Effects of Novel Coronavirus (COVID-19) on Civil Aviation

Montréal, Canada
As of 24 February 2020
Economic Impact Analysis
Air traffic has been vulnerable to external factors including disease outbreaks.

Source: ICAO Annual Report of the Council
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)
Chinese international traffic more than doubled since 2003 SARS spread

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

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

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

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Source: Routes Online, OAG and airline websites (as of 24 Feb 2020)

Announced since late January 2020;
Duration varies

*: Airlines with all service Cancelled
**: Airlines with all service cancelled but gradual resumption
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 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

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<tr>
<th>Assumptions</th>
<th>Baseline</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
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<td>Seat capacity reduction</td>
<td>Passenger load factor</td>
<td>Seat capacity reduction</td>
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<td>80%</td>
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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.

Impact of Hong Kong protests:

Source: OAG scheduled data
Scenarios 1 & 2:

**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 based on OAG scheduled data*
ICAO estimates show a reduction of 14.1 to 17.0 million “international” passenger reduction in 1Q 2020 compared to Baseline.
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**

- Jan 2020: -66
- Feb 2020: -69
- Mar 2020: -92

**Scenario 2: USD 5.0 billion reduction**

- Jan 2020: -78
- Feb 2020: -91
- Mar 2020: -100

**Source:** ICAO estimates

- 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.
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

### Scope of analysis

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<th>Scenario 1</th>
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<td>-9,700 -37% -10,600 -41%</td>
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<tr>
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<td>Total</td>
<td>-21,500 -40% -23,300 -43%</td>
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**Estimated Impact on**

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<th>Number of Passengers (000)</th>
<th>Gross operating revenues of airlines (USD, million)</th>
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<td>Regional between mainland China and Taiwan, Province of China</td>
<td>-1,300 -39%</td>
<td>-1,400 -43%</td>
</tr>
<tr>
<td>Total</td>
<td>-21,500 -40%</td>
<td>-23,300 -43%</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.
“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)

Capacity share 1Q 2020

- 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.

Source: OAG Scheduled data
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>
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</thead>
<tbody>
<tr>
<td>Aeroflot Russian Airlines</td>
<td>El Al Israel Airlines*</td>
<td>Lanmei Airlines*</td>
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<td>Emirates</td>
<td>Lufthansa German Airlines</td>
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<td>Scoot</td>
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<td>Etihad Airways*</td>
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<td>T'way Air*</td>
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<td>EZNIS AIRWAYS LLC*</td>
<td>Myanmar National Airlines</td>
<td>Virgin Australia Intl*</td>
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</tr>
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<td>Qatar Airways</td>
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<td>IndiGo*</td>
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<td>Cathay Dragon</td>
<td>Jetstar Asia*</td>
<td>Siberia Airlines*</td>
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<td>Cathay Pacific Airways</td>
<td>Jetstar Japan*</td>
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<tr>
<td>Eastar Jet</td>
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<table>
<thead>
<tr>
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<th>Bamboo Airways*</th>
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<tbody>
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<td>Qantas Airways</td>
<td>Royal Brunei Airlines</td>
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<tr>
<td>Lufthansa German Airlines</td>
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<td>Scoot</td>
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<td>Myanmar National Airlines</td>
<td>Peach Aviation Limited</td>
<td>Siberia Airlines*</td>
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<td>NL Airways*</td>
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<td>Thai Airways International</td>
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<td>United Airlines*</td>
<td>United Airlines*</td>
<td>SWISS</td>
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<tr>
<td>VietJet</td>
<td>VietJet</td>
<td>Philippine Airlines*</td>
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<tr>
<td>Vietnam Airlines</td>
<td>Vietnam Airlines*</td>
<td>Philippine Airlines*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virgin Australia Intl*</td>
<td>Virgin Australia Intl*</td>
<td>Philippine Airlines*</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Cross-Strait (9)</th>
<th>Air Macau</th>
<th>Cathay Dragon</th>
<th>Cathay Pacific Airways</th>
<th>China Airlines</th>
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</thead>
<tbody>
<tr>
<td>Thai Airways International</td>
<td>Thai Airways International</td>
<td>EVA Airways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Airlines*</td>
<td>United Airlines*</td>
<td>HK Express</td>
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<tr>
<td>VietJet</td>
<td>VietJet</td>
<td>Hong Kong Airlines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam Airlines*</td>
<td>Vietnam Airlines*</td>
<td>Mandarin Airlines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virgin Australia Intl*</td>
<td>Virgin Australia Intl*</td>
<td>Tigerair Taiwan Co. Ltd*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Announced since late January 2020; Duration varies

* Airlines with all service cancelled

Source: Routes Online, OAG and airline websites (as of 24 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

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>January 2020</th>
<th>February 2020</th>
<th>March 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Scenario 1</td>
<td>Scenario 2</td>
</tr>
<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>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>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>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 based on OAG scheduled data
3.2 to 5.2 million passenger reduction in 1Q 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 0.7 to 1.2 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 0.7 billion reduction

Scenario 2: USD 1.2 billion reduction

Source: ICAO estimates

Hong Kong International: calculated with an average fare of USD 287.5 per passenger (i.e. the same as “International (Foreign carriers)”; Macao International and Cross-Strait: calculated with an average fare of USD 135 per passenger (i.e. the same as “Regional”)
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 1.2 billion potential loss** of gross operating revenues of airlines

### Scope of analysis

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Scenario 1</th>
<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>Number of seats offered by airlines (000)</td>
<td>-2,300</td>
<td>-16%</td>
<td>-2,800</td>
<td>-19%</td>
<td>-1,800</td>
<td>-16%</td>
</tr>
<tr>
<td>Number of Passengers (000)</td>
<td>-1,800</td>
<td>-16%</td>
<td>-2,800</td>
<td>-19%</td>
<td>-1,800</td>
<td>-16%</td>
</tr>
<tr>
<td>Gross operating revenues of airlines (USD, million)</td>
<td>-$60</td>
<td>-$30%</td>
<td>-$80</td>
<td>-$40%</td>
<td>-$60</td>
<td>-$40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-4,000</strong></td>
<td><strong>-21%</strong></td>
<td><strong>-4,600</strong></td>
<td><strong>-24%</strong></td>
<td><strong>-3,200</strong></td>
<td><strong>-21%</strong></td>
</tr>
</tbody>
</table>

### Source: ICAO estimates
Scenario Analysis: Summary and Additional Initial Estimates

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
### Break-down of estimated impact in 1Q 2020

#### Source: ICAO estimates

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Scenario 1</th>
<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>Number of seats offered by airlines (000)</td>
<td>-9,700</td>
<td>-10,600</td>
<td>-7,600</td>
<td>-9,400</td>
<td>-$1,890</td>
<td>-$2,340</td>
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<tr>
<td>Number of Passengers (000)</td>
<td>-37%</td>
<td>-41%</td>
<td>-37%</td>
<td>-46%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross operating revenues of airlines (USD, million)</td>
<td>-8,200</td>
<td>-8,900</td>
<td>-6,600</td>
<td>-7,600</td>
<td>-$1,890</td>
<td>-$2,180</td>
</tr>
<tr>
<td>Number of Passengers (000)</td>
<td>-42%</td>
<td>-46%</td>
<td>-42%</td>
<td>-49%</td>
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<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>-1,700</td>
<td>-1,800</td>
<td>-1,600</td>
<td>-1,700</td>
<td>-$210</td>
<td>-$230</td>
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<tr>
<td>Number of Passengers (000)</td>
<td>-44%</td>
<td>-47%</td>
<td>-51%</td>
<td>-56%</td>
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</tr>
<tr>
<td>Regional between mainland China and Macao SAR of China</td>
<td>-700</td>
<td>-700</td>
<td>-500</td>
<td>-600</td>
<td>-$70</td>
<td>-$90</td>
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<tr>
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<td>-48%</td>
<td>-45%</td>
<td>-53%</td>
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<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
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<td>-1,200</td>
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<tr>
<td>Number of Passengers (000)</td>
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<td>-43%</td>
<td>-39%</td>
<td>-48%</td>
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<tr>
<td>Sub-total</td>
<td>-21,500</td>
<td>-23,300</td>
<td>-17,200</td>
<td>-20,600</td>
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<td>Number of Passengers (000)</td>
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<td>-43%</td>
<td>-40%</td>
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</tr>
<tr>
<td>Hong Kong International</td>
<td>-2,300</td>
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<td>-1,800</td>
<td>-3,500</td>
<td>-$530</td>
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<td>Number of Passengers (000)</td>
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<td>-19%</td>
<td>-16%</td>
<td>-30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macao International</td>
<td>-600</td>
<td>-600</td>
<td>-500</td>
<td>-600</td>
<td>-$60</td>
<td>-$80</td>
</tr>
<tr>
<td>Number of Passengers (000)</td>
<td>-44%</td>
<td>-47%</td>
<td>-44%</td>
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<tr>
<td>Cross-Strait</td>
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<td>-1,200</td>
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<td>-38%</td>
<td>-34%</td>
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<tr>
<td>Sub-total</td>
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<td>-5,200</td>
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<td>Number of Passengers (000)</td>
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<td>-21%</td>
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<td>Grand total</td>
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<td>-25,800</td>
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<tr>
<td>Number of Passengers (000)</td>
<td>-35%</td>
<td>-38%</td>
<td>-35%</td>
<td>-44%</td>
<td></td>
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</tr>
</tbody>
</table>
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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of seats offered by airlines (000)</td>
</tr>
<tr>
<td>Domestic within mainland China</td>
<td>Scenario 1: -76,100 -40%</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

**Source:** ICAO estimates
Potential loss of revenues from tourists to top 5 States for 1Q 2020

<table>
<thead>
<tr>
<th>Top 5 States that Chinese traveller had the largest share</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>
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<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-119,843</td>
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<tr>
<td>France</td>
<td>240,523</td>
<td>233.31</td>
<td>137,867</td>
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<tr>
<td>Japan</td>
<td>3,181,840</td>
<td>3,086.38</td>
<td>2,167,273</td>
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<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-1,014,567</td>
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<tr>
<td>Thailand</td>
<td>2,772,352</td>
<td>2,689.18</td>
<td>1,826,629</td>
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<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-945,723</td>
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<tr>
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<td>888,102</td>
<td>861.46</td>
<td>505,096</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-383,006</td>
</tr>
</tbody>
</table>

- 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