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

Montréal, Canada
9 March 2020
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Estimated impact of COVID-19 outbreak on scheduled international passenger traffic during 1Q 2020 compared to originally-planned:

- **China (including Hong Kong/Macao SARs):** 42 to 43% seat capacity reduction, 24.8 to 28.1 million passenger reduction, USD 6.0 to 6.9 billion loss of gross operating revenues of airlines
- **Republic of Korea:** 27% seat capacity reduction, 6.1 to 6.7 million passenger reduction, USD 1.3 to 1.4 billion loss of gross operating revenues of airlines
- **Italy:** 11% seat capacity reduction, 2.8 to 3.7 million passenger reduction, USD 0.4 to 0.5 billion loss of gross operating revenues of airlines
- **Iran (Islamic Republic of):** 24% seat capacity reduction, 570,000 to 620,000 passenger reduction, USD 90 to 99 million loss of gross operating revenues of airlines
Introduction and Background
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.
Chinese international traffic more than doubled since 2003 SARS spread

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: \( \text{\textup{\textdegree} 9.6\%} \)

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
China is more integrated in the global economy

Source: OECD Interim Economic Outlook dated 2 March 2020
The drop in Chinese travellers will hit hard
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

Major air traffic originating from Wuhan Tianhe International Airport in 2018
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 9 March 2020)
Scenario Analysis:
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)

- 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

<table>
<thead>
<tr>
<th>International (136)</th>
<th>Beijing Capital Airlines</th>
<th>Hebei Airlines*</th>
<th>Malaysia Airlines</th>
<th>SAS Scandinavian Airlines*</th>
<th>T'way Air*</th>
<th>Hebei Airlines*</th>
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<tbody>
<tr>
<td>Aero Mongolia*</td>
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<td>Himalaya Airlines*</td>
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<td>NokScoot Airlines Co Ltd*</td>
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<td>19</td>
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</tr>
</tbody>
</table>
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 (average)

- **Scenario 1 (mild)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: used 2018 actual results of airlines except Hong Kong SAR of China

- **Scenario 2 (severe)**
  - Seat capacity in January and February: estimated by airlines' schedule changes
  - Seat capacity in March: assumed summer schedules not starting from 29 March
  - Load factor: 12 – 22 and 7 – 17 percentage points lower in February and March from January, respectively
## Scenario analysis: Assumptions

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Baseline</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<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>
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<td><strong>January 2020</strong></td>
<td></td>
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<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>
<td>80%</td>
<td>-1%</td>
</tr>
<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>0%</td>
<td>80%</td>
<td>-1%</td>
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<tr>
<td><strong>February 2020</strong></td>
<td></td>
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</tr>
<tr>
<td>International from/to mainland China (Chinese carriers)</td>
<td>0%</td>
<td>78%</td>
<td>-57%</td>
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<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<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>
<tr>
<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>
<tr>
<td><strong>March 2020</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>International from/to mainland China (Chinese carriers)</td>
<td>0%</td>
<td>78%</td>
<td>-77%</td>
</tr>
<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<td>0%</td>
<td>80%</td>
<td>-80%</td>
</tr>
<tr>
<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>0%</td>
<td>80%</td>
<td>-82%</td>
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<tr>
<td>Regional between mainland China and Macao SAR of China</td>
<td>0%</td>
<td>80%</td>
<td>-70%</td>
</tr>
<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>0%</td>
<td>80%</td>
<td>-77%</td>
</tr>
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</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: 46% seat capacity reduction from Baseline

Scenario 1: for 1Q 2020 a total of 40% reduction compared to 1Q 2019 and 46% reduction from Baseline

Scenario 2: for 1Q 2020 a total of 41% reduction compared to 1Q 2019 and 46% reduction from Baseline

Source: ICAO estimates
16.3 to 18.0 million “international” passenger reduction in 1Q 2020 compared to Baseline

**Scenario 1**

16.3 million passenger reduction

**Scenario 2**

18.0 million passenger reduction

**Source:** ICAO estimates
3.4 to 3.7 million “regional” passenger reduction in 1Q 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 4.8 to 5.3 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

- **Scenario 1: USD 4.8 billion reduction**
  - Jan 2020: -1.18
  - Feb 2020: -1.20
  - Mar 2020: -1.120

- **Scenario 2: USD 5.3 billion reduction**
  - Jan 2020: -1.14
  - Feb 2020: -1.24
  - Mar 2020: -1.124

**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 of **46% of seats offered by airlines**
- Overall reduction of **19.7 to 21.7 million passengers**
- Approx. **USD 4.8 to 5.3 billion potential loss** of gross operating revenues of airlines

### Estimated Impact

<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>International from/to mainland China (Chinese carriers)</td>
<td>-11,400 -44%</td>
<td>-11,600 -45%</td>
<td>-8,900 -44%</td>
<td>-10,100 -49%</td>
<td>-$2,230</td>
<td>-$2,510</td>
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<tr>
<td>International from/to mainland China (Foreign carriers)</td>
<td>-9,200 -47%</td>
<td>-9,300 -48%</td>
<td>-7,400 -47%</td>
<td>-7,900 -51%</td>
<td>-$2,120</td>
<td>-$2,280</td>
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<td>Regional between mainland China and Hong Kong SAR of China</td>
<td>-1,900 -49%</td>
<td>-1,900 -50%</td>
<td>-1,700 -56%</td>
<td>-1,800 -58%</td>
<td>-$230</td>
<td>-$240</td>
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<tr>
<td>Regional between mainland China and Macao SAR of China</td>
<td>-700 -46%</td>
<td>-700 -47%</td>
<td>-600 -46%</td>
<td>-600 -52%</td>
<td>-$80</td>
<td>-$90</td>
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<tr>
<td>Regional between mainland China and Taiwan, Province of China</td>
<td>-1,500 -45%</td>
<td>-1,500 -46%</td>
<td>-1,200 -45%</td>
<td>-1,300 -51%</td>
<td>-$160</td>
<td>-$180</td>
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<tr>
<td>Total</td>
<td>-24,700 -46%</td>
<td>-25,100 -46%</td>
<td>-19,700 -46%</td>
<td>-21,700 -51%</td>
<td>-$4,820</td>
<td>-$5,300</td>
</tr>
</tbody>
</table>

**Source:** ICAO estimates

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**Summary of estimated impact in 1Q 2020**

- Overall reduction of **46% of seats offered by airlines**
- Overall reduction of **19.7 to 21.7 million passengers**
- Approx. **USD 4.8 to 5.3 billion potential loss** of gross operating revenues of airlines
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
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

### Hong Kong International (66)

<table>
<thead>
<tr>
<th>Airline</th>
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<tbody>
<tr>
<td>Aeroflot Russian Airlines</td>
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<tr>
<td>Air Astana</td>
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<td>Air Busan*</td>
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<td>Air Canada</td>
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<td>Cathay Dragon</td>
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<td>Cathay Pacific Airways</td>
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<tr>
<td>Cebu Pacific Air*</td>
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<tr>
<td>Eastar Jet</td>
</tr>
</tbody>
</table>

### Airports

- **Egyptair**
- **Emirates**
- **Ethiopian Airlines**
- **Etihad Airways* **
- **EZNIS AIRWAYS LLC* **
- **Fiji Airways**
- **Finnair**
- **Garuda Indonesia**
- **HK Express**
- **Hong Kong Airlines**
- **IndiGo**
- **Japan Airlines**
- **Jetstar Asia**
- **Jetstar Japan**
- **Jetstar Pacific Airlines* **
- **KLM-Royal Dutch Airlines**
- **Korean Air* **
- **Lanmei Airlines* **
- **Lufthansa German Airlines**
- **Malaysia Airlines**
- **Malindo Airways**
- **MIAT - Mongolian Airlines* **
- **Myanmar National Airlines**
- **Peach Aviation Limited**
- **Philippine Airlines* **
- **Philippines AirAsia Inc.**
- **Qantas Airways**
- **Qatar Airways**
- **Royal Brunei Airlines**
- **Royal Jordanian**
- **SAS Scandinavian Airlines* **
- **Scoot**
- **Siberia Airlines* **
- **Singapore Airlines**
- **South African Airways* **
- **SWISS**
- **Thai AirAsia**
- **Thai Airways International**
- **Turkish Airlines**
- **T'way Air**
- **United Airlines* **
- **Vietjet* **
- **Vietnam Airlines**
- **Virgin Atlantic Airways**
- **Virgin Australia Intl* **

### Macao International (17)

<table>
<thead>
<tr>
<th>Airline</th>
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<tbody>
<tr>
<td>Air Busan*</td>
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<td>Lanmei Airlines*</td>
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<td>Philippine Airlines*</td>
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</table>

### Cross-Strait (9)

- **Air Macau**
- **Cathay Dragon**
- **Cathay Pacific Airways**
- **China Airlines**
- **EVA Airways**
- **HK Express* **
- **Hong Kong Airlines**
- **Mandarin Airlines* **
- **Tigerair Taiwan Co. Ltd* **

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* Announced since late January 2020; Duration varies

*: Airlines with all service cancelled

*^: Airlines with all service cancelled but gradual resumption

**Source:** Routes Online, OAG and airline websites (as of 9 March 2020)
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 (mild)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: used the same percentage as Baseline

- **Scenario 2 (severe)**
  - Seat capacity in January and February: estimated by airlines' schedule changes
  - Seat capacity in March: assumed summer schedules not starting from 29 March
  - Load factor: 22 and 17 percentage points lower in February and March from January, respectively
### Scenario analysis: Assumptions

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Baseline</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<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><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>-65%</td>
</tr>
<tr>
<td>Macao International</td>
<td>0%</td>
<td>80%</td>
<td>-78%</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>0%</td>
<td>80%</td>
<td>-86%</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:
33 to 34% seat capacity reduction from Baseline

Scenario 1: for 1Q 2020 a total of 37% reduction compared to 1Q 2019 and 33% reduction from Baseline

Scenario 2: for 1Q 2020 a total of 38% reduction compared to 1Q 2019 and 34% reduction from Baseline

Source: ICAO estimates
ICA O
UNITING AVIATION

5.1 to 6.4 million passenger reduction in 1Q 2020 compared to Baseline

Scenario 1: a total of 5.1 million passenger reduction for 1Q 2020 from Baseline

Scenario 2: a total of 6.4 million passenger reduction for 1Q 2020 from Baseline

Source: ICAO estimates
Approx. USD 1.2 to 1.6 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 1.2 billion reduction
- Jan 2020: 0
- Feb 2020: -59
- Mar 2020: -102

Scenario 2: USD 1.6 billion reduction
- Jan 2020: 0
- Feb 2020: -74
- Mar 2020: -107

- 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 **33% to 34% of seats offered by airlines**
- Overall reduction of **5.1 to 6.4 million passengers**
- Approx. **USD 1.2 to 1.6 billion potential loss** of gross operating revenues of airlines

<table>
<thead>
<tr>
<th>Scope of analysis</th>
<th>Estimated Impact on</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number of seats offered by airlines (000)</td>
<td>Number of passengers (000)</td>
<td>Gross operating revenues of airlines (USD, million)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scenario 1</td>
<td>Scenario 2</td>
<td>Scenario 1</td>
<td>Scenario 2</td>
<td>Scenario 1</td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>-4,200</td>
<td>-4,400</td>
<td>-3,400</td>
<td>-4,500</td>
<td>-970</td>
</tr>
<tr>
<td>Macao International</td>
<td>-600</td>
<td>-700</td>
<td>-500</td>
<td>-600</td>
<td>-90</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>-1,500</td>
<td>-1,500</td>
<td>-1,200</td>
<td>-1,300</td>
<td>-160</td>
</tr>
<tr>
<td>Total</td>
<td>-6,300</td>
<td>-6,500</td>
<td>-5,100</td>
<td>-6,400</td>
<td>-1,220</td>
</tr>
</tbody>
</table>

Source: ICAO estimates
Summary of Scenario Analysis: China
+ Additional 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 **42% to 43% of seats offered by airlines**
- Overall reduction of **24.8 to 28.1 million passengers**
- Approx. **USD 6.0 to 6.9 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 87% of revenue reduction is estimated to be attributed to the loss from Chinese carriers and Asia/Pacific carriers (including Chinese carriers), respectively.
### Break-down of estimated impact in 1Q 2020

<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>-11,400</td>
<td>-11,600</td>
<td>-8,900</td>
<td>-10,100</td>
<td>-2,230</td>
<td>-2,510</td>
</tr>
<tr>
<td>Number of passengers (000)</td>
<td>-9,200</td>
<td>-9,300</td>
<td>-7,400</td>
<td>-7,900</td>
<td>-2,120</td>
<td>-2,280</td>
</tr>
<tr>
<td>Number of passengers (000)</td>
<td>-1,900</td>
<td>-1,900</td>
<td>-1,700</td>
<td>-1,800</td>
<td>-230</td>
<td>-240</td>
</tr>
<tr>
<td>Number of passengers (000)</td>
<td>-700</td>
<td>-700</td>
<td>-600</td>
<td>-600</td>
<td>-80</td>
<td>-90</td>
</tr>
<tr>
<td>Number of passengers (000)</td>
<td>-1,500</td>
<td>-1,500</td>
<td>-1,200</td>
<td>-1,300</td>
<td>-160</td>
<td>-180</td>
</tr>
<tr>
<td>Sub-total</td>
<td>-24,700</td>
<td>-25,100</td>
<td>-19,700</td>
<td>-21,700</td>
<td>-4,820</td>
<td>-5,300</td>
</tr>
<tr>
<td>Gross operating revenues of airlines (USD, million)</td>
<td>-$2,230</td>
<td>-$2,510</td>
<td>-$2,120</td>
<td>-$2,280</td>
<td>-$80</td>
<td>-$90</td>
</tr>
<tr>
<td>Hong Kong International</td>
<td>-4,200</td>
<td>-4,400</td>
<td>-3,400</td>
<td>-4,500</td>
<td>-$970</td>
<td>-$1,290</td>
</tr>
<tr>
<td>Macao International</td>
<td>-600</td>
<td>-700</td>
<td>-500</td>
<td>-600</td>
<td>-$90</td>
<td>-$100</td>
</tr>
<tr>
<td>Cross-Strait</td>
<td>-1,500</td>
<td>-1,500</td>
<td>-1,200</td>
<td>-1,300</td>
<td>-$160</td>
<td>-$180</td>
</tr>
<tr>
<td>Sub-total</td>
<td>-6,300</td>
<td>-6,500</td>
<td>-5,100</td>
<td>-6,400</td>
<td>-$1,220</td>
<td>-$1,570</td>
</tr>
<tr>
<td>Grand total</td>
<td>-31,100</td>
<td>-31,600</td>
<td>-24,800</td>
<td>-28,100</td>
<td>-$6,040</td>
<td>-$6,870</td>
</tr>
</tbody>
</table>

Source: ICAO estimates
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 75.8 million passengers**
- Approx. **USD 6.7 to 7.6 billion potential loss** of gross operating revenues of airlines

### Estimated Impact on

<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></td>
<td>Scenario 1</td>
</tr>
<tr>
<td>Domestic within mainland China</td>
<td>-76,100</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 65% in March 2020

**Source:** ICAO estimates
Potential loss of revenues from Chinese tourists to top 5 States in 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>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-119,843</td>
</tr>
<tr>
<td>France</td>
<td>240,523</td>
<td>233.31</td>
<td>137,867</td>
</tr>
<tr>
<td>Japan</td>
<td>3,181,840</td>
<td>3,086.38</td>
<td>2,167,273</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-1,014,567</td>
</tr>
<tr>
<td>Thailand</td>
<td>2,772,352</td>
<td>2,689.18</td>
<td>1,826,629</td>
</tr>
<tr>
<td></td>
<td>Loss</td>
<td>-</td>
<td>-945,723</td>
</tr>
<tr>
<td>United States</td>
<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
Scenario Analysis:
Republic of Korea

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
• **Scope:** scheduled international passenger services from/to Republic of Korea

• **Baseline (hypothetical situation without COVID-19 outbreak)**
  - Seat capacity: used "originally-planned" winter schedule
  - Load factor: 80%

• **Scenario 1 (mild)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: used the same percentage as Baseline

• **Scenario 2 (severe)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: 10 percentage points lower in March (i.e. 70%)

*Between Republic of Korea and China, Hong Kong SAR and Macao SAR of China: extracted the impacts involving Korea from the respective scenarios of China and Hong Kong/Macao SARs*
ICAO estimates

27% seat capacity reduction in 1Q 2020 from Baseline

COVID-19 has started to impact airline operations from late February 2020 (except China routes)

Source: ICAO estimates
ICAO estimates

6.1 to 6.7 million passenger reduction in 1Q 2020 compared to Baseline

Scenario 1: a total of 6.1 million passenger reduction for 1Q 2020 from Baseline

Scenario 2: a total of 6.7 million passenger reduction for 1Q 2020 from Baseline

Source: ICAO estimates
ICAO estimates

Approx. USD 1.3 to 1.4 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

- Scenario 1: USD 1.3 billion reduction
- Scenario 2: USD 1.4 billion reduction

Source: ICAO estimates

- Between Korea and China including Hong Kong/Macao SARs
- Between Korea and other international destinations (Korean carriers)
- Between Korea and other international destinations (Foreign carriers)

- Between Korea and China including Hong Kong SAR: extracted the impact involving Korea from scenarios 1 and 2 of China;
- Other internal destinations: Other internal destinations: calculated with an average fare of USD 287.6 per passenger (ranging from USD 155 to 485 by destination)
Scenario Analysis:
Italy

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
Scenario analysis of COVID-19 outbreak impact for 1Q 2020

- **Scope:** scheduled international passenger services from/to Italy

- **Baseline (hypothetical situation without COVID-19 outbreak)** *
  - Seat capacity: used "originally-planned" winter schedule
  - Load factor: 80%

- **Scenario 1 (mild)** *
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: used the same percentage as Baseline

- **Scenario 2 (severe)** *
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: 10 percentage points lower in March (i.e. 70%)

* Between Italy and China, Hong Kong SAR of China, as well as Republic of Korea: extracted the impacts involving Italy from the respective scenarios of China, Hong Kong SAR and Korea
ICAO estimates

COVID-19 has started to impact airline operations from late February 2020 (except China routes)

Source: ICAO estimates
Between Italy and China including Hong Kong SAR, Republic of Korea, and Iran (Islamic Republic of) Between Italy and other international destinations

2.8 to 3.7 million passenger reduction in 1Q 2020 compared to Baseline

Source: ICAO estimates
Approx. USD 0.4 to 0.5 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

- Between Italy and China, Hong Kong SAR and Macao SAR of China, as well as Republic of Korea: extracted the impacts involving Italy from the respective scenarios of China, Hong Kong/Macao SARs and Korea;

- Other internal destinations: calculated with an average fare of USD 287.6 per passenger (ranging from USD 60 to 485 by destination)

Source: ICAO estimates
Scenario Analysis:
Iran (Islamic Republic of)

This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
Scenario analysis of COVID-19 outbreak impact for 1Q 2020

- **Scope:** scheduled international passenger services from/to Iran

- **Baseline (hypothetical situation without COVID-19 outbreak)**
  - Seat capacity: used "originally-planned" winter schedule
  - Load factor: 80%

- **Scenario 1 (mild)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: used the same percentage as Baseline

- **Scenario 2 (severe)**
  - Seat capacity: estimated by airlines' schedule changes
  - Load factor: 10 percentage points lower in March (i.e. 70%)

* Between Iran (Islamic Republic of) and China, as well as Italy: extracted the impacts involving Iran from the respective scenarios of China and Italy
ICAO estimates

24% seat capacity reduction in 1Q 2020 from Baseline

COVID-19 has started to impact airline operations from late February 2020 (except China routes)

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

Source: ICAO estimates
Between Iran and China, Italy

Baseline | Scenario 1 | Scenario 2
---|---|---
January 2020 | 45 | 44 | 44
February 2020 | 14 | 13 | 13
March 2020 | 15 | 13 | 47

Between Iran and other international destinations

Baseline | Scenario 1 | Scenario 2
---|---|---
January 2020 | 744 | 728 |
February 2020 | 709 | 599 |
March 2020 | 766 | 383 |

Source: ICAO estimates

570,000 to 620,000 passenger reduction in 1Q 2020 compared to Baseline
Approx. USD 90 to 99 million potential loss of airline revenues for 1Q 2020 compared to Baseline

- Between Italy and China, Italy: extracted the impacts involving Iran from the respective scenarios of China and Italy;
- Other internal destinations: calculated with an average fare of USD 140 per passenger (ranging from USD 105 to 370 by destination)

Source: ICAO estimates
This section contains a very preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.
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
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
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
– Arrangement for the prevention and Management of Public Health Events in Civil Aviation (CAPSCA)
  • https://www.capsca.org/CoronaVirusRefs.html

– Aviation and COVID-19
  • https://www.icao.int/Security/COVID-19/Pages/default.aspx

– Updated analysis of the effects of the Novel Coronavirus (COVID-19) on air transport