Effects of Novel Coronavirus (COVID-19) on Civil Aviation: Economic Impact Analysis

Montréal, Canada
31 March 2020
The preliminary estimates indicate the COVID-19 impact on scheduled international passenger traffic during first half 2020, compared to Baseline (originally-planned):

- Overall reduction of 37 to 47% of seats offered by airlines
- Overall reduction of 401 to 528 million passengers
- Approx. USD 88 to 116 billion potential loss of gross operating revenues of airlines depending upon the V- or U-shaped path
Introduction, Background and Situation Overview
Scheduled commercial traffic

Total (international and domestic) services

Air traffic has been vulnerable to external factors including disease outbreaks

Source: ICAO Annual Report of the Council
Previous outbreaks/pandemics had a V-shaped impact on aviation.

History shows that SARS has the most serious impact on traffic. At the height of the outbreak (May 2003), monthly RPKs of Asia-Pacific airlines were 35% lower than their pre-crisis levels. Overall in 2003, Asia-Pacific airlines lost 8% of annual RPKs and $6 billion of revenues.

Source: IATA Economics’ Chart of the Week (24 January 2020)
Disease outbreak directly impacts air traffic and revenues of aviation industry

**Number of cases / countries affected**
- Flights cancellations
- Aircraft groundings
- Travel bans
- Border closures

**Traffic decline**
- Fewer flights
- Lower load factors
- Impact on yield

**Revenue loss**
- Proportionate to traffic loss
- Decline in unit revenues, especially in non-aeronautical (airports)

*Source: The Impact of COVID-19 on the Airport Business (ACI)*
COVID-19 outbreak has impacted air traffic for China starting from late January 2020

Note: The above includes a) international from mainland China, Hong Kong SAR of China, Macao SAR of China, Taiwan, Province of China; b) domestic within mainland China, and c) regional between mainland China and Hong Kong SAR, Macao SAR and Taiwan Province.

Source: CARNOC.com/VariFlight (retrieved on 9 March 2020)
A surge of COVID-19 confirmed cases occurred in several States by late February 2020

In February 2020, international passenger capacity reduced by 8%, mainly related to traffic from/to States experiencing an early outbreak and countries deeply interconnected to China.

Source: OAG scheduled data adjusted by ICAO estimates
COVID-19 Pandemic was declared and accelerating in March 2020

In March 2020, COVID-19 and its impacts have gone global. International passenger capacity so far reduced by 33%, with significant reduction not only in States experiencing an early outbreak but also at the worldwide scale.

<table>
<thead>
<tr>
<th>State/Territory with 100 to 999 confirmed cases*</th>
<th>State/Territory with 1,000 to 9,999 confirmed cases*</th>
<th>State/Territory with 10,000 to 49,999 confirmed cases*</th>
<th>State/Territory with 50,000 or more confirmed cases*</th>
</tr>
</thead>
</table>

Source: OAG scheduled data adjusted by ICAO estimates

Air traffic reduction no longer limited to initial outbreak countries

Available seat kilometres (ASKs, international and domestic)

Note: March 2020 data is up till 21 March 2020

Source: ICAO ADS-B operation data
Drastic reduction in air traffic amplified by travel restrictions amid COVID-19 outbreak

As of 30 March 2020, 65% capacity reduction so far since the announcement of U.S. travel policy, affecting a maximum of approx. 5.5 million passengers for one month if all the flights were suspended.
Sharp decrease in consumers’ expenditures for air travel due to containment measures

The potential initial impact of partial or complete shutdowns on private consumption in selected G7 economies

Per cent of total consumers’ expenditure

Source: OECD Evaluating the Initial Impact ofContainment Measures (27 March 2020)
Global Level Analysis

Figures and estimates herein is preliminary and subject to substantial changes. The analysis will be updated with the situation evolving and more information available.
Three scenarios to measure the possible impact of COVID-19 outbreak on scheduled international passenger traffic worldwide for first half of the year 2020 (1Q and 2Q 2020):

- **Baseline**: hypothetical situation without COVID-19 outbreak, i.e. originally-planned
- **Scenario 1**: V-shaped path, quick recovery from May 2020
- **Scenario 2**: U-shaped path, prolonged contraction to June 2020

Assumptions used for each scenario are summarized in Appendix.

- Given a rapidly changing environment, Scenarios 1 and 2 are merely indicative of two possible paths out of many. The exact path will depend upon various factors, inter alia, duration and magnitude of the outbreak and containment measures, availability of government assistance, consumers’ confidence, and economic conditions.

- Scenarios 1 and 2 are differentiated in terms of supply (output) and demand (spending) conditions, mainly, a) the timing and scale of airline capacity decline and recovery, and b) the degree of consumers’ confidence for air travel that can be translated into demand or load factor.
Impact on International Passenger Traffic

The preliminary estimates indicate the impact in terms of scheduled international passenger traffic during first half 2020 compared to Baseline (originally-planned):

**Scenario 1 (V-shaped path)**
- Overall reduction of 37% of seats offered by airlines
- Overall reduction of 401 million passengers
- Approx. USD 88 billion potential loss of gross operating revenues of airlines

**Scenario 2 (U-shaped path)**
- Overall reduction of 47% of seats offered by airlines
- Overall reduction of 528 million passengers
- Approx. USD 116 billion potential loss of gross operating revenues of airlines
Baseline: 3% seat capacity increase (year-on-year) globally for first half 2020

A total of YoY 3.2% seat capacity increase originally planned for 1Q 2020 (scheduled international passenger set number)

Source: OAG scheduled data and ICAO estimates (Apr – Jun 2020)
Scenarios 1 & 2 show 37 to 47% seat capacity reduction in first half 2020 from Baseline.

Source: ICAO estimates based on OAG, Routes Online and airline websites
Break-down of seat capacity by region

Source: ICAO estimates based on OAG, Routes Online and airline websites
A total of 401 to 528 million passenger reduction in first half 2020 compared to Baseline

Note: Number of international passengers departing from each country and territory, which are aggregated at the regional level to avoid double counting.

Source: ICAO estimates
Break-down of passenger number by region

Source: ICAO estimates
Break-down of passenger number by region

Source: ICAO estimates
Approx. USD 88 to 116 billion loss of airline revenues in first half 2020 compared to Baseline

Note: The above revenues are gross passenger operating revenues of all airlines serving international routes from each country and territory, which are aggregated at the regional level (revenues of international routes to each country and territory were removed to avoid double counting.)
Break-down of revenue reduction by region

Source: ICAO estimates
Break-down of revenue reduction by region

Source: ICAO estimates
**Biggest overall impact in Europe and Asia/Pacific, followed by North America and Middle East**

<table>
<thead>
<tr>
<th>Region</th>
<th>Seat Capacity (%)</th>
<th>Passenger number (thousand)</th>
<th>Gross passenger revenue (USD, million)</th>
<th>Seat Capacity (%)</th>
<th>Passenger number (thousand)</th>
<th>Gross passenger revenue (USD, million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRICA</td>
<td>-26.9%</td>
<td>-12,900</td>
<td>-4,500</td>
<td>-37.2%</td>
<td>-18,200</td>
<td>-6,300</td>
</tr>
<tr>
<td>ASIA/PACIFIC</td>
<td>-41.8%</td>
<td>-126,300</td>
<td>-29,500</td>
<td>-51.6%</td>
<td>-158,000</td>
<td>-37,000</td>
</tr>
<tr>
<td>EUROPE</td>
<td>-38.2%</td>
<td>-183,900</td>
<td>-32,000</td>
<td>-50.0%</td>
<td>-243,500</td>
<td>-42,400</td>
</tr>
<tr>
<td>LATIN AMERICA/CARIBBEAN</td>
<td>-24.0%</td>
<td>-19,800</td>
<td>-4,500</td>
<td>-33.6%</td>
<td>-28,500</td>
<td>-6,400</td>
</tr>
<tr>
<td>MIDDLE EAST</td>
<td>-30.4%</td>
<td>-27,300</td>
<td>-7,700</td>
<td>-40.5%</td>
<td>-37,400</td>
<td>-10,600</td>
</tr>
<tr>
<td>NORTH AMERICA</td>
<td>-31.8%</td>
<td>-30,600</td>
<td>-9,900</td>
<td>-42.5%</td>
<td>-41,900</td>
<td>-13,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-36.5%</strong></td>
<td><strong>-401,000</strong></td>
<td><strong>-88,000</strong></td>
<td><strong>-47.3%</strong></td>
<td><strong>-527,500</strong></td>
<td><strong>-116,200</strong></td>
</tr>
</tbody>
</table>

**Scenario 1 (V-shaped)** compared to Baseline (originally-planned) for first half 2020

**Scenario 2 (U-shaped)** compared to Baseline (originally-planned) for first half 2020

*Source: ICAO estimates*
Impacts on Airports and Tourism

Figures and estimates herein are quoted from the analyses of the Airport Council International (ACI) and the World Tourism Organization (UNWTO).
Airport may lose approx. USD 46 billion for 2020 (estimated by ACI)

Potential losses for 2020 (billions USD)

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<thead>
<tr>
<th>Region</th>
<th>Potential Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>-1</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>-12</td>
</tr>
<tr>
<td>Europe</td>
<td>-15</td>
</tr>
<tr>
<td>Latin America-Caribbean</td>
<td>-2</td>
</tr>
<tr>
<td>Middle East</td>
<td>-2</td>
</tr>
<tr>
<td>North America</td>
<td>-14</td>
</tr>
</tbody>
</table>

Total airport industry losses: > USD 46 billion
Decline in industry revenues: >25%

Source: The Impact of COVID-19 on the Airport Business (ACI)
A loss of USD 300 to 450 billion in international tourism receipts for 2020 (estimated by UNWTO)

2020 forecast - international tourism receipts, world (US$ billion)

Source: Impact Assessment of the COVID-19 Outbreak on International Tourism (UNWTO)
State Level Scenario Analysis

Figures and estimates herein will be updated with the situation evolving and more information available.
Estimated impact on 4 States with the highest number of confirmed cases*

Estimated impact of COVID-19 outbreak on scheduled international passenger traffic from/to the following States during first half 2020 compared to originally-planned:

- **China (including Hong Kong/Macao SARs and Taiwan Province):** 54 to 64% seat capacity reduction, 81 to 97 million passenger reduction, USD 18.3 to 21.9 billion loss of gross operating revenues of airlines from/to the country

- **Republic of Korea:** 44 to 54% seat capacity reduction, 23 to 28 million passenger reduction, USD 4.5 to 5.6 billion loss of gross operating revenues of airlines from/to the country

- **Italy:** 46 to 58% seat capacity reduction, 31 to 39 million passenger reduction, USD 3.8 to 4.8 billion loss of gross operating revenues of airlines from/to the country

- **Iran (Islamic Republic of):** 39 to 49% seat capacity reduction, 2.2 to 2.8 million passenger reduction, USD 350 to 450 million loss of gross operating revenues of airlines from/to the country

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Three scenarios to measure the possible impact of COVID-19 outbreak at State level:

- **Baseline:** hypothetical situation without COVID-19 outbreak, i.e. originally-planned

- **Scenario 1:** V-shaped path, quick recovery from May 2020

- **Scenario 2:** U-shaped path, prolonged contraction to June 2020

Assumptions used for each scenario are summarized in Appendix

*Coronavirus Disease 2019 (COVID-19) Situation Report by WHO as of 15 March 2020*
China

The estimates indicate the impact in terms of scheduled international passenger traffic from/to China (including Hong Kong SAR of China, Macao SAR of China, Taiwan, Province of China, and cross-strait services) during first half 2020 compared to originally-planned:

- Overall reduction of **54 to 64% of seats offered by airlines**
- Overall reduction of **81 to 97 million passengers**
- Approx. **USD 18.3 to 21.9 billion potential loss** of gross operating revenues of airlines
A total of 54 to 64% seat capacity reduction in first half 2020 from Baseline

- “Mainland International” refers to scheduled international passenger services from/to mainland China, excluding “Regional”, “Hong Kong International”, “Macao International”, “Taiwan International” and “Cross-Strait”
- “Regional” refers to scheduled passenger services between mainland China and Hong Kong SAR of China, between mainland China and Macao SAR of China, and between mainland China and Taiwan, Province of China
- “Hong Kong International” refers to scheduled international passenger services from/to Hong Kong Special Administrative Region (SAR) of China excluding “Regional” and “Cross-Strait”
- “Macao International” refers to scheduled international passenger services from/to Macao SAR of China, excluding “Regional” and “Cross-Strait”
- “Taiwan International” refers to scheduled international passenger services from/to Taiwan, Province of China, excluding “Regional” and “Cross-Strait”
- “Cross-Strait” refers to scheduled passenger services among Hong Kong SAR of China, Macao SAR of China and Taiwan, Province of China, excluding “Regional”

Source: ICAO estimates based on OAG, Routes Online and airline websites
Break-down of seat capacity by route

Source: ICAO estimates based on OAG, Routes Online and airline websites
A total of 81 to 97 million passenger reduction in first half 2020 compared to Baseline

Source: ICAO estimates
Break-down of passenger number by route

Source: ICAO estimates
Approx. USD 18.3 to 21.9 billion loss of airline revenues in first half 2020 compared to Baseline

- Mainland international: calculated with an average fare of USD 250 per passenger based on traffic/financial reports of CA, CZ and MU with wide variations by destination (20% lower for LCCs);
- Regional: calculated with an average fare of USD 135 per passenger based on traffic/financial reports of CA, CZ and MU (20% lower for LCCs);
- Hong Kong and Taiwan International: calculated with an average fare of USD 287.6 per passenger with wide variations by destination (20% lower for LCCs);
- Macao International: calculated with an average fare of USD 172 per passenger (ditto);
- Cross-Strait: calculated with an average fare of USD 135 per passenger (ditto)

Source: ICAO estimates
Break-down of revenue reduction by route

Source: ICAO estimates
Republic of Korea

The estimates indicate the impact in terms of scheduled international passenger traffic from/to Republic of Korea during first half 2020 compared to originally-planned:

- Overall reduction of **44 to 54% of seats offered by airlines**
- Overall reduction of **23 to 28 million passengers**
- Approx. **USD 4.5 to 5.6 billion potential loss** of gross operating revenues of airlines
COVID-19 has started to impact airline operations from late February 2020 (except China routes).

44 to 54% seat capacity reduction in first half 2020 from Baseline.

Source: ICAO estimates based on OAG, Routes Online and airline websites.
23 to 28 million passenger reduction in first half 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 4.5 to 5.6 billion loss of airline revenues in first half 2020 compared to Baseline

Note: calculated with an average fare ranging from USD 155 to 485 by destination (20% lower for LCCs)

Source: ICAO estimates
The estimates indicate the impact in terms of scheduled international passenger traffic from/to Italy during first half 2020 compared to originally-planned:

- Overall reduction of **46 to 58% of seats offered by airlines**
- Overall reduction of **31 to 39 million passengers**
- Approx. **USD 3.8 to 4.8 billion potential loss** of gross operating revenues of airlines
COVID-19 has started to impact airline operations from late February 2020 (except China routes)

Source: ICAO estimates based on OAG, Routes Online and airline websites

Note: Some capacity change was announced before COVID-19 outbreak

46 to 58% seat capacity reduction in first half 2020 from Baseline
31 to 39 million passenger reduction in first half 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 3.8 to 4.8 billion loss of airline revenues in first half 2020 compared to Baseline

Note: calculated with an average fare ranging from USD 60 to 485 by destination (20% lower for LCCs)

Source: ICAO estimates
The estimates indicate the impact in terms of scheduled international passenger traffic from/to Italy during first half 2020 compared to originally-planned:

- Overall reduction of **39 to 49% of seats offered by airlines**
- Overall reduction of **2.2 to 2.8 million passengers**
- Approx. **USD 350 to 450 million potential loss** of gross operating revenues of airlines
COVID-19 has started to impact airline operations from late February 2020 (except China routes)

39 to 49 % seat capacity reduction in first half 2020 from Baseline

Note: Some capacity change was announced before COVID-19 outbreak

Source: ICAO estimates based on OAG, Routes Online and airline websites
2.2 to 2.8 million passenger reduction in first half 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 350 to 450 million loss of airline revenues in first half 2020 compared to Baseline

Note: calculated with an average fare ranging from USD 105 to 370 by destination (20% lower for LCCs)

Source: ICAO estimates
Appendix: Scenario assumptions
<table>
<thead>
<tr>
<th>Assumptions (Global)</th>
<th>Baseline (Originally-planned)</th>
<th>Scenario 1 (V-shaped)</th>
<th>Scenario 2 (U-shaped)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seat capacity reduction from originally-planned</td>
<td>Seat capacity reduction from originally-planned</td>
<td>Seat capacity reduction from originally-planned</td>
</tr>
<tr>
<td>January 2020</td>
<td>0%</td>
<td>January 2019 results by region</td>
<td>actual (estimated)</td>
</tr>
<tr>
<td>February 2020</td>
<td>0%</td>
<td>February 2019 results by region</td>
<td>actual (estimated)</td>
</tr>
<tr>
<td>March 2020</td>
<td>0%</td>
<td>March 2019 results by region</td>
<td>actual (estimated)</td>
</tr>
<tr>
<td>April 2020</td>
<td>0%</td>
<td>April 2019 results by region</td>
<td>airlines’ schedules filed in late March minus 5 to 15 percentage points, subject to update by actual</td>
</tr>
<tr>
<td>May 2020</td>
<td>0%</td>
<td>May 2019 results by region</td>
<td>50 to 65 percentage points lower than Baseline, subject to update by actual</td>
</tr>
<tr>
<td>June 2020</td>
<td>0%</td>
<td>June 2019 results by region</td>
<td>20 to 35 percentage points lower than Baseline, subject to update by actual</td>
</tr>
</tbody>
</table>

Note: Impacts on traffic departing from China (including Hong Kong SAR of China, Macao SAR of China and Taiwan, Province of China), Republic of Korea, Italy and Iran (Islamic Republic of) are separately calculated based on the respective State level analysis, which are subsequently integrated into the global level analysis.
<table>
<thead>
<tr>
<th>Assumptions (Mainland Intl and Regional)</th>
<th>Baseline (Originally-planned)</th>
<th>Scenario 1 (V-shaped)</th>
<th>Scenario 2 (U-shaped)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat capacity reduction from originally-planned</td>
<td>Passenger load factor</td>
<td>Seat capacity reduction from originally-planned</td>
<td>Passenger load factor</td>
</tr>
<tr>
<td>January 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>actual (estimated)</td>
</tr>
<tr>
<td>February 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
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<tr>
<td>March 2020</td>
<td>0%</td>
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<td>actual (estimated)</td>
</tr>
<tr>
<td>April 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>maximum 10 percentage points more contraction from March reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>May 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>15 percentage points improvement from April reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>June 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>30 percentage points improvement from May reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>Assumptions (Hong Kong SAR et al)</td>
<td>Baseline (Originally-planned)</td>
<td>Scenario 1 (V-shaped)</td>
<td>Scenario 2 (U-shaped)</td>
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<tr>
<td>----------------------------------</td>
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<td></td>
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<td>Passenger load factor</td>
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</tr>
<tr>
<td>April 2020</td>
<td>0%</td>
<td>80% (except 87% all LCCs)</td>
<td>maximum 10 percentage points (except 25 point for Taiwan) more contraction from March reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>May 2020</td>
<td>0%</td>
<td>80% (except 87% all LCCs)</td>
<td>15 percentage points improvement from April reduction rate, subject to update by actual</td>
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<tr>
<td>June 2020</td>
<td>0%</td>
<td>80% (except 87% all LCCs)</td>
<td>30 percentage points improvement from May reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>Assumptions (Korea)</td>
<td>Baseline (Originally-planned)</td>
<td>Scenario 1 (V-shaped)</td>
<td>Scenario 2 (U-shaped)</td>
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<tr>
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</tr>
<tr>
<td>Assumptions (Italy)</td>
<td>Baseline (Originally-planned)</td>
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<td>Scenario 2 (U-shaped)</td>
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<td>April 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>maximum 25 percentage points more contraction from March reduction rate, and will be updated by actual (estimated) once available</td>
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<tr>
<td>May 2020</td>
<td>0%</td>
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<td>Assumptions (Iran)</td>
<td>Baseline (Originally-planned)</td>
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<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>15 percentage points improvement from April reduction rate, subject to update by actual</td>
</tr>
<tr>
<td>June 2020</td>
<td>0%</td>
<td>80% (except 78% Chinese carriers, 87% all LCCs)</td>
<td>30 percentage points improvement from May reduction rate, subject to update by actual</td>
</tr>
</tbody>
</table>