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

Montréal, Canada
28 February 2020
Air traffic has been vulnerable to external factors including disease outbreaks.
What can we learn from past experience? SARS, Aviation flu and MERS

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)
Total number of passenger moved through Chinese airports 2003-2018 (million of passengers)

Passengers move to/from Chinese airports 2003 vs 2018

Annual average growth rate: ↑9.6%

Source: ICAO-ACI Airport traffic data
Chinese economic size quadrupled since 2003 but growth rate slowed down

GDP of China (constant 2010 USD, trillion)

GDP Annual Growth of China (%)

Source: World Bank Group
Air connectivity of China in terms of O-D passenger movement

Major international air traffic originating from People's Republic of China in 2018

Source: ICAO-ICM MIDT data
Air connectivity of Wuhan airport in terms of O-D passenger movement

Source: ICAO-ICM MIDT data
COVID-19 outbreak caused a substantial setback in flight bookings for Chinese New Year.
Flight cancellation has exceeded actual operations since 31 January 2020

Number of originally-planned flights

Number of actual operations

Number of cancellation

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 (retrieved on 24 Feb 2020)
Scenario Analysis: International Services from/to Mainland China

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
• **“International”** refers to scheduled international passenger services from/to mainland China excluding:
  
  – scheduled passenger services between mainland China and Hong Kong Special Administrative Region (SAR) of China, Macao SAR of China and Taiwan, Province of China; and
  
  – scheduled international passenger services from/to Hong Kong SAR, Macao SAR of China and Taiwan, Province of China

• **“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
Number of seats offered by airlines (monthly, 2019)

Capacity share 2019

- 45%: International by Chinese carriers
- 37%: International by foreign carriers
- 9% Regional (mainland China - Hong Kong SAR)
- 3% Regional (mainland China - Macao SAR)
- 7% Regional (mainland China - Taiwan Province)

Source: OAG Scheduled data
Number of seats offered by airlines
(1Q 2020 originally-planned)

Capacity share 1Q 2020

- 48%: International by Chinese carriers
- 36%: International by foreign carriers
- 7% Mainland China - Hong Kong SAR
- 3% Mainland China - Macao SAR
- 6% Mainland China - Taiwan Province

Source: OAG Scheduled data
Over 130 airlines reduced international services or cancelled all operations from/to mainland China


Source: Routes Online, OAG and airline websites (as of 28 Feb 2020)

Announced since late January 2020; Duration varies

*: Airlines with all service cancelled
**: Airlines with all service cancelled but gradual resumption
• **Baseline (hypothetical situation without COVID-19 outbreak)**
  – Seat capacity: used "originally-planned" winter schedule
  – Load factor: used 2018 actual results of airlines

• **Scenario 1**
  – Seat capacity in January and February: estimated by airlines' schedule changes
  – Seat capacity in March: applied the same reduction rate as February
  – Load factor: used 2018 actual results of airlines except Hong Kong SAR of China

• **Scenario 2**
  – Seat capacity in January and February: estimated by airlines' schedule changes;
  – Seat capacity in March: reduced by further 10% from February;
  – Load factor: decreased by 12 - 22% in February and by 7 - 17% in March
## Scenario analysis: Assumptions

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Baseline</th>
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<th>Scenario 2</th>
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<tbody>
<tr>
<td></td>
<td>Seat capacity reduction from originally-planned</td>
<td>Passenger load factor</td>
<td>Seat capacity reduction from originally-planned</td>
</tr>
<tr>
<td>International from/to mainland China (Chinese carriers)</td>
<td>0%</td>
<td>78%</td>
<td>-1%</td>
</tr>
<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<td>0%</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>0%</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Regional between mainland China and Macao SAR of China</td>
<td>0%</td>
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<td>0%</td>
<td>80%</td>
<td>-64%</td>
</tr>
<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>0%</td>
<td>80%</td>
<td>-65%</td>
</tr>
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<td>Regional between mainland China and Macao SAR of China</td>
<td>0%</td>
<td>80%</td>
<td>-67%</td>
</tr>
<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>0%</td>
<td>80%</td>
<td>-60%</td>
</tr>
</tbody>
</table>
Baseline:
10% seat capacity increase compared to 1Q 2019

A total of YoY 10% seat capacity increase originally planned for 1Q 2020 despite the reduction of capacity between mainland China and Hong Kong SAR and Taiwan Province.
Scenarios 1 & 2: 40 to 43% seat capacity reduction from Baseline

Scenario 1: for 1Q 2020 a total of 34% reduction compared to 1Q 2019 and 40% reduction from Baseline

Scenario 2: for 1Q 2020 a total of 37% reduction compared to 1Q 2019 and 43% reduction from Baseline

Source: ICAO estimates
14.1 to 17.0 million “international” passenger reduction in 1Q 2020 compared to Baseline

Scenario 1
14.1 million passenger reduction

Scenario 2
17.0 million passenger reduction

Source: ICAO estimates
3.1 to 3.6 million “regional” passenger reduction in 1Q 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 4.2 to 5.0 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 4.2 billion reduction

Scenario 2: USD 5.0 billion reduction

- International (Chinese carriers): calculated with an average fare of USD 250 per passenger based on traffic/financial reports of CA, CZ and MU;
- International (Foreign carriers): assumed 15% higher average fare than Chinese carriers;
- Regional: calculated with an average fare of USD 135 per passenger based on traffic/financial reports of CA, CZ and MU

Source: ICAO estimates
The preliminary estimates indicate the impact in terms of scheduled international passenger traffic from/to mainland China (including between mainland China and Hong Kong SAR of China, Macao SAR of China and Taiwan, Province of China) during 1Q 2020 compared to originally-planned:

- Overall reduction ranging from **40% to 43% of seats offered by airlines**
- Overall reduction of **17.2 to 20.6 million passengers**
- Approx. **USD 4.2 to 5.0 billion potential loss** of gross operating revenues of airlines

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Number of seats offered by airlines (000)</th>
<th>Number of Passengers (000)</th>
<th>Gross operating revenues of airlines (USD, million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scenario 1</td>
<td>Scenario 2</td>
<td>Scenario 1</td>
</tr>
<tr>
<td>International from/to mainland China (Chinese carriers)</td>
<td>-9,700</td>
<td>-37%</td>
<td>-10,600</td>
</tr>
<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<td>-8,200</td>
<td>-42%</td>
<td>-8,900</td>
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<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>-1,700</td>
<td>-44%</td>
<td>-1,800</td>
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<tr>
<td>Regional between mainland China and Macao SAR of China</td>
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<td>-45%</td>
<td>-700</td>
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<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>-1,300</td>
<td>-39%</td>
<td>-1,400</td>
</tr>
<tr>
<td>Total</td>
<td>-21,500</td>
<td>-40%</td>
<td>-23,300</td>
</tr>
</tbody>
</table>

Source: ICAO estimates
Scenario Analysis:
Hong Kong SAR of China and Macao SAR of China

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
Scope of analysis: Hong Kong SAR and Macao SAR

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

- **“Macao International”** refers to scheduled international passenger services from/to Macao SAR of China excluding:
  - scheduled passenger services between Macao SAR of China and mainland China, Hong Kong SAR of China and Taiwan, Province of China

- **“Cross-Strait”** refers to scheduled passenger services among Hong Kong SAR of China, Macao SAR of China and Taiwan, Province of China excluding:
  - **“Regional”** already included in the mainland China analysis
Number of seats offered by airlines (monthly, 2019)

Capacity share 2019
- 78%: Hong Kong International
- 6%: Macao International
- 16%: Cross-Strait

Source: OAG Scheduled data
Number of seats offered by airlines (1Q 2020 originally-planned)

- 76%: Hong Kong International
- 7%: Macao International
- 17%: Cross-Strait

Airlines originally planned to reduce seat capacity slightly due to the impact of Hong Kong protests and the continued trade tension.
Some 70 airlines cancelled all services or reduced services from/to Hong Kong SAR and Macao SAR

<table>
<thead>
<tr>
<th>Hong Kong International (59)</th>
<th>Egyptair</th>
<th>Korean Air</th>
<th>Thai AirAsia</th>
<th>Philippine Airlines*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeroflot Russian Airlines</td>
<td>El Al Israel Airlines*</td>
<td>Lanmei Airlines*</td>
<td>Thai Airways International</td>
<td>Philippines AirAsia Inc.*</td>
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<tr>
<td>Air Busan*</td>
<td>Emirates</td>
<td>Lufthansa German Airlines</td>
<td>United Airlines*</td>
<td>Scoot</td>
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<td>Ethiopian Airlines</td>
<td>Malaysia Airlines</td>
<td>Vietjet</td>
<td>Thai AirAsia</td>
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<td>Air France</td>
<td>Etihad Airways*</td>
<td>MIAT - Mongolian Airlines*</td>
<td>Vietnam Airlines</td>
<td>T’way Air*</td>
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<tr>
<td>Air India*</td>
<td>EZNIS AIRWAYS LLC*</td>
<td>Myanmar National Airlines</td>
<td>Virgin Australia Intl*</td>
<td>Vietnam Airlines*</td>
</tr>
<tr>
<td>Air Mauritius*</td>
<td>Fiji Airways</td>
<td>Peach Aviation Limited</td>
<td>Philippine Airlines*</td>
<td>*</td>
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<tr>
<td>Air Niugini</td>
<td>Finnair</td>
<td>Philipinnes AirAsia Inc.*</td>
<td>Philippine Airlines*</td>
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<tr>
<td>Air Seoul, Inc</td>
<td>Garuda Indonesia</td>
<td>Qantas Airways</td>
<td>Philipinnes AirAsia Inc.*</td>
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<td>AirAsia</td>
<td>HK Express</td>
<td>Qatar Airways</td>
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<td>All Nippon Airways</td>
<td>Hong Kong Airlines</td>
<td>Royal Brunei Airlines</td>
<td>Royal Jordanian</td>
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<td>American Airlines*</td>
<td>IndiGo*</td>
<td>Royal Jordanian</td>
<td>Scoot</td>
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<tr>
<td>Asiana Airlines</td>
<td>Japan Airlines</td>
<td>Siberia Airlines*</td>
<td>Siberia Airlines*</td>
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<tr>
<td>British Airways</td>
<td>Jeju Airlines</td>
<td>Singapore Airlines</td>
<td>Singapore Airlines</td>
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<tr>
<td>Cathay Dragon</td>
<td>Jetstar Asia*</td>
<td>South African Airways*</td>
<td>South African Airways*</td>
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<tr>
<td>Cathay Pacific Airways</td>
<td>Jetstar Japan*</td>
<td>SWISS</td>
<td>SWISS</td>
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<tr>
<td>Cebu Pacific Air*</td>
<td>Jetstar Pacific Airlines*</td>
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<tr>
<td>Eastar Jet</td>
<td>KLM-Royal Dutch Airlines</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Macao International (17)</th>
<th>Cross-Strait (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Busan*</td>
<td>Air Macau</td>
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<tr>
<td>Air Asia</td>
<td>AirAsia</td>
</tr>
<tr>
<td>Bamboo Airways*</td>
<td>Cambodia Airways Co. Ltd*</td>
</tr>
<tr>
<td>Cambodia Airways Co. Ltd*</td>
<td>China Airlines</td>
</tr>
<tr>
<td>Cambodia Angkor Air*</td>
<td>EVA Airways</td>
</tr>
<tr>
<td>Cebu Pacific Air*</td>
<td>HK Express</td>
</tr>
<tr>
<td>Eastar Jet*</td>
<td>Hong Kong Airlines</td>
</tr>
<tr>
<td>Jeju Airlines</td>
<td>Mandarin Airlines</td>
</tr>
<tr>
<td>Jin Air*</td>
<td>Tigerair Taiwan Co. Ltd*</td>
</tr>
<tr>
<td>Lanmei Airlines*</td>
<td>*: Airlines with all service cancelled</td>
</tr>
</tbody>
</table>

Source: Routes Online, OAG and airline websites (as of 28 Feb 2021)
Scenario analysis of COVID-19 outbreak impact for 1Q 2020

• **Baseline (hypothetical situation without COVID-19 outbreak)**
  – Seat capacity: used "originally-planned" winter schedule
  – Load factor: used the same percentage as "International from/to mainland China (Foreign carriers)" and "Regional"

• **Scenario 1**
  – Seat capacity in January and February: estimated by airlines' schedule changes
  – Seat capacity in March: applied the same reduction rate as February
  – Load factor: used the same percentage as Baseline

• **Scenario 2**
  – Seat capacity in January and February: estimated by airlines' schedule changes;
  – Seat capacity in March: reduced by further 10% from February;
  – Load factor: decreased by 22% in February and by 17% in March
## Scenario analysis: Assumptions

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<th>Baseline</th>
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<th>Scenario 2</th>
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<tr>
<td></td>
<td>Seat capacity reduction from originally-planned</td>
<td>Passenger load factor</td>
<td>Seat capacity reduction from originally-planned</td>
</tr>
<tr>
<td><strong>January 2020</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>0%</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Macao International</td>
<td>0%</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>0%</td>
<td>80%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>February 2020</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>0%</td>
<td>80%</td>
<td>-25%</td>
</tr>
<tr>
<td>Macao International</td>
<td>0%</td>
<td>80%</td>
<td>-67%</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>0%</td>
<td>80%</td>
<td>-52%</td>
</tr>
<tr>
<td><strong>March 2020</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>0%</td>
<td>80%</td>
<td>-25%</td>
</tr>
<tr>
<td>Macao International</td>
<td>0%</td>
<td>80%</td>
<td>-67%</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>0%</td>
<td>80%</td>
<td>-52%</td>
</tr>
</tbody>
</table>
Baseline: 5% seat capacity reduction compared to 1Q 2019

A total of YoY 5% seat capacity reduction originally planned for 1Q 2020 due to the expectation of continued weak demand for Hong Kong SAR and Taiwan Province.
Scenarios 1 & 2:
21 to 24% seat capacity reduction from Baseline

Scenario 1: for 1Q 2020 a total of 25% reduction compared to 1Q 2019 and 21% reduction from Baseline

Scenario 2: for 1Q 2020 a total of 28% reduction compared to 1Q 2019 and 24% reduction from Baseline

Source: ICAO estimates
3.2 to 5.2 million passenger reduction in 1Q 2020 compared to Baseline

**Scenario 1:**
A total of 3.2 million passenger reduction for 1Q 2020 from Baseline

**Scenario 2:**
A total of 5.2 million passenger reduction for 1Q 2020 from Baseline

Source: ICAO estimates
Approx. USD 0.7 to 1.3 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 0.7 billion reduction
- Hong Kong International: calculated with an average fare of USD 287.6 per passenger (i.e. almost the same as “International (Foreign carriers)”);
- Macao International: calculated with an average fare of USD 172 per passenger;
- Cross-Strait: calculated with an average fare of USD 135 per passenger (i.e. the same as “Regional”)

Scenario 2: USD 1.3 billion reduction
- Hong Kong International: calculated with an average fare of USD 287.6 per passenger (i.e. almost the same as “International (Foreign carriers)”);
- Macao International: calculated with an average fare of USD 172 per passenger;
- Cross-Strait: calculated with an average fare of USD 135 per passenger (i.e. the same as “Regional”)

Source: ICAO estimates
The preliminary estimates indicate the impact in terms of scheduled international passenger traffic from/to Hong Kong SAR of China and Macao SAR of China, as well as scheduled passenger traffic among Hong Kong SAR of China, Macao SAR of China and Taiwan, Province of China, during 1Q 2020 compared to originally-planned:

- Overall reduction ranging from **21% to 24% of seats offered by airlines**
- Overall reduction of **3.2 to 5.2 million passengers**
- Approx. **USD 0.7 to 1.3 billion potential loss** of gross operating revenues of airlines

### Scope of analysis

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Number of seats offered by airlines (000)</th>
<th>Number of Passengers (000)</th>
<th>Gross operating revenues of airlines (USD, million)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Scenario 1</td>
<td>Scenario 2</td>
<td>Scenario 1</td>
</tr>
<tr>
<td><strong>Hong Kong International</strong></td>
<td>-2,300 -16%</td>
<td>-2,800 -19%</td>
<td>-1,800 -16%</td>
</tr>
<tr>
<td><strong>Macao International</strong></td>
<td>-600 -44%</td>
<td>-600 -47%</td>
<td>-500 -44%</td>
</tr>
<tr>
<td><strong>Cross-Strait</strong></td>
<td>-1,100 -34%</td>
<td>-1,200 -38%</td>
<td>-900 -34%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-4,000 -21%</td>
<td>-4,600 -24%</td>
<td>-3,200 -21%</td>
</tr>
</tbody>
</table>

Source: ICAO estimates
Summary of Scenario Analysis

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
The direct impact of COVID-19 outbreak is expected to be greater than that caused by SARS in 2003 due to higher scale of flight cancellations and bigger economic size/air travel market of China.

The preliminary estimates indicate the impact in terms of scheduled international passenger traffic from/to China (including Hong Kong SAR of China, Macao SAR of China and cross-strait services from/to Taiwan, Province of China) during 1Q 2020 compared to originally-planned:

- Overall reduction ranging from 35% to 38% of seats offered by airlines
- Overall reduction of 20.4 to 25.8 million passengers
- Approx. USD 4.9 to 6.3 billion potential loss of gross operating revenues of airlines

The above estimates exclude, inter alia, the impact of traffic reduction related to air cargo, Chinese domestic, as well as other international services.

Source: ICAO estimates
55% and 85% of revenue reduction is estimated to be attributed to the loss from Chinese carriers and Asia/Pacific carriers (including Chinese carriers), respectively.

Source: ICAO estimates
# Break-down of estimated impact in 1Q 2020

<table>
<thead>
<tr>
<th>Scope of analysis</th>
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<th>Scenario 2</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>International from/to mainland China (Chinese carriers)</td>
<td>-9,700 -37%</td>
<td>-10,600 -41%</td>
<td>-7,600 -37%</td>
<td>-9,400 -46%</td>
<td>-$1,890</td>
<td>-$2,340</td>
</tr>
<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<td>-8,200 -42%</td>
<td>-8,900 -46%</td>
<td>-6,600 -42%</td>
<td>-7,600 -49%</td>
<td>-$1,890</td>
<td>-$2,180</td>
</tr>
<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>-1,700 -44%</td>
<td>-1,800 -47%</td>
<td>-1,600  -51%</td>
<td>-1,700 -56%</td>
<td>-$210</td>
<td>-$230</td>
</tr>
<tr>
<td>Regional between mainland China and Macao SAR of China</td>
<td>-700 -45%</td>
<td>-700 -48%</td>
<td>-500 -45%</td>
<td>-600 -53%</td>
<td>-$70</td>
<td>-$90</td>
</tr>
<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>-1,300 -39%</td>
<td>-1,400 -43%</td>
<td>-1,000 -39%</td>
<td>-1,200 -48%</td>
<td>-$140</td>
<td>-$170</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>-21,500 -40%</strong></td>
<td><strong>-23,300 -43%</strong></td>
<td><strong>-17,200 -40%</strong></td>
<td><strong>-20,600 -48%</strong></td>
<td><strong>-$4,200</strong></td>
<td><strong>-$5,010</strong></td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>-2,300 -16%</td>
<td>-2,800 -19%</td>
<td>-1,800 -16%</td>
<td>-3,500 -30%</td>
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<td>-$1,000</td>
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<tr>
<td>Macao International</td>
<td>-600 -44%</td>
<td>-600 -47%</td>
<td>-500 -44%</td>
<td>-600 -52%</td>
<td>-$80</td>
<td>-$100</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>-1,100 -34%</td>
<td>-1,200 -38%</td>
<td>-900 -34%</td>
<td>-1,200 -45%</td>
<td>-$120</td>
<td>-$160</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td><strong>-4,000 -21%</strong></td>
<td><strong>-4,600 -24%</strong></td>
<td><strong>-3,200 -21%</strong></td>
<td><strong>-5,200 -34%</strong></td>
<td><strong>-$730</strong></td>
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</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>-25,500 -35%</strong></td>
<td><strong>-28,000 -38%</strong></td>
<td><strong>-20,400 -35%</strong></td>
<td><strong>-25,800 -44%</strong></td>
<td><strong>-$4,930</strong></td>
<td><strong>-$6,270</strong></td>
</tr>
</tbody>
</table>

Source: ICAO estimates
Appendix
China Domestic Tourism by Chinese Passengers
Republic of Korea
Iran (Islamic Republic of)
Mongolia

This section contains a very preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
The preliminary estimates indicate the impact in terms of scheduled domestic passenger traffic within mainland China during 1Q 2020 compared to originally-planned:

- Overall reduction of 40% of seats offered by airlines
- Overall reduction of 66.6 to 76.3 million passengers
- Approx. USD 6.8 to 7.8 billion potential loss of gross operating revenues of airlines

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Estimated Impact on</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ICAO estimates</td>
</tr>
<tr>
<td>Domestic within mainland China</td>
<td>Number of seats offered by airlines (000)</td>
<td>Scenario 1</td>
</tr>
<tr>
<td></td>
<td>Number of Passengers (000)</td>
<td>Scenario 1</td>
</tr>
<tr>
<td></td>
<td>Gross operating revenues of airlines (USD, million)</td>
<td>Scenario 1</td>
</tr>
</tbody>
</table>

Assumption:
- Seat capacity is reduced by 3% in January 2020 and 60% in February and March 2020 from the originally-planned schedules (baseline)
- Load factor is down from 83% (baseline) to 80% for 1Q 2020
- Load factor is down from 83% (baseline) to 80% in January 2020, 58% in February 2020 and 63% in March 2020
- Calculated with an average fare of USD 102.5 per passenger based on traffic/financial reports of CA, CZ and MU
## Potential loss of revenues from Chinese tourists to top 5 States in 1Q 2020

### Top 5 States that Chinese traveller had the largest share

<table>
<thead>
<tr>
<th>States</th>
<th>Baseline</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger number</td>
<td>Tourism revenue (in million USD)*</td>
<td>Passenger number</td>
</tr>
<tr>
<td>Australia</td>
<td>460,161</td>
<td>446.36</td>
<td>340,318</td>
</tr>
<tr>
<td>Japan</td>
<td>3,181,840</td>
<td>3,086.38</td>
<td>2,167,273</td>
</tr>
<tr>
<td>United States</td>
<td>888,102</td>
<td>861.46</td>
<td>505,096</td>
</tr>
<tr>
<td>Thailand</td>
<td>2,772,352</td>
<td>2,689.18</td>
<td>1,826,629</td>
</tr>
<tr>
<td>France</td>
<td>240,523</td>
<td>233.31</td>
<td>137,867</td>
</tr>
</tbody>
</table>

### Data

- Data excludes Special Administrative Regions (SAR) of China (Hong Kong SAR and Macao SAR) and Taiwan, Province of China
- Calculated with average international tourism spending of China (USD 970) per tourist reported by UNWTO

**Source:** ICAO estimates
International passenger services from/to Republic of Korea in Feb 2020

18% seat capacity reduction from originally-planned level in February 2020

- -17%: Korean carriers
- -55%: Chinese carriers
- -32%: Carriers of Hong Kong/Macao SARs
- -4%: Other foreign carriers

Source: OAG Scheduled data and ICAO estimates
1.3 to 1.5 million passenger reduction in February 2020 compared to originally-planned

- From/to mainland China including Hong Kong/Macao SARs: extracted the impact involving Republic of Korea from scenarios 1 and 2;
- Other internal destinations: assumed 80% load factor

Source: ICAO estimates
International passenger services from/to Republic of Korea in Feb 2020

USD 204 to 232 million potential loss of airline revenues in February 2020 compared to originally-planned

- From/to mainland China including Hong Kong/Macao SARs: extracted the impact involving Republic of Korea from scenarios 1 and 2;
- Other internal destinations: calculated with an average fare of USD 287.6 per passenger (ranging from USD 155 to 485 by destination);

Source: ICAO estimates
12% seat capacity reduction from originally-planned level in February 2020 due to COVID-19

-6%: Iranian carriers
-25%: Foreign carriers

*: Capacity change was announced and implemented before COVID-19 outbreak
International passenger services from/to Iran (Islamic Republic of) in Feb 2020

0.11 million passenger reduction in February 2020 compared to originally-planned due to COVID-19

- From/to mainland China: extracted the impact involving Republic of Korea from scenarios 1 and 2;
- Other internal destinations: assumed 80% load factor

* Capacity change was announced and implemented before COVID-19 outbreak

Source: ICAO estimates
International passenger services from/to Iran (Islamic Republic of) in Feb 2020

USD 22 million potential loss of airline revenues in February 2020 compared to originally-planned due to COVID-19

- From/to mainland China: extracted the impact involving Republic of Korea from scenarios 1 and 2;
- Other internal destinations: calculated with an average fare of USD 160 per passenger

Source: ICAO estimates

*: Capacity change was announced and implemented before COVID-19 outbreak
International passenger services from/to Mongolia in Feb 2020

42% seat capacity reduction from originally-planned level in February 2020

- -53%: Mongolian carriers
- -59%: Chinese carriers
- -19%: Korean carriers
- -2%: Other foreign carriers

Source: OAG Scheduled data and ICAO estimates
ICAO estimates

International passenger services from/to Mongolia in Feb 2020

34,000 passenger reduction in February 2020 compared to originally-planned

- From/to mainland China: extracted the impact involving Mongolia from scenarios 1 and 2;
- From/to Republic of Korea and other internal destinations: assumed 80% load factor

Source: ICAO estimates
ICAO estimates

International passenger services from/to Mongolia in Feb 2020

USD 6.1 million potential loss of airline revenues in February 2020 compared to originally-planned

• From/to mainland China and Hong Kong SAR: extracted the impact involving Mongolia from scenarios 1 and 2;

• From/to Republic of Korea and other internal destinations: calculated with an average fare of USD 135 to 155 per passenger

Source: ICAO estimates