL MONETARY FUND

High frequency indicators to monitor economic impacts

Very early in the pandemic colleagues began to use flight data to track the number of flights to help better understand impacts on tourism revenues.

Our enhancements to the use of flight data:

- Exclude non-passenger flights (cargo, private, hobby, business flights, etc)
- Account for the differing capacities of flights
- Distinguish between domestic and international flights
- Present data in index form in addition to absolute numbers for ease of analysis
- Create national, regional, and global aggregations
- Develop a dashboard to allow internal users to easily develop customized queries including tabulation

Commercial passenger flights

Flightradar24 is a **global flight tracking service** that provides real-time information about flights around the world. (All flights type)

To identify **Commercial passenger flights, for every flight** we matched information on the **airport of departure and arrival**, **airline operator** and **aircraft** against several sources publicly available.

Airports

All airports with scheduled commercial traffic air service.

Airlines

Passenger airlines sourced from public lists and manual refinements

Aircrafts

Characteristics of planes collected from several databases.
These include max altitude, length, number of seats.

Passenger Capacity Index

Passenger Capacity Index

$$Passenger\ Capacity\ Index\ W_t = \frac{\text{Passenger Capacity } W_t}{\text{WAver2019}} \times 100$$

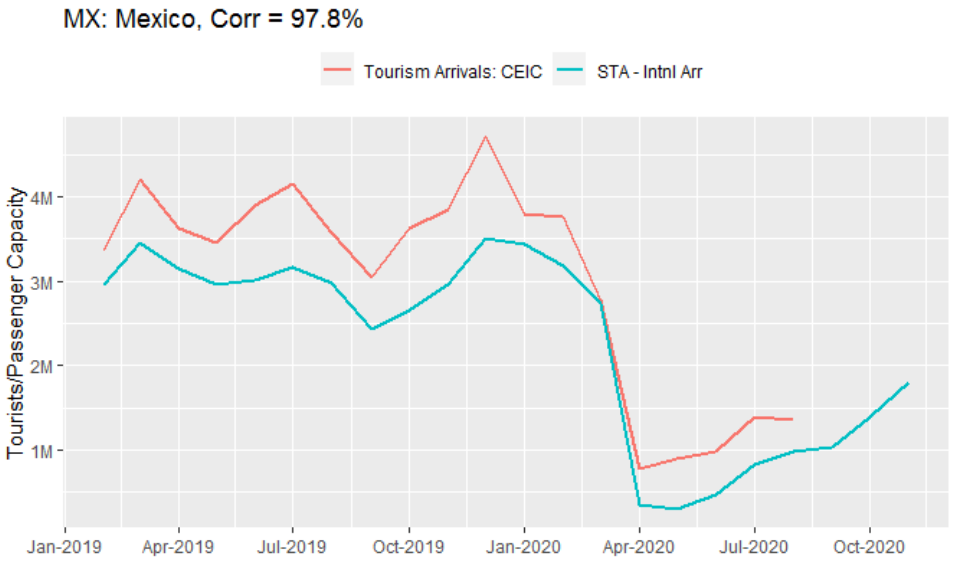
Passenger Capacity is estimated from the *number of seats* information as included in the aircraft characteristics. (if a range for different combinations of seat classes, this is estimated from the geometric mean)

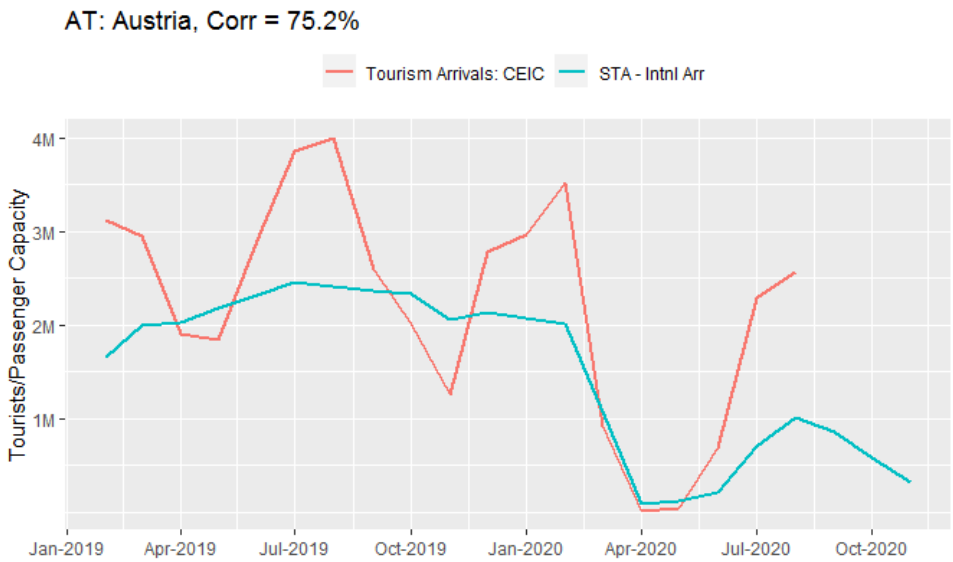
We aggregate estimates at different granularities:

- Global and Regional Indices
- Country series
- *Airport pairings series*

Comparisons to Tourism Arrivals data

Mix of results:



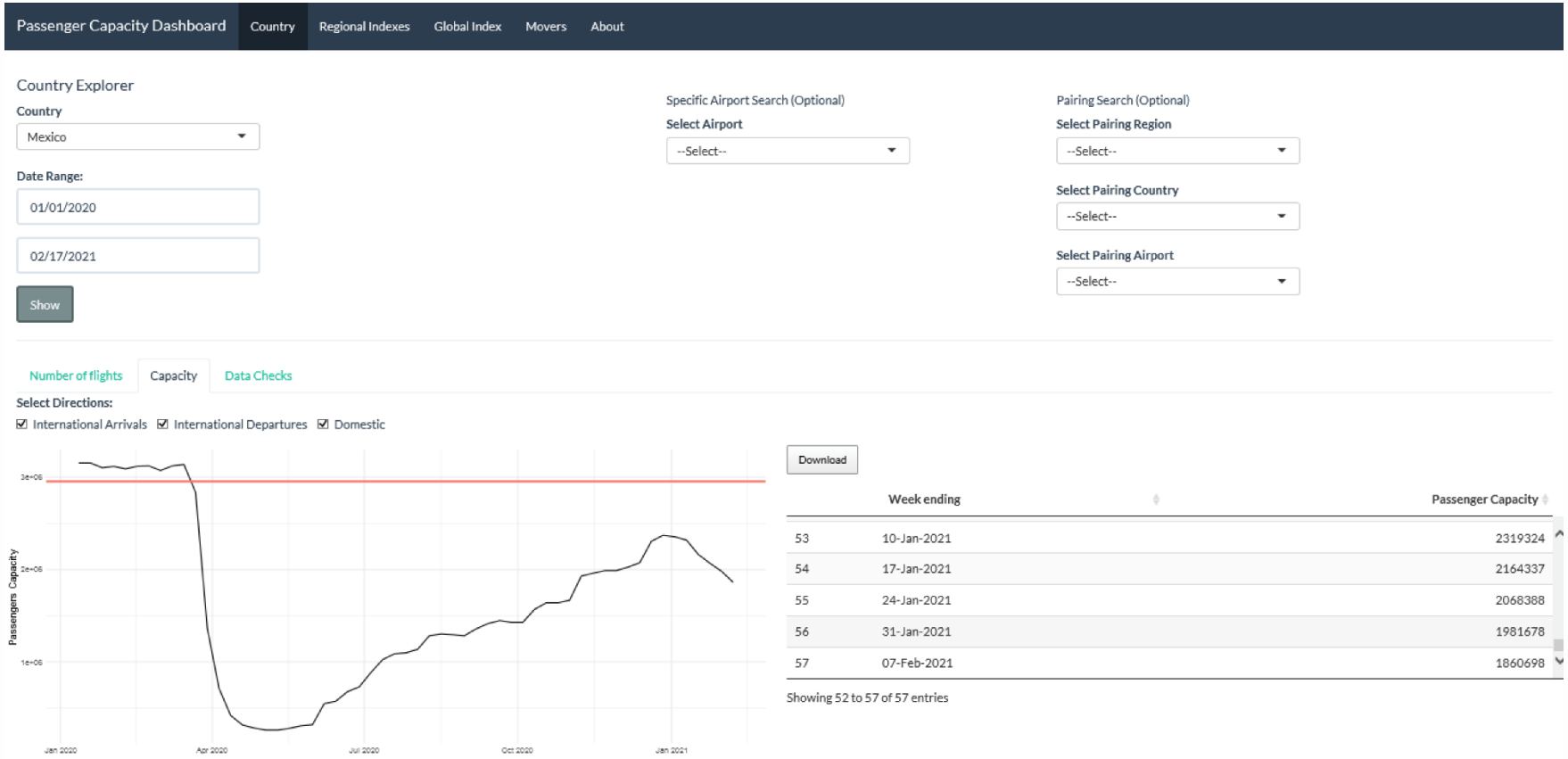


Source: CEIC Data Company Limited, FlightRadar24, IMF Staff Calculations

For several countries the series are very close, with almost perfect correlation

- Lack of official data is an issue, especially for more recent comparisons. Series had to be compared monthly.
- Estimation of Tourism arrivals varies between countries based on different availability of source data.
- Passenger Capacity vs tourism arrivals: differences might be largely due to other means of entry to countries (land, sea) and changes to seat utilization during the pandemic.

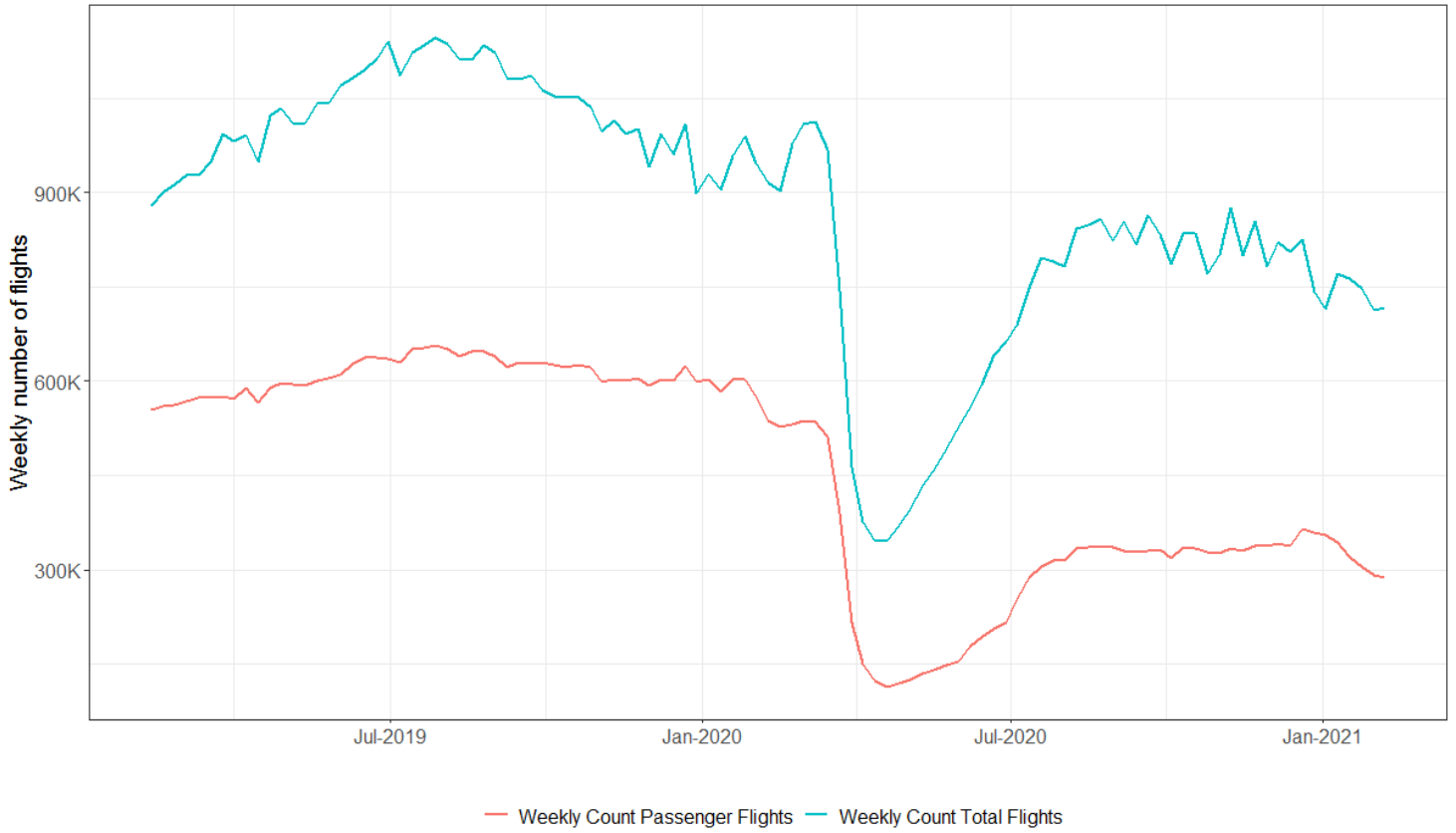
Internal dissemination dashboard



- Country view: country series, country-to-country view down to airport level
- Regional and Global Indexes
- Movers: weekly tracking country movements
- Linked to the database and automatically updated

Value added (1)

- **Precision:** Total flights do not convey the full picture of how commercial passenger air traffic is developing across countries.



Source: FlightRadar24, IMF Staff Calculations

Value added (2)

- **High-Frequency and timely data:** weekly with one week lag suited to nowcasting.
- **An estimation of passenger capacity:** supplementing information on the number of flights, in the absence of publicly available detailed passenger numbers data.
- **Detail of analysis:** an accompanying dashboard allows users to easily generate weekly passenger capacity estimates down by region and country pairings.
- **These enhancements are facilitating a more granular analysis of the impacts of COVID-19 related travel disruption:** especially important in economies where tourism accounts for large share of GDP and income inflow.
- **Indices facilitate multilateral comparison:** such as country performance as measured against regional (or peer country) performance.

Areas for enhancement

Passenger capacity vs. Number of people flying: The index does not take into account the reduced numbers of passengers flying on individual flights and socially distanced configurations. If we can access passenger numbers in the future, we will present those data also.

Cargo flights: We cannot at present identify flights operated by passenger airlines as cargo-only flights. We expect that our data shows a temporary increase in such flights during the early stages of the pandemic as passenger airlines mobilized to transport personal protection equipment. We are currently exploring this phenomenon in an attempt to discern cargo-only flights and create dedicated estimates to provide an overall picture of the commercial industry.

Full picture: Many small island nations heavily rely on tourist arrivals via cruise lines, which in turn have a positive effect on their economy (ICLA, 2019). With no clear timeline for cruise operations to resume and uncertainty on how the industry will recover, we plan to develop new estimates from vessel traffic data as it is already being done for cargo vessels (Cerdeiro et al., 2020). These high-frequency data will accompany air passenger capacity estimates.