



ICAO

UNITING AVIATION

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

Montréal, Canada

12 March 2020





- Introduction and Background
- Scenario Analysis: **Mainland China**
- Scenario Analysis: **Hong Kong SAR of China and Macao SAR of China**
- Summary of Scenario Analysis and Additional Estimates: **China**
- Scenario Analysis: **Republic of Korea**
- Scenario Analysis: **Italy**
- Scenario Analysis: **Iran (Islamic Republic of)**
- Preliminary Analysis: **Japan** and **Singapore**
- Preliminary Analysis: **Transatlantic between United States and Schengen Area**



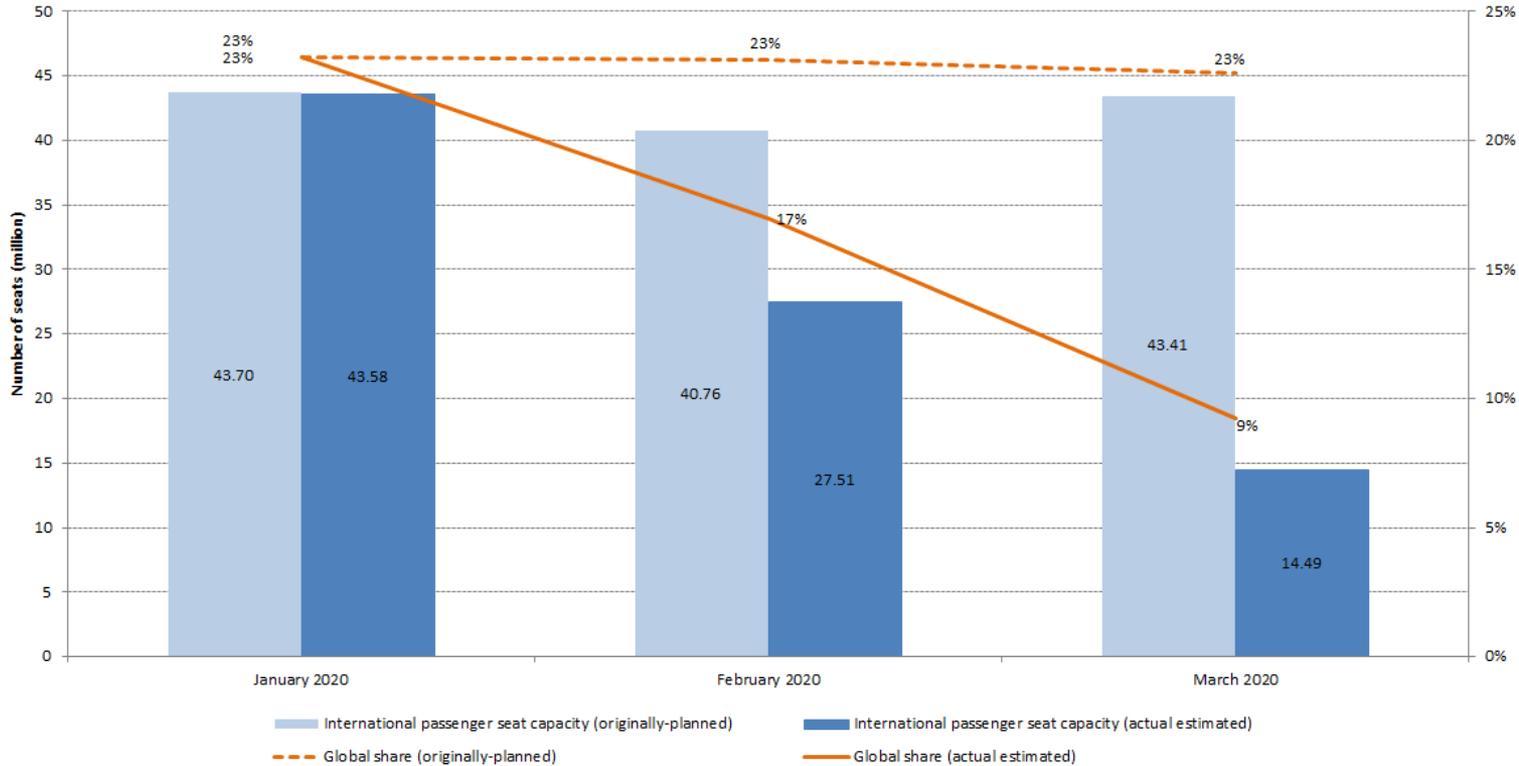
Estimated impact of COVID-19 outbreak on scheduled **international passenger** traffic during **1Q 2020** compared to originally-planned:

- **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 6.6 million passenger reduction, USD 1.3 to 1.4 billion loss of gross operating revenues of airlines
- **Italy:** 20% seat capacity reduction, 5.3 to 5.9 million passenger reduction, USD 0.7 billion loss of gross operating revenues of airlines
- **Iran (Islamic Republic of):** 25% seat capacity reduction, 580,000 to 630,000 passenger reduction, USD 92 to 100 million loss of gross operating revenues of airlines

* *Coronavirus Disease 2019 (COVID-19) Situation Report by WHO*



Global capacity share of 4 States dropped from 23% in January to 9% in March 2020

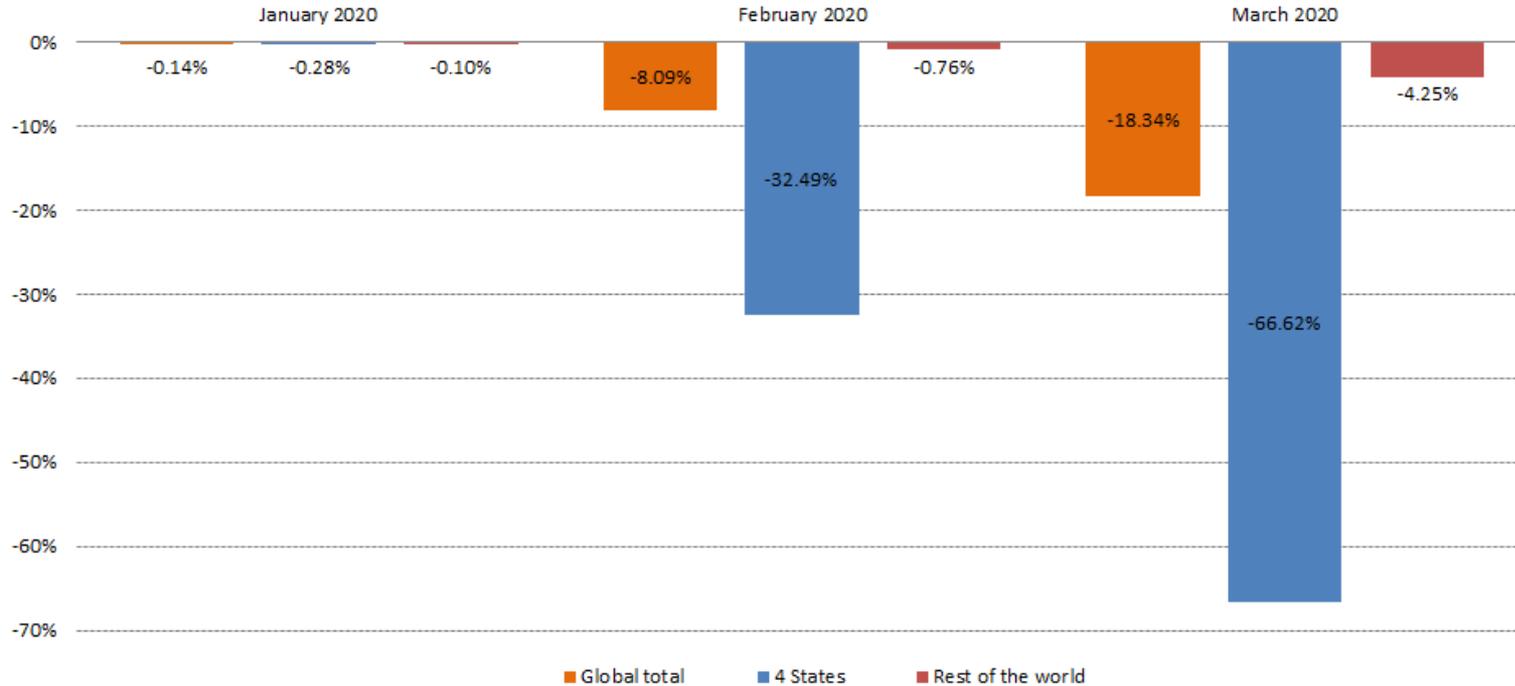


- Number of seats offer by airlines for scheduled international passenger traffic;
- 4 States combined with the exclusion of route overlaps



4 States have represented a significant portion of international capacity reduction in 1Q 2020

Reduction of international passenger seat capacity from originally-planned

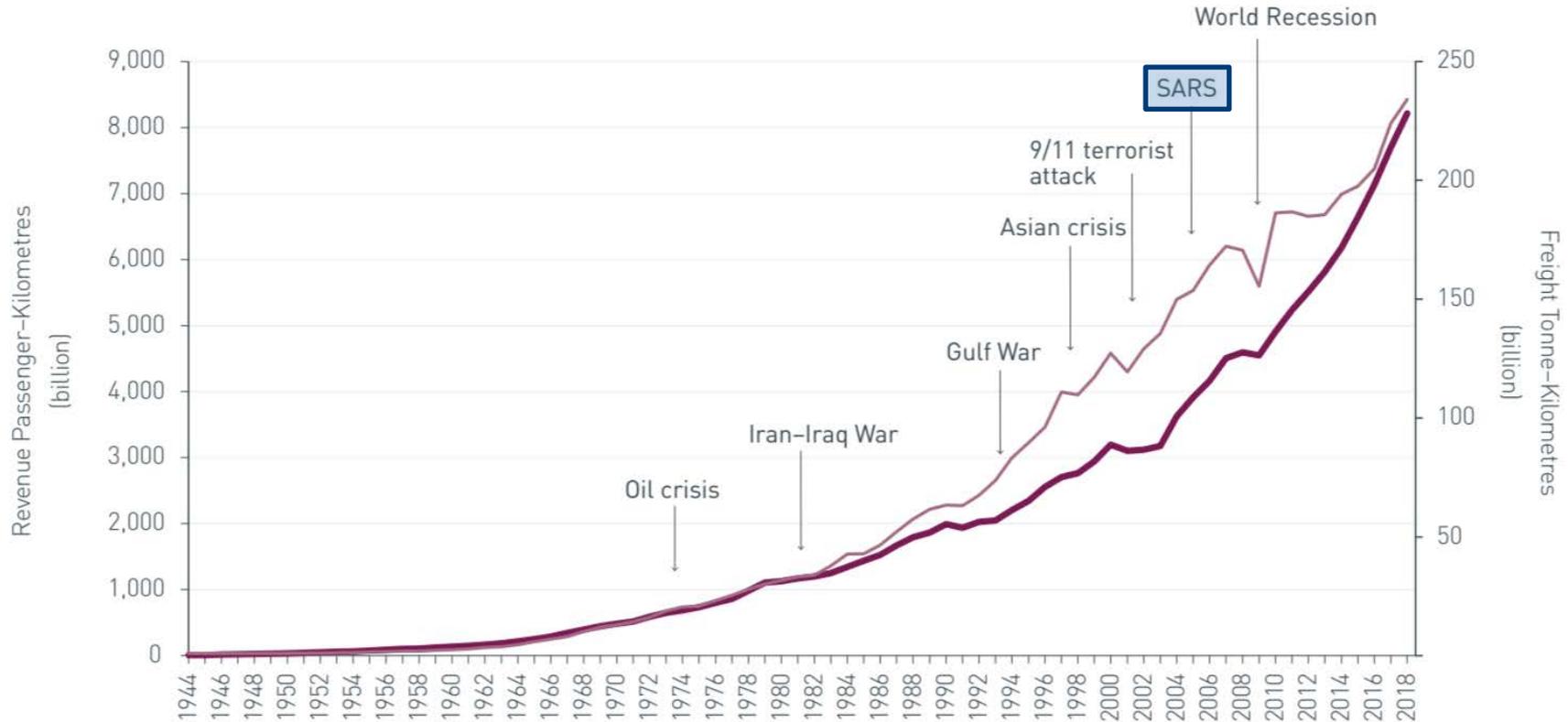




Introduction and Background

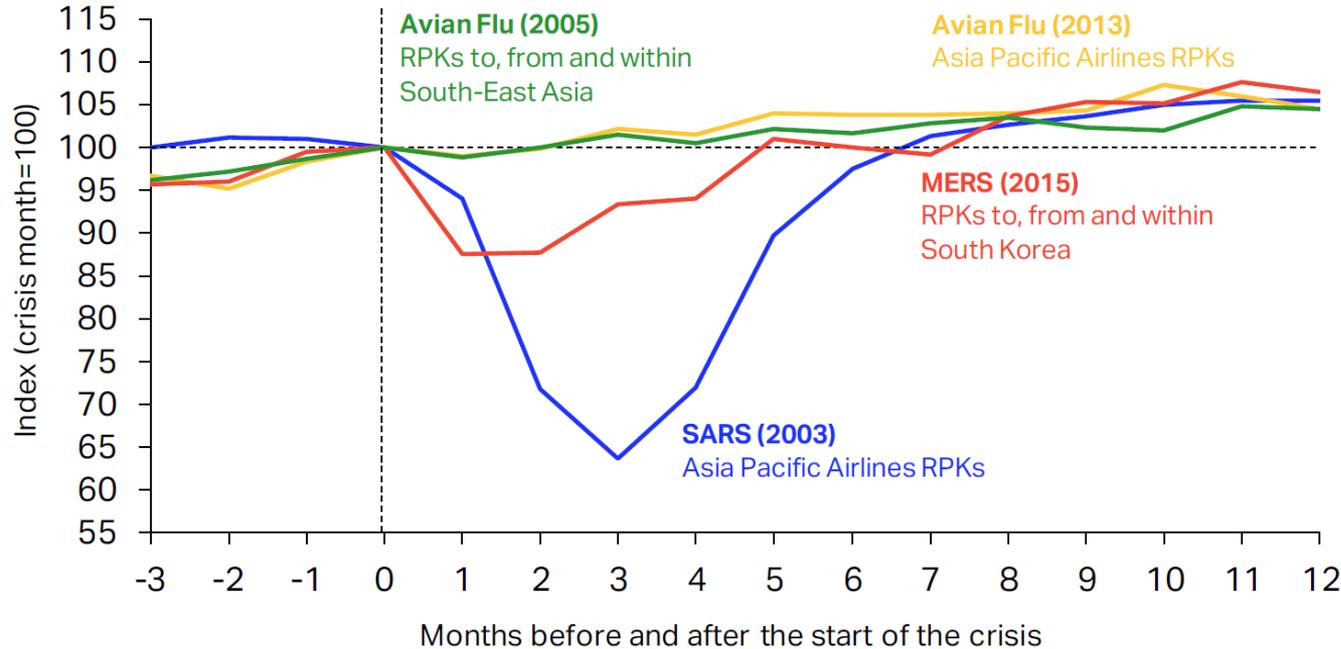


Air traffic has been vulnerable to external factors including disease outbreaks



What can we learn from past experience? SARS, Aviation flu and MERS

Impact of past outbreaks on aviation



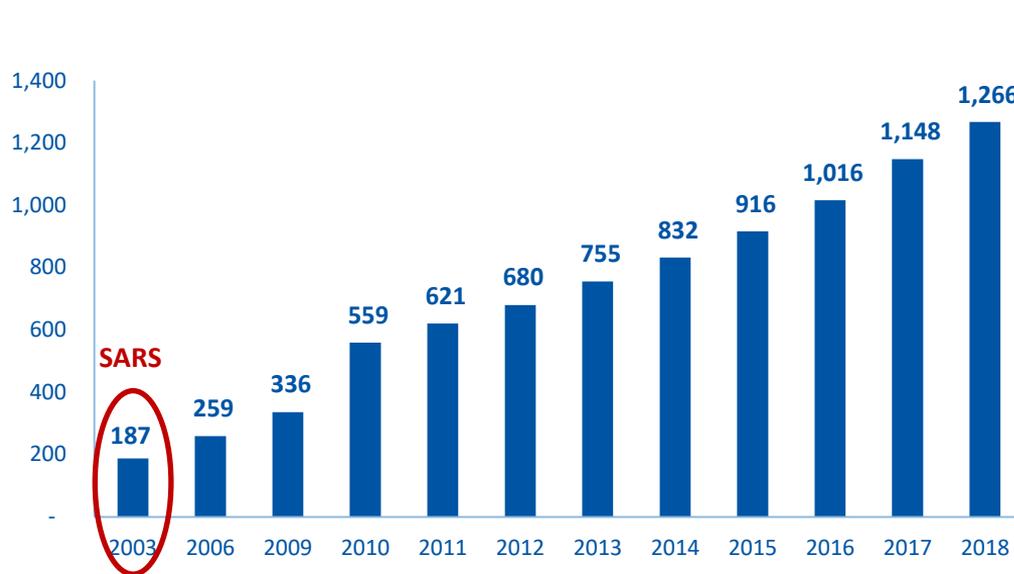
History shows that SARS has the most serious impact on traffic. At the height of the outbreak (May 2003), monthly RPKs of Asia-Pacific airlines were 35% lower than their pre-crisis levels. Overall in 2003, Asia-Pacific airlines lost **8% of annual RPKs** and **\$6 billion of revenues**.

Source: IATA Economics

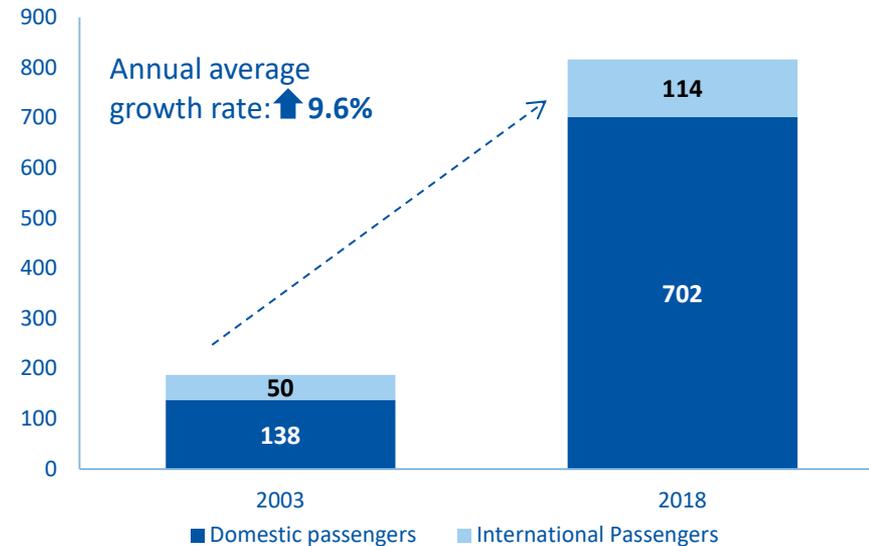


Chinese international traffic more than doubled since 2003 SARS spread

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

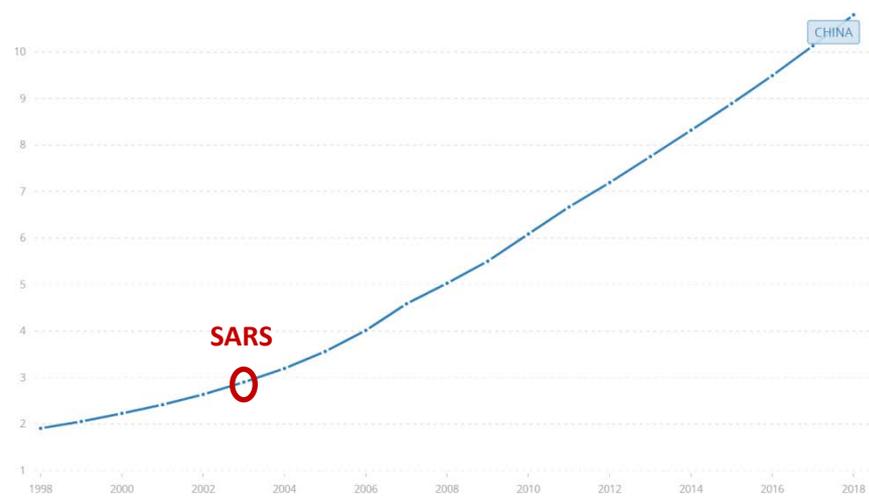


Passengers move to/from Chinese airports 2003 vs 2018

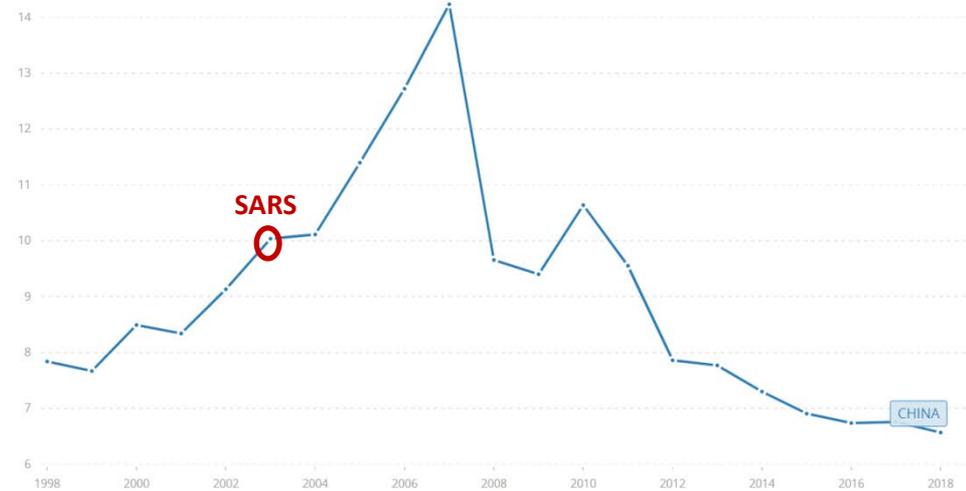


Chinese economic size quadrupled since 2003 but growth rate slowed down

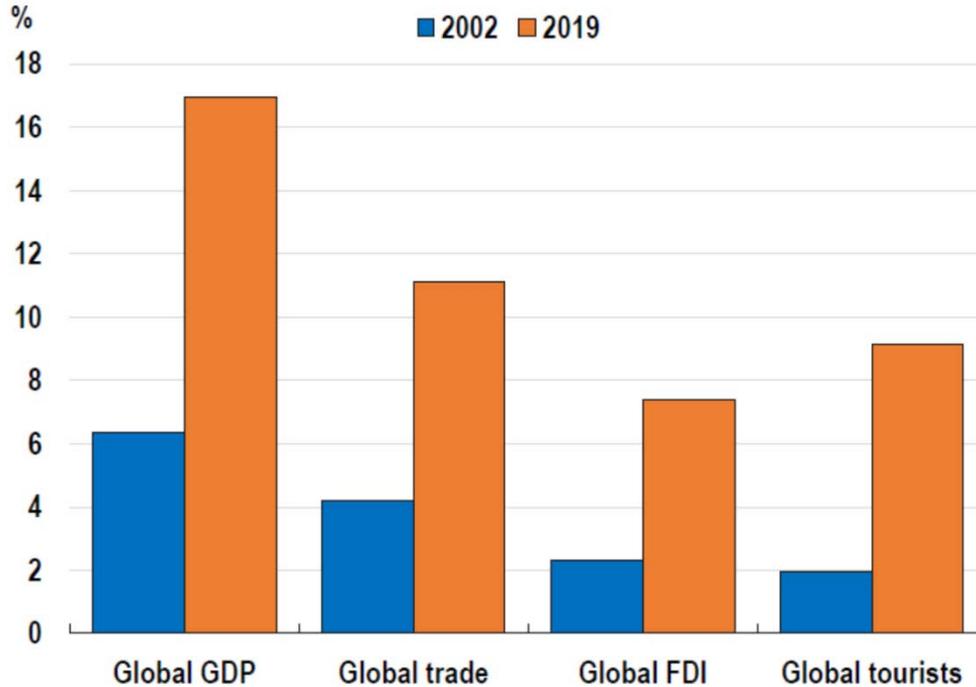
GDP of China (constant 2010 USD, trillion)



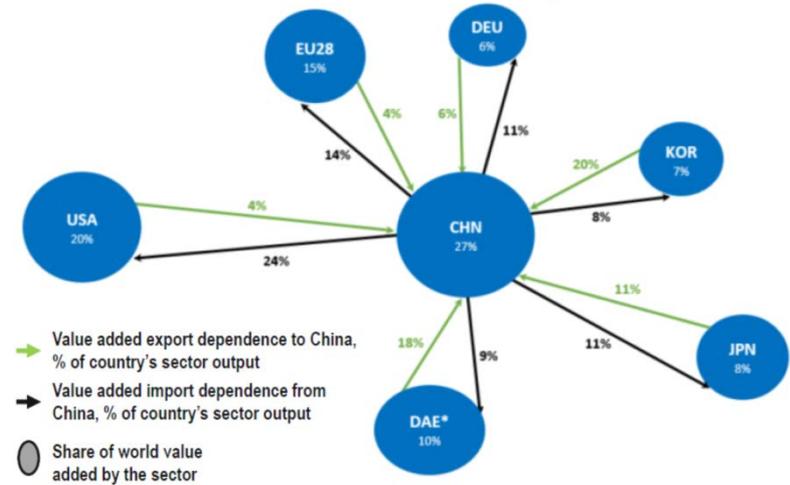
GDP Annual Growth of China (%)



Share of China in world



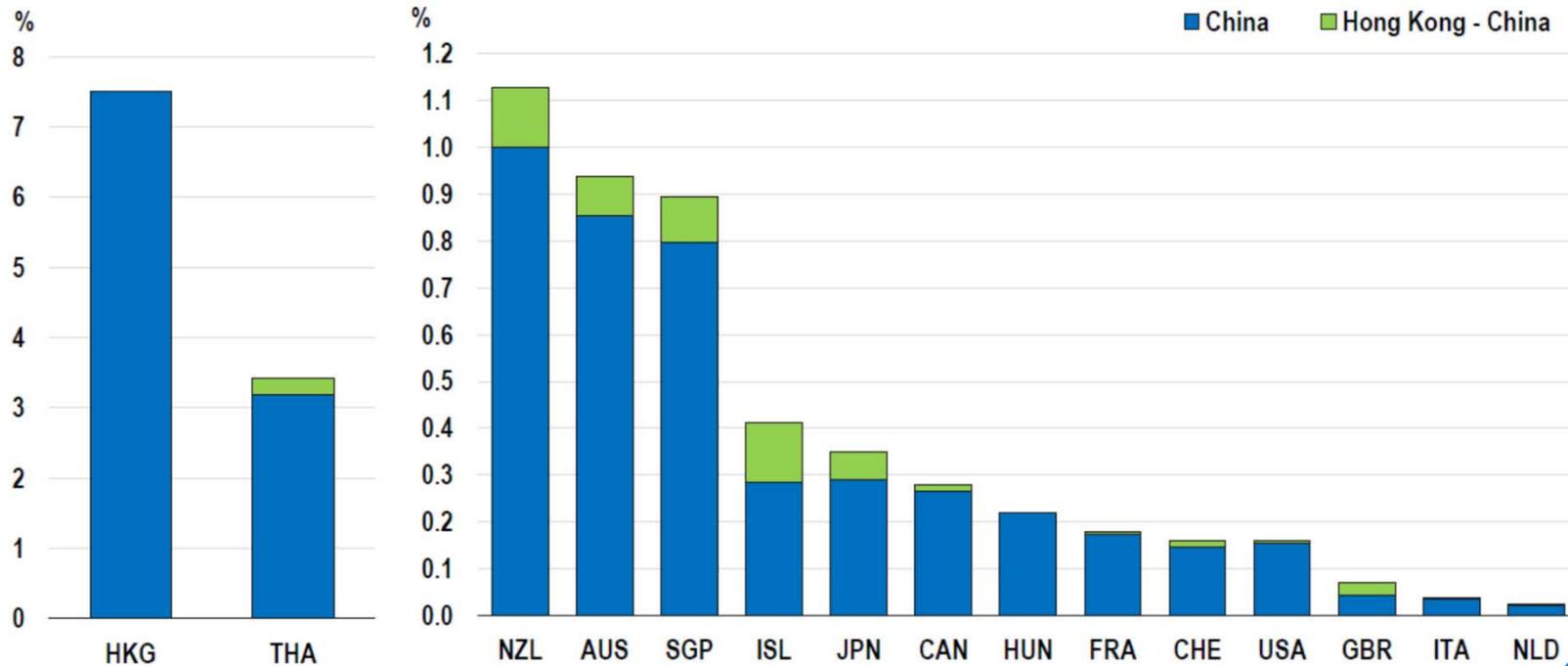
Computers, electronics and electrical equipment sector



Value added trade flows between China and key partners

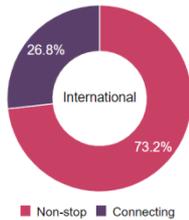
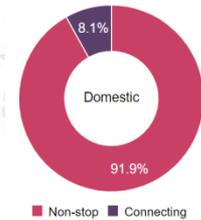
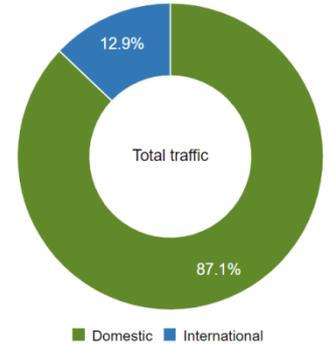
Travel services to China and Hong Kong-China, as a share of GDP

2018



Air connectivity of China in terms of O-D passenger movement

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



Air connectivity of Wuhan airport in terms of O-D passenger movement

Major air traffic originating from Wuhan Tianhe International Airport in 2018



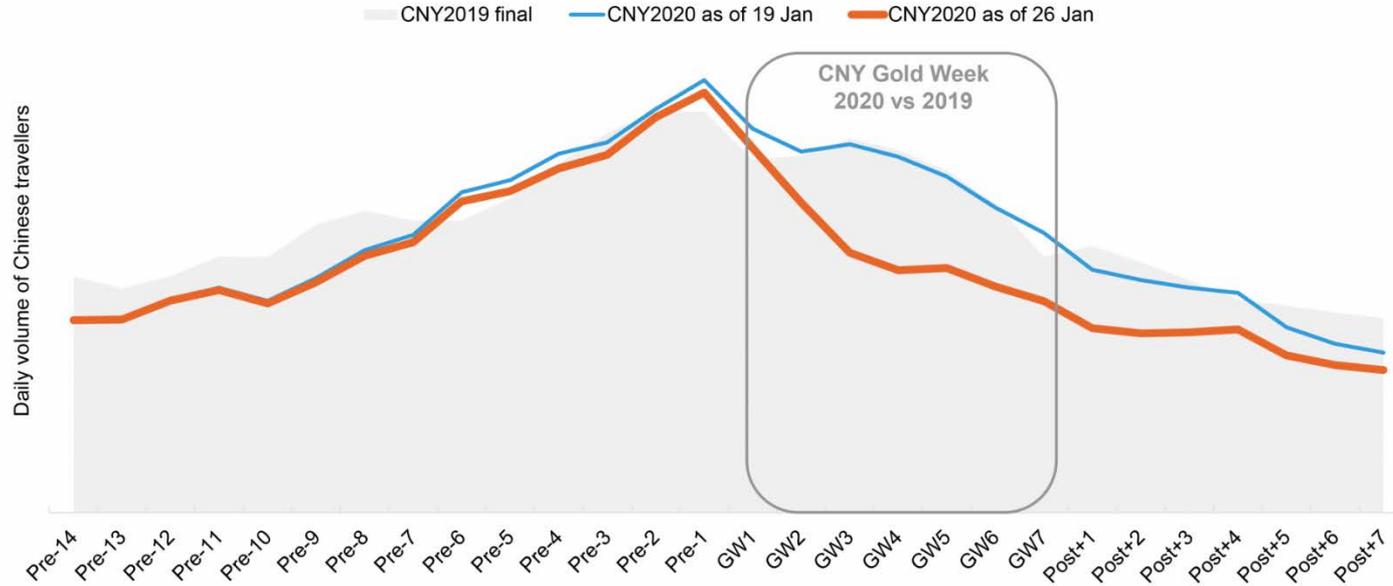
24,073,870
Total traffic



COVID-19 outbreak caused a substantial setback in flight bookings for Chinese New Year

Chinese air arrivals in worldwide regions for Chinese New Year, before vs one week after the travel restrictions

10 January – 6 February, Bookings made as of 19 January and 26 January 2020. Volumes of arrivals.



Travel dates from 10 January to 6 February 2020 vs. 21 January to 17 February 2020, according to bookings issued as of 19 January and 26 January 2020.
 Only considered pax staying 1 to 21 nights at destinations.
 Source: ForwardKeys air reservation data.



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



Scenario Analysis: Mainland China

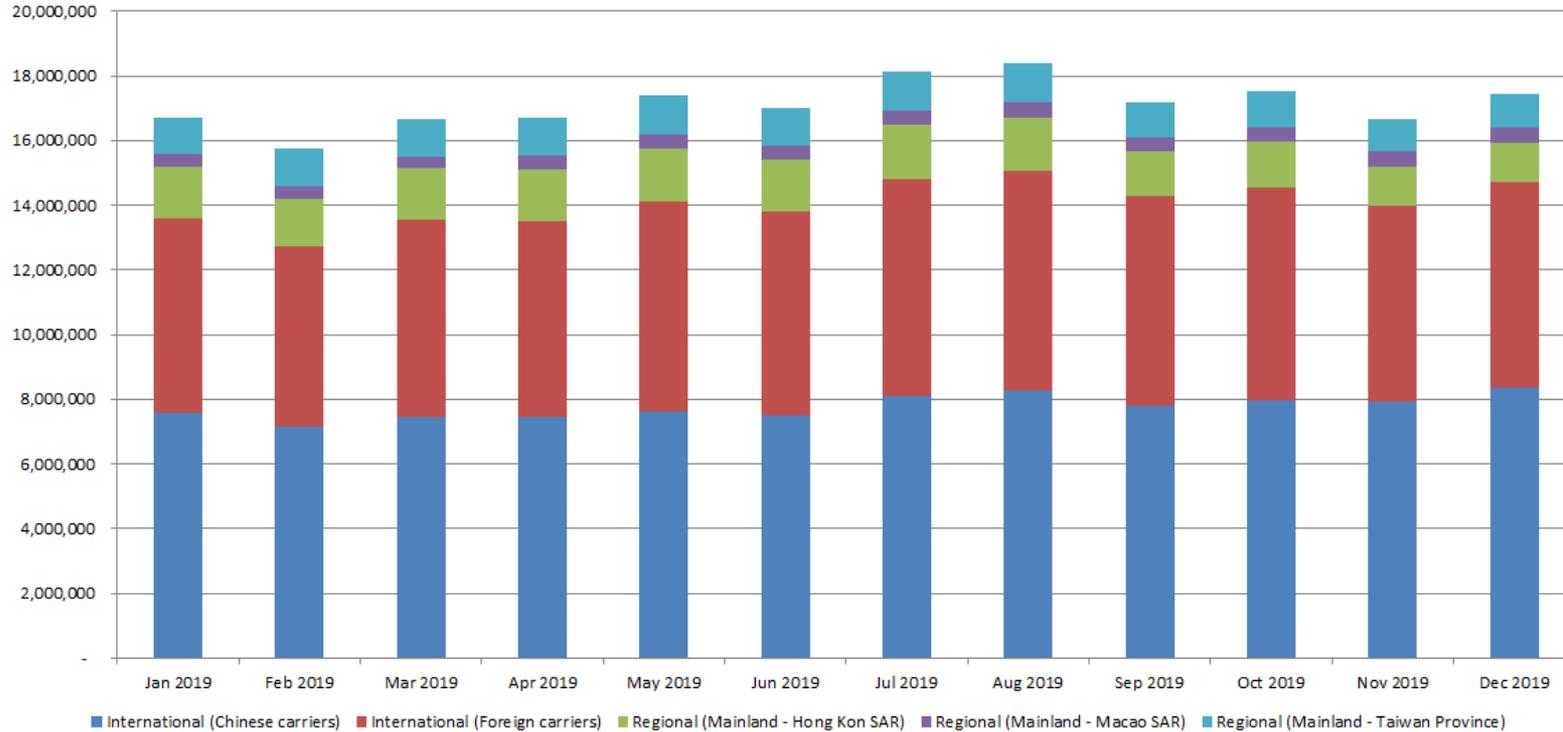
This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.



- **“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)

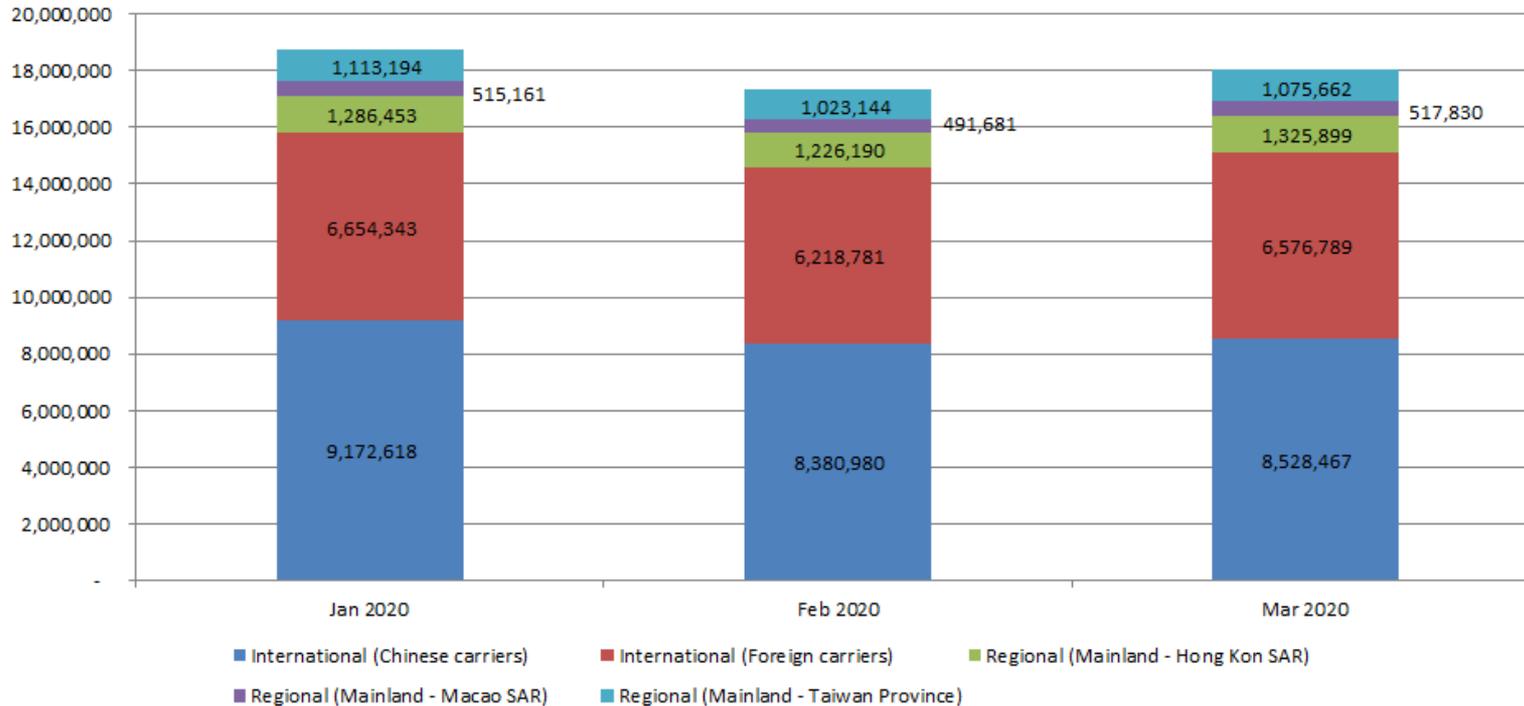


Capacity share 2019

- 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)



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



Over 130 airlines reduced international services or cancelled all operations from/to mainland China

| | | | | | | |
|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|
| International (136) | Beijing Capital Airlines | Hebei Airlines* | Malaysia Airlines | SAS Scandinavian Airlines* | T'way Air* | Hebei Airlines* |
| Aero Mongolia* | British Airways* | Himalaya Airlines* | Malindo Airways | Saudi Arabian Airlines* | Ukraine Interl Airlines* | HK Express |
| Air Algerie*^ | Cambodia Airways Co. Ltd | Iberia* | MIAT - Mongolian Airlines* | Scoot* | United Airlines* | Hong Kong Airlines |
| Air Astana* | Cambodia Angkor Air* | IndiGo* | Myanmar Airways Intl* | Shandong Airlines | Ural Airlines | Juneyao Airlines |
| Air Busan | Cebu Pacific Air* | IrAero* | Myanmar National Airlines* | Shanghai Airlines | Urumqi Airlines* | Mandarin Airlines |
| Air Canada* | Chengdu Airlines | Iraqi Airways* | Neos Air* | Shenzhen Airlines | US-Bangla Airlines | Shandong Airlines |
| Air China | China Eastern Airlines | Japan Airlines | Nok Air* | Siberia Airlines* | Uzbekistan Airways* | Shanghai Airlines |
| Air Company SCAT* | China Express Airlines | JC Cambodia Intl Airlines | NokScoot Airlines Co Ltd* | Sichuan Airlines | Vietnam Airlines* | Shenzhen Airlines |
| Air France* | China Southern Airlines | Jeju Airlines | NordStar* | SilkAir | Virgin Atlantic Airways* | Sichuan Airlines |
| Air India* | China United Airlines | Jetstar Asia* | Okay Airways* | Singapore Airlines | Xiamen Airlines Company | Tigerair Taiwan Co. Ltd |
| Air Koryo* | China West Air* | Jetstar Japan* | Oman Air* | Sky Angkor Airlines | Yakutia* | Uni Airways |
| Air Madagascar* | Chongqing Airlines* | Jetstar Pacific Airlines* | Pakistan Intl Airlines* | Somon Air* | Zhejiang Loong Airlines | Xiamen Airlines Company |
| Air Mauritius* | Citilink Indonesia | Jin Air* | PAL Express* | Spring Airlines | Regional (25) | Zhejiang Loong Airlines* |
| Air New Zealand* | Delta Air Lines* | Juneyao Airlines | Peach Aviation Limited* | Spring Airlines Japan | Air China | |
| Air Seoul, Inc* | Donghai Airlines* | Kenya Airways* | Pegas Fly* | Srilankan Airlines | Air Macau | |
| AirAsia | Eastar Jet | KLM-Royal Dutch Airlines* | Philippine Airlines* | SWISS* | Cathay Dragon | |
| Airasia X | Egyptair*^ | Korean Air | Philippines AirAsia Inc.* | Thai Air Asia X | Cathay Pacific Airways | |
| All Nippon Airways | El Al Israel Airlines* | Kunming Airlines | Qantas Airways* | Thai AirAsia | China Airlines | |
| American Airlines* | Emirates | Lanmei Airlines | Qatar Airways* | Thai Airways International | China Eastern Airlines | |
| Asiana Airlines | Ethiopian Airlines | Lao Airlines | Qingdao Airline Co, Ltd | Thai Lion Air | China Southern Airlines | |
| Austrian Airlines* | Etihad Airways | Lion Air | Royal Air Maroc* | Thai Smile Airways* | Chongqing Airlines | |
| Azerbaijan Airlines* | Finnair* | LOT - Polish Airlines* | Royal Brunei Airlines* | TianJin Airlines* | Donghai Airlines | |
| AZUR air* | Garuda Indonesia* | Lucky Air Co. Ltd. | Royal Flight Airlines* | Tibet Airlines* | EVA Airways | |
| Bangkok Airways* | Guangxi Beibu Gulf Airlines | Lufthansa German Airlines* | Ruili Airlines | Turkish Airlines*^ | Far Eastern Air Transport* | |
| Batik Air | Hainan Airlines | Mahan Air* | RwandAir* | Turkmenistan Airlines* | Hainan Airlines | |

Announced since late January 2020;
Duration varies

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

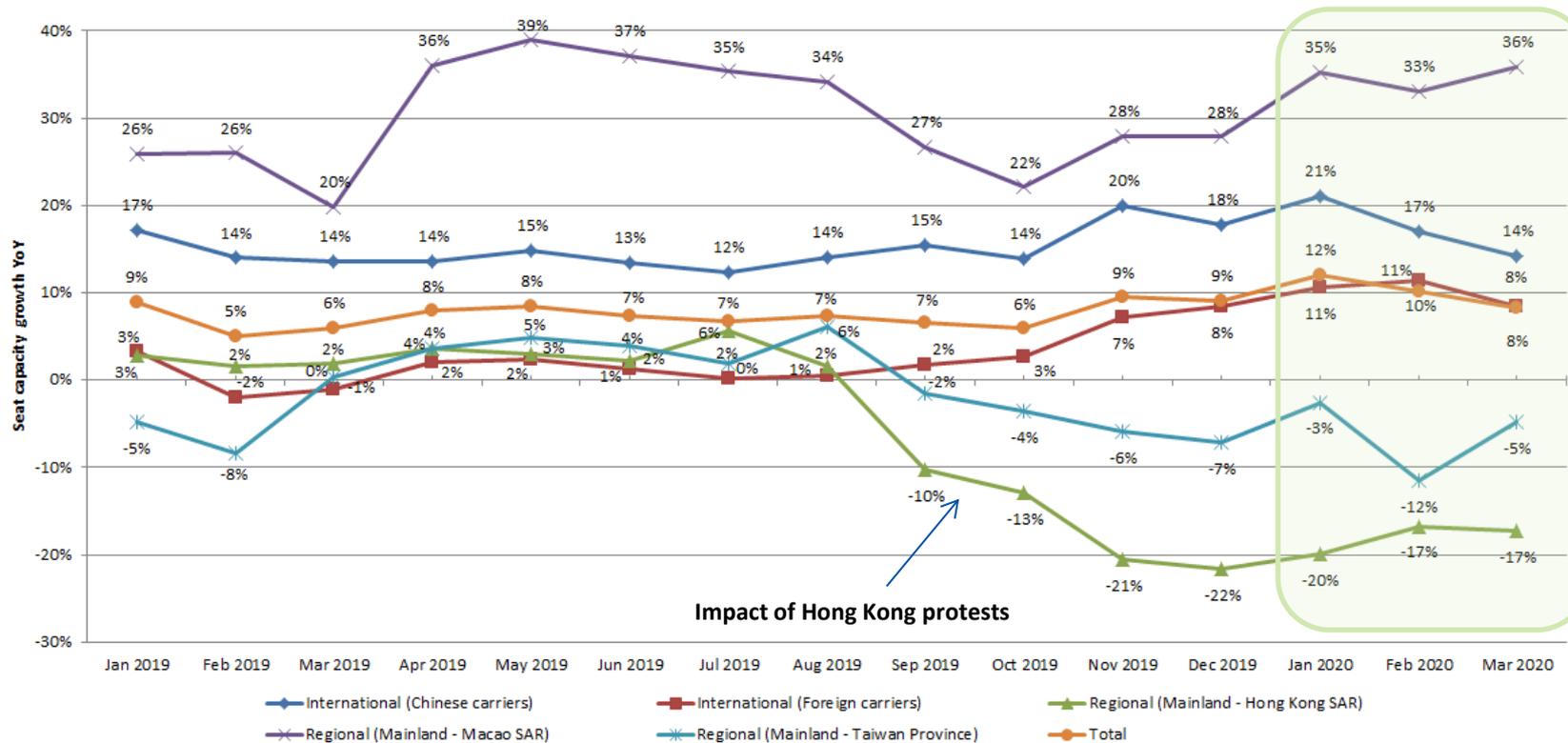


- **Baseline (hypothetical situation without COVID-19 outbreak)**
 - Seat capacity: used "originally-planned" winter schedule
 - Load factor: used 2018 actual results of airlines (average)
- **Scenario 1 (mild)**
 - Seat capacity: estimated by airlines' schedule changes
 - Load factor: used 2018 actual 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

| Assumptions | | Baseline | | Scenario 1 | | Scenario 2 | |
|---------------|---|---|-----------------------|---|-----------------------|---|-----------------------|
| | | Seat capacity reduction from originally-planned | Passenger load factor | Seat capacity reduction from originally-planned | Passenger load factor | Seat capacity reduction from originally-planned | Passenger load factor |
| January 2020 | International from/to mainland China (Chinese carriers) | 0% | 78% | -1% | 78% | -1% | 78% |
| | International from/to mainland China (Foreign carriers) | 0% | 80% | 0% | 80% | 0% | 80% |
| | Regional between mainland China and Hong Kong SAR of China | 0% | 80% | 0% | 70% | 0% | 70% |
| | Regional between mainland China and Macao SAR of China | 0% | 80% | -1% | 80% | -1% | 80% |
| | Regional between mainland China and Taiwan, Province of China | 0% | 80% | -1% | 80% | -1% | 80% |
| February 2020 | International from/to mainland China (Chinese carriers) | 0% | 78% | -57% | 78% | -57% | 58% |
| | International from/to mainland China (Foreign carriers) | 0% | 80% | -64% | 80% | -64% | 65% |
| | Regional between mainland China and Hong Kong SAR of China | 0% | 80% | -65% | 70% | -65% | 58% |
| | Regional between mainland China and Macao SAR of China | 0% | 80% | -67% | 80% | -67% | 58% |
| | Regional between mainland China and Taiwan, Province of China | 0% | 80% | -60% | 80% | -60% | 58% |
| March 2020 | International from/to mainland China (Chinese carriers) | 0% | 78% | -77% | 78% | -80% | 63% |
| | International from/to mainland China (Foreign carriers) | 0% | 80% | -80% | 80% | -82% | 70% |
| | Regional between mainland China and Hong Kong SAR of China | 0% | 80% | -82% | 70% | -83% | 63% |
| | Regional between mainland China and Macao SAR of China | 0% | 80% | -70% | 80% | -73% | 63% |
| | Regional between mainland China and Taiwan, Province of China | 0% | 80% | -77% | 80% | -79% | 63% |



10% seat capacity increase compared to 1Q 2019



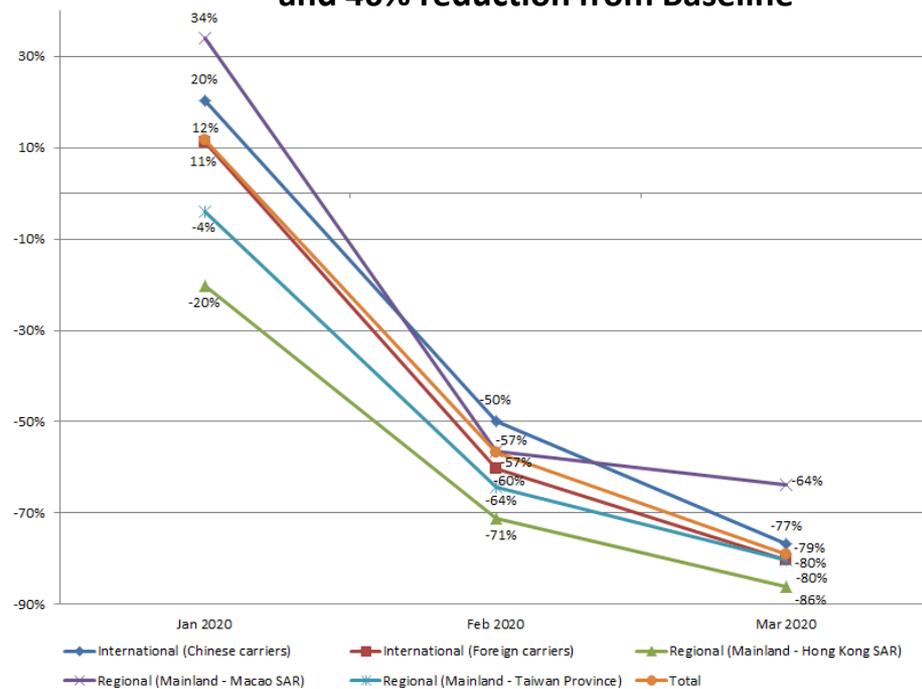
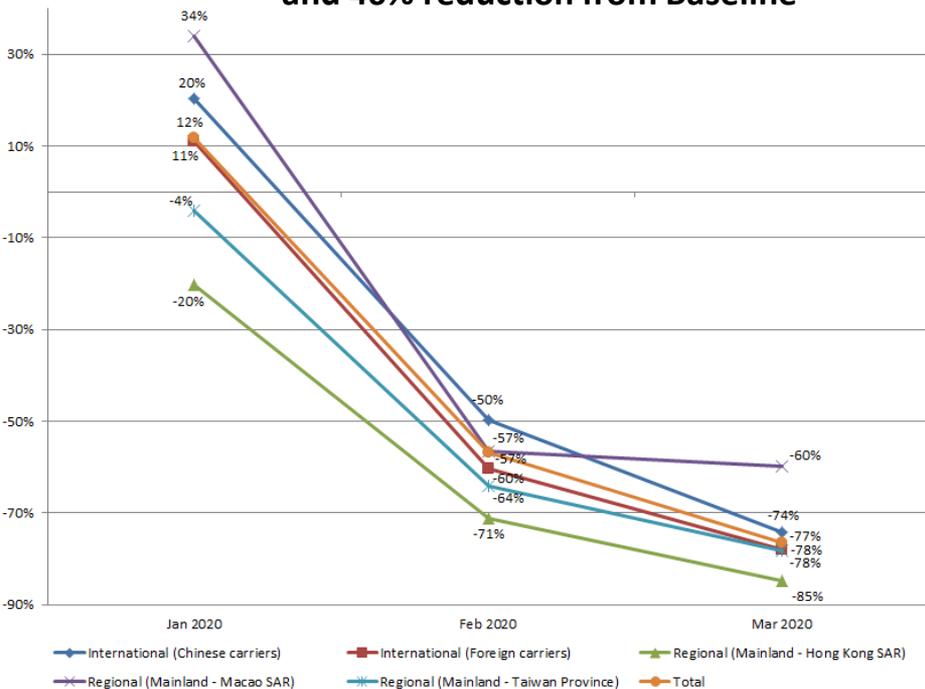
A total of YoY 10% seat capacity increase originally - planned for 1Q 2020 despite the reduction of capacity between mainland China and Hong Kong SAR and Taiwan Province

Impact of Hong Kong protests

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

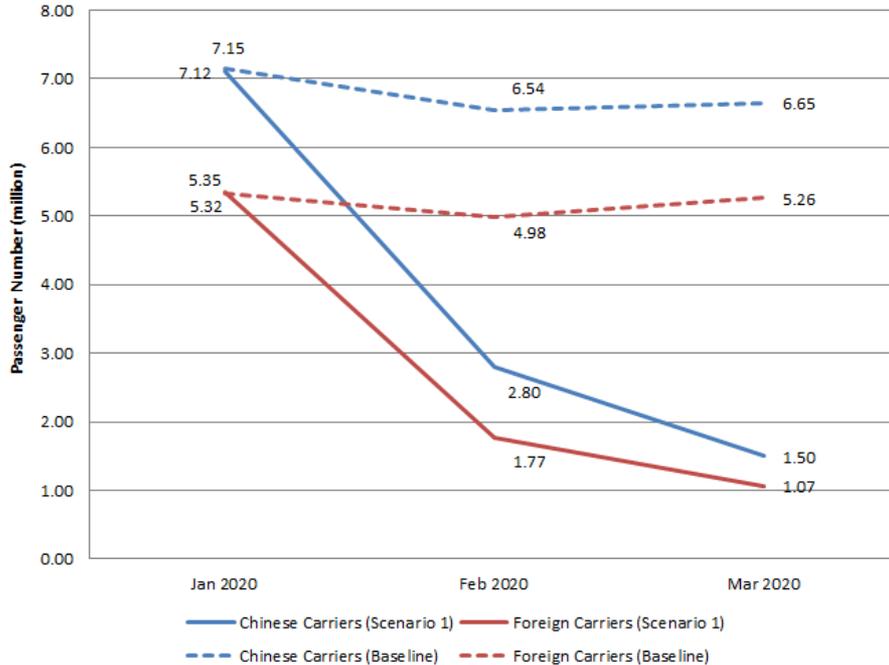




16.3 to 18.0 million “international” passenger reduction in 1Q 2020 compared to Baseline

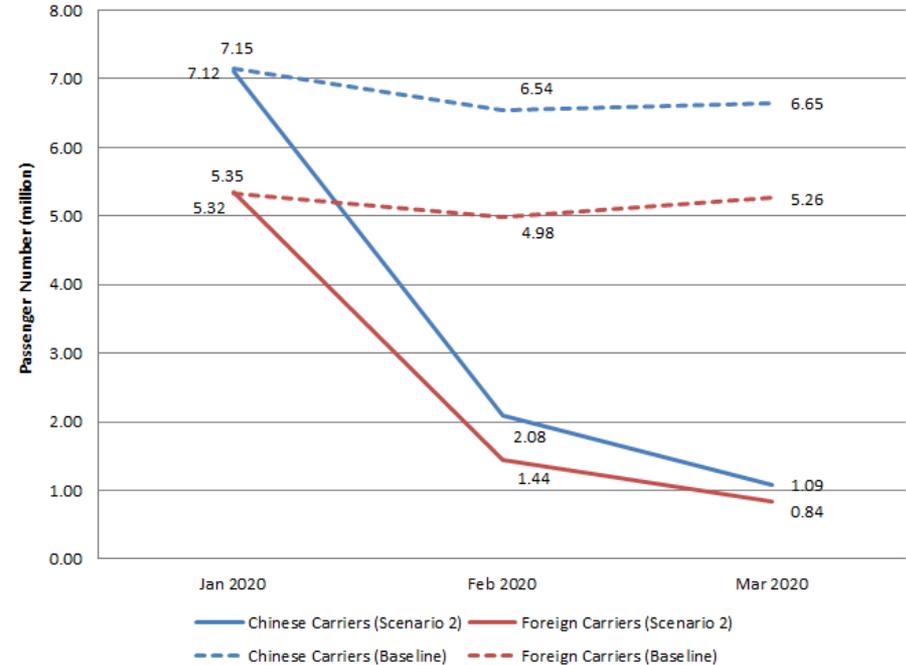
Scenario 1

16.3 million passenger reduction



Scenario 2

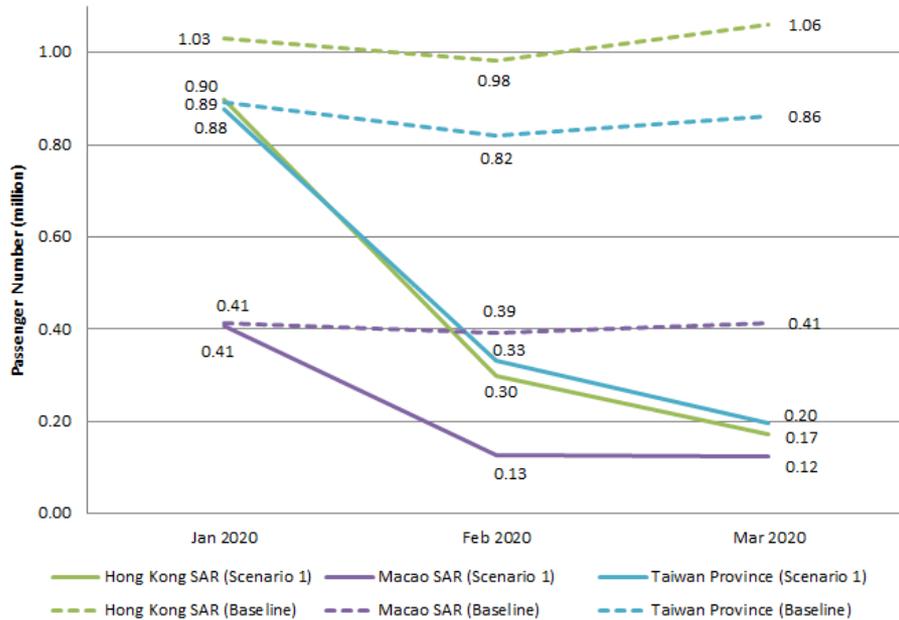
18.0 million passenger reduction



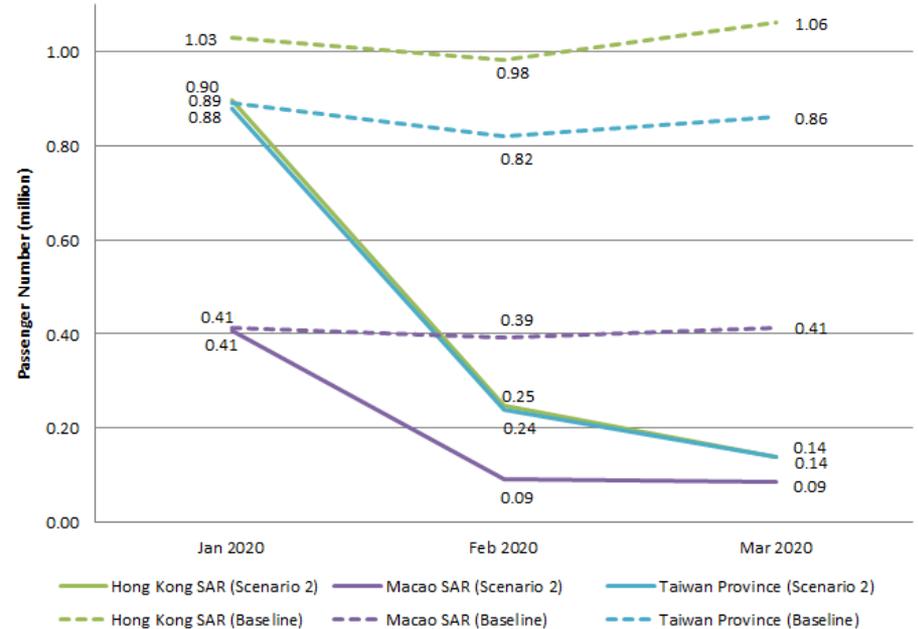


3.4 to 3.7 million “regional” passenger reduction in 1Q 2020 compared to Baseline

Scenario 1 3.4 million passenger reduction



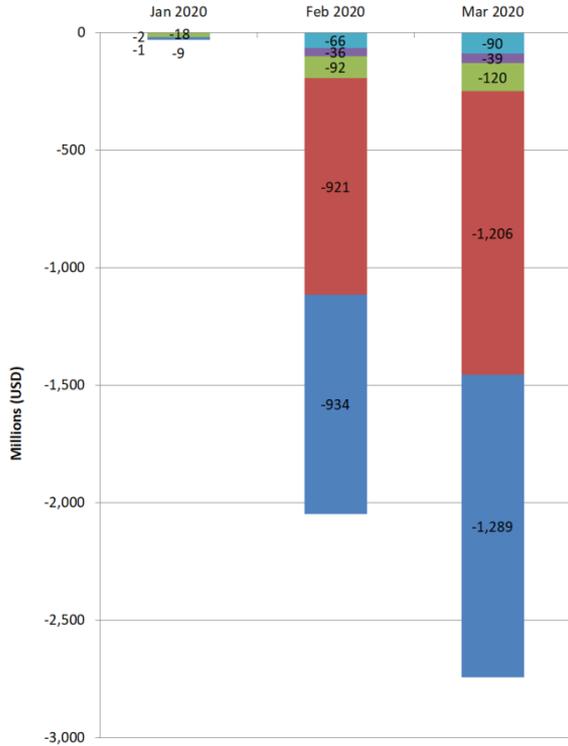
Scenario 2 3.7 million passenger reduction



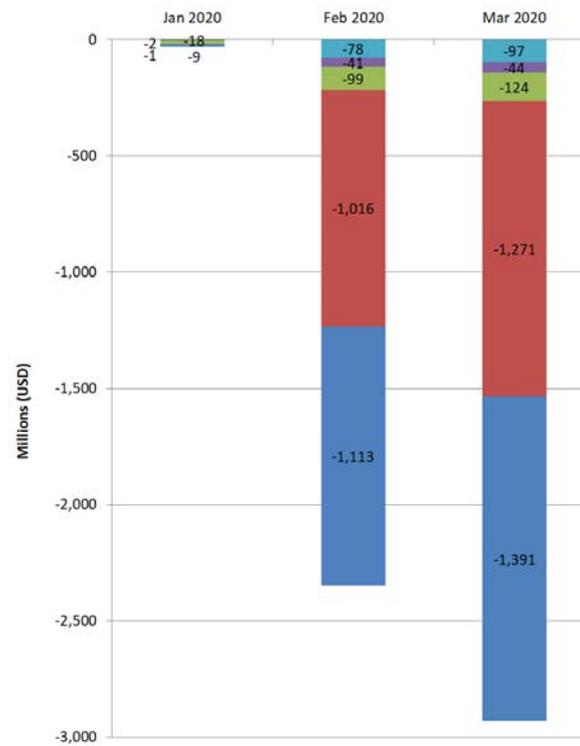


Approx. USD 4.8 to 5.3 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 4.8 billion reduction



Scenario 2: USD 5.3 billion reduction



- International (Chinese carriers)
- International (Foreign carriers)
- Regional (Mainland - Hong Kong SAR)
- Regional (Mainland - Macao SAR)
- Regional (Mainland - Taiwan Province)

- 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

| Scope of analysis | Estimated Impact on | | | | | | | | | |
|---|---|-------------|----------------|-------------|----------------------------|-------------|----------------|-------------|---|-----------------|
| | Number of seats offered by airlines (000) | | | | Number of passengers (000) | | | | Gross operating revenues of airlines (USD, million) | |
| | Scenario 1 | | Scenario 2 | | Scenario 1 | | Scenario 2 | | Scenario 1 | Scenario 2 |
| International from/to mainland China (Chinese carriers) | -11,400 | -44% | -11,600 | -45% | -8,900 | -44% | -10,100 | -49% | -\$2,230 | -\$2,510 |
| International from/to mainland China (Foreign carriers) | -9,200 | -47% | -9,300 | -48% | -7,400 | -47% | -7,900 | -51% | -\$2,120 | -\$2,280 |
| Regional between mainland China and Hong Kong SAR of China | -1,900 | -49% | -1,900 | -50% | -1,700 | -56% | -1,800 | -58% | -\$230 | -\$240 |
| Regional between mainland China and Macao SAR of China | -700 | -46% | -700 | -47% | -600 | -46% | -600 | -52% | -\$80 | -\$90 |
| Regional between mainland China and Taiwan, Province of China | -1,500 | -45% | -1,500 | -46% | -1,200 | -45% | -1,300 | -51% | -\$160 | -\$180 |
| Total | -24,700 | -46% | -25,100 | -46% | -19,700 | -46% | -21,700 | -51% | -\$4,820 | -\$5,300 |



Scenario Analysis: Hong Kong SAR of China and Macao SAR of China

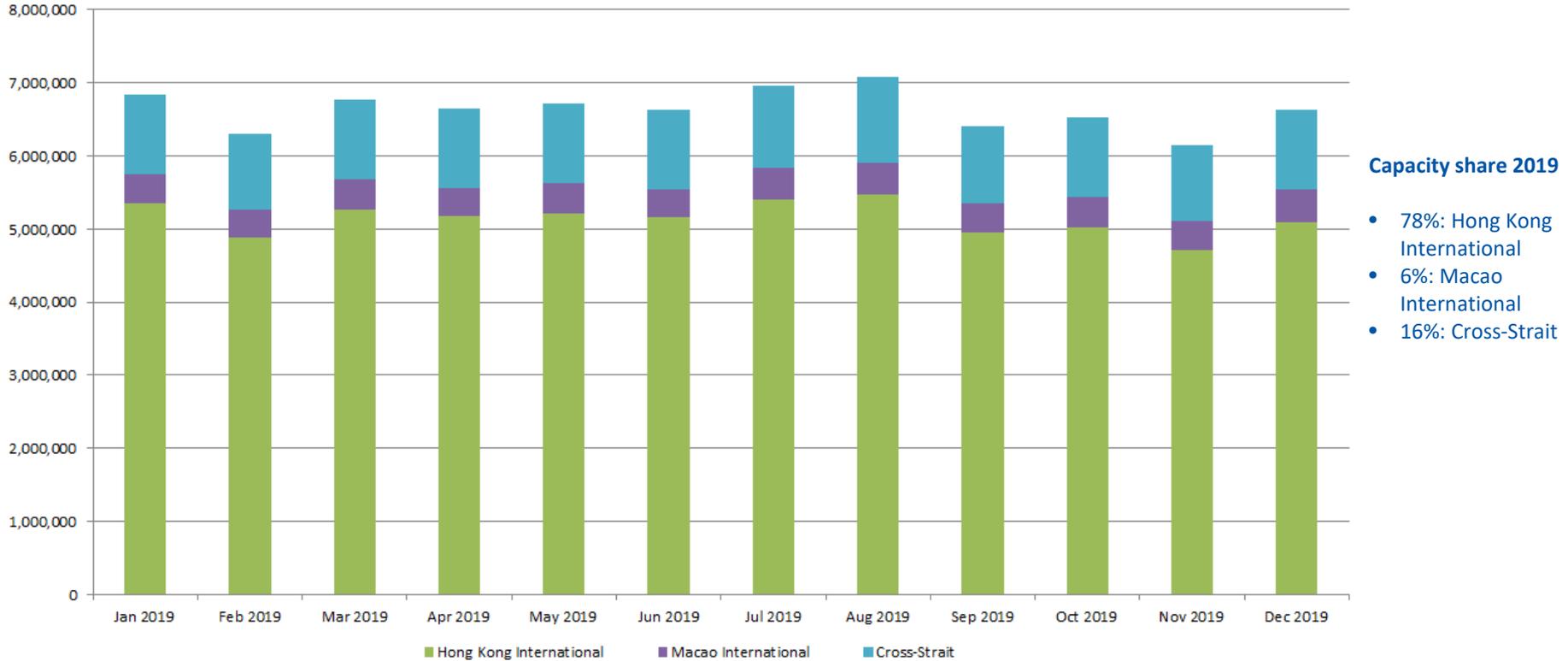
This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.



- **“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

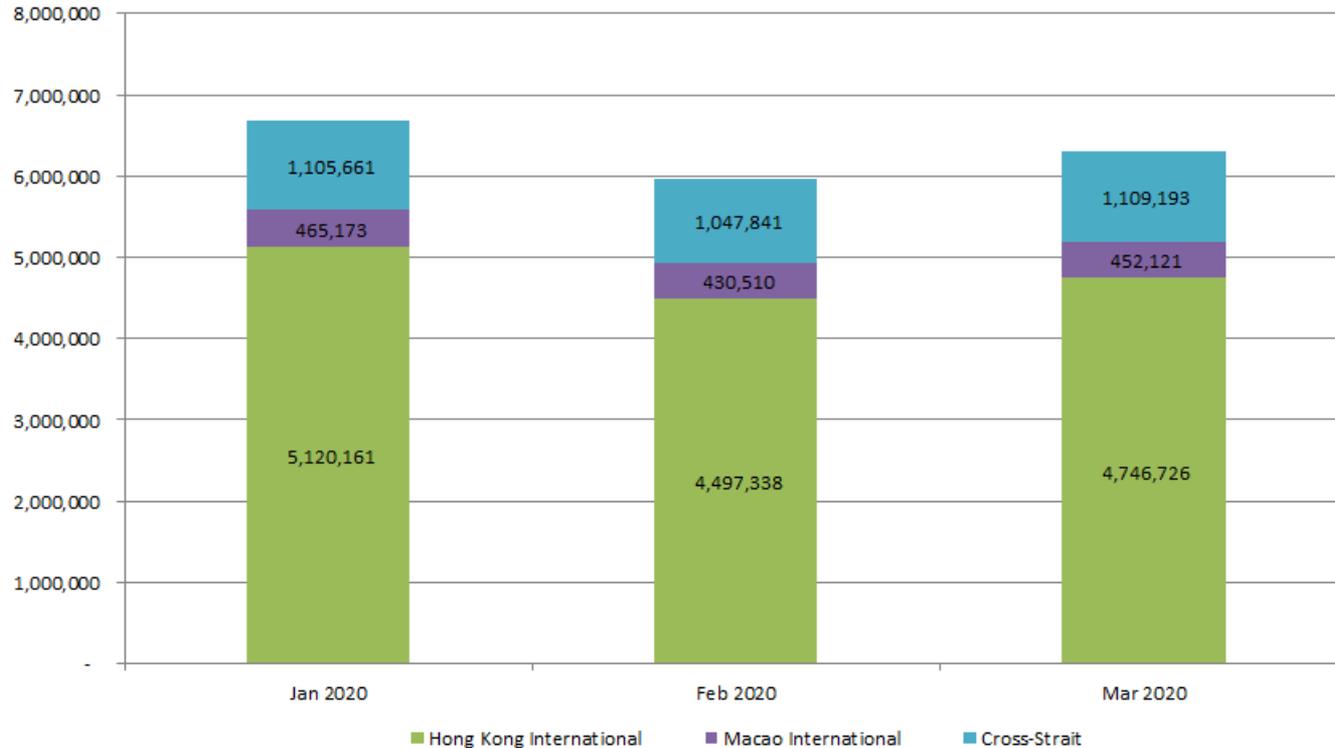


Number of seats offered by airlines (monthly, 2019)





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.



Some 70 airlines cancelled all services or reduced services from/to Hong Kong SAR and Macao SAR

| | | | | |
|-------------------------------------|---------------------------|----------------------------|---------------------------------|---|
| Hong Kong International (66) | Egyptair | Lufthansa German Airlines | Turkish Airlines | Philippines AirAsia Inc.* |
| Aeroflot Russian Airlines | El Al Israel Airlines* | Malaysia Airlines | T'way Air | Scoot |
| Air Astana | Emirates | Malindo Airways | United Airlines* | Thai AirAsia |
| Air Busan* | Ethiopian Airlines | MIAT - Mongolian Airlines* | Vietjet* | T'way Air* |
| Air Canada | Etihad Airways* | Myanmar National Airlines | Vietnam Airlines | Vietnam Airlines* |
| Air France | EZNIS AIRWAYS LLC* | Peach Aviation Limited | Virgin Atlantic Airways | Cross-Strait (9) |
| Air India* | Fiji Airways | Philippine Airlines* | Virgin Australia Intl* | Air Macau |
| Air Mauritius* | Finnair | Philippines AirAsia Inc.* | Macao International (17) | Cathay Dragon |
| Air Niugini | Garuda Indonesia | Qantas Airways | Air Busan* | Cathay Pacific Airways |
| Air Seoul, Inc* | HK Express | Qatar Airways | Air Macau | China Airlines |
| AirAsia | Hong Kong Airlines | Royal Brunei Airlines | AirAsia | EVA Airways |
| All Nippon Airways | IndiGo* | Royal Jordanian | Bamboo Airways* | HK Express* |
| American Airlines* | Japan Airlines | SAS Scandinavian Airlines* | Cambodia Airways Co. Ltd* | Hong Kong Airlines |
| Asiana Airlines | Jeju Airlines | Scoot | Cambodia Angkor Air* | Mandarin Airlines* |
| Bangkok Airways | Jetstar Asia* | Siberia Airlines* | Cebu Pacific Air* | Tigerair Taiwan Co. Ltd* |
| British Airways | Jetstar Japan* | Singapore Airlines | Eastar Jet* | <i>Announced since late January 2020; Duration varies</i> |
| Cathay Dragon | Jetstar Pacific Airlines* | South African Airways* | Jeju Airlines | *: Airlines with all service cancelled |
| Cathay Pacific Airways | KLM-Royal Dutch Airlines | SWISS | Jin Air* | *^: Airlines with all service cancelled but gradual resumption |
| Cebu Pacific Air*^ | Korean Air* | Thai AirAsia | Lanmei Airlines* | |
| Eastar Jet | Lanmei Airlines* | Thai Airways International | Philippine Airlines* | |



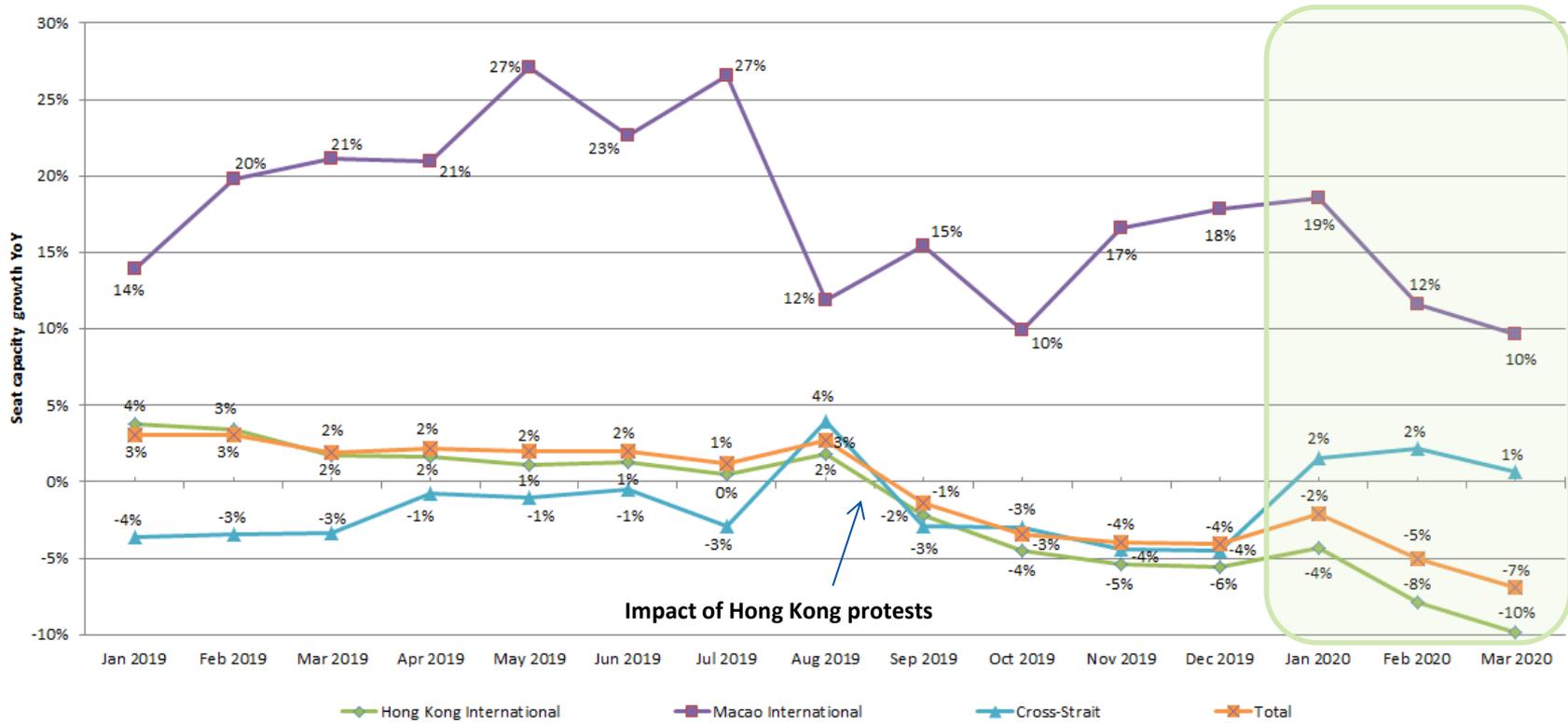
- **Baseline (hypothetical situation without COVID-19 outbreak)**
 - Seat capacity: used "originally-planned" winter schedule
 - Load factor: used the same percentage as "International from/to mainland China (Foreign carriers)" and "Regional"
- **Scenario 1 (mild)**
 - Seat capacity: estimated by airlines' 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



| Assumptions | | Baseline | | Scenario 1 | | Scenario 2 | |
|---------------|-------------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| | | Seat capacity reduction from originally-planned | Passenger load factor | Seat capacity reduction from originally-planned | Passenger load factor | Seat capacity reduction from originally-planned | Passenger load factor |
| January 2020 | Hong Kong International | 0% | 80% | 0% | 80% | 0% | 80% |
| | Macao International | 0% | 80% | 0% | 80% | 0% | 80% |
| | Cross-Strait | 0% | 80% | 1% | 80% | 1% | 80% |
| February 2020 | Hong Kong International | 0% | 80% | -25% | 80% | -25% | 58% |
| | Macao International | 0% | 80% | -67% | 80% | -67% | 58% |
| | Cross-Strait | 0% | 80% | -52% | 80% | -52% | 58% |
| March 2020 | Hong Kong International | 0% | 80% | -65% | 80% | -69% | 63% |
| | Macao International | 0% | 80% | -78% | 80% | -80% | 63% |
| | Cross-Strait | 0% | 80% | -86% | 80% | -87% | 63% |



5% seat capacity reduction compared to 1Q 2019

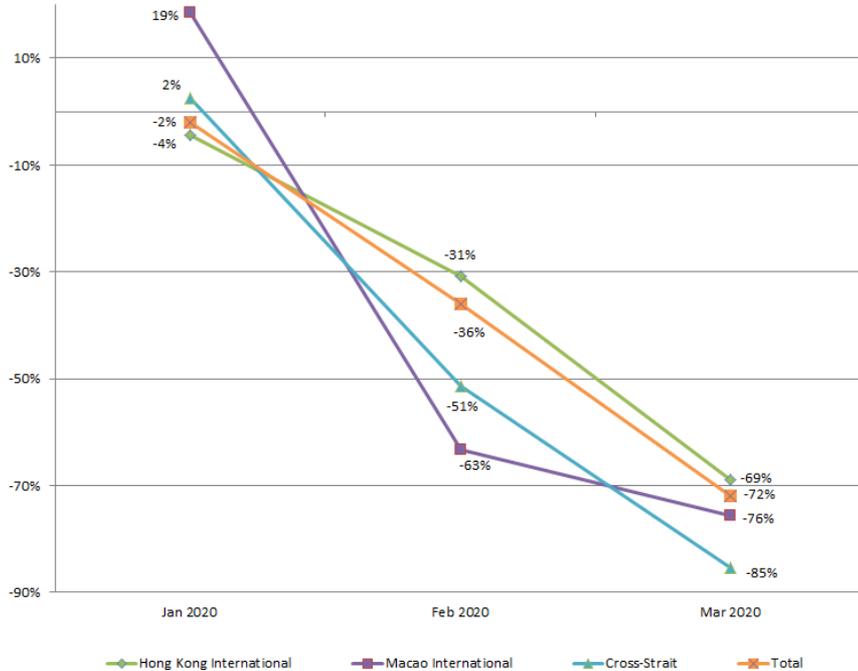


A total of YoY 5% seat capacity reduction originally - planned for 1Q 2020 due to the expectation of continued weak demand for Hong Kong SAR and Taiwan Province

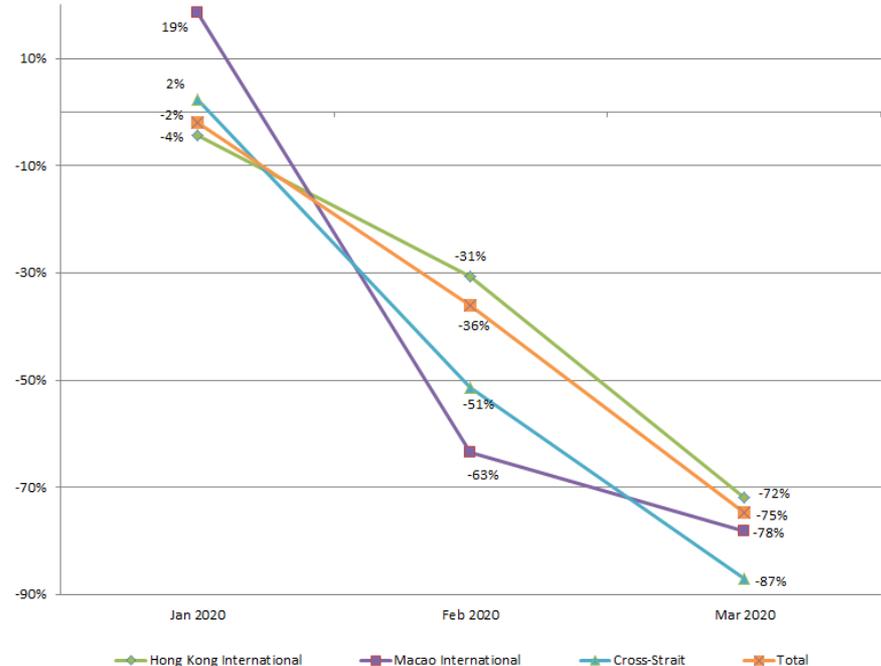


33 to 34% seat capacity reduction from Baseline

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

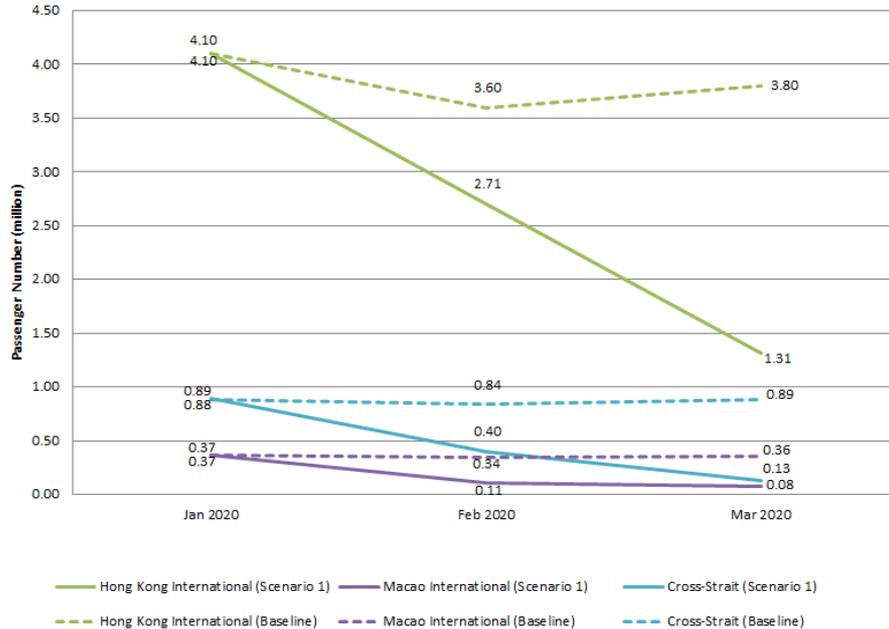


Scenario 2: for 1Q 2020 a total of 38% reduction compared to 1Q 2019 and 34% reduction from Baseline

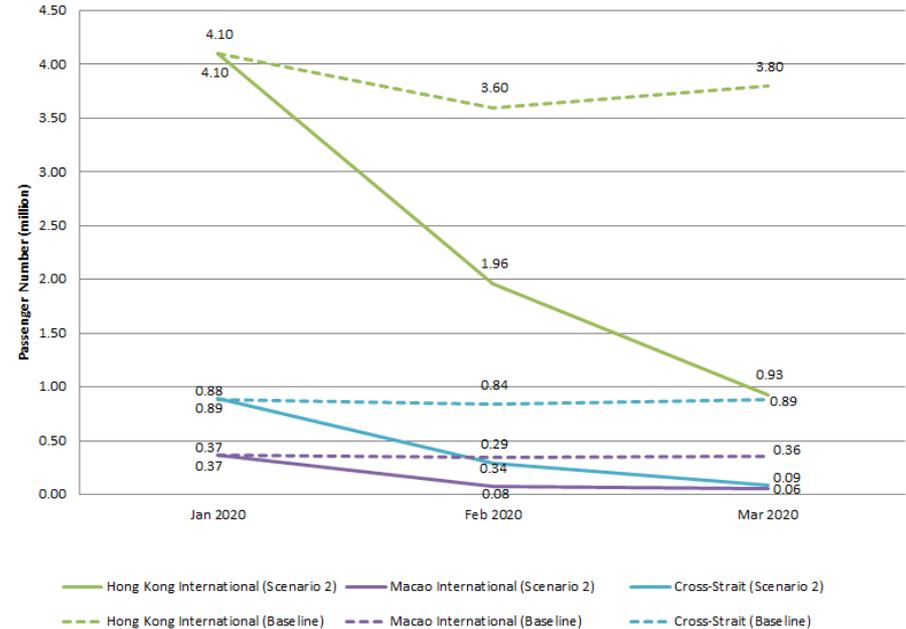


5.1 to 6.4 million passenger reduction in 1Q 2020 compared to Baseline

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



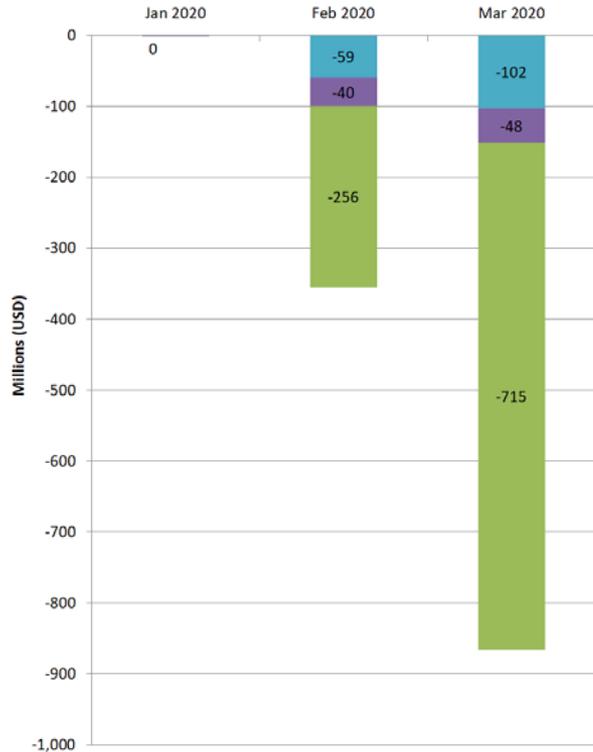
Scenario 2: a total of 6.4 million passenger reduction for 1Q 2020 from Baseline



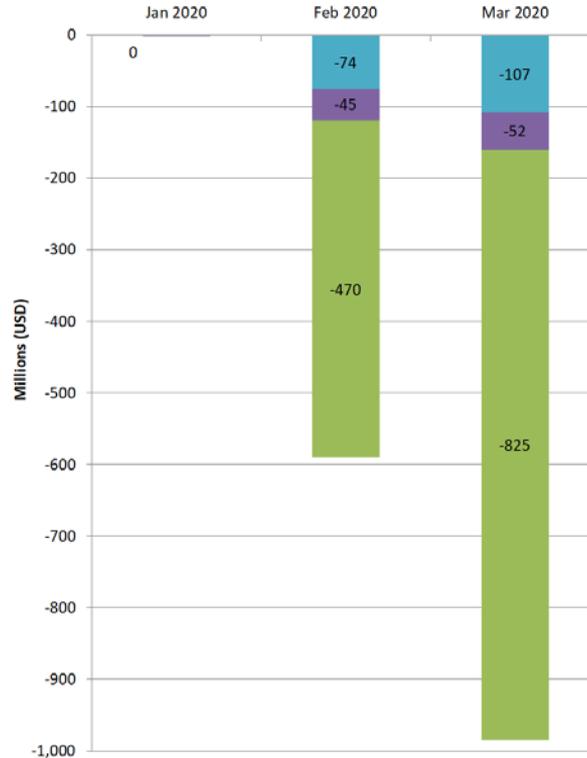


Approx. USD 1.2 to 1.6 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 1.2 billion reduction



Scenario 2: USD 1.6 billion reduction



- Hong Kong International
- Macao International
- Cross-Strait

- 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”)



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

| Scope of analysis | Estimated Impact on | | | | | | | | | |
|-------------------------|---|-------------|---------------|-------------|----------------------------|-------------|---------------|-------------|---|-----------------|
| | Number of seats offered by airlines (000) | | | | Number of passengers (000) | | | | Gross operating revenues of airlines (USD, million) | |
| | Scenario 1 | | Scenario 2 | | Scenario 1 | | Scenario 2 | | Scenario 1 | Scenario 2 |
| Hong Kong International | -4,200 | -29% | -4,400 | -31% | -3,400 | -29% | -4,500 | -39% | -\$970 | -\$1,290 |
| Macao International | -600 | -48% | -700 | -48% | -500 | -48% | -600 | -53% | -\$90 | -\$100 |
| Cross-Strait | -1,500 | -46% | -1,500 | -46% | -1,200 | -46% | -1,300 | -51% | -\$160 | -\$180 |
| Total | -6,300 | -33% | -6,500 | -34% | -5,100 | -33% | -6,400 | -42% | -\$1,220 | -\$1,570 |



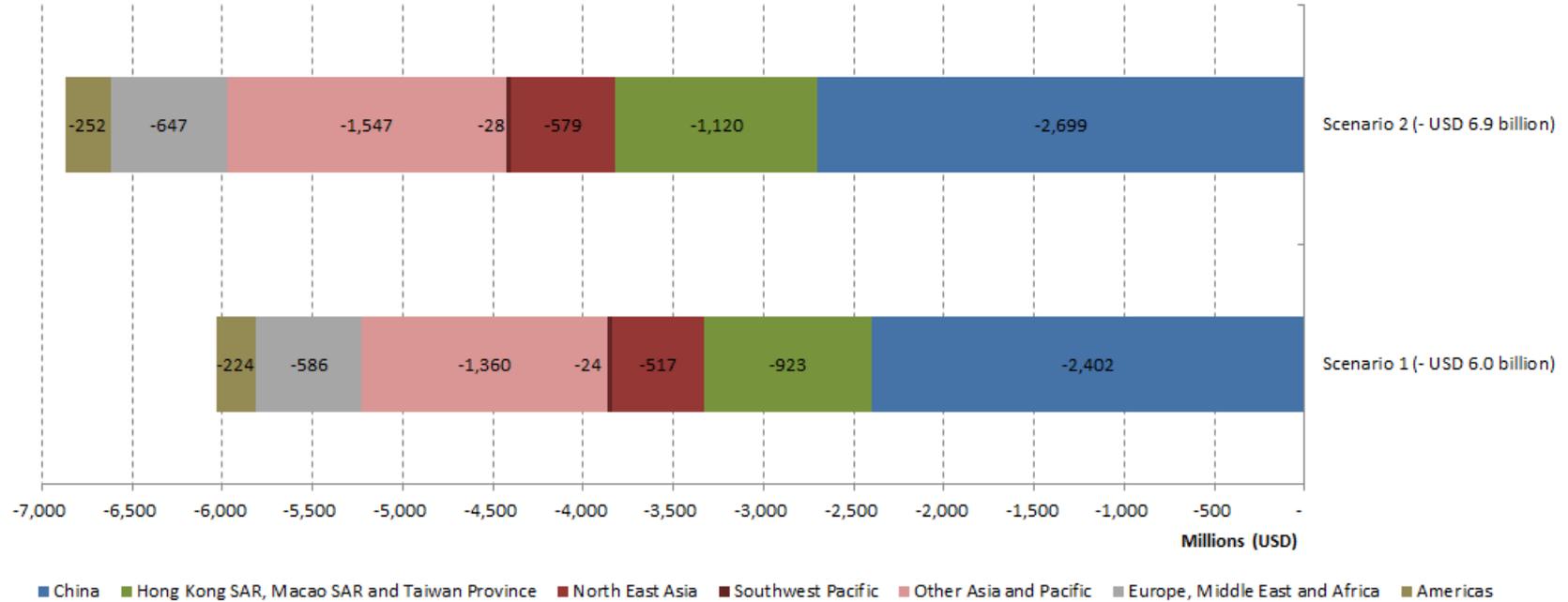
Summary of Scenario Analysis: China + Additional Estimates

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

Break-down of revenue reduction by region of air carrier registration in 1Q 2020



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



| Scope of analysis | Estimated Impact on | | | | | | | | | |
|---|---|-------------|----------------|-------------|----------------------------|-------------|----------------|-------------|---|-----------------|
| | Number of seats offered by airlines (000) | | | | Number of passengers (000) | | | | Gross operating revenues of airlines (USD, million) | |
| | Scenario 1 | | Scenario 2 | | Scenario 1 | | Scenario 2 | | Scenario 1 | Scenario 2 |
| International from/to mainland China (Chinese carriers) | -11,400 | -44% | -11,600 | -45% | -8,900 | -44% | -10,100 | -49% | -\$2,230 | -\$2,510 |
| International from/to mainland China (Foreign carriers) | -9,200 | -47% | -9,300 | -48% | -7,400 | -47% | -7,900 | -51% | -\$2,120 | -\$2,280 |
| Regional between mainland China and Hong Kong SAR of China | -1,900 | -49% | -1,900 | -50% | -1,700 | -56% | -1,800 | -58% | -\$230 | -\$240 |
| Regional between mainland China and Macao SAR of China | -700 | -46% | -700 | -47% | -600 | -46% | -600 | -52% | -\$80 | -\$90 |
| Regional between mainland China and Taiwan, Province of China | -1,500 | -45% | -1,500 | -46% | -1,200 | -45% | -1,300 | -51% | -\$160 | -\$180 |
| Sub-total | -24,700 | -46% | -25,100 | -46% | -19,700 | -46% | -21,700 | -51% | -\$4,820 | -\$5,300 |
| Hong Kong International | -4,200 | -29% | -4,400 | -31% | -3,400 | -29% | -4,500 | -39% | -\$970 | -\$1,290 |
| Macao International | -600 | -48% | -700 | -48% | -500 | -48% | -600 | -53% | -\$90 | -\$100 |
| Cross-Strait | -1,500 | -46% | -1,500 | -46% | -1,200 | -46% | -1,300 | -51% | -\$160 | -\$180 |
| Sub-total | -6,300 | -33% | -6,500 | -34% | -5,100 | -33% | -6,400 | -42% | -\$1,220 | -\$1,570 |
| Grand total | -31,100 | -42% | -31,600 | -43% | -24,800 | -43% | -28,100 | -49% | -\$6,040 | -\$6,870 |



Domestic passenger services in mainland China in 1Q 2020

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

| Scope of analysis | Estimated Impact on | | | | | | | | | | |
|--------------------------------|---|--|----------------------------|--|---|--|---------|--|----------|--|--|
| | Number of seats offered by airlines (000) | | Number of passengers (000) | | Gross operating revenues of airlines (USD, million) | | | | | | |
| | Scenario 1 | Scenario 2 | Scenario 1 | Scenario 2 | Scenario 1 | Scenario 2 | | | | | |
| Domestic within mainland China | -76,100 | -40% | -76,100 | -40% | -66,600 | -42% | -75,800 | -48% | -\$6,460 | -\$7,774 | |
| PRELIMINARY | 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 | | Calculated with an average fare of USD 97 per passenger based on CANNNews.com.cn estimates | | 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 | | Baseline | | Scenario 1 | | Scenario 2 | |
|---|------|------------------|-----------------------------------|------------------|-----------------------------------|------------------|-----------------------------------|
| | | Passenger number | Tourism revenue (in million USD)* | Passenger number | Tourism revenue (in million USD)* | Passenger number | Tourism revenue (in million USD)* |
| Australia | | 460,161 | 446.36 | 340,318 | 330.11 | 296,616 | 287.72 |
| | Loss | - | - | -119,843 | -116.25 | -163,545 | -158.64 |
| France | | 240,523 | 233.31 | 137,867 | 133.73 | 120,670 | 117.05 |
| | Loss | - | - | -102,656 | -99.58 | -119,853 | -116.26 |
| Japan | | 3,181,840 | 3,086.38 | 2,167,273 | 2102.25 | 1,855,034 | 1,799.38 |
| | Loss | - | - | -1,014,567 | -984.13 | -1,326,806 | -1287.00 |
| Thailand | | 2,772,352 | 2,689.18 | 1,826,629 | 1771.83 | 1,589,458 | 1,541.77 |
| | Loss | - | - | -945,723 | -917.35 | -1,182,894 | -1147.41 |
| United States | | 888,102 | 861.46 | 505,096 | 489.94 | 446,707 | 433.31 |
| | Loss | - | - | -383,006 | -371.52 | -441,395 | -428.15 |

- 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



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.

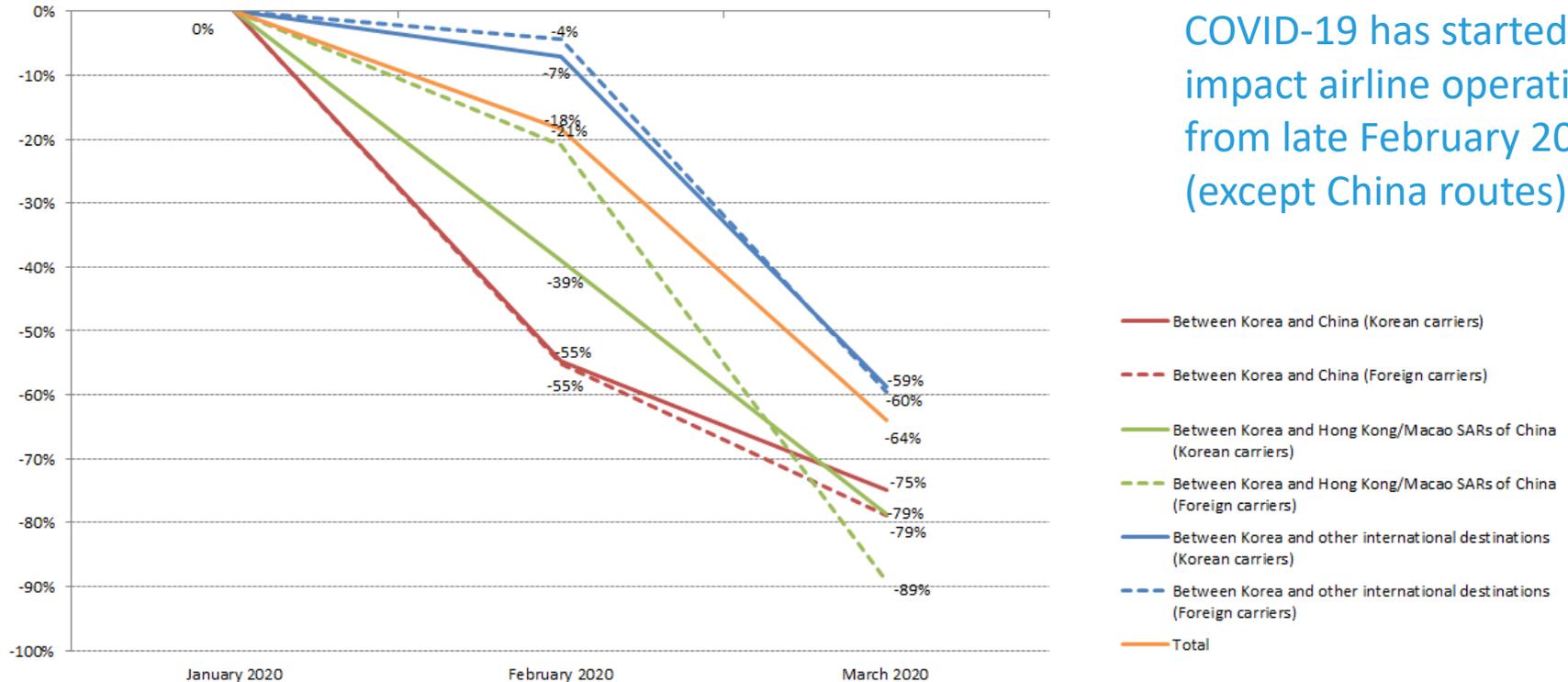


- Scope: scheduled international passenger services from/to Republic of Korea
- Baseline (hypothetical situation without COVID-19 outbreak)*
 - Seat capacity: used "originally-planned" winter schedule
 - Load factor: 80%
- Scenario 1 (mild)*
 - Seat capacity: estimated by airlines' schedule changes
 - 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



27% seat capacity reduction in 1Q 2020 from Baseline

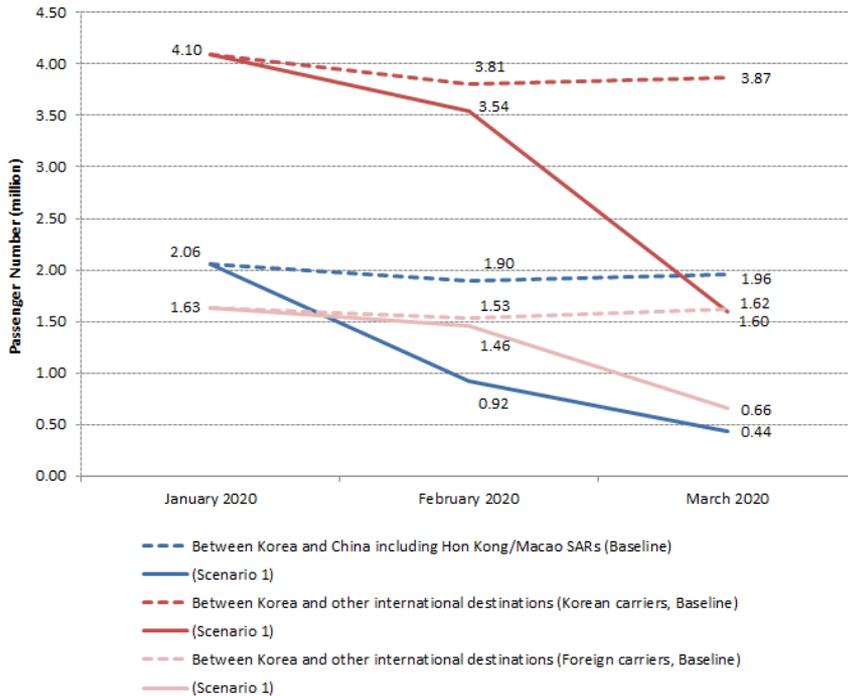


COVID-19 has started to impact airline operations from late February 2020 (except China routes)

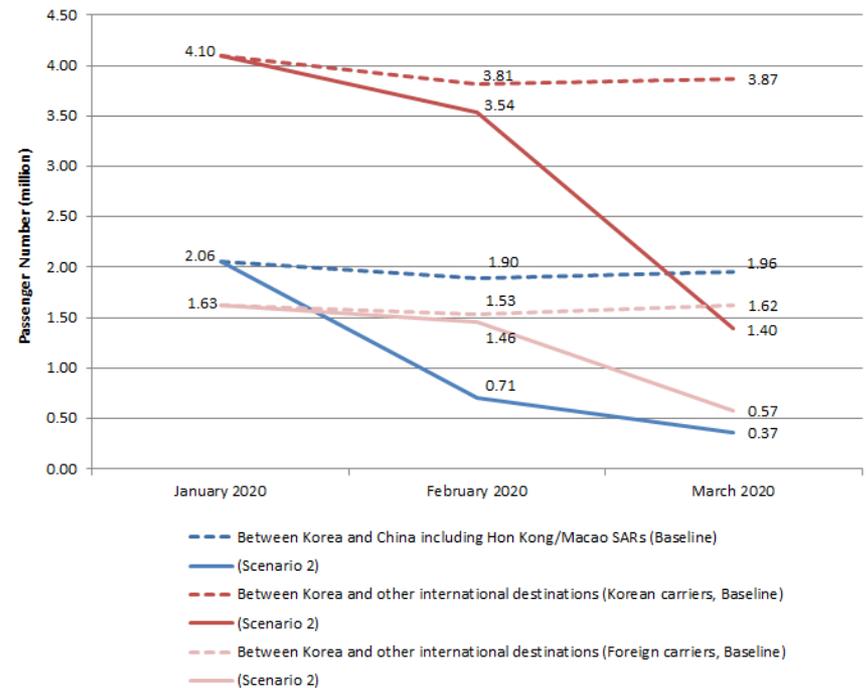
- Between Korea and China (Korean carriers)
- Between Korea and China (Foreign carriers)
- Between Korea and Hong Kong/Macao SARs of China (Korean carriers)
- Between Korea and Hong Kong/Macao SARs of China (Foreign carriers)
- Between Korea and other international destinations (Korean carriers)
- Between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

6.1 to 6.6 million passenger reduction in 1Q 2020 compared to Baseline

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



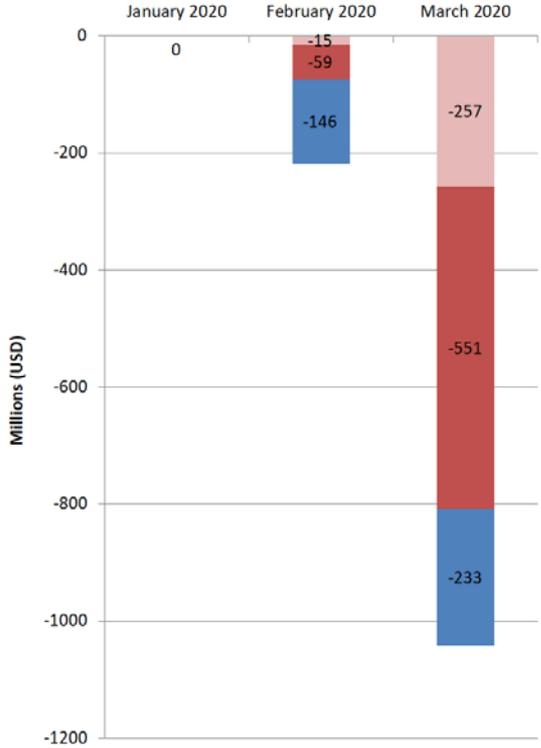
Scenario 2: a total of 6.6 million passenger reduction for 1Q 2020 from Baseline



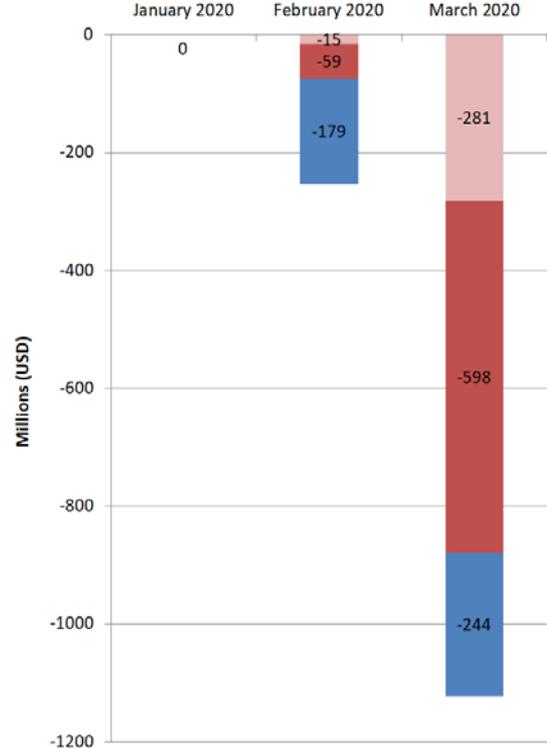


Approx. USD 1.3 to 1.4 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 1.3 billion reduction



Scenario 2: USD 1.4 billion reduction



- Between Korea and China including Hon 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.

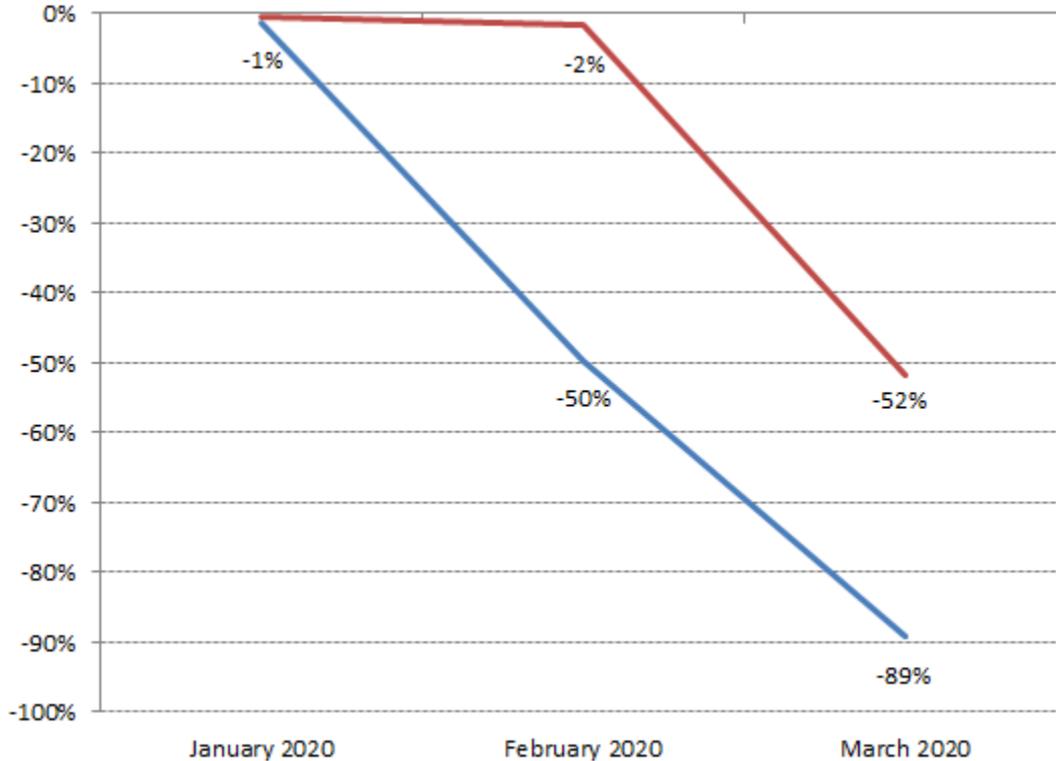


- Scope: scheduled international passenger services from/to Italy
- Baseline (hypothetical situation without COVID-19 outbreak)*
 - Seat capacity: used "originally-planned" winter schedule
 - Load factor: 80% (90% for short-haul low-cost carriers)
- Scenario 1 (mild)*
 - Seat capacity: estimated by airlines' 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

*** 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



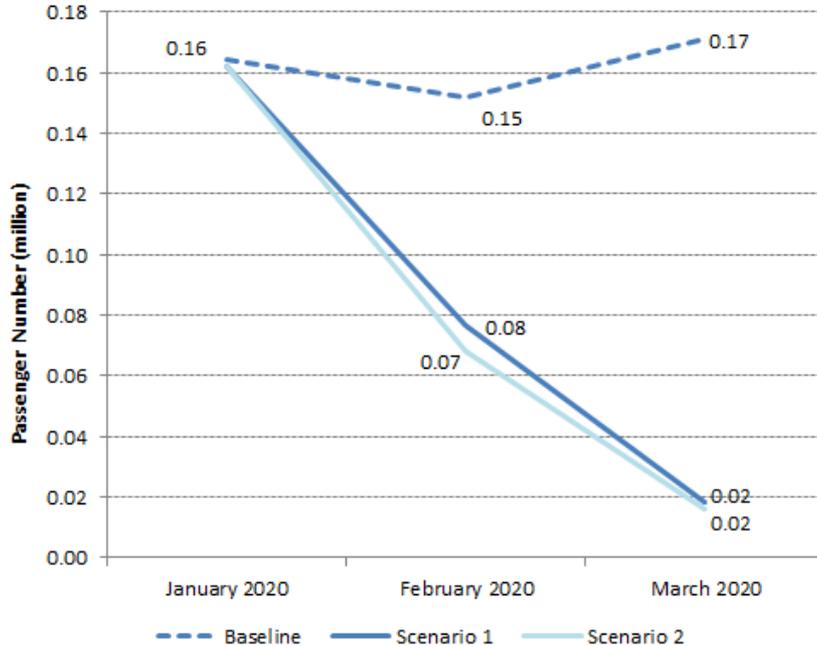
20% seat capacity reduction in 1Q 2020 from Baseline



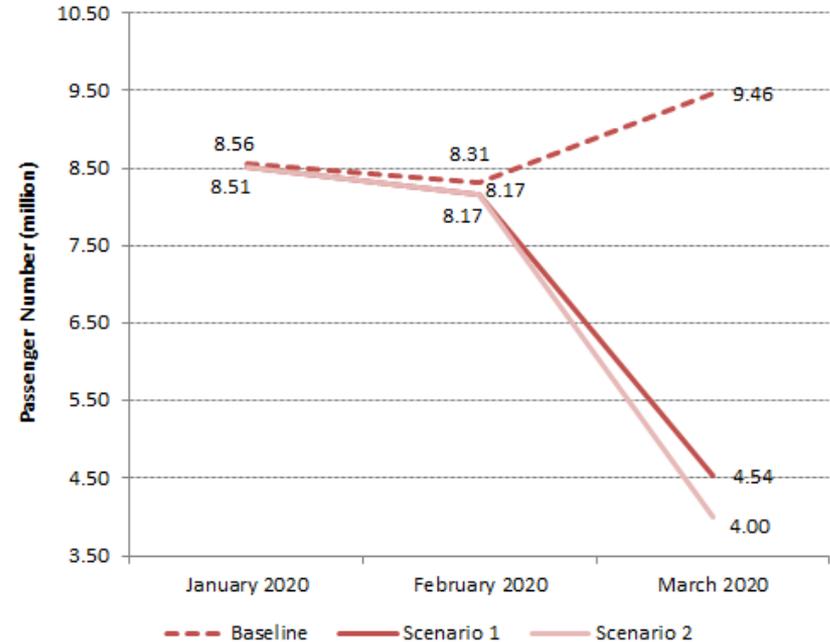
COVID-19 has started to impact airline operations from late February 2020 (except China routes)

- Between Italy and China including Hong Kong SAR, Republic of Korea, and Iran (Islamic Republic of)
- Between Italy and other international destinations

5.3 to 5.9 million passenger reduction in 1Q 2020 compared to Baseline



Between Italy and China including Hong Kong SAR, Republic of Korea, and Iran (Islamic Republic of)

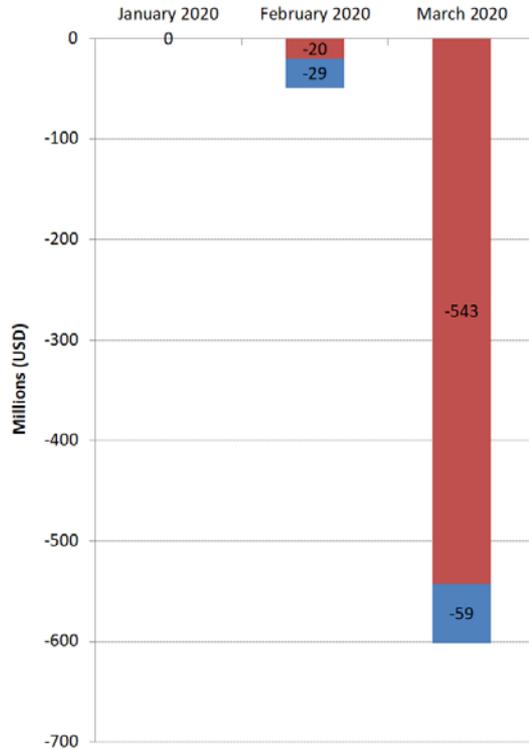


Between Italy and other international destinations

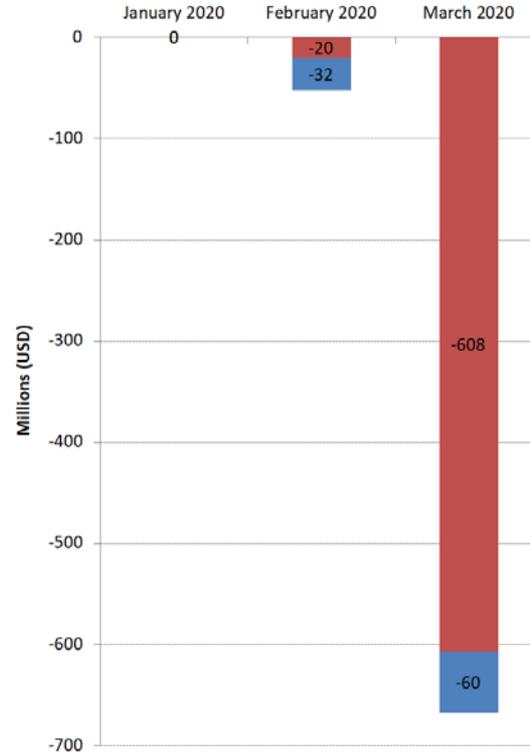


Approx. USD 0.7 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 650 million reduction



Scenario 2: USD 720 million reduction



- Between Italy and China including Hong Kong SAR, Republic of Korea, and Iran (Islamic Republic of)
- Between Italy and other international destinations

- 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 180 per passenger (ranging from USD 60 to 485 by destination)



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.

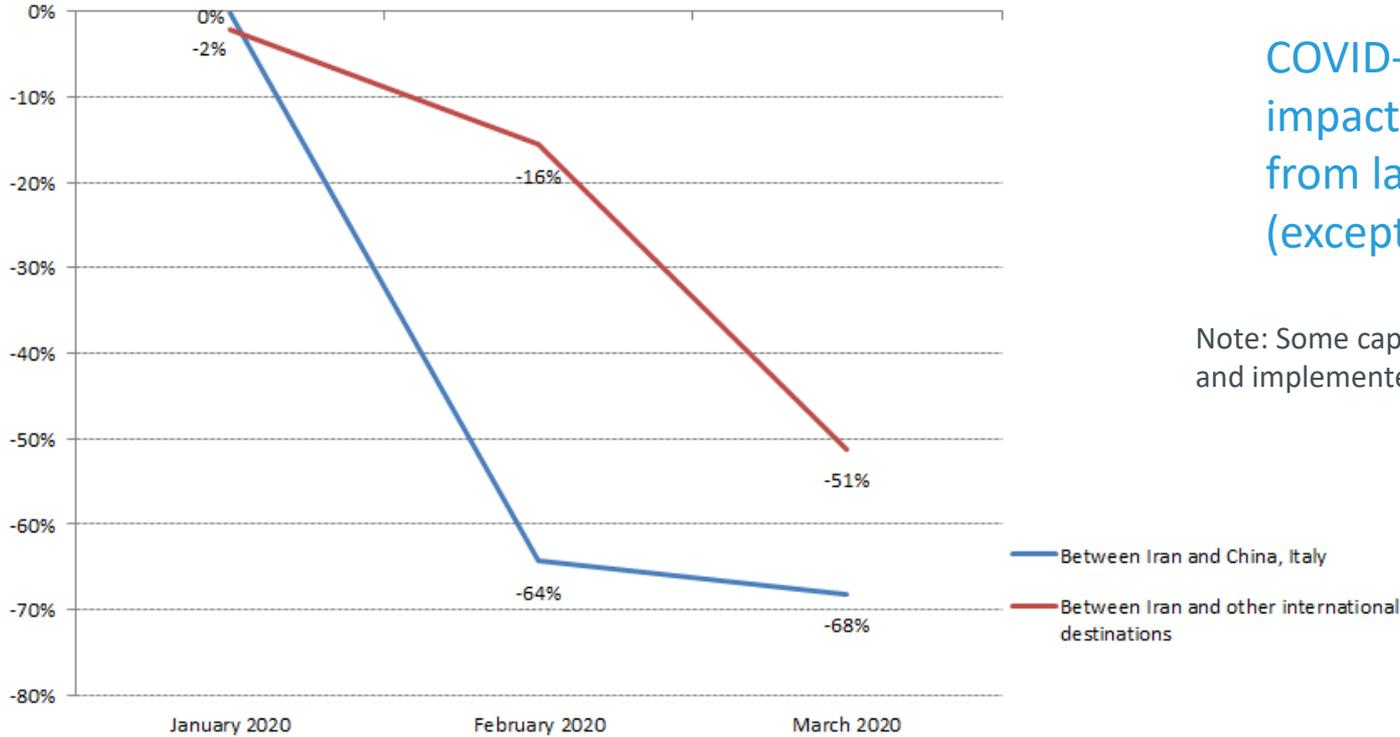


- Scope: scheduled international passenger services from/to Iran (Islamic Republic of)
- Baseline (hypothetical situation without COVID-19 outbreak)*
 - Seat capacity: used "originally-planned" winter schedule
 - Load factor: 80%
- Scenario 1 (mild)*
 - Seat capacity: estimated by airlines' schedule 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



25% seat capacity reduction in 1Q 2020 from Baseline

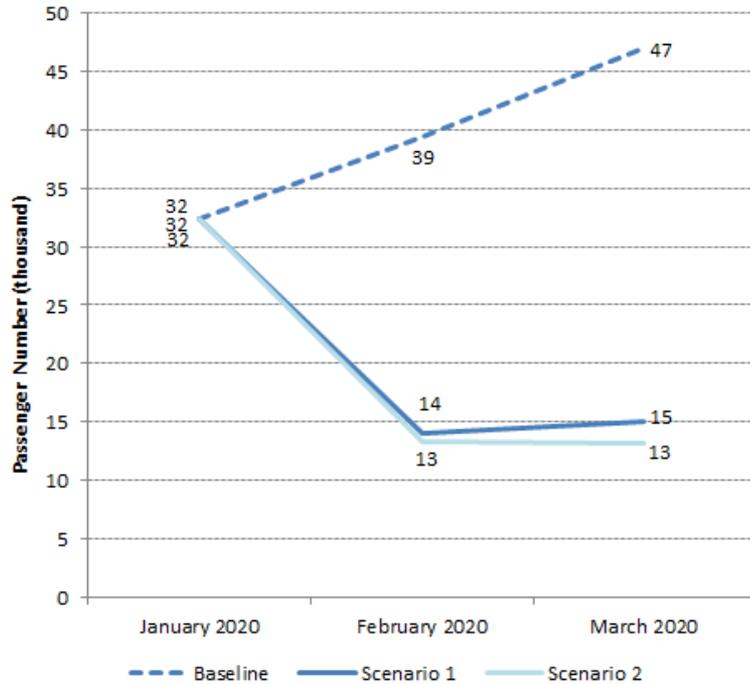


COVID-19 has started to impact airline operations from late February 2020 (except China routes)

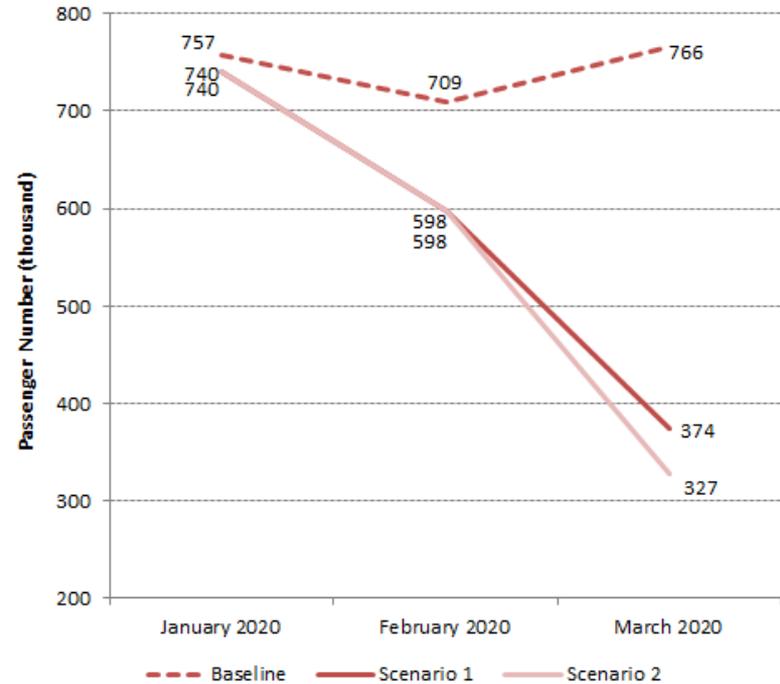
Note: Some capacity change was announced and implemented before COVID-19 outbreak



580,000 to 630,000 passenger reduction in 1Q 2020 compared to Baseline



Between Iran and China, Italy

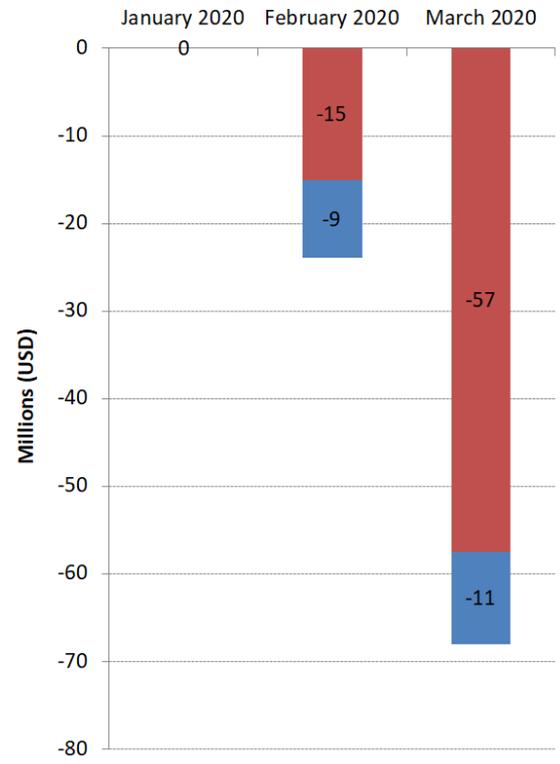


Between Iran and other international destinations

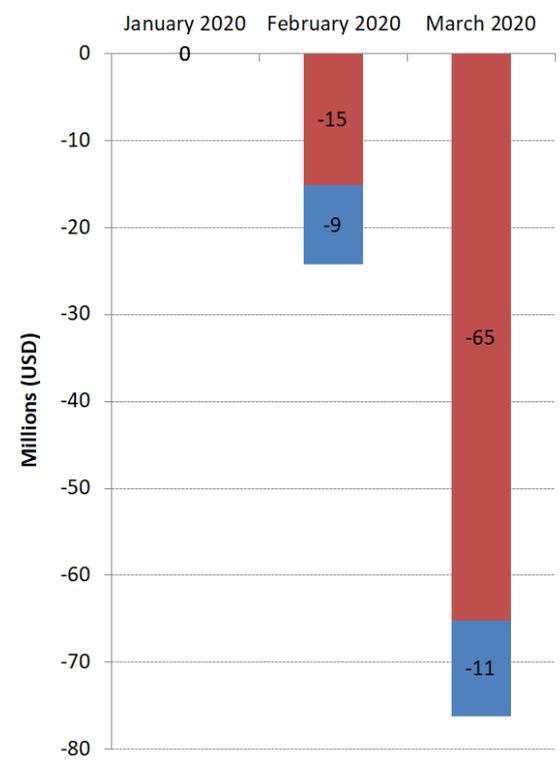


Approx. USD 92 to 100 million potential loss of airline revenues for 1Q 2020 compared to Baseline

Scenario 1: USD 92 million reduction



Scenario 2: USD 100 million reduction



- Between Iran and China, Italy
- Between Iran and other international destinations

- 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)



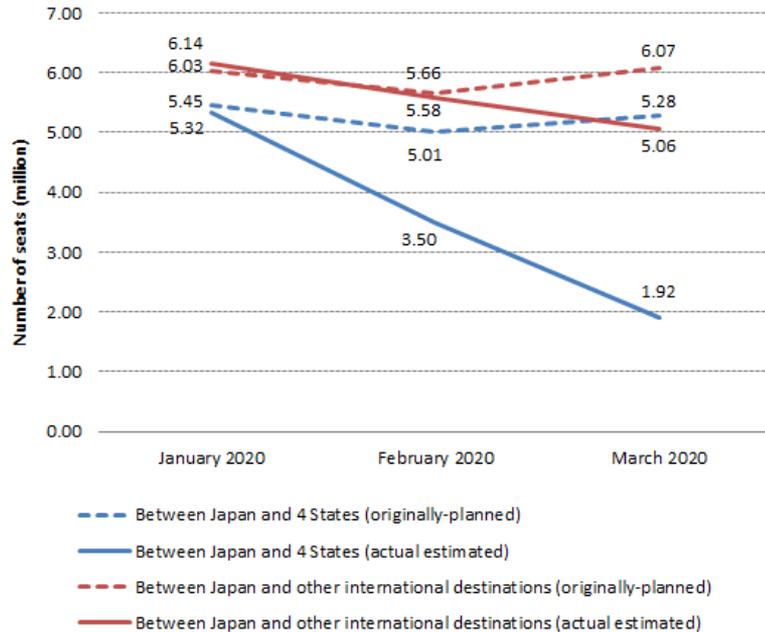
Preliminary Analysis: Japan and Singapore

This section contains a very preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.

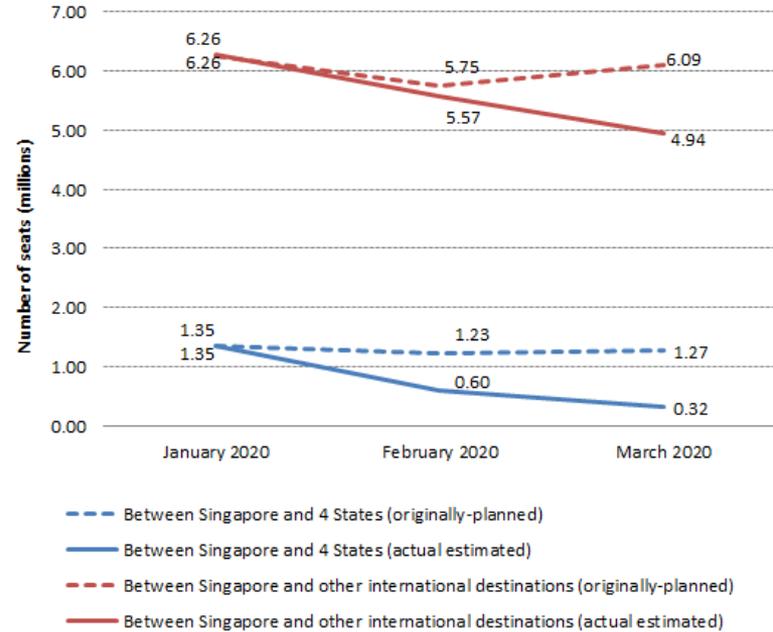


Japan/Singapore reported the second highest confirmed cases till mid-February*

International passenger seat capacity (Japan)



International passenger seat capacity (Singapore)



* *Coronavirus Disease 2019 (COVID-19) Situation Report by WHO*



Preliminary Analysis: Transatlantic between United States and Schengen Area

This section contains a very preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.



Potentially impacting on over 4.3 million seats offered by 15,000 flights for the first one month

International passenger capacity between U.S. and Schengen Area potentially impacted by U.S. travel policy (30 days from 14 March 2020)



The U.S. travel policy may affect approx. **3.5 million passengers** for one month



North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU

<https://www.icao.int/sustainability/Pages/Economic-Impacts-of-COVID-19.aspx>

<https://www.icao.int/Newsroom/Pages/Economic-impact-estimates-due-to-COVID-19-travel-bans.aspx>

<https://www.icao.int/Security/COVID-19/Pages/default.aspx>

<http://www.capsca.org/CoronaVirusRefs.html>