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

Montréal, Canada
13 March 2020

Contents

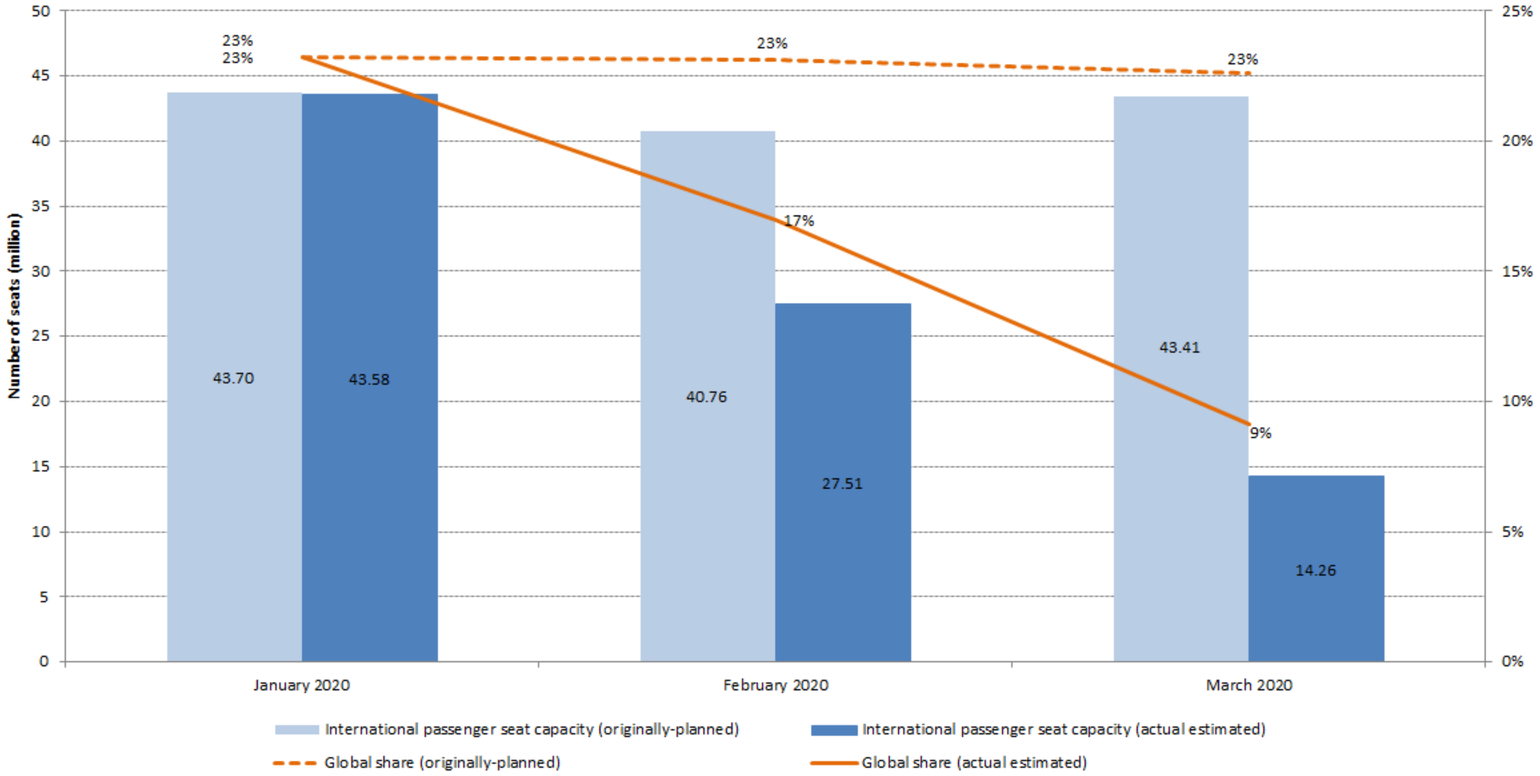
Estimated impact on 4 States with the highest number of confirmed cases*

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**: 21% seat capacity reduction, 5.5 to 6.1 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

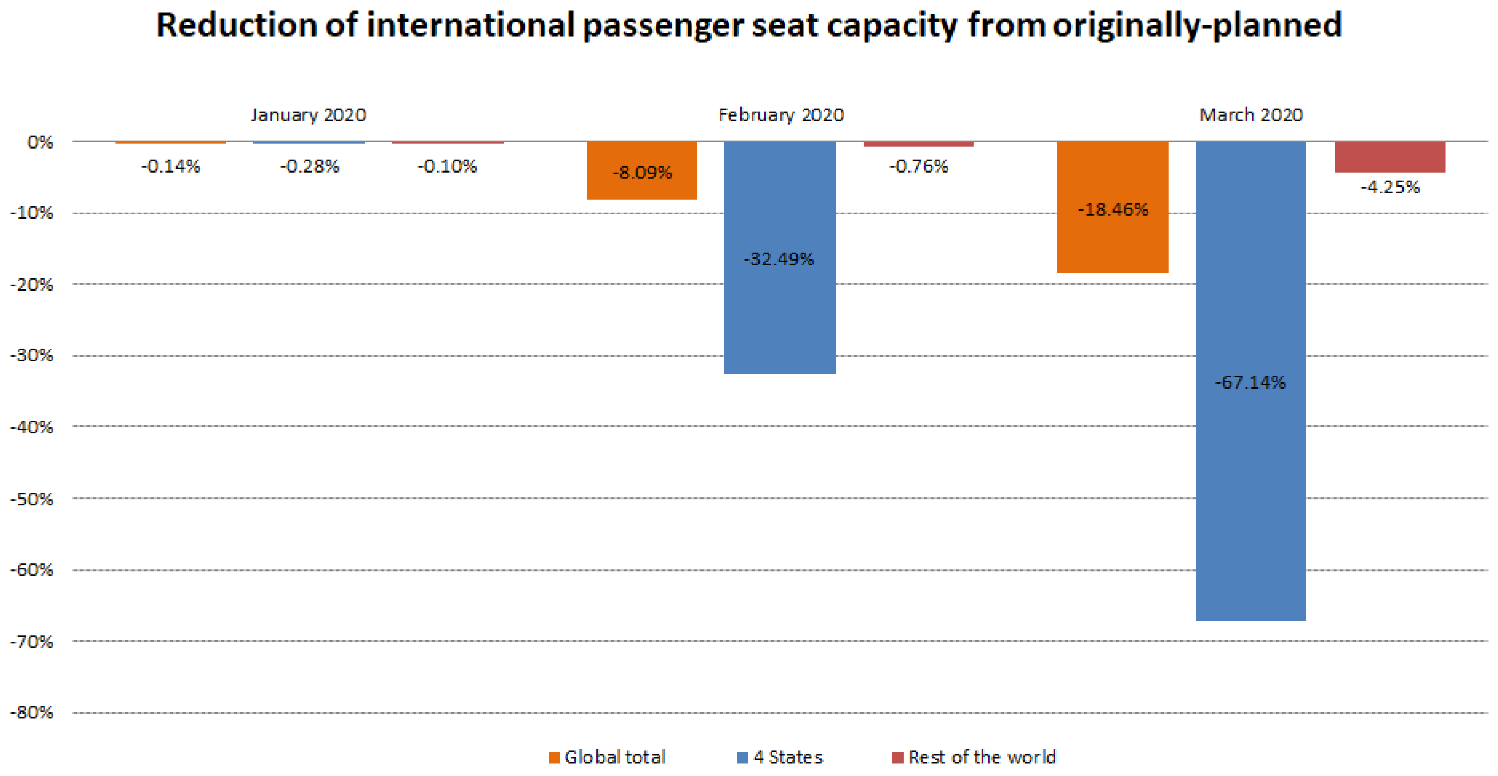
Global capacity share of 4 States dropped from 23% in January to 9% in March 2020



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

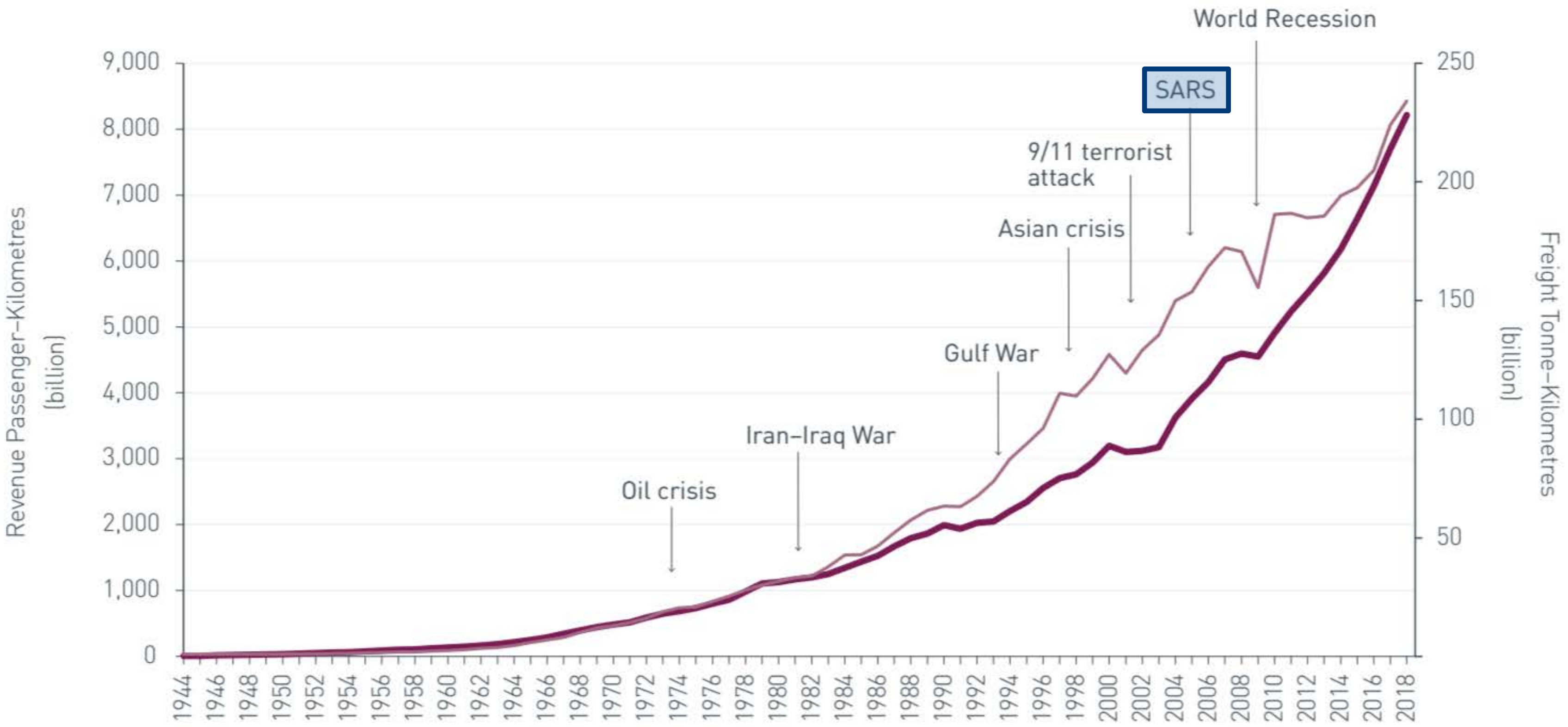
Source: ICAO estimates based on OAG, Routes Online and airline websites

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



Introduction and Background

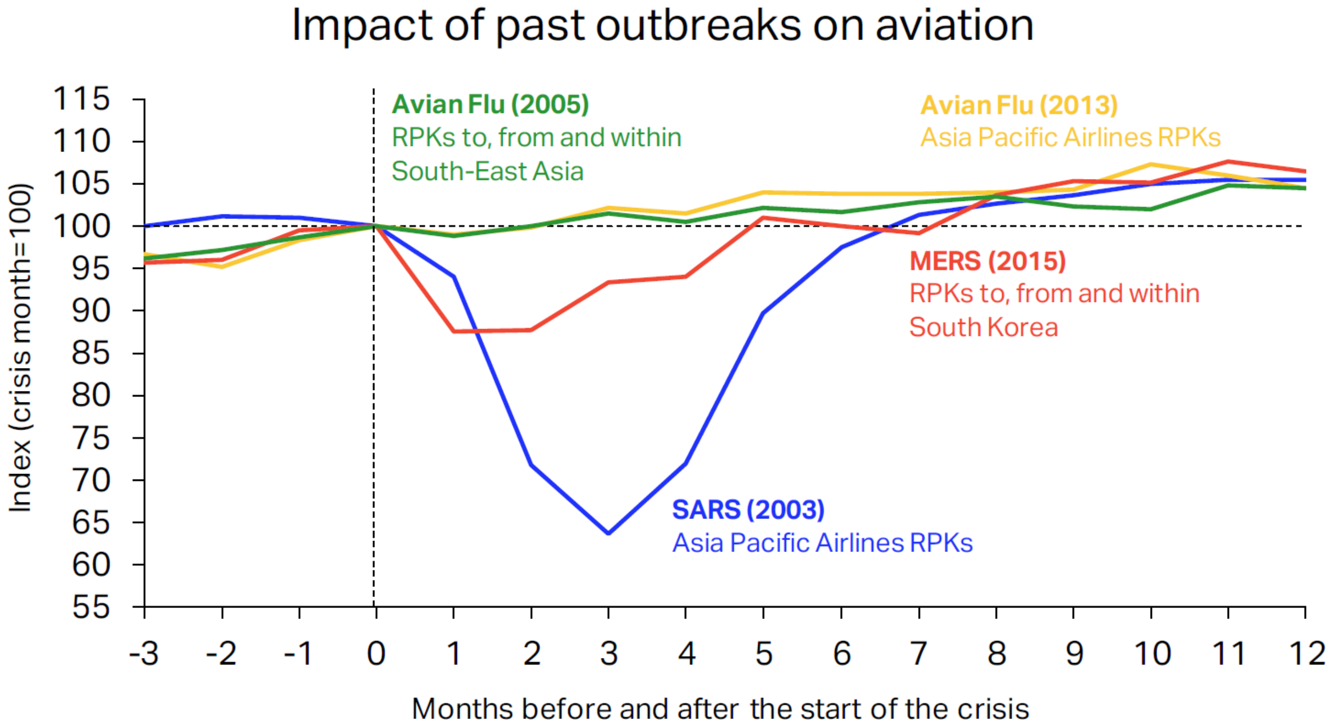
Air traffic has been vulnerable to external factors including disease outbreaks



Source: ICAO Annual Report of the Council

Scheduled commercial traffic
Total (international and domestic) services

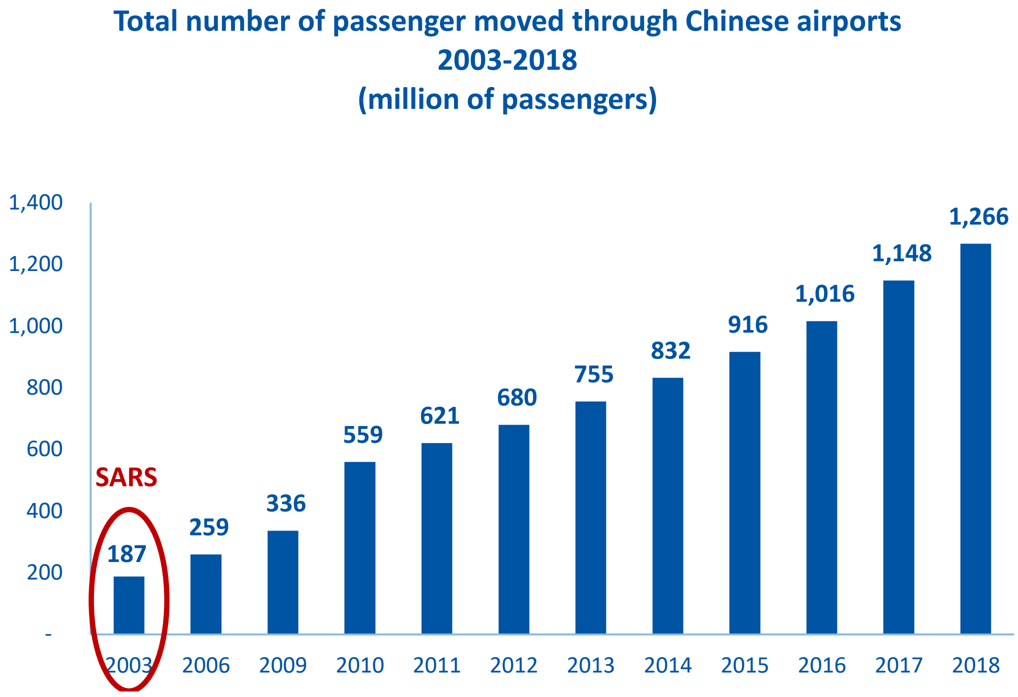
What can we learn from past experience? SARS, Aviation flu and MERS

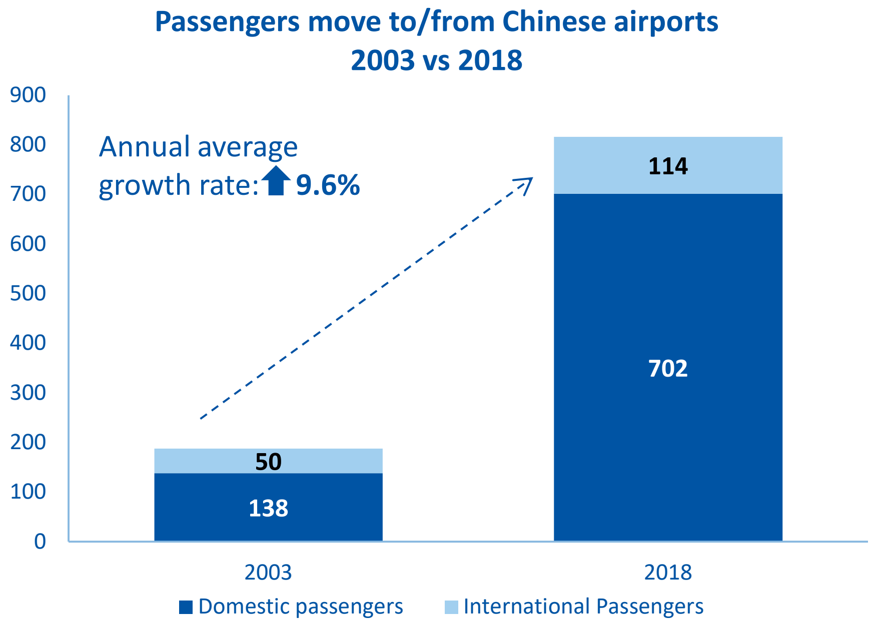


Source: IATA Economics

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

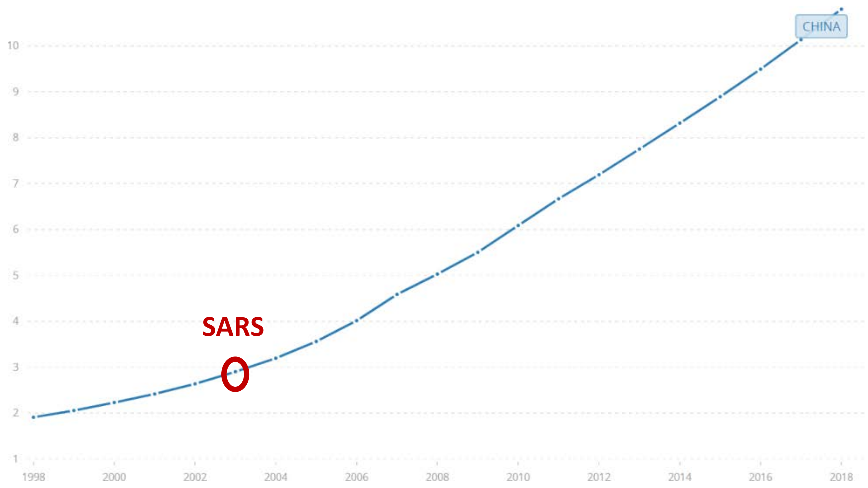




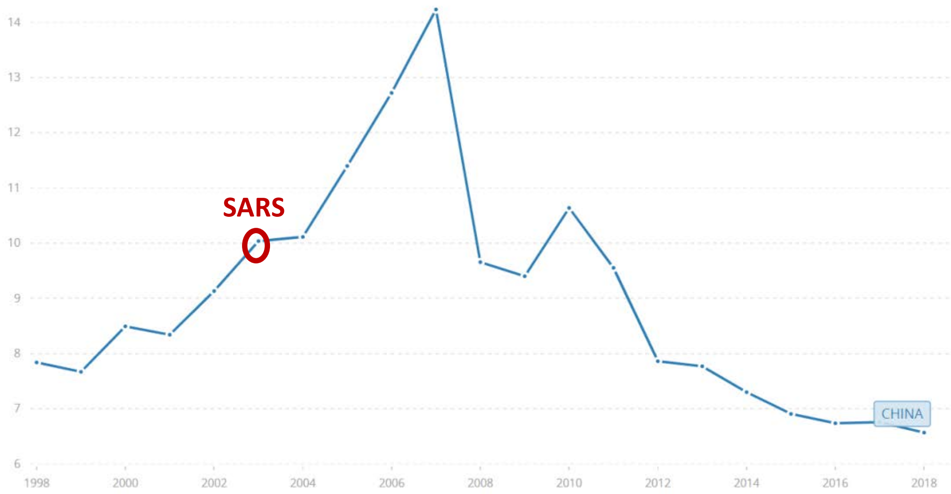
Source: ICAO-ACI Airport traffic data

Chinese economic size quadrupled since 2003 but growth rate slowed down

GDP of China (constant 2010 USD, trillion)

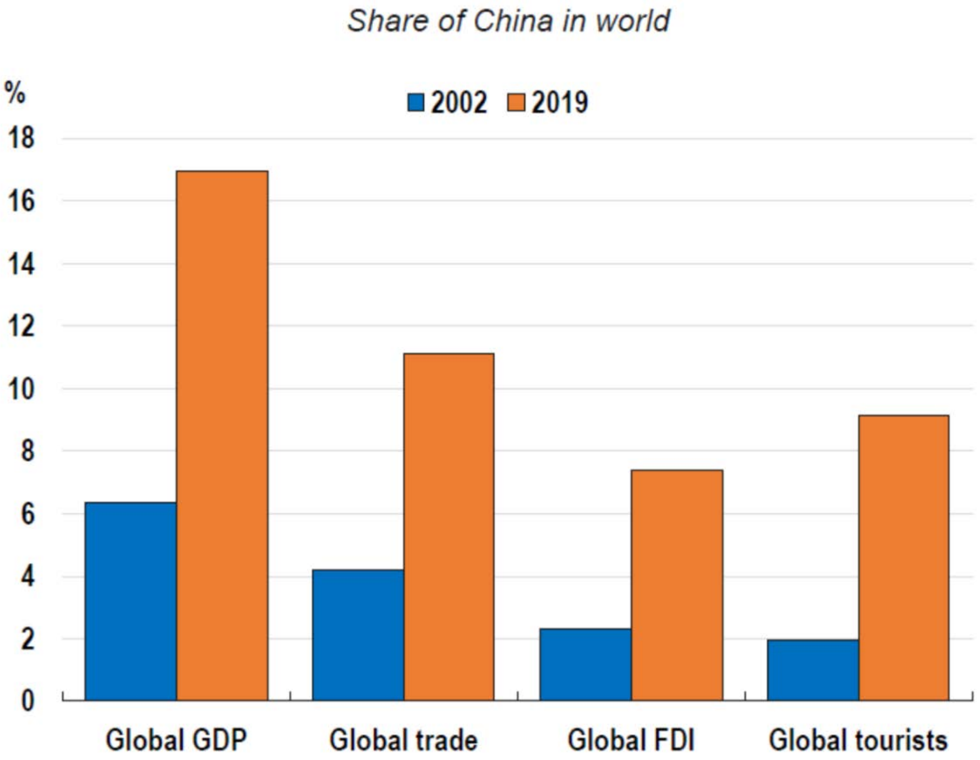


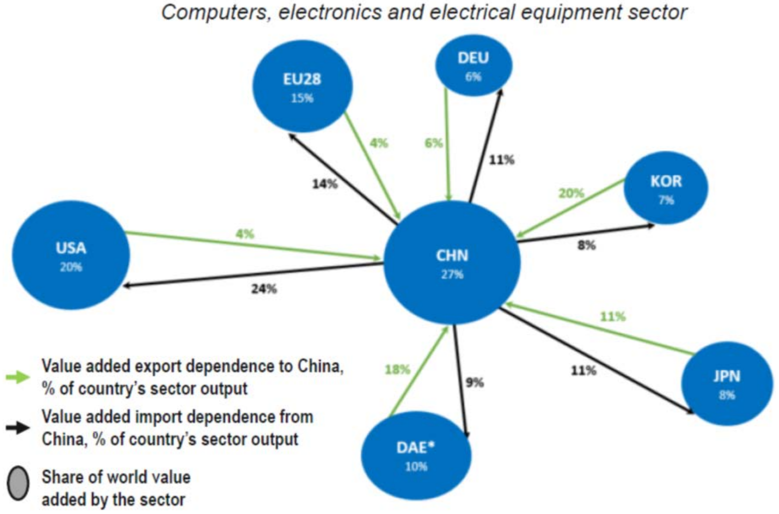
GDP Annual Growth of China (%)



Source: World Bank Group

China is more integrated in the global economy

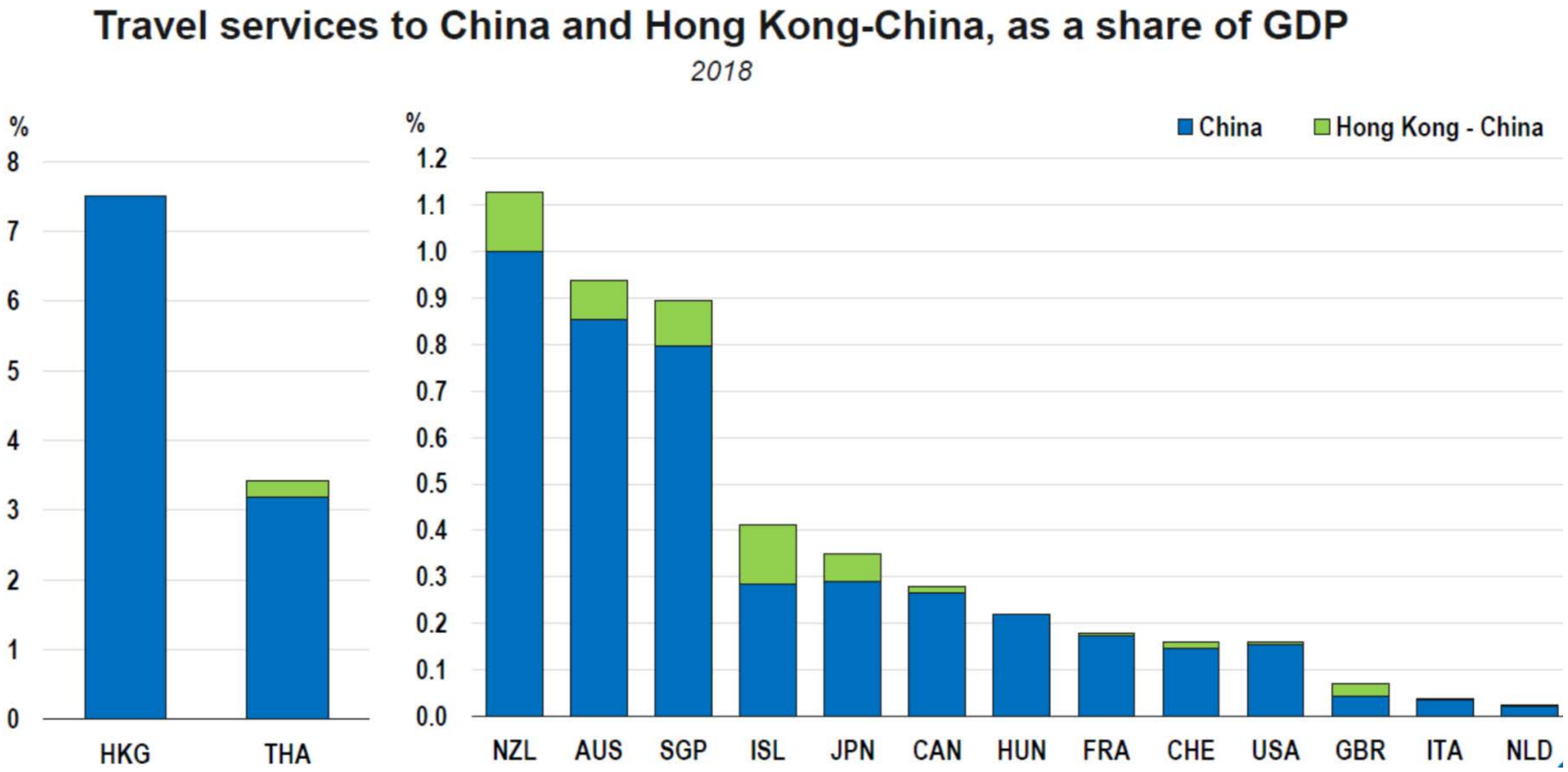




Value added trade flows between China and key partners

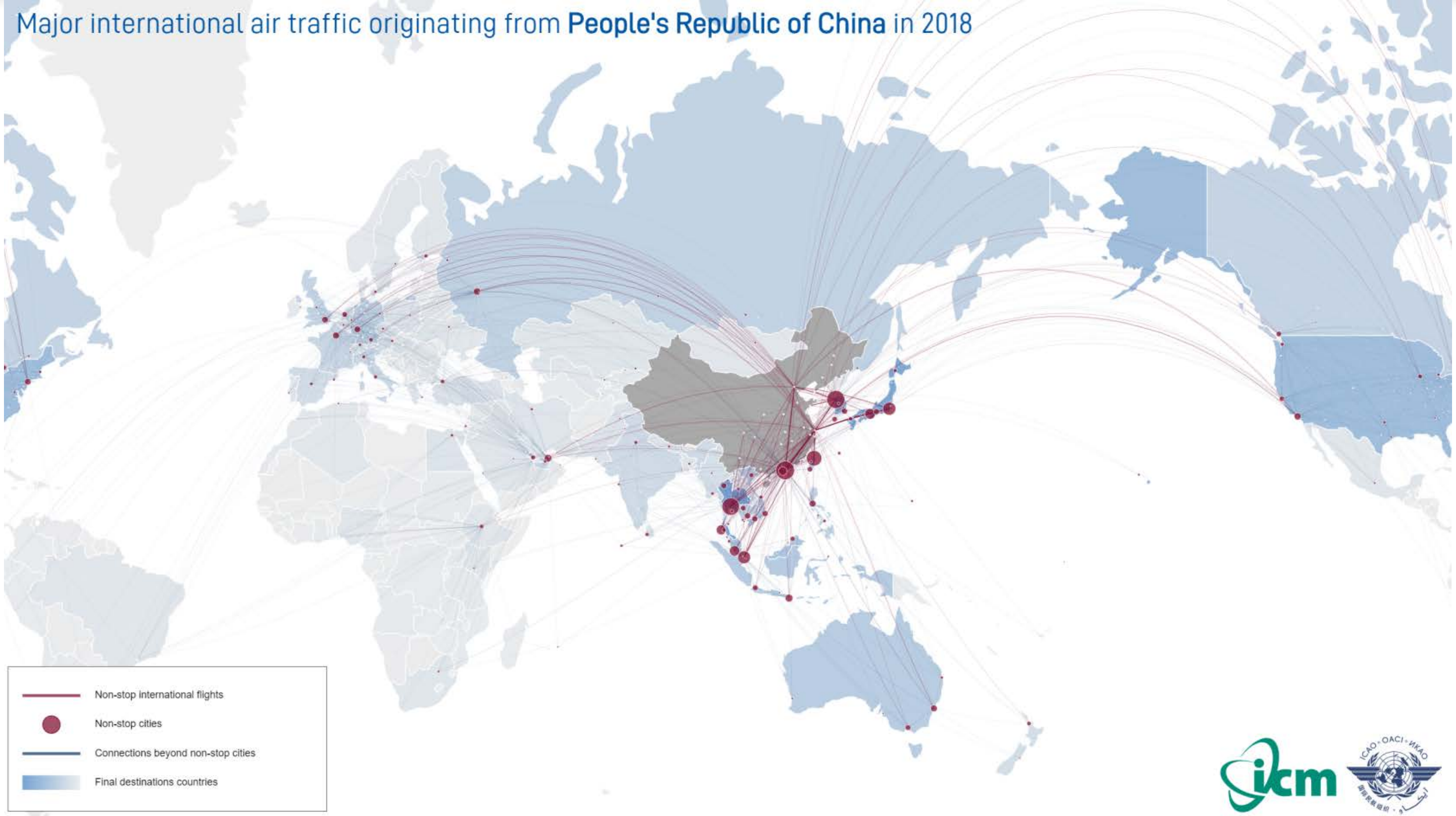
Source: OECD Interim Economic Outlook dated 2 March 2020

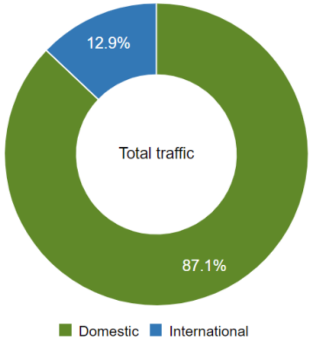
The drop in Chinese travellers will hit hard

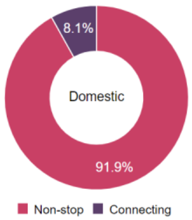


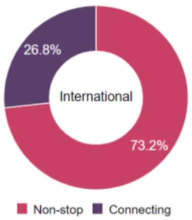
Source: OECD Interim Economic Outlook dated 2 March 2020

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









Source: ICAO-ICM MIDT data

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

24,073,870
Total traffic

Source: ICAO-ICM MIDT data

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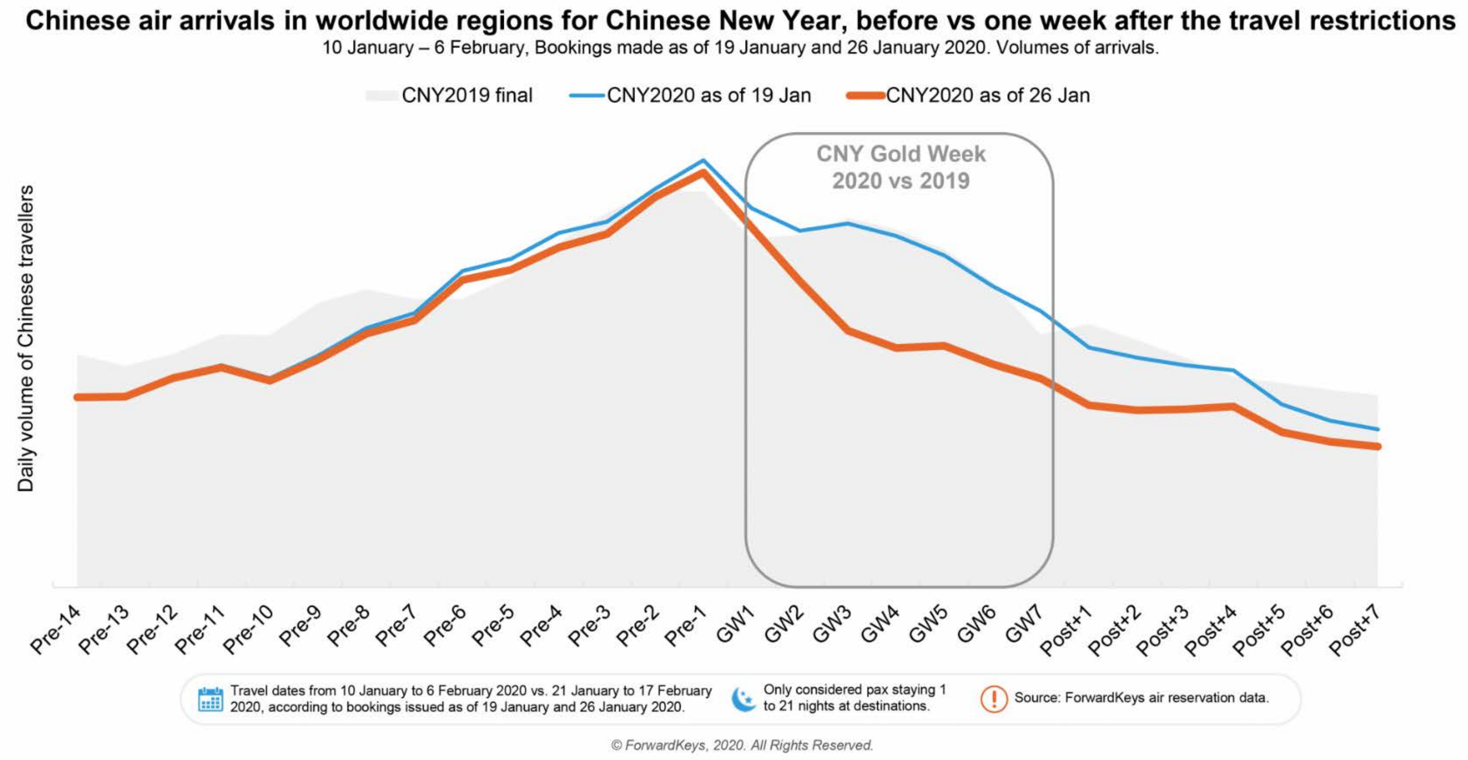
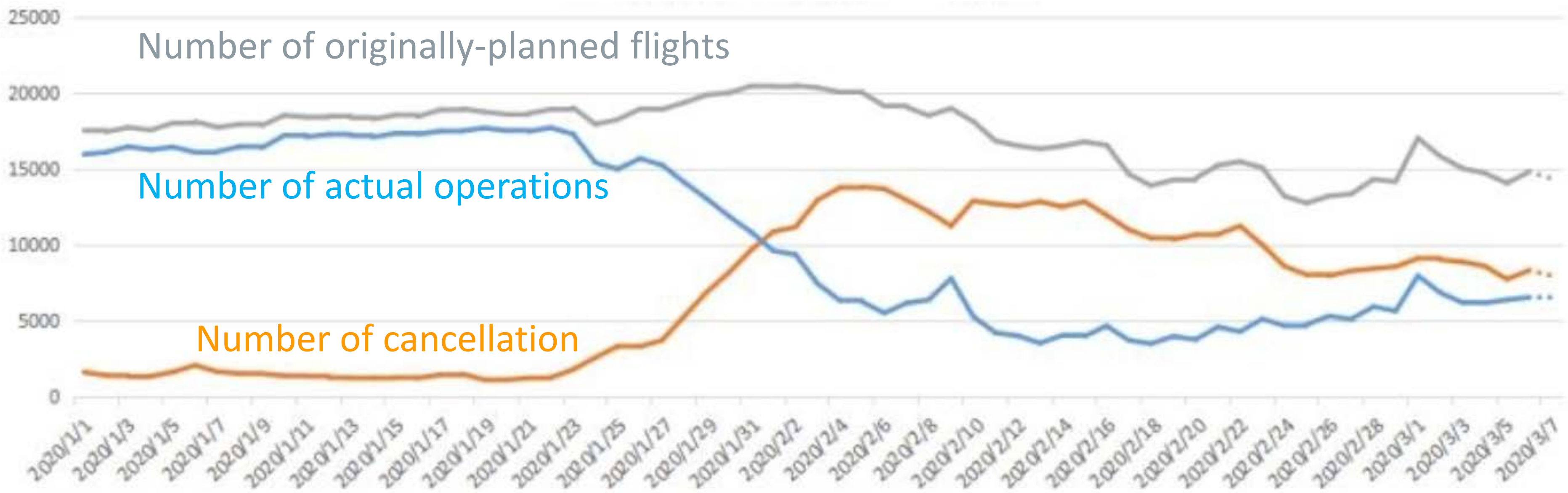
COVID-19 outbreak caused a substantial setback in flight bookings for Chinese New Year



Source: forwardkeys.com

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 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.

Scope of analysis: Mainland China

- **“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

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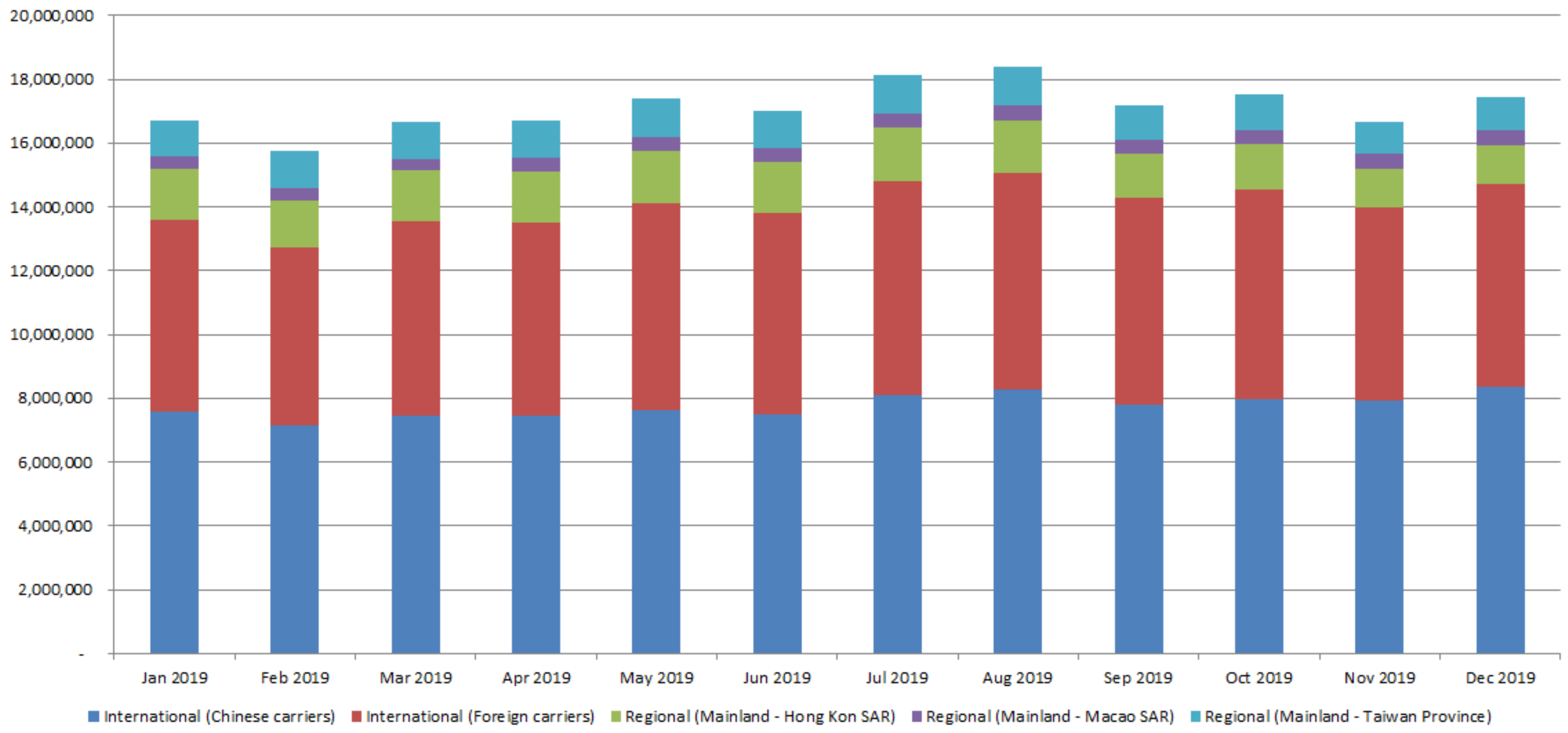
Number of seats offered by airlines (monthly, 2019)



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

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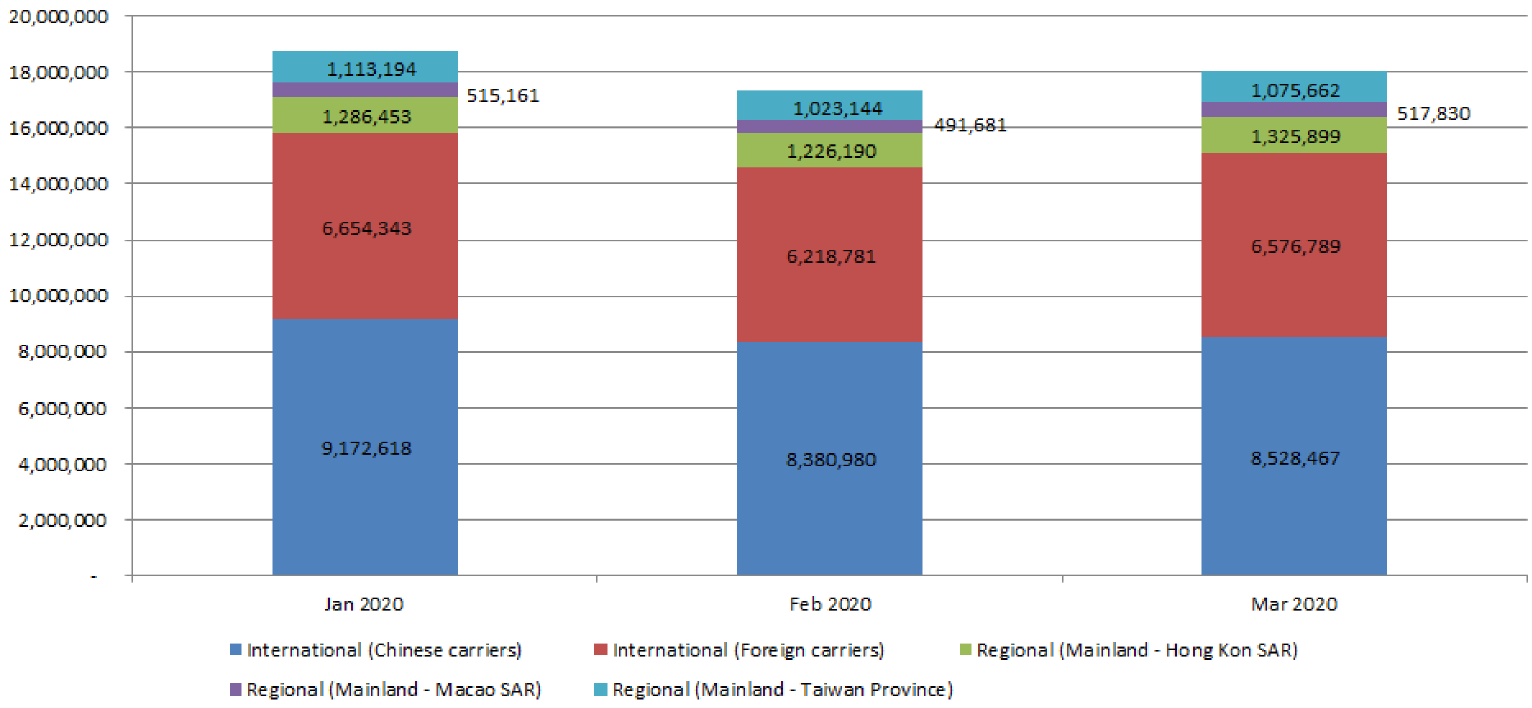
Number of seats offered by airlines (1Q 2020 originally-planned)



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

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

International (136)

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

Regional (25)

- Air China
- Air Macau
- Cathay Dragon
- Cathay Pacific Airways
- China Airlines
- China Eastern Airlines
- China Southern Airlines
- Chongqing Airlines
- Donghai Airlines
- EVA Airways
- Far Eastern Air Transport*
- Hainan Airlines
- Hebei Airlines*
- HK Express
- Hong Kong Airlines
- Juneyao Airlines
- Mandarin Airlines
- Shandong Airlines
- Shanghai Airlines
- Shenzhen Airlines
- Sichuan Airlines
- Tigerair Taiwan Co. Ltd
- Uni Airways
- Xiamen Airlines Company
- Zhejiang Loong Airlines*

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 13 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 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

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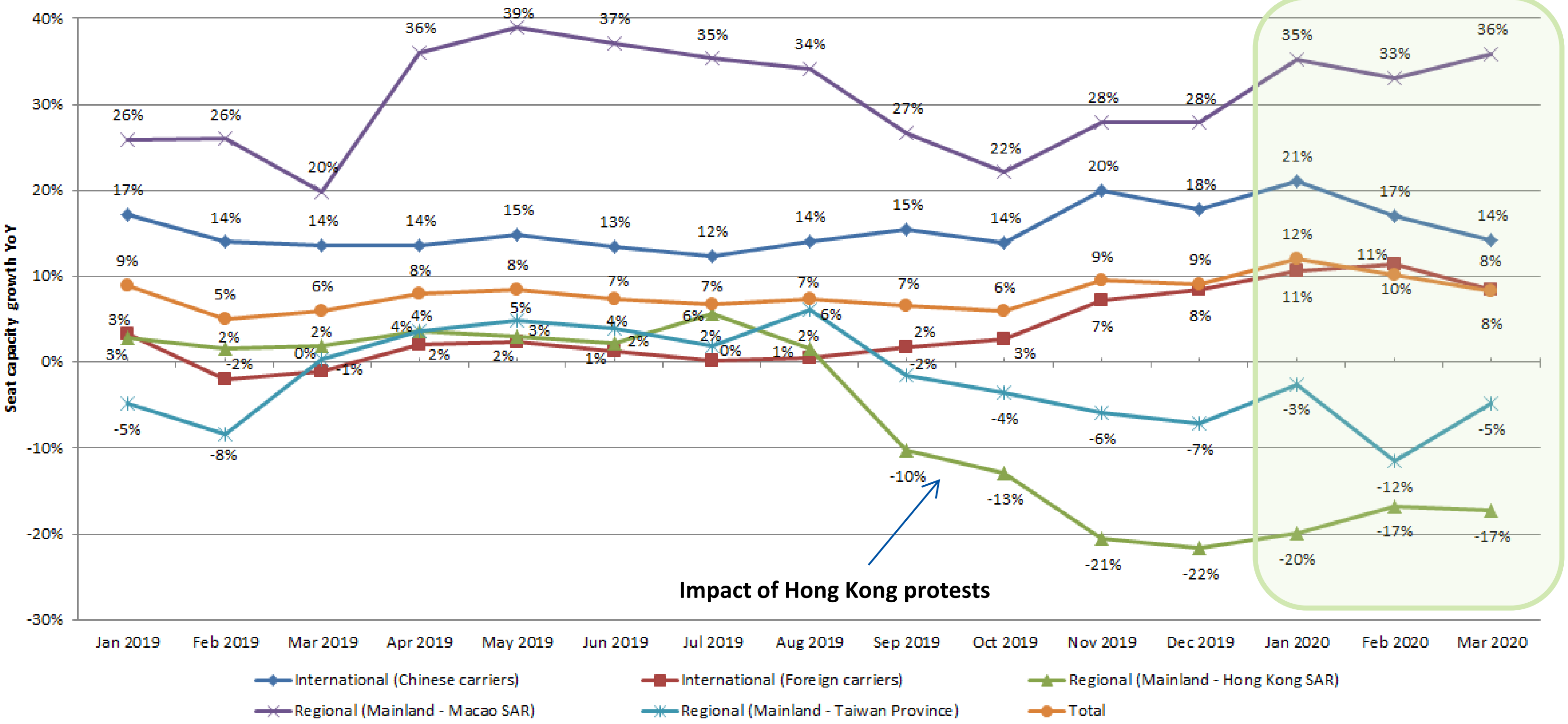
Scenario analysis: Assumptions

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%

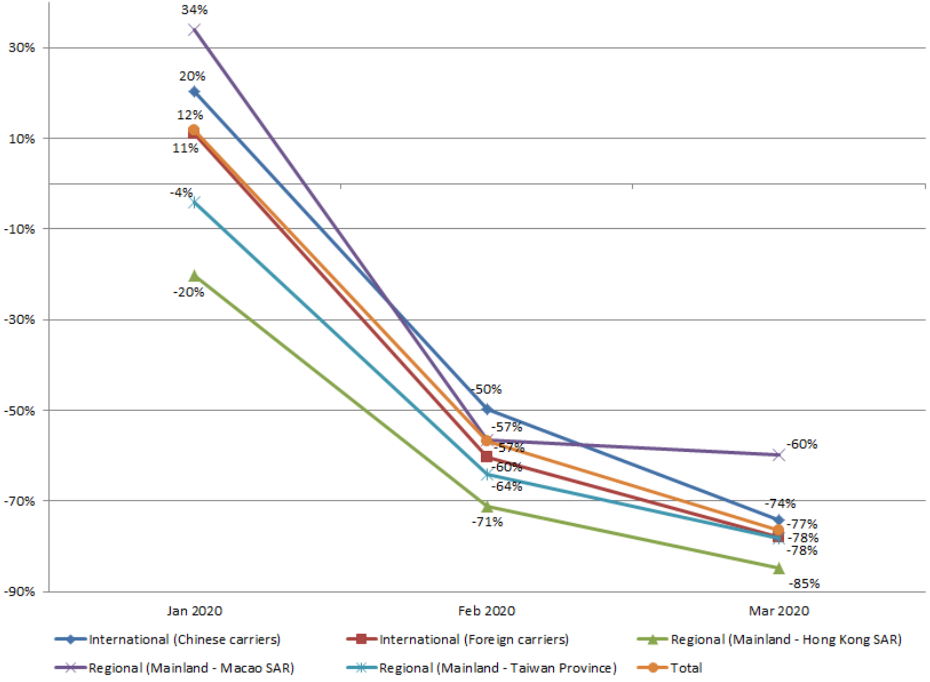
Baseline: 10% seat capacity increase compared to 1Q 2019



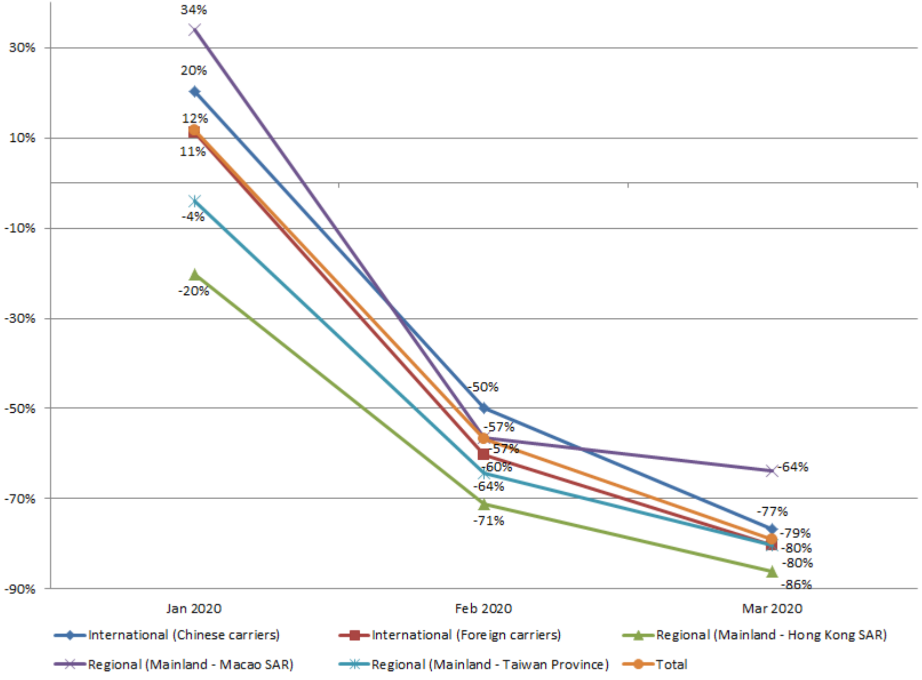
A total of YoY 10% seat capacity increase originally - planned for 1Q 2020 despite the reduction of capacity between mainland China and Hong Kong SAR and Taiwan Province

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

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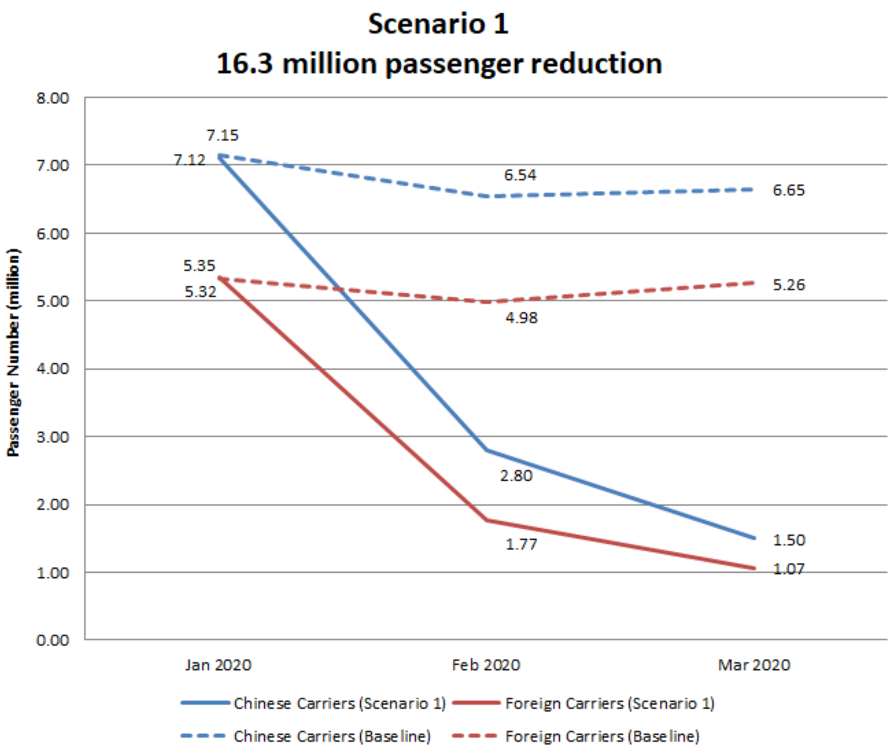
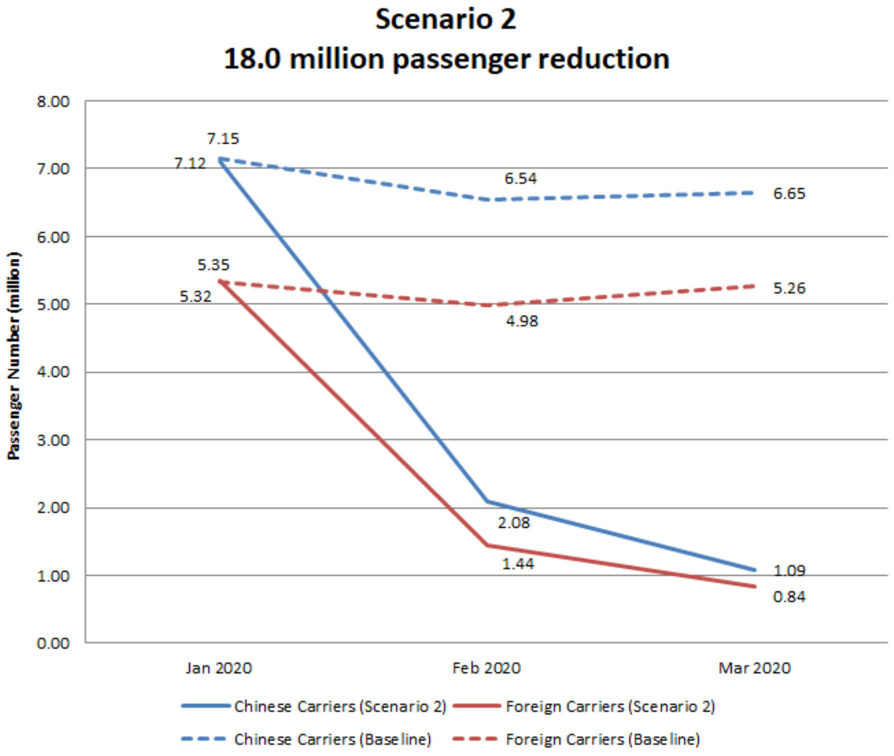
16.3 to 18.0 million “international” passenger reduction in 1Q 2020 compared to Baseline





Source: ICAO estimates

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

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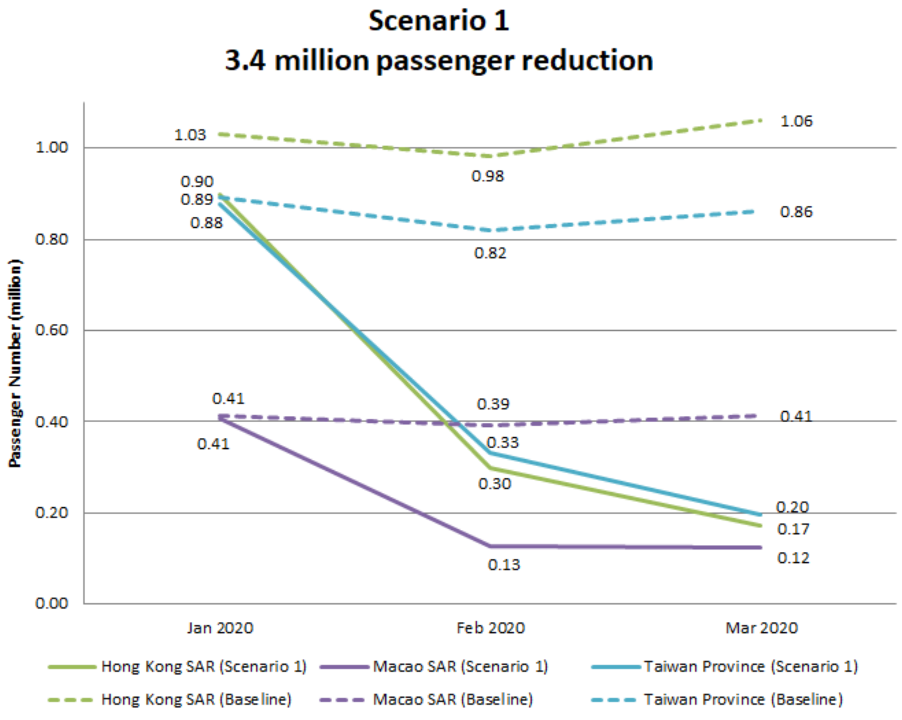

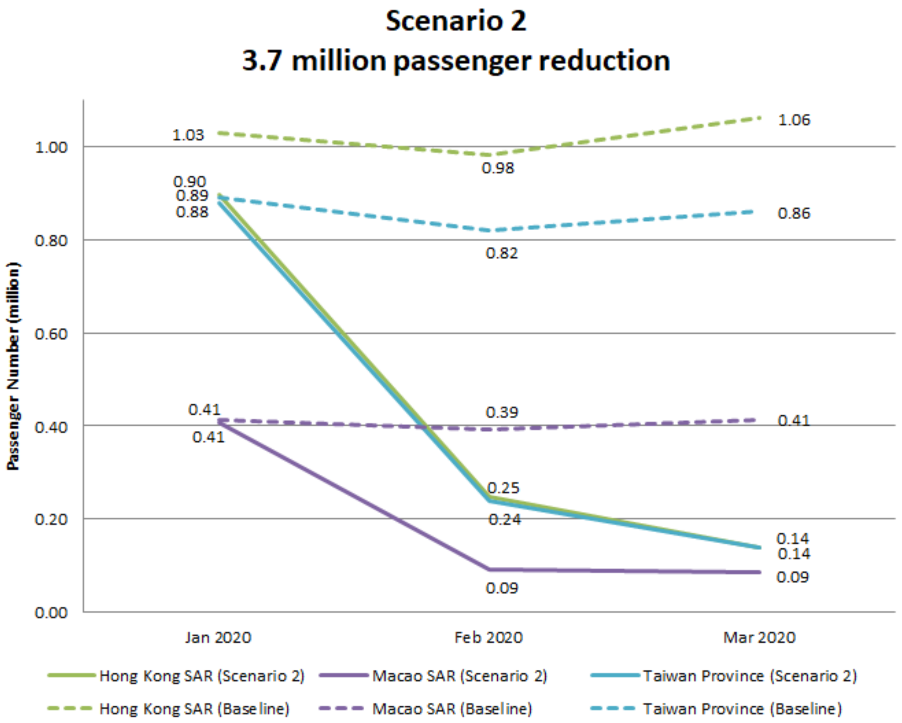

Source: ICAO estimates

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

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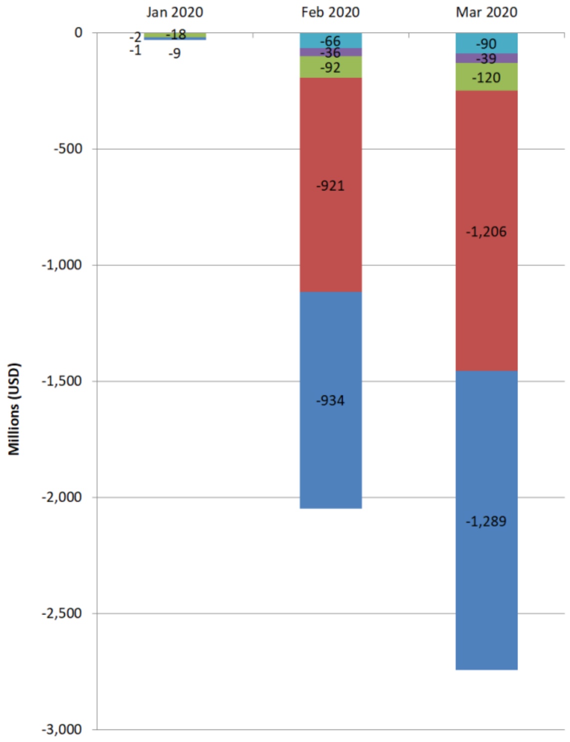
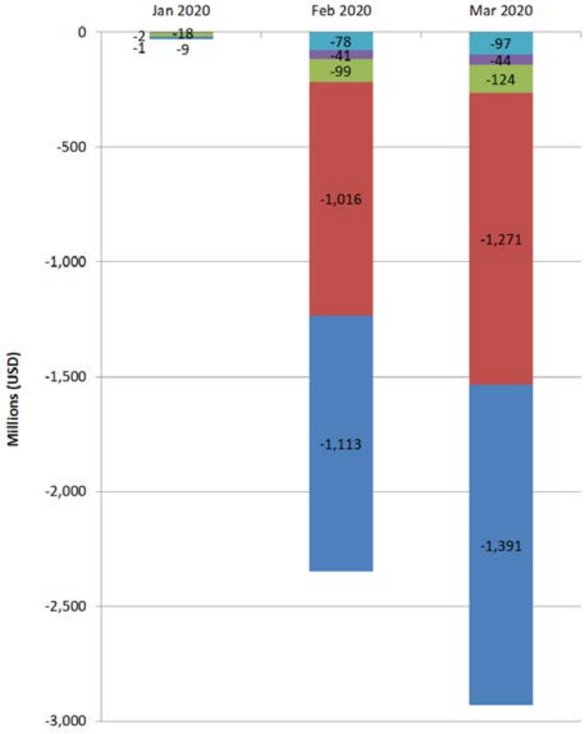
Scenario 1: USD 4.8 billion reduction



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

Source: ICAO estimates

Summary of estimated impact in 1Q 2020

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 on									
	Number of seats offered by airlines (000)				Number of passengers (000)				Gross operating revenues of airlines (USD, million)	
Scope of analysis	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**

Source: ICAO estimates

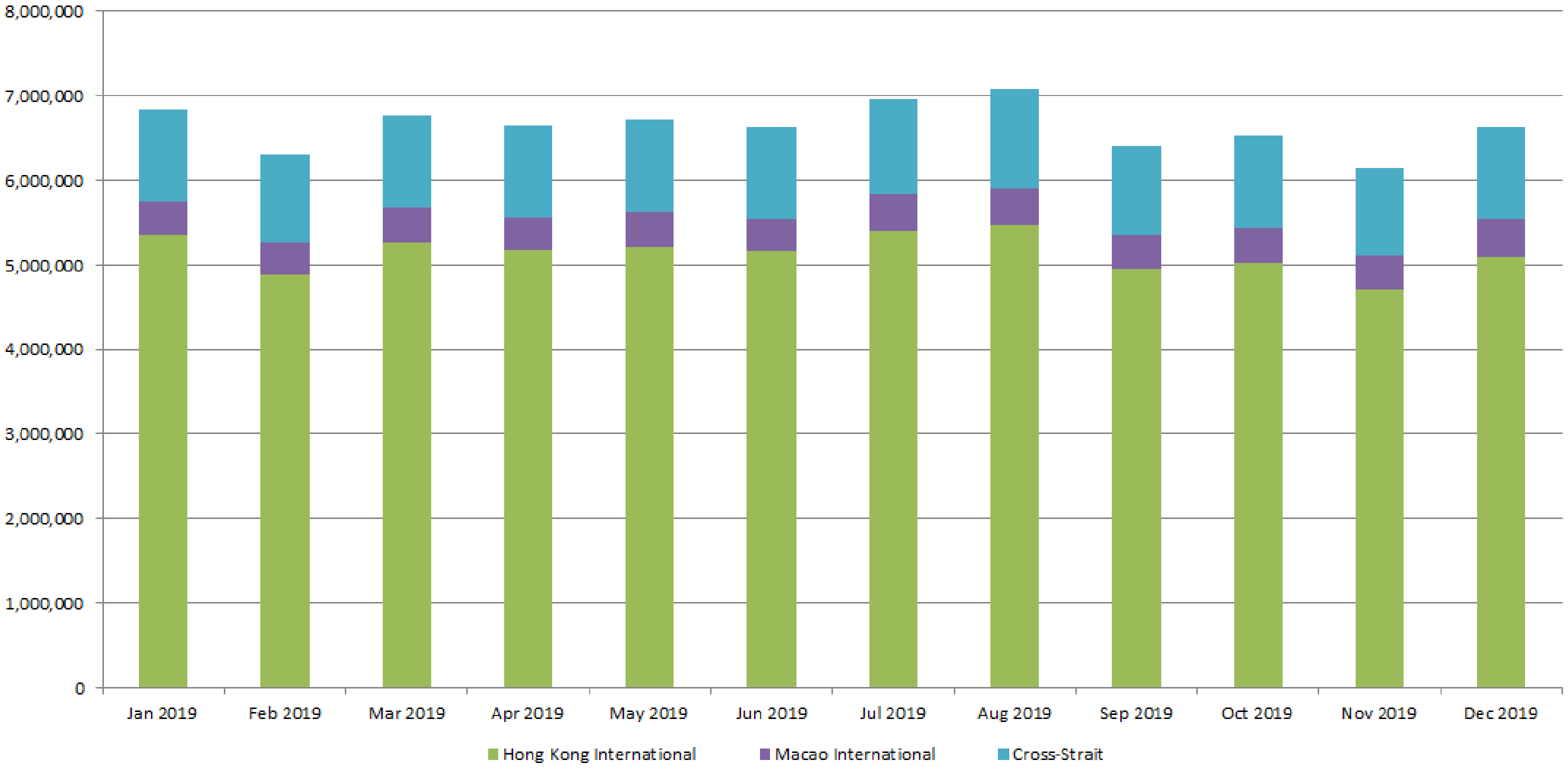
Scenario Analysis:
Hong Kong SAR of China and Macao SAR of China

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

Scope of analysis: Hong Kong SAR and Macao SAR

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

Number of seats offered by airlines (monthly, 2019)

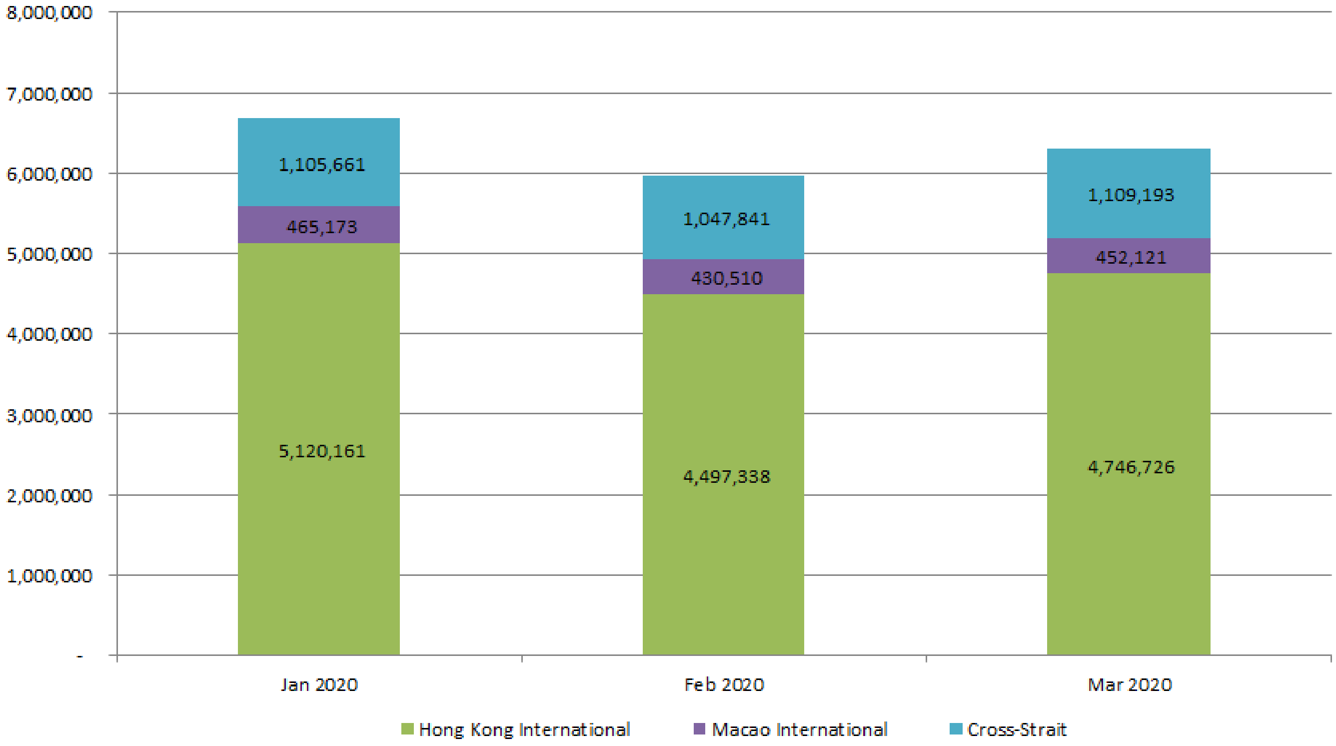


Capacity share 2019

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

Source: OAG Scheduled data

Number of seats offered by airlines (1Q 2020 originally-planned)



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

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

Hong Kong International (66)

Aeroflot Russian Airlines
Air Astana
Air Busan*
Air Canada
Air France
Air India*
Air Mauritius*
Air Niugini
Air Seoul, Inc*
AirAsia
All Nippon Airways
American Airlines*
Asiana Airlines
Bangkok Airways
British Airways
Cathay Dragon
Cathay Pacific Airways
Cebu Pacific Air*^
Eastar Jet
Egyptair
El Al Israel Airlines*
Emirates
Ethiopian Airlines
Etihad Airways*
EZNIS AIRWAYS LLC*
Fiji Airways
Finnair
Garuda Indonesia
HK Express
Hong Kong Airlines
IndiGo*
Japan Airlines
Jeju 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)

Air Busan*
Air Macau
AirAsia
Bamboo Airways*
Cambodia Airways Co. Ltd*
Cambodia Angkor Air*
Cebu Pacific Air*
Eastar Jet*
Jeju Airlines
Jin Air*
Lanmei Airlines*
Philippine Airlines*
Philippines AirAsia Inc.*
Scoot
Thai AirAsia
T'way Air*
Vietnam Airlines*

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*

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 13 March 2020)

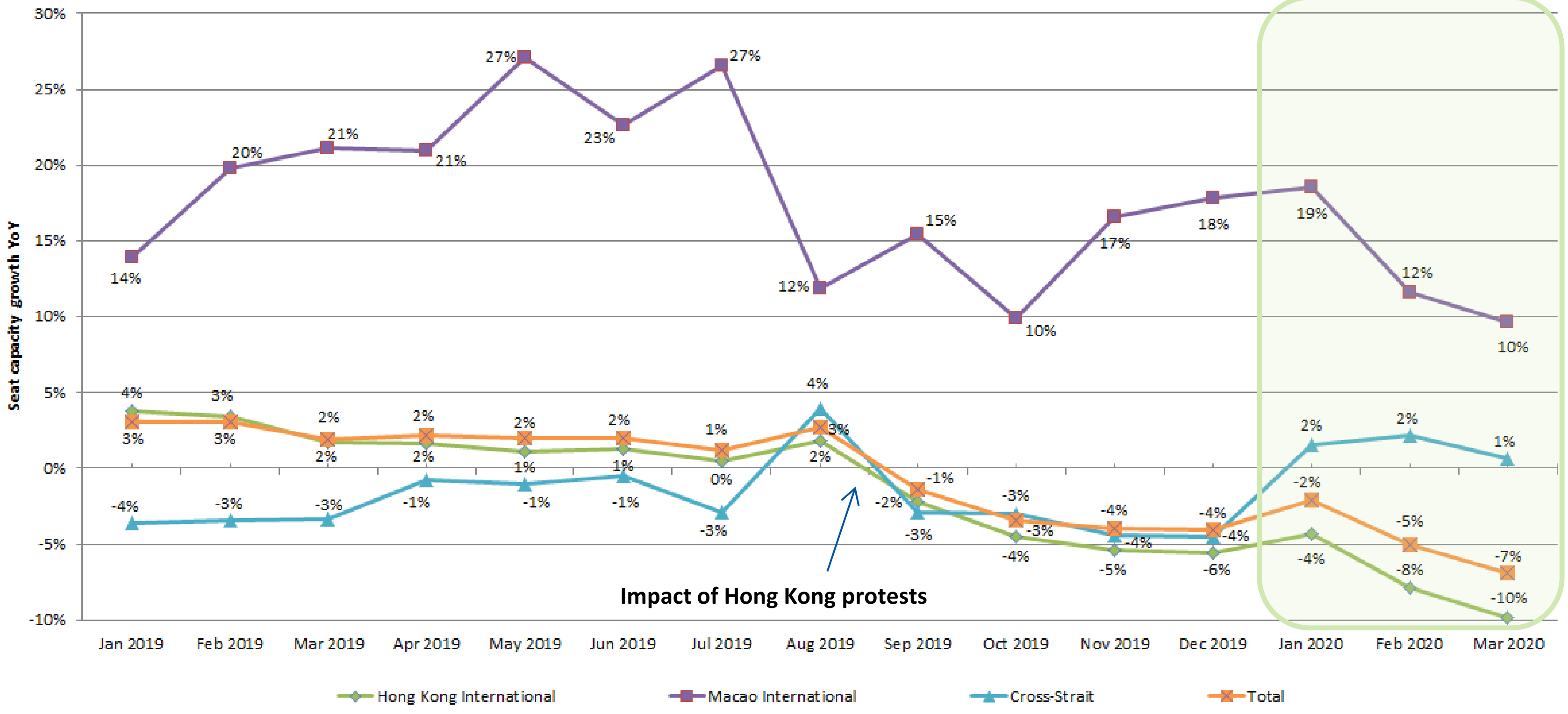
Scenario analysis of COVID-19 outbreak impact for 1Q 2020

- 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

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%**

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

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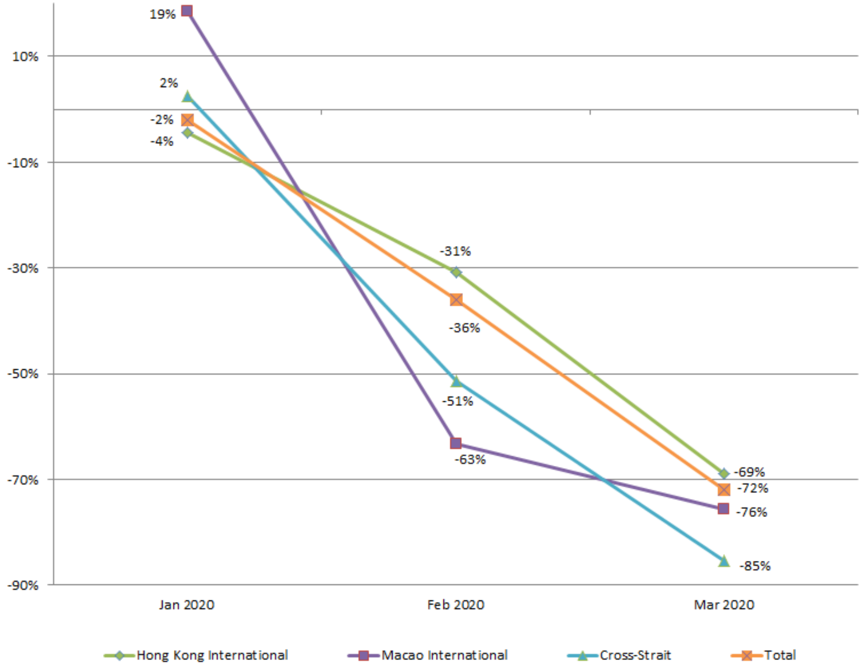
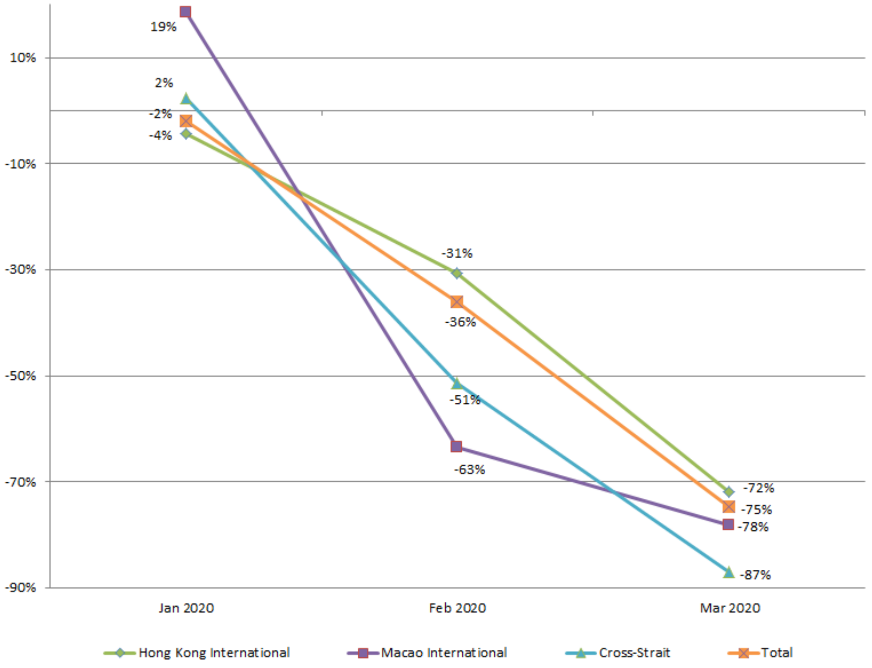
Scenario 1: for 1Q 2020 a total of 37% reduction compared to 1Q 2019 and 33% reduction from Baseline

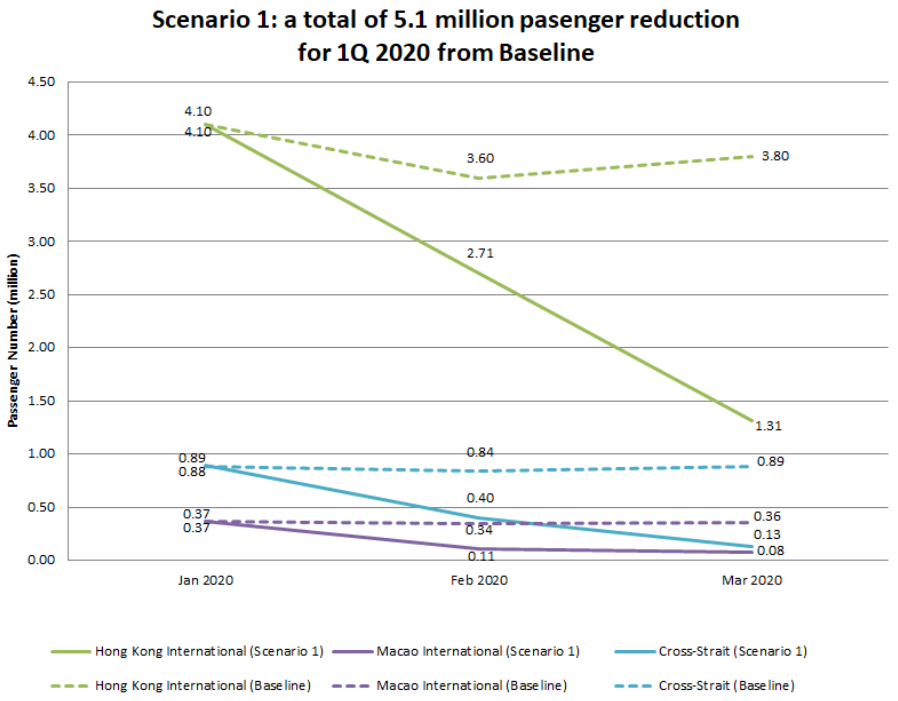


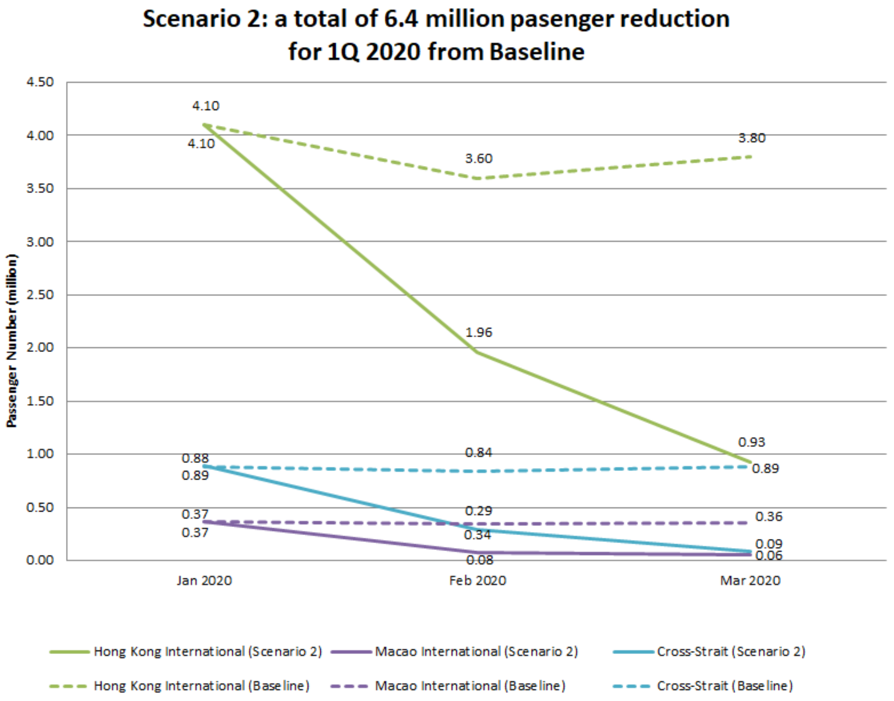
Scenario 2: for 1Q 2020 a total of 38% reduction compared to 1Q 2019 and 34% reduction from Baseline



Source: ICAO estimates

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

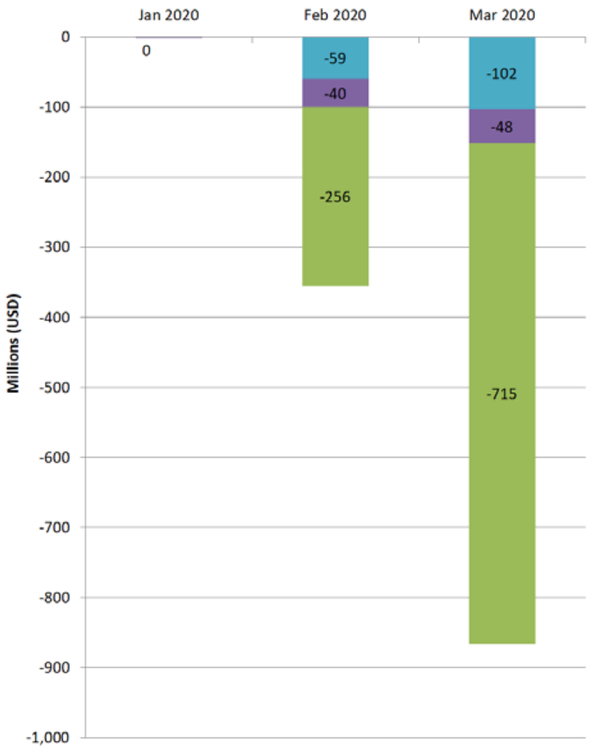




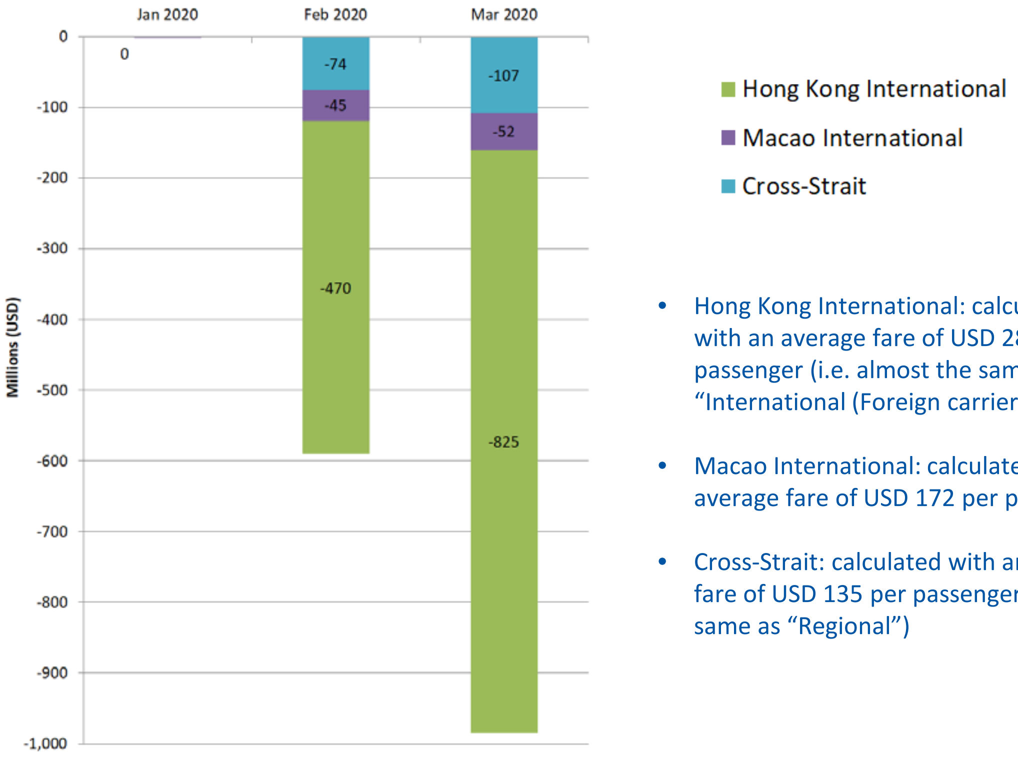
Source: ICAO estimates

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



Scenario 2: USD 1.6 billion reduction



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

Source: ICAO estimates

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Summary of estimated impact in 1Q 2020

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

	Estimated Impact on									
	Number of seats offered by airlines (000)				Number of passengers (000)				Gross operating revenues of airlines (USD, million)	
Scope of analysis	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**

Source: ICAO estimates

Summary of Scenario Analysis: China + Additional Estimates

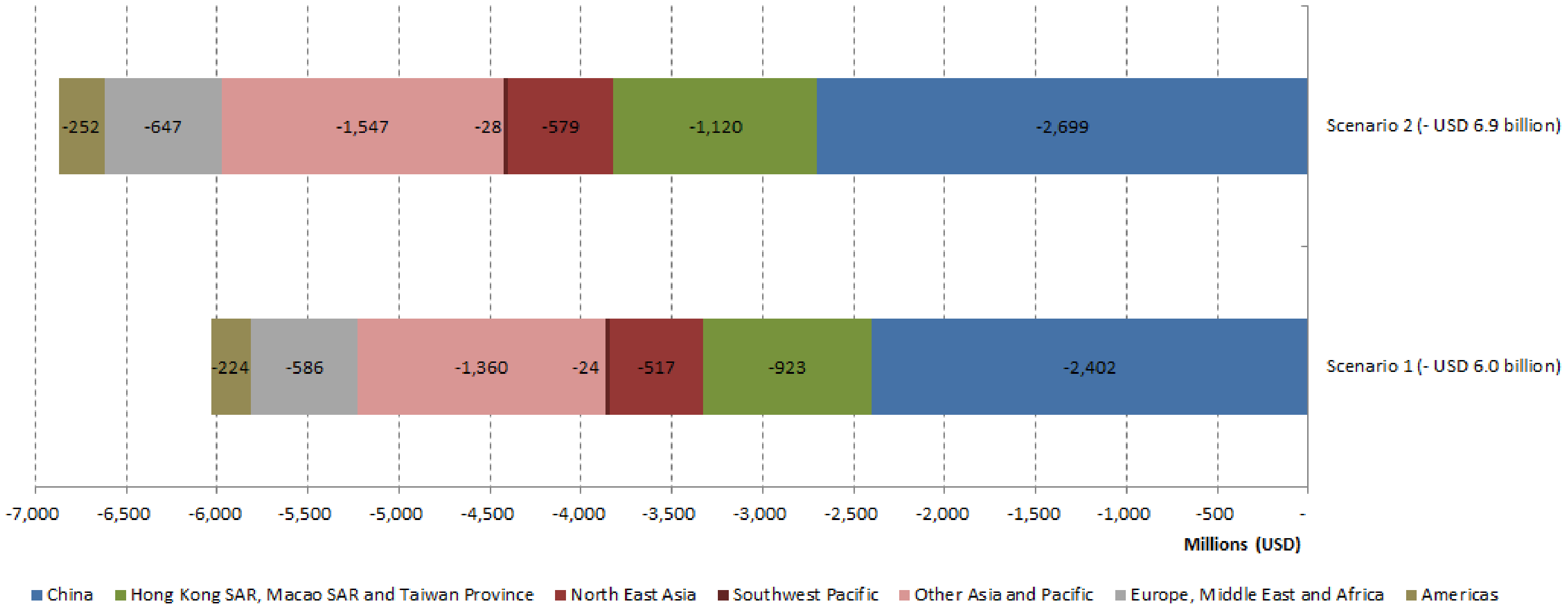
This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.

Summary of observations

- 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

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

Source: ICAO estimates

Break-down of estimated impact in 1Q 2020

	Estimated Impact on									
	Number of seats offered by airlines (000)				Number of passengers (000)				Gross operating revenues of airlines (USD, million)	
Scope of analysis	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**

Source: ICAO estimates

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

	Estimated Impact on					
	Number of seats offered by airlines (000)		**Number of passengers (000)**		**Gross operating revenues of airlines (USD, million)**	
Scope of analysis	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
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 CANNews.com.cn estimates	Calculated with an average fare of USD 102.5 per passenger based on traffic/financial reports of CA, CZ and MU

PRELIMINARY

Source: ICAO estimates

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

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.

Scenario analysis of COVID-19 outbreak impact for 1Q 2020

- 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

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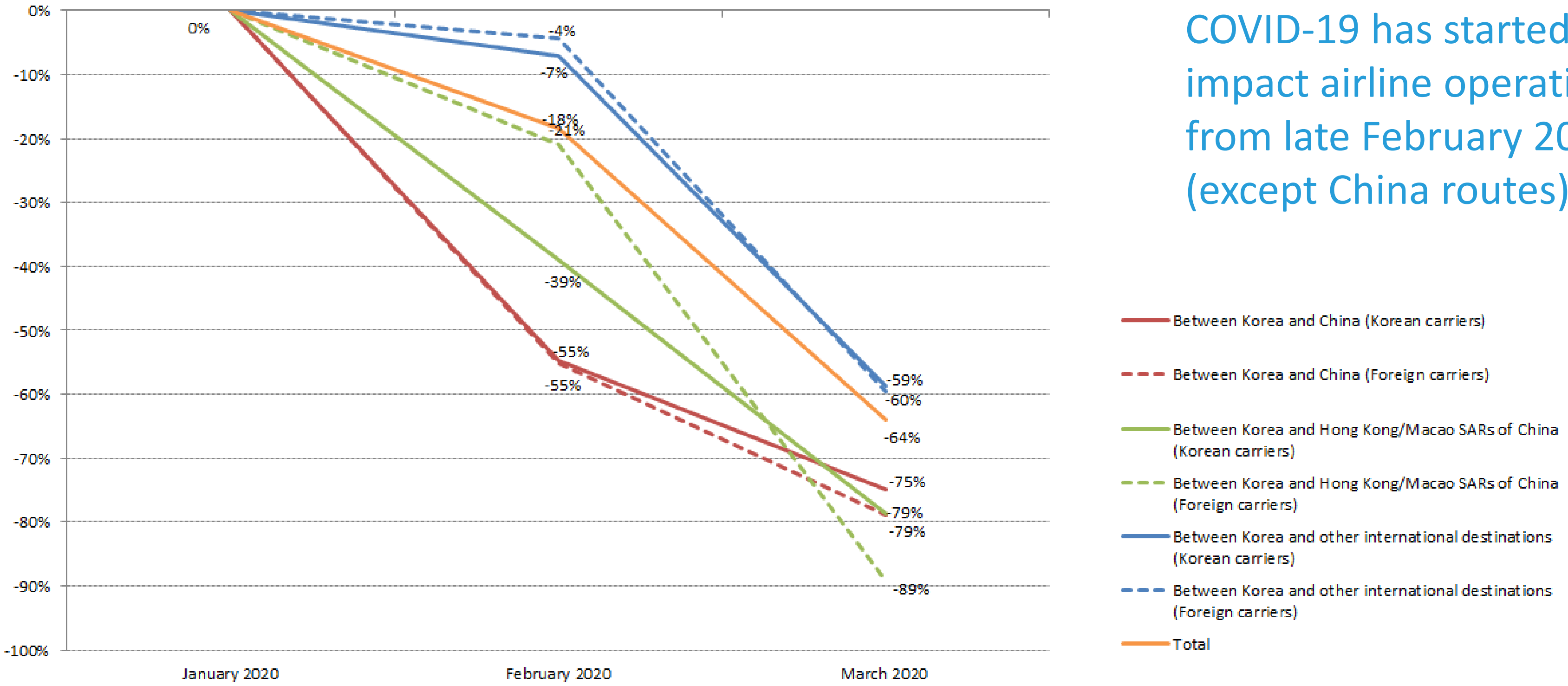
27% seat capacity reduction in 1Q 2020 from Baseline



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

Source: ICAO estimates

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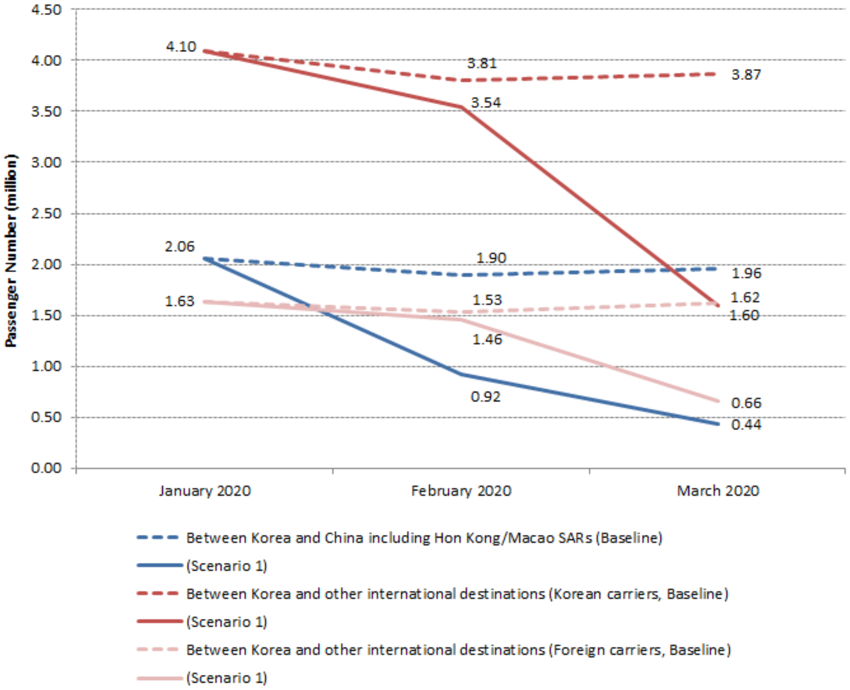
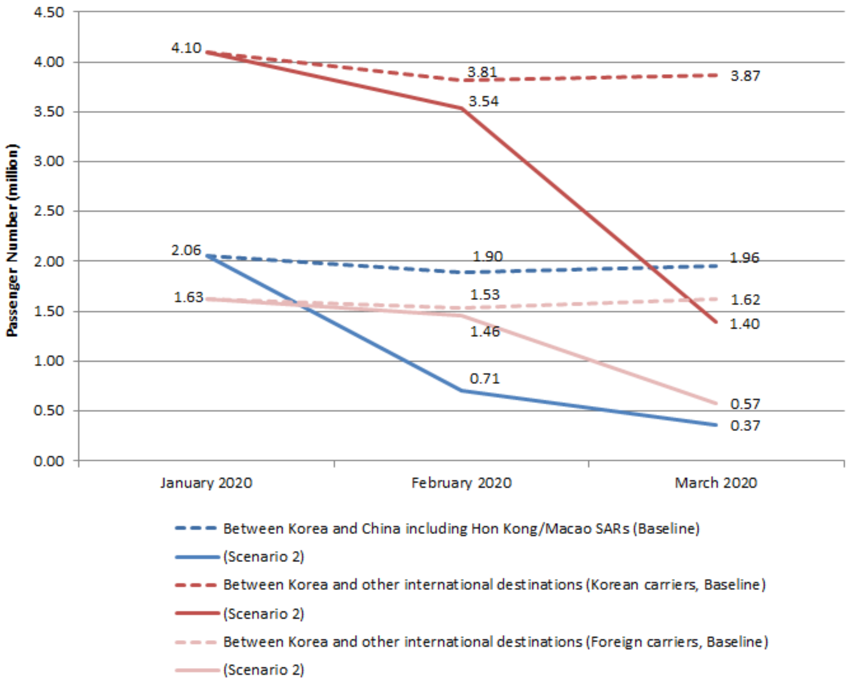
6.1 to 6.6 million passenger reduction in 1Q 2020 compared to Baseline

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



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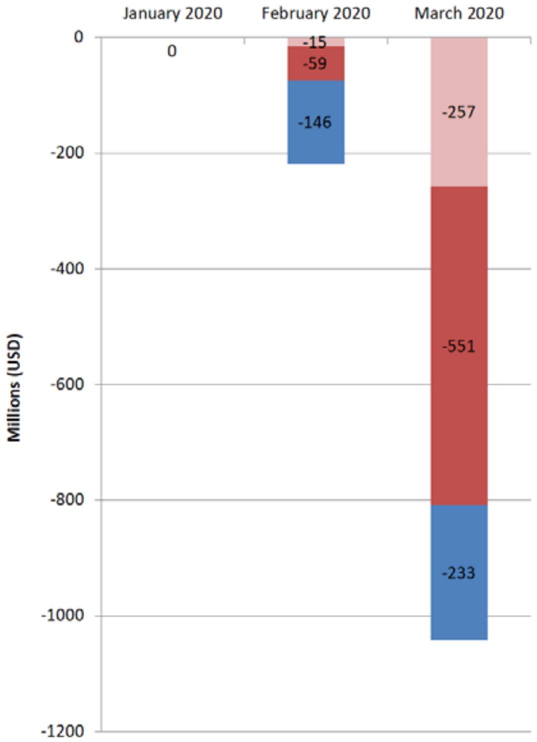
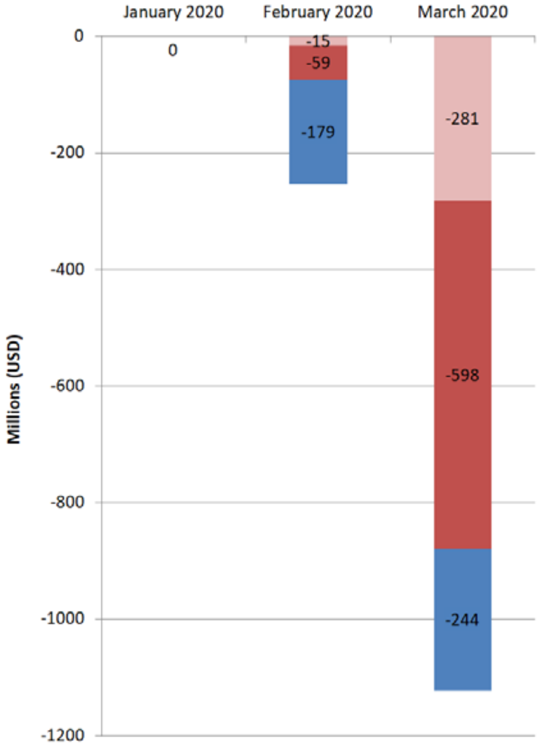
Approx. USD 1.3 to 1.4 billion potential loss of airline revenues for 1Q 2020 compared to Baseline

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

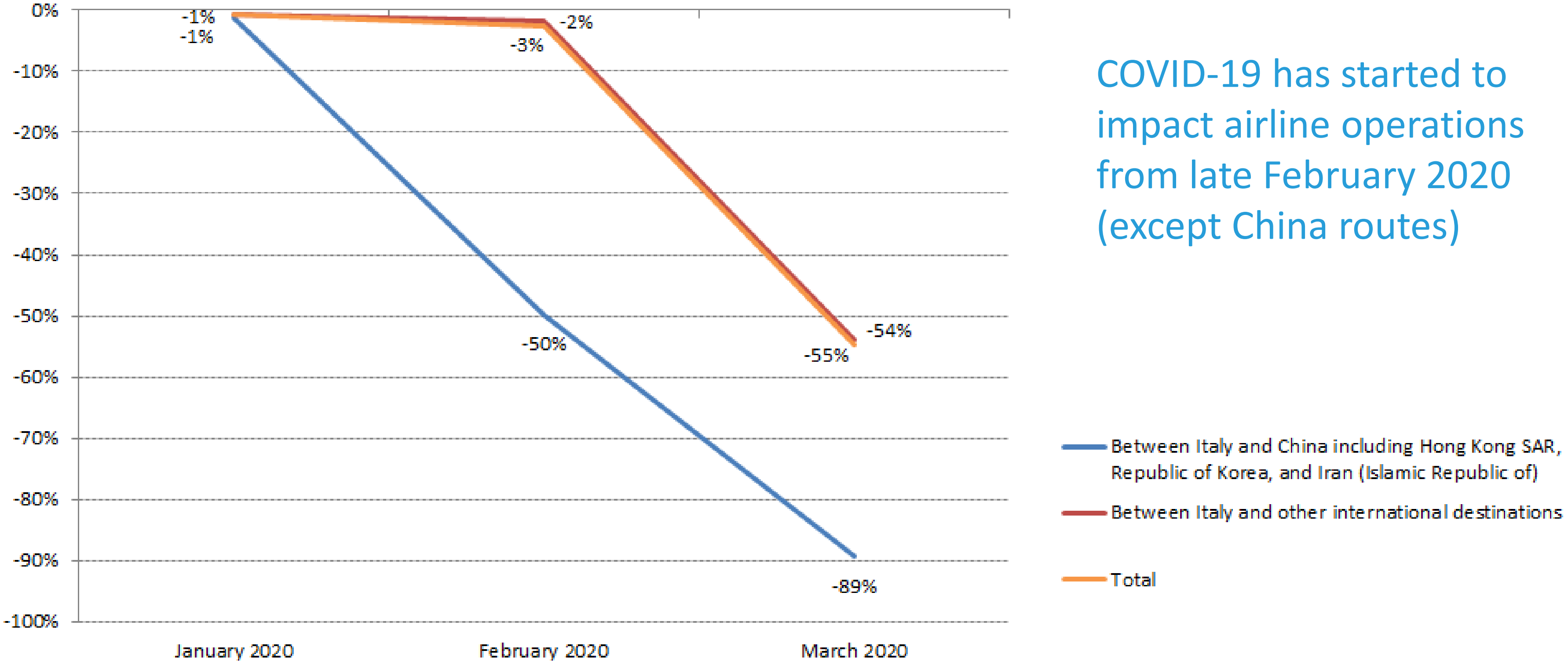
This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.

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% (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

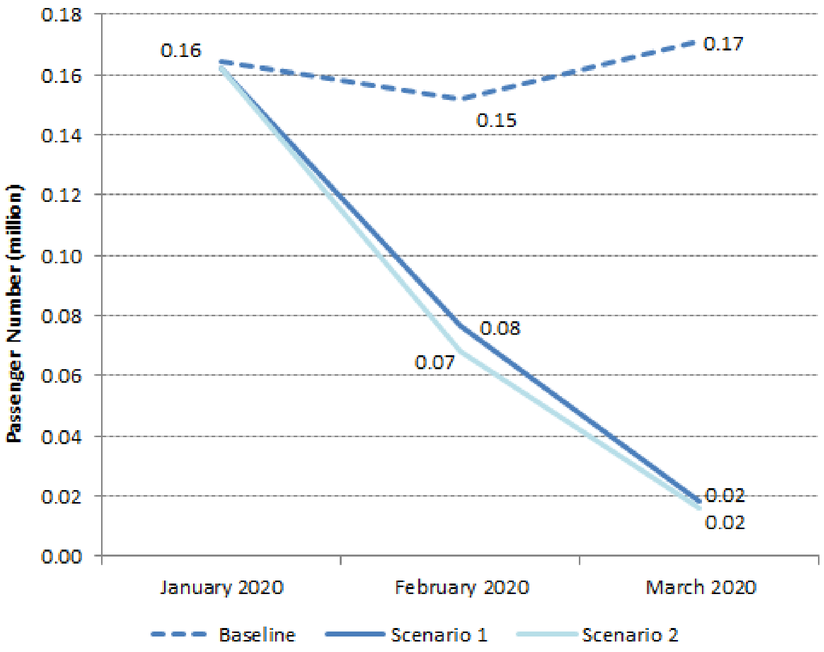
21% seat capacity reduction in 1Q 2020 from Baseline



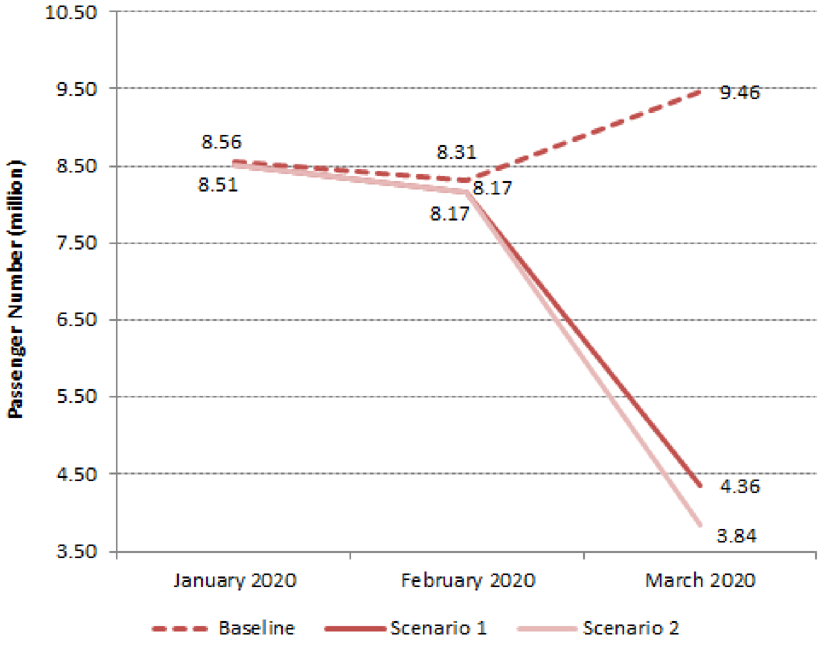
COVID-19 has started to impact airline operations from late February 2020 (except China routes)

Source: ICAO estimates

5.5 to 6.1 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)

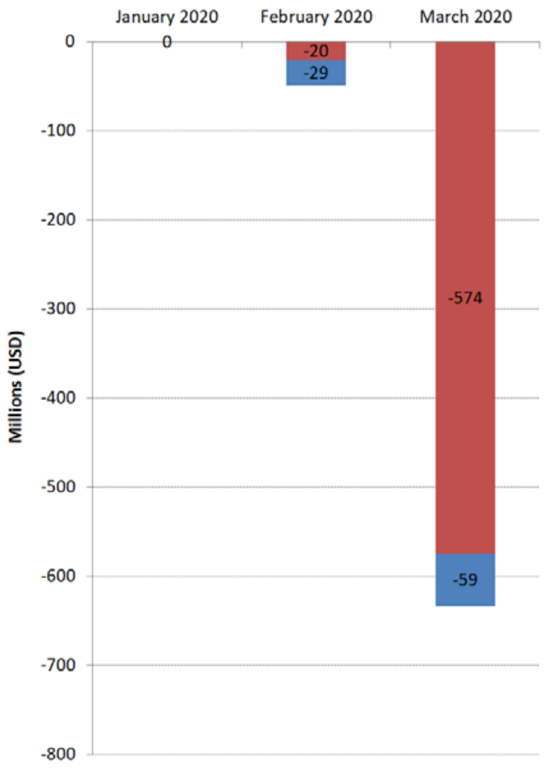


Between Italy and other international destinations

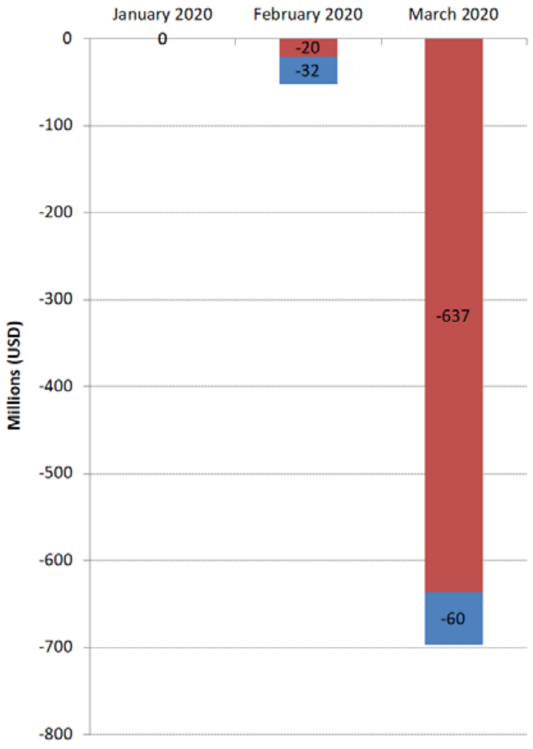
Source: ICAO estimates

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

Scenario 1: USD 680 million reduction



Scenario 2: USD 750 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)

Source: ICAO estimates

Scenario Analysis:
Iran (Islamic Republic of)

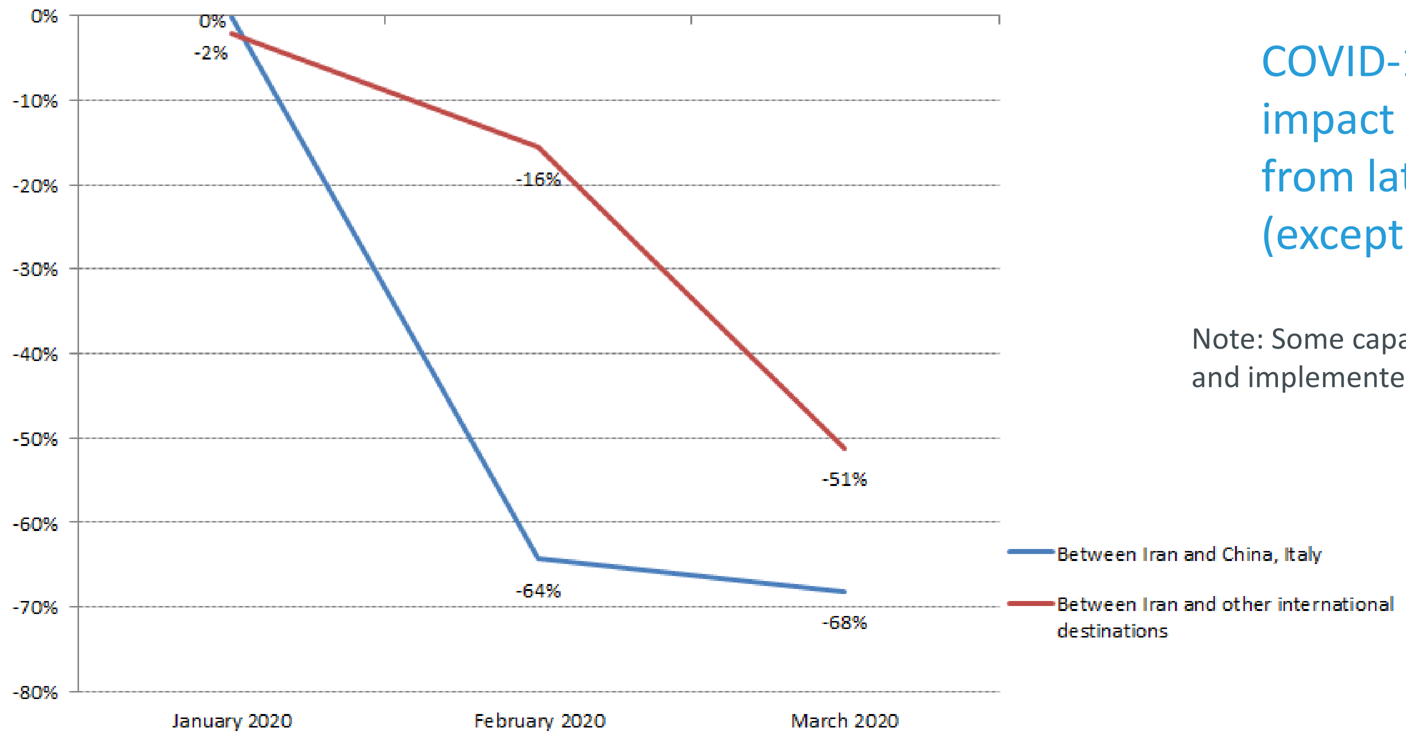
This is a preliminary analysis. Figures and estimates herein will be updated with the situation evolving and more information available.

Scenario analysis of COVID-19 outbreak impact for 1Q 2020

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

Source: ICAO estimates

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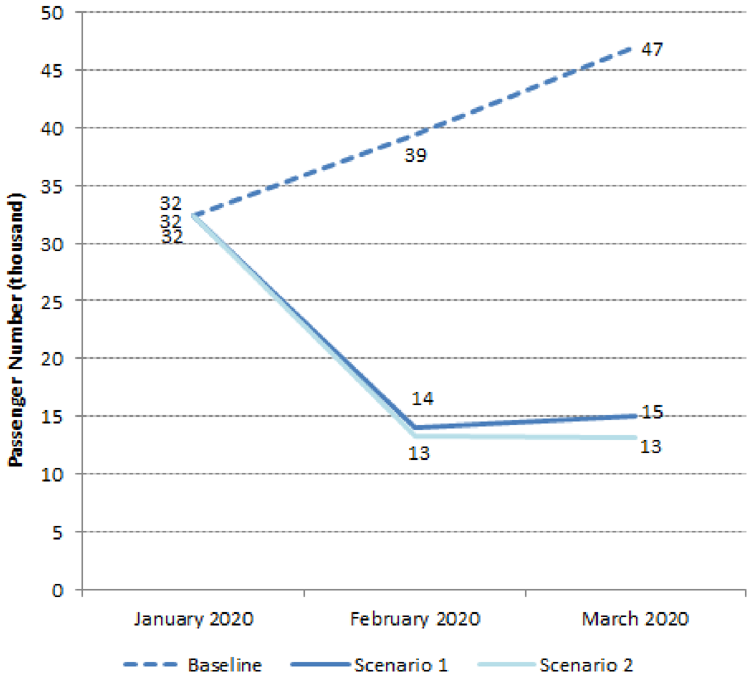
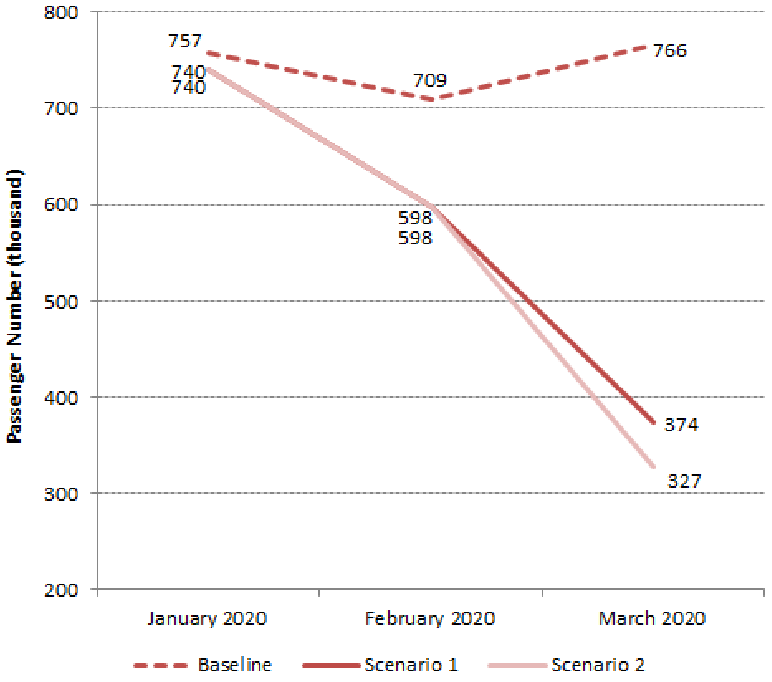
580,000 to 630,000 passenger reduction in 1Q 2020 compared to Baseline



Between Iran and China, Italy

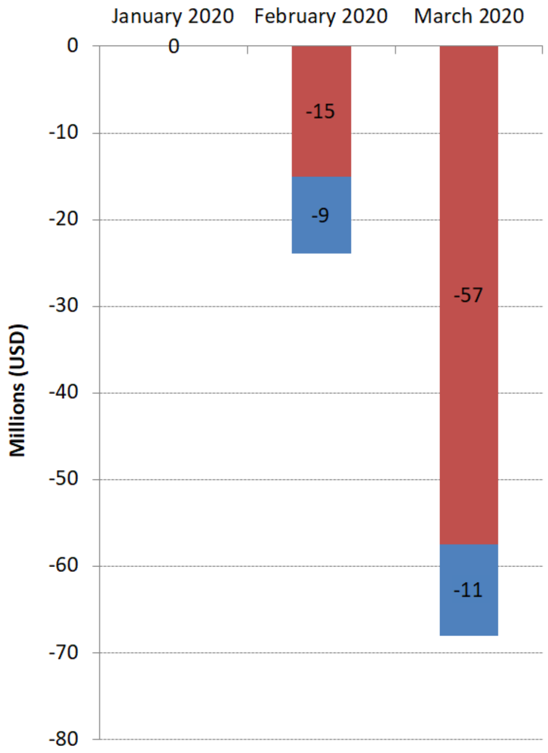


Between Iran and other international destinations

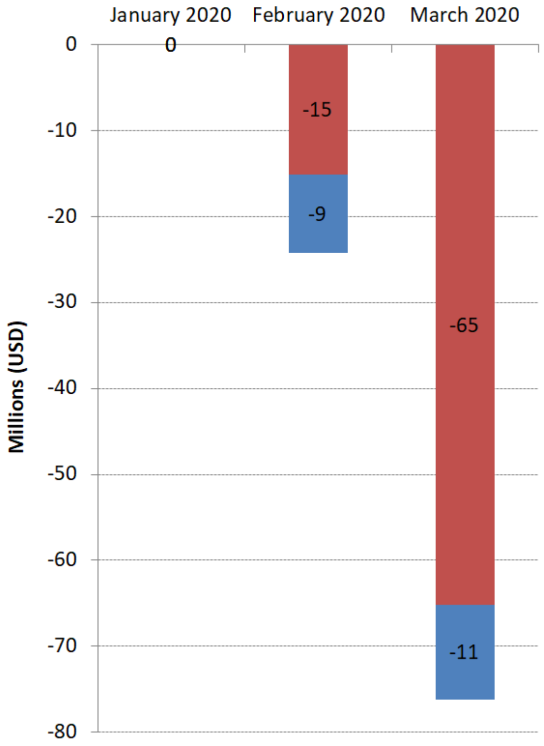
Source: ICAO estimates

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.

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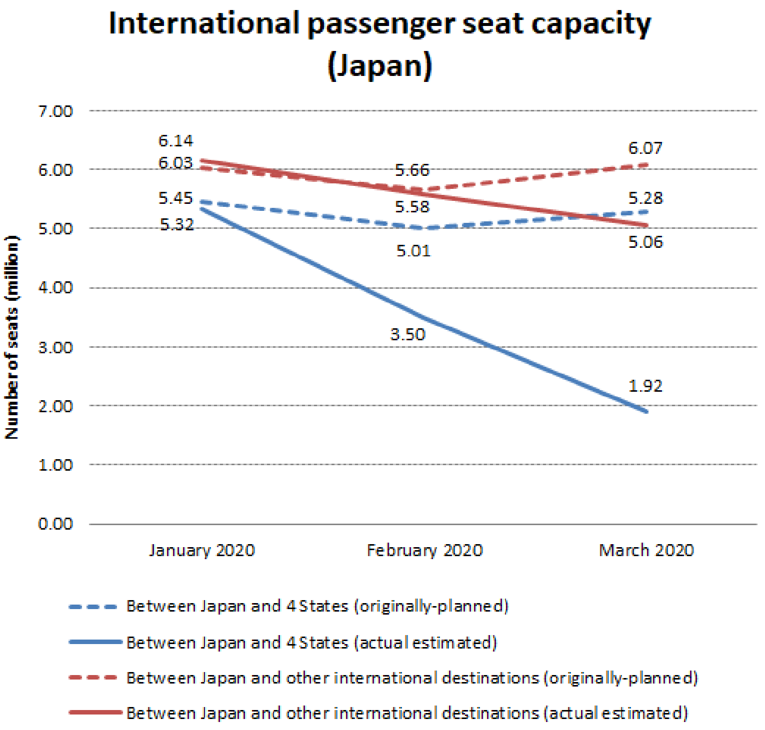
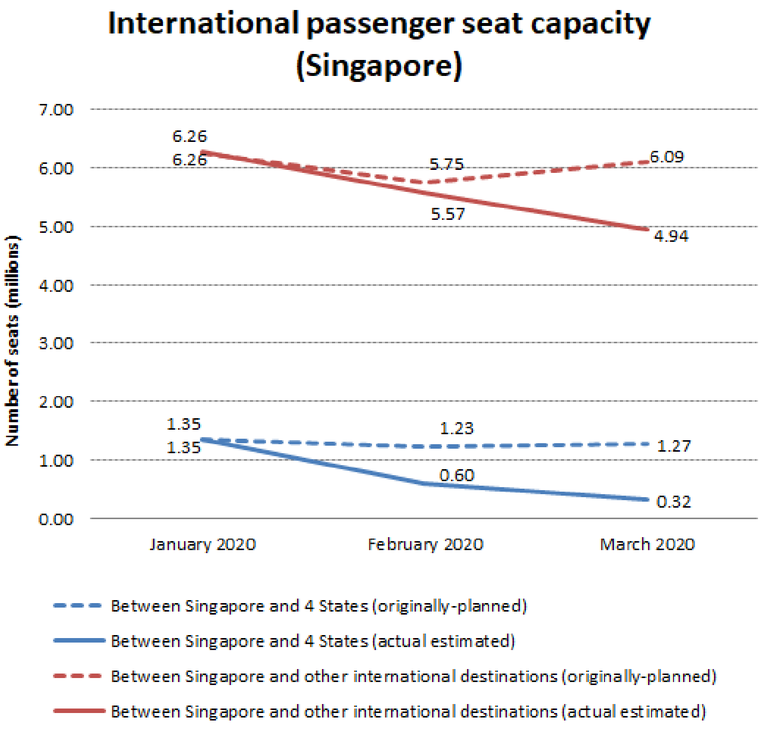
Japan/Singapore reported the second highest confirmed cases till mid-February*





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

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

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.

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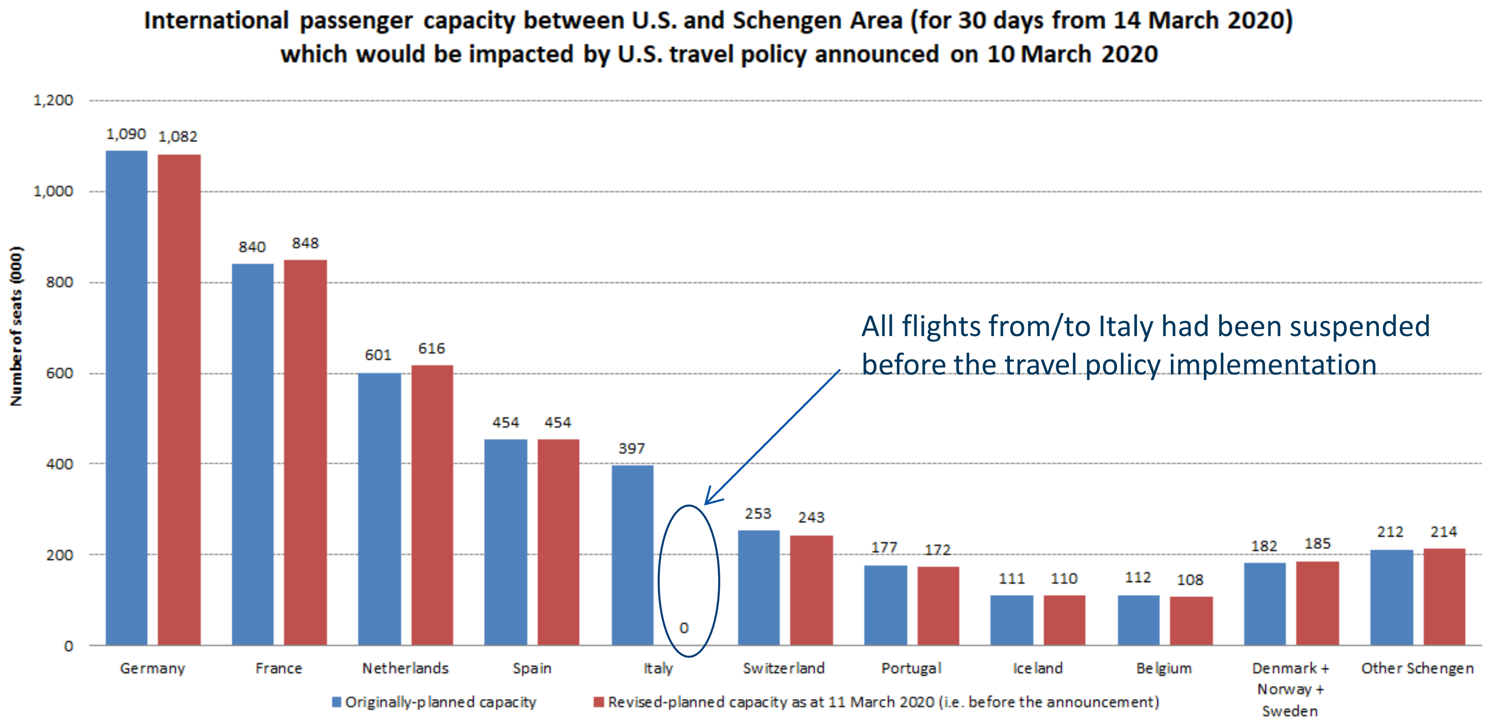
Potentially impacting on over 4.3 million seats offered by 15,000 flights for the first one month



The U.S. travel policy may affect approx. **3.6 million passengers** for one month

Source: OAG Scheduled data and estimates using ICAO-ICM MIDT data

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Contact: ECD@icao.int

ICAO

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