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SERIES EDITORS STEPHEN ISON AND LUCY BUDD

The Air Transportation Industry

Economic Conflict and Competition

Volume Editors

Rosário Macário

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ELSEVIER

THE AIR TRANSPORTATION INDUSTRY

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CHAPTER 5

Exogenous shocks on the air transport business: the effects of a global emergency

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1. Introduction

The COVID-19 public health crisis is commonly recognized as the biggest social and economic shock at the global level after the Second World War. Its impact on the ways we currently live, work, do business, and trade has already been enormous but still difficult to evaluate. The long-term scenarios of COVID-19 disruptions in transport systems and on the economy as a whole are not easy to predict, also considering that such systems affect the spatial distribution of population and economic activities and have both positive externalities (e.g., transport connectivity, social cohesion) and negative ones (e.g., CO_2 emissions, global warming). In this context, the whole current mobility patterns and tools are rapidly changing, and we have to start re-thinking what will be the "new normal" and how do we get there.

Aviation is undoubtedly one of the sectors most hit by the economic crisis induced by the COVID-19 health emergency, with many countries closing their borders. The domestic air travel supply has also been affected by social distancing, confinement measures, and shrinking economic activities. The year 2020 witnessed a decline of 65% in the world airline capacity. Particularly, the United States recorded a 72% decrease, followed by 71% in China and 48% in Japan. In Europe, Italy, Spain, France, and Germany lost 90% of their air traffic compared to the same period of 2019.

What happened in 2020 has shown that new business models are required both for airlines and for airport management. Besides, restoring air connectivity is essential for economic recovery.

The COVID-19 crisis is still causing a massive economic output loss, creating the biggest shock in a century for many economies. Such a loss would be translated into a contraction in world 2020 GDP ranging

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between −4.4% and −5.2%, far worse than during the 2008 global financial crisis (cf. IMF, 2020; World Bank, 2021). The government's potential agreements not already carried out make scenarios for recovery particularly uncertain. Even if some of the initial harsh restrictions have been quite relaxed, the future economic output will be likely depressed because of business failures, canceled investments, and long-term unemployment.

The hope is that the new normal in the post-COVID-19 will be significantly different and better than before. Some argue that it could be more car-dependent, but others suggest it could be a significant chance for more local living and virtual communications to replace longer trips. Anyway, the main outcomes will be the result, in substantial part, of the policy choices made over the coming months and years.

The air market's emergency crisis impacts will be outlined in the following sections. A focus on the supply revision policies will highlight the new mission of the nationalized airlines and the presence of the State, also in its new role of entrepreneur. Special attention will be paid to the core measures put into action by the main incumbents and low-cost air carriers in response to the sanitary and economic crisis, thus investigating the stability of the respective business models, according to the different airlines' viewpoint.

2. Impact of COVID-19 on the airline business—the worst crisis since ever

This section presents an overview of facts and figures of air traffic volumes at the global and European levels by investigating the dramatic drop in travel demand due to government restrictions. Even in the brightest forecasts and considering a greater domestic market's resilience than the international one, such analysis highlights that traffic volumes of 2019 will be expected only in late 2024. Nevertheless, such a result is not unique; it rather frames different geographical contexts because today, regions such as the United States, Central and South America, and India are replying differently in terms of timing and types of containment measures the virus' spreading.

On the supply side, a critical discussion on whether and how it is possible to create a margin for air carrier survival is provided. Besides, the main value drivers affecting the airlines' operation model's efficiency are presented, thus linking the aircraft capacity with the resources' productivity concept.

Lastly, starting from the key figures of the worst month since ever, the main reactions addressing the global air market are described.

2.1 Air transport demand hugely impacted

The reduction in passenger mobility demand, arising from governments' restrictions and individuals' fears of contracting the virus by using mass transit systems, is one of the major social and economic impacts to be traced back to the COVID-19. What is caused by such a pandemic is an impressive crisis negatively impacting—in all its drama—also on the shrinkage of air transport demand, both short and long haul.

Even if this sector has undergone many declines over time (e.g., due to the 2001 terrorist attack on the Twin Towers or the global economic crisis of 2008), such a sudden and profound emergency is putting a strain on air transport, thus announcing epochal changes in the industry itself. The decline process of global air transport services slowly started in early 2020, then turned into a free fall over the following 3 months. In February 2020, the international passenger capacity decreased by 10%, affected mainly by traffic from/to countries experiencing an early outbreak and those deeply linked to China. In March 2020, such a capacity was further reduced by 48% at the global level. The bottom—the historical minimum ever experienced in modern aviation history—was reached on April 2020 due to strict constraints imposed worldwide for national and international air travel (Table 5.1).

As of May 18, 2020, almost all worldwide destinations have been subjected to travel restrictions. About 85% of destinations have entirely or partially closed their borders, and a further 5% have suspended international flights almost wholly.

What happened in Europe presents almost similar dynamics. The following three months' scenario has been beyond any plausible gloomy forecast, resulting in a more than 60% reduction of passenger traffic because of COVID-19 restrictions measures. The above, in turn, was translated into a significant loss of resources, in terms of money and workforce, along with a decrease of the Gross Added Value (GAV).[1] The key figures describing the economic impact affecting air carriers, regardless of the airline

[1] GAV is a measure of the contribution to GDP made by an individual producer/industry/sector. As it includes all primary incomes, it provides a better measure of the economic welfare of population. The GVA and GDP relationship is given, as follows: GVA = GDP + subsidies on products − taxes on products.

Table 5.1 International passenger capacity loss: the snapshot of April 2020.

Country	Capacity loss from originally planned		COVID-19 virus spread
United States	−22,976,621	−88%	≥50,000 confirmed cases
United Kingdom	22,345,210	−90%	
Germany	−19,374,444	−92%	
Spain	−18,041,897	−94%	
China	−16,683,876	−95%	
France	−13,480,021	−91%	
Italy	−12,464,502	−94%	
United Arab Emirates	−11,009,896	−89%	10,000 ≤ confirmed
Japan	−9,501,833	−88%	cases ≤ 49,999
Turkey	−8,798,224	−94%	≥50,000 confirmed cases
Thailand	−8,441,105	−94%	1000 ≤ confirmed cases ≤ 9999
Republic of Korea	−7,960,525	−86%	10,000 ≤ confirmed cases ≤ 49,999
Hong Kong SAR of China (CN)	−7,122,206	−93%	100 ≤ confirmed cases ≤ 999
Netherlands	−6,960,693	−89%	10,000 ≤ confirmed
Singapore	−6,596,279	−93%	cases ≤ 49,999
Canada	−6,288,656	−90%	≥50,000 confirmed cases
India	−6,286,458	−89%	10,000 ≤ confirmed
Switzerland	−5,990,424	−93%	cases ≤ 49,999
Russian Federation	−5,747,918	−87%	≥50,000 confirmed cases
Malaysia	4,959,606	−85%	1000 ≤ confirmed cases ≤ 9999
Portugal	−4,913,803	−95%	10,000 ≤ confirmed
Saudi Arabia	−4,193,572	−77%	cases ≤ 49,999
Australia	−4,115,805	−92%	1000 ≤ confirmed cases ≤ 9999
Mexico	−4,104,882	−78%	10,000 ≤ confirmed
Austria	−3,812,866	−91%	cases ≤ 49,999
Qatar	−3,760,492	−80%	
Indonesia	−3,723,583	−87%	1000 ≤ confirmed cases ≤ 9999
Vietnam	−3,681,731	−89%	100 ≤ confirmed cases ≤ 999
Ireland	−3,595,318	−92%	10,000 ≤ confirmed
Poland	−3,449,632	−79%	cases ≤ 49,999
Denmark	−3,417,729	−93%	1000 ≤ confirmed cases ≤ 9999
Belgium	−3,323,135	−87%	10,000 ≤ confirmed cases ≤ 49,999
Greece	−3,078,774	−94%	1000 ≤ confirmed
Philippines	−2,993,741	−86%	cases ≤ 9999

Table 5.1 International passenger capacity loss: the snapshot of April 2020.—cont'd

Country	Capacity loss from originally planned		COVID-19 virus spread
Sweden	−2,941,579	−89%	10,000 ≤ confirmed cases ≤ 49,999
Norway	−2,476,519	−90%	1000 ≤ confirmed cases ≤ 9999
Egypt	−2,248,437	−78%	10,000 ≤ confirmed cases ≤ 49,999
Brazil	−2,214,850	−92%	≥50,000 confirmed cases
Israel	−2,196,238	−91%	10,000 ≤ confirmed cases ≤ 49,999

Source: Authors' elaboration from ICAO dataset, 2020.

registration region, for an international framework are summarized in Table 5.2. In this context, the UK and Western European markets result as the most impacted in terms of passenger demand and economic losses.

To better understand the magnitude of COVID-19 impacts on the European skies, an actual comparison (Fig. 5.1) between the daily flights performed in 2019 (light blue; light gray in print) and 2020 (dark blue; black in print) provides evidence of what happened during the last three months of restrictions when the air services were almost entirely stopped compared to the pre-emergency conditions. This is also confirmed by the descending trend of the moving average of the daily variation over the last seven days (red color; light gray in print).

A focus at the country level allows stressing how in the second half of June 2020, which is around two months away from the plunge in transport supply, most countries were still coping with a shortfall of air transport services: Macedonia, Malta, Morocco, Georgia, and Israel—followed by Ireland, Spain, UK, Greece, Portugal, Ukraine, and Latvia recorded a daily average flight number more than 80% below what performed in 2019, underlining that some of them will take several years to compensate the traffic lost in the first semester of 2020. In early August 2020, stricter air travel restrictions were lifted and, still missing the evidence of the second epidemic wave, the European market's business confidence continued its slowly ascending trend toward a new equilibrium point. This is shown in Fig. 5.1, where the trend started in mid-June, compared to the March—June past direction, confirms an increase, albeit relatively thin, of daily flights performed in the 2020 early second half (dark blue).

Table 5.2 Impacts of COVID-19 on the air industry.

	Country	Passenger [%]	O-D passengers [million]	Airline revenues [$ billion]	Employment [units]	GVA* total [$ billion]
1	Austria	−58	−16.5	−2.6	−52,600	−4.6
2	Belgium	−61	−18.6	−2.6	−66,700	−6.4
3	Czech Republic	−61	−10.6	−1.3	−33,800	−1.2
4	Finland	−61	−9.6	−1.5	−40,600	−3.6
5	France	−61	−88.7	−15.7	−434,700	−38.9
6	Germany	−63	−113.4	−19.5	−534,000	−37.6
7	Greece	−58	−28.8	−4.1	−260,100	−11.2
8	Hungary	−59	−9.8	−1.2	−42,300	−1.7
9	Ireland	−61	−21.3	−2.7	−86,800	−12.5
10	Israel	−55	−13.1	−3.2	−95,300	−8.3
11	Italy	−59	−92.0	−12.6	−345,300	−23.5
12	Netherlands	−60	−32.6	−6.0	−177,600	−14.4
13	Norway	−76	−26.0	−3.6	−105,900	−11.5
14	Poland	−57	−22.8	−2.6	−64,600	−2.1
15	Portugal	−60	−28.6	−4.0	−187,800	−8.0
16	Romania	−59	−12.3	−1.4	−54,300	−1.3
17	Russia	−58	−67.5	−9.0	−428,800	−9.9
18	Spain	−59	−124.5	−16.8	−983,100	−64.7
19	Sweden	−67	−22.6	−3.0	−112,200	−11.2
20	Switzerland	−60	−29.6	−5.6	−120,000	−15.9
21	Turkey	−55	−58.7	−7.0	−559,600	−24.8
22	UK	−61	−154.6	−28.7	−732,500	−55.7
23	Ukraine	−55	−10.8	−1.3	−81,100	−0.8
Average value		**−60%**	**−45.55**	**−7.03**	**−243,465**	**−13.90**

GAV, Gross Added Value.
Source: Authors' elaboration from IATA dataset, 2020.

According to the broad set of forecasts (IATA, 2020; ICAO, 2021) describing possible global and local scenarios, it is reasonable to assume a rise in the air traffic demand could be achieved not before Summer 2021. The mid-year IATA forecasts affirmed that it would need to wait until 2024 to win back traffic levels of 2019. That was because air traffic recovery speed in May and June 2020 was lower than expected, mainly due to uncertainties about the restrictions to entry imposed for international flights. Such an outlook is, in turn, confirmed by the IATA forecasts based on end-2020 data: airlines are not expected to turn liquidity positive until 2022 or see their traffic levels recovery until 2024. As of this stage of total uncertainty, coming months will be decisive to understand better whether such projections will be totally or partially denied or, at best, confirmed.

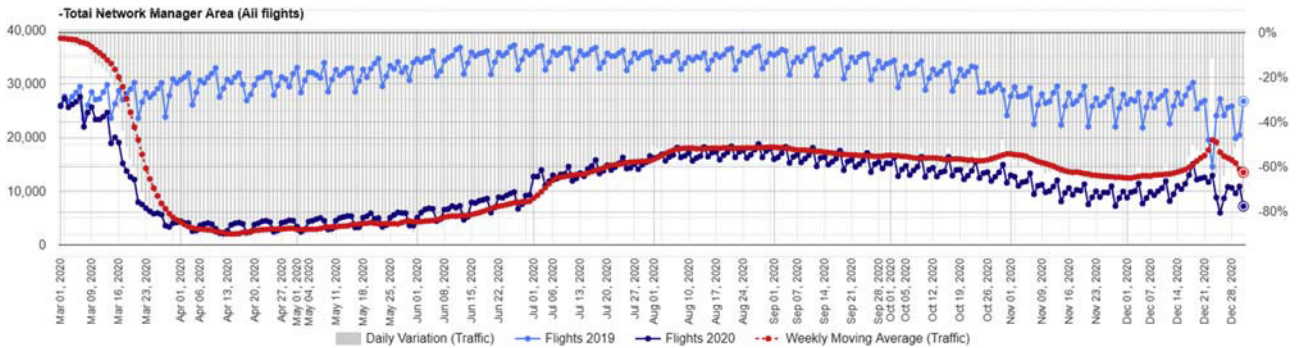

Figure 5.1 EU air market: March—December trend and comparison with 2019. *(Source: EUROCONTROL—AIU, January 1, 2021.)*

2.2 Deep impact on operating model: resources' productivity and aircraft capacity

The leading airlines' financial statements—given a relatively fragile business model as exposed to cyclical crises of drops in demand in an environment always highly competitive—inevitably suffered from the pandemic effect. Compared to the previous ones, such a crisis is still casting doubt also on the survival of the strongest and most consolidated carriers. Even in the past, air fleets were grounded, but there had never been a collapse of nearly 90% of passenger traffic lasting for at least three months. But that's exactly what happened at the global level during the first phase of the COVID-19 health crisis.

According to a literature review in the field (cf. Lan et al., 2006; Daft and Albers, 2014; Zhou et al., 2020), the robustness of the airline business model could mainly be traced to value drivers, as follows: (1) *efficiency* in terms of productivity, to be intended both for airplane fleets and crew; and (2) *density*, in terms of seats sold and flights operated, to measure how efficiently the single plane is used. They both have been entirely destroyed by the economic crisis induced by the pandemic, causing revenue to be zeroed.

The reduction of offered capacity, that is, number and frequency of flights, due to destinations canceled because politically quoted and reduced flight frequencies due to low demand, negatively impact the productivity of the business model as a whole. That happens because the reduction in the total number of hours flown, one of the main parameters affecting the efficiency, has to be distributed over the entire airline schedule, thus entailing an increase in the single flight unit cost. In other words, the amount of "no-flown hours" determines a drop of main production factors such as crews (employment contracts) and airplanes (leasing contracts) whose fixed component remains constant. Consequently, the cost per single hour flown increases while the productivity ratios invoiced, both for personnel and aircraft, significantly fall.

Besides, adopting spacing measures imposed for passenger safety purposes implies a reduction of on-board capacity that, in turn, causes an increase in the unit cost of the seat (CASK—Cost of Available Seat Kilometer). All the above, considering the suspension of some ancillary items (e.g., luggage, food) as an essential source of additional revenues (up to 40%–50% for aggressive low-cost airlines), put a strain on the survival of airlines. Air carriers try to increase the ticket price to compensate for the

very low-profit margins; however, the high demand elasticity and the low structural traffic volumes make such tactics quite tricky to apply. As a final consequence of such a vicious circle, the aircraft's filling coefficients are significantly reduced and remain far from the economic break-even load factor.[2] That generally ranges between 70% and 75% on the short-medium haul and 80% on the long haul in normal conditions.

The IATA's (2020) year-end forecasts estimate that about 40 million jobs in global aviation and its related value-chains, including the tourism sector, are at risk in the current crisis. Besides, passenger revenues fell to $191 billion, less than a third of $612 billion earned in 2019. Again, they predict industry losses of $118.5 billion in 2020 and $38.7 billion in 2021, thus stressing that both estimates are more profound than previously expected (Table 5.3).

After a gradual lifting of domestic markets restrictions started in early June 2020, followed by a reopening of regional and intercontinental

Table 5.3 Impact of COVID-19 at the global level: current trend and expected one.

Continent	Demand 2019 −2020	Capacity 2019 −2020	2020 profits	Demand 2020 −2021 (Δ 2019)	Capacity 2020 −2021 (Δ 2019)	2021 profits
North America	−66.0%	−51.6%	−$45.8bn	+60.5% (−45%)	+36.4% (−34%)	−$11.0bn
Europe	−70.0%	−62.4%	−$26.9bn	+47.5 (−56%)	+35.5% (−49%)	−$11.9bn
Asia Pacific	−62.0%	−55.1%	−$31.7bn	+50.0% (−43%)	+38.4% (−38%)	−$7.5bn
Middle East	−73.0%	−64.5%	−$7.1bn	+43.0% (−61%)	+23.6% (−56%)	−$3.3bn
Latin America	−64.0%	−60%	−$5.0bn	+39.0% (−50%)	+34.3% (−46%0	−$3.3bn
Africa	−72.0%	−62.8%	−$2.0bn	+35.0% (−62%)	+21.5% (−55%)	−$1.7bn
World	−66.3%	−57.6%	−$118.5bn	+50.4% (−50%)	+35.5% (−43%)	−$38.7bn

Source: Based on IATA, 2020. Annual Review. https://www.iata.org/contentassets/c81222d96c9a4e0bb4ff6ced0126f0bb/iata-annual-review-2020.pdf. (Accessed 4 January 2021).

[2] It is given by the ratio between the CASK and the Yield (revenue per passenger km), thus making clear that a drop of revenues leads to an increase in the numerators that can rise indefinitely (up to over 100%).

traveling, the last quarter of 2020 was affected by a tightening of restrictions globally due to the second pandemic wave affecting worldwide. At this point, we don't know how long it will take to come back to pre-crisis conditions. Undoubtedly, COVID-19 related impacts will change the way the air sector industry operates shortly and beyond and, surely, it will never be the same again.

2.3 Immediate reactions from the vast majority of the operators: fleet and capacity reductions

By the first week of April, governments in 75% of the markets monitored by the IATA[3] banned entry, while an additional 19% imposed travel restrictions or mandatory quarantine for international arrivals. The above resulted in a 98.3% collapse of global passenger demand (measured in Revenue Passenger Kilometers) in April 2020, compared to April 2019, thus worsening the 58.1% drop recorded in March. Besides, available capacity (expressed by Available Seat Kilometers) decreased by 95.1% and the load factor[4] (computed as a percentage of ASKs used) fell 46.6% over the 2019 same period up to 36.6%. Key figures of the worst month since ever, April 2020, spitted by the leading international markets, are summarized in Table 5.4.

Table 5.4 International passenger market in April 2020: the worst month since ever.

International markets	World share	RPK	ASK	PLF (%-PT)	PLF (LEVEL)
Africa	2.1%	−98.3%	−88.4%	−62.8%	11%, 1%
Asia-Pacific	34.7%	−88.5%	−82.5%	−28.2%	53%, 8%
Europe	26.8%	−98.1%	−94.9%	−53.2%	32%, 0%
Latin America	5.1%	−96.0%	−94.0%	−27.1%	55%, 0%
Middle East	9.0%	−97.3%	−92.4%	−52.1%	28%, 4%
North America	22.2%	−96.6%	−80.5%	−69.9%	15%, 0%
Total market	***100.0%***	***−94.3%***	***−87.0%***	***−46.6%***	***36%, 6%***

ASK, Available Seat Kilometers; *PLF*, Actual load factor; *RPK*, Revenue Passenger Kilometers.
PLF (%PT): Year-on-Year change in load factor.
Source: Based on IATA, 2020. Annual Review. https://www.iata.org/contentassets/c81222d96c9a4e0bb4ff6ced0126f0bb/iata-annual-review-2020.pdf. (Accessed 4 January 2021).

[3] IATA (International Air Transport Association) represents 290 airlines comprising 82% of air traffic at global level.
[4] It is given by the ratio between the RPK and the ASK.

Table 5.5 Main domestic passenger markets in April 2020: the worst month ever.

Domestic markets	World share	RPK	ASK	PLF (%PT)	PLF (LEVEL)
Australia	0.8%	−96.8%	−92.5%	−46.1%	34.6%
Brazil	1.1%	−93.1%	−91.4%	−15.9%	65.9%
China	9.8%	−66.6%	−57.2%	−18.6%	66.4%
Japan	1.1%	−88.7%	−54.6%	−51.8%	17.1%
Russia	1.5%	−82.7%	−62.4%	−43.8%	37.1%
USA	14.0%	−95.7%	−72.9%	−72.3%	13.5%
Domestic market	***36%, 2%***	***86%, 9%***	***72%, 1%***	***−44%, 3%***	***39%, 5%***

ASK, Available Seat Kilometers; *PLF*, Actual load factor; *RPK*, Revenue Passenger Kilometers.
PLF (%PT): Year-on-Year change in load factor.
Source: Based on IATA, 2020. Annual Review. https://www.iata.org/contentassets/c81222d96c9a4e0bb4ff6ced0126f0bb/iata-annual-review-2020.pdf. (Accessed 4 January 2021).

As far as the domestic passenger markets are concerned (Table 5.5), last April, the traffic component decreased by 86.9%; the deepest drop respectively occurred in Australia (−96.8%), Brazil (−93.1%), and the United States (−95.7%). This was a further deterioration from a 51% decrease already recorded in March. Moreover, the ASK declined by 72.1% and the related load factor fell from 44.3% up to 39.5%.

It is worth mentioning how the initial flight increases, following the partial reopening of international skies in early June 2020, focused on national markets. Late May 2020 data showed that flight levels in the Republic of Korea, China and Vietnam increased by up to 22%−28% less than in 2019. Such latter figures suggest that the airline industry market, after reached the crisis peak, was giving the first sign of a new beginning to relaunch connectivity in the medium term, least for national and continental destinations.

Throughout the full year 2020 (cf. ICAO, 2021), the COVID-19 impact on scheduled passenger traffic, compared to the baseline scenario (Business-as-usual) planned before this pandemic, would be likely translated into a consistent reduction of 67% of seats globally offered by airlines, an overall traffic volume reduction of 1470 million passengers and a potential loss of airlines' gross operating revenues of $263 billion. To this end, it seems useful to look at the corresponding figures at the global level (Fig. 5.2). The above indicators—namely capacity offered, mobility demand, and revenues—confirm that the European air market, followed by Asia and Pacific ones, are still suffering the impact of the crisis more than other countries.

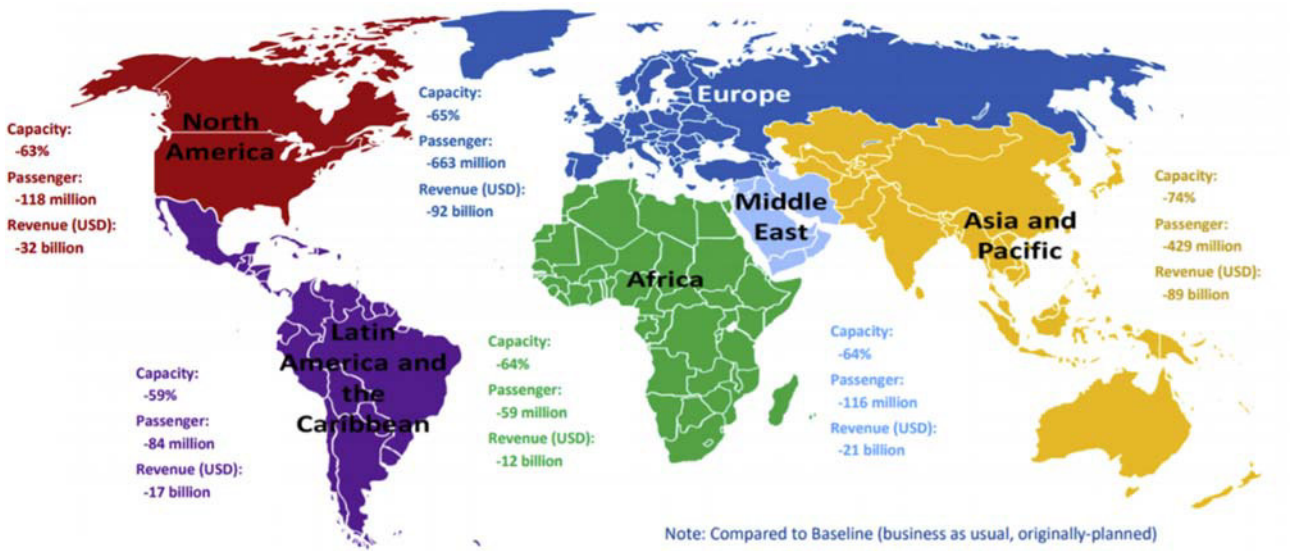

Figure 5.2 Impact on international passenger traffic and revenues by region during 2020. *(Source: Based on ICAO, 2021. Effects of Novel Coronavirus on Civil Aviation: Economic Impact Analysis. Air Transport Bureau, Montréal, Canada. January 7th, 2021. https://www.icao.int/sustainability/Documents/COVID-19/ICAO%20COVID%202021%2001%2007%20Economic%20Impact.pdf. (Accessed 24 January 2021).)*

From the passenger demand side, it is plausible to suppose that the public's response to the COVID-19 emergency will probably be delayed by the current greater perceived risk of infection than other sanitary crises that occurred in the past. A confirmation of that arises from two surveys involving a large sample of travelers living in different countries worldwide; the former[5] focuses on the public attitude to risk while the latter[6] deals with the passenger behavioral approaches in China and Australia domestic aviation markets. Both underlined how people take more time, up to six months, before feeling safe enough to restart travel and, anyway, they will wait until their financial condition comes to stable again.

Lessons learned from previous crises suggest that people often adopt new mobility practices during and immediately following an emergency, which can sometimes become permanent. Traveling for business purposes could be the case, at least for all Companies replacing business trips with videoconferencing, also in virtue of the wide spreading of more robust digital technologies.

Such a consideration would not be applied to leisure purpose trips distinguished in the long and short-haul. The former requires a more complex planning phase so, they likely perform a slow recovery, while the latter could show a more dynamic trend once travelers have assured that flying and traveling is safe again. Despite the high number of flights canceled by April 2020, the willingness to travel showed slight recovery signs in the following months. Late June 2020, flight capacity was still around 60% of what it used to be in the pre-crisis condition. After some countries announced to remove travel limitations for the summer season, air traveling increased between July and September 2020. Then, a growing of infection cases at the global level imposed a new round of gradual lock-downs and travel restrictions in many regions affecting Eastern and Western Europe, the Middle East, the United States, Latin America, India, and Asia.

The sanitary equilibrium and, so the economic and social ones, continue to be still very labile. The awareness the pandemic has not yet been defeated causes such instability and until the virus is completely eradicated,

[5] The Ipsos survey was conducted April 16–19, 2020 on the Global Advisor online platform among 28,000 adults (approximately 2000 individuals in each country) respectively aged 18–74 in Canada and the United States and 16–74 in Australia, Brazil, China, France, Germany, Italy, India, Japan, Mexico, Russia, and the United Kingdom.

[6] It was commissioned by IATA to define a set of confidence-boosting measures aimed at speeding up the recovery in air travel demand. The survey focused on the domestic markets of China and Australia.

also considering the vaccination campaign in progress, it will call for stricter sanitary measures to be translated in a suspension of all flights with the risk regions. Such safety measures are commonly applied in all those countries still hostage to the first infection wave or those affected by a second wave because of the virus's resurgence after the summer season or those who fear the third wave because of the virus's alterations and variants.

Whether and when passenger air transport demand returns to pre-crisis levels will depend on a broad set of parameters, all affecting people's decision-making process. However, once countries lifted restrictions due to virus' regression and/or large-scale vaccine administration, it is also reasonable thinking that confidence-boosting measures, along with support actions to the air market by States, will play a key role in restart traveling-related activities, thus speeding up the recovery of the global economy.

3. A new era of nationalization?

3.1 The financial support to traditional flag carriers

In common with the rest of the economy, government assistance has been essential in the aviation industry to preserve incomes and jobs through the COVID-19 crisis. Specific measures have included suspending requirements for "use it or lose it" landing rights at slot-coordinated airports, suspension of landing charges in Iceland and Norway and protecting services to remote communities.

There was no single approach to supporting airlines during the crisis (Table 5.6). The US government earmarked $50 billion for a mix of grants, loans, and equity options for all airlines until July 2020 while Australia turned down support applications, partly because of the potential negative impact on competition. In Europe, the UK has considered support once all commercial finance options were exhausted. French government support to Air France-KLM required to bring forward the Company's commitment to halve CO_2 emissions per passenger from 2020 to 2024 for domestic flights. Different is the Italian airline case where the government will bring at least €3 billion capital into Alitalia, preparing itself to retake control of the airline after 11 years of difficult private management and three failed restructuring attempts.

By summarizing, initially, governments were to provide temporary relief to airlines until travel demand recovery; however, such support has been unevenly distributed across all regions: the USA, European and parts of Asian airlines have generally received relevant governments support,

Table 5.6 Support to airlines in selected countries in addition to payroll support until July 2020.

	USA	France	Germany	Italy	The Netherlands
Airlines eligible	All airlines (pax)	Air France	Lufthansa	Alitalia	KLM
Grants	$17.5 billion	0	0	€1.3 billion[a]	0
Equity stakes	Optional	0	€300 million[c]	To be defined[b]	0
Loan guarantees	0	€4 billion	€3 billion	n.a.	€2.4 billion[d]
Government loans	$32.5 billion	€3 billion	€5.7 billion	€3.5 billion	€1 billion[d]
Total	$50 billion	€7 billion	€9 billion	€4.8 billion	€3.4 billion

[a]Paid by the Italian State, in the pre-COVID era (when the Company was commissioned).
[b]The State will likely take a 100% stake, at least initially, and set aside €700 million to support Alitalia.
[c]For 20% government stake in the Company.
[d]Bank loans of up to €2.4 billion and a direct loan from the Dutch State of up to €1 billion.
Source: Authors' elaborations.

while the assistance for airlines in Latin America, the Middle East and Africa was quite limited. As of the end of November 2020, government aid has globally amounted to $173 billion. The core of them made up of loans ($58 bn), wage subsidies to preserve jobs ($46 bn), loan guarantees ($24 bn) then followed by capital injections ($23 bn), deferring the taxes payment and reducing tax liabilities ($23 bn).

3.2 A new model of nationalized airlines

The COVID-19 crisis shows that the decision-makers in governments have enormous power to exercise to the extent that they can decide which companies survive and which companies should go bankrupt or be liquidated. After the initial crisis is over, the policymakers are likely to develop the temptation to exercise their power over the private sector airlines in which the government owns significant portions of their shares and/or bonds. Such government power may lead to inefficiency and/or corruptive practices that should be avoided considering the following best practices:

A. Governments should purchase "non-voting" shares rather than buying bonds. Non-voting shares make it difficult for the government to chair the Company or change the Top Management. The government could

recover some returns to taxpayers' money by selling those shares at a higher price later.

B. State intervention in airline activities should be needed at the operational level, but more likely in tied bailouts or conditional restructuring loans. The governments around the world have to start specifying what they expect to extract for their interventions. These conditions may counter what an unchained business community would ordinarily want, but it's necessary for this difficult situation. Noteworthy is the case of the German government's support to Lufthansa, the second largest European airline getting strong financial support during the crisis of €9 billion (cf. Table 5.6). From the first lockdown end, the German carrier increased the number of flights handled after a second quarter with a considerable decrease of the revenues (−96%) and a first semester 2020 with a reduction of the passengers handled (−66%) compared to the 2019.

C. Governments should also take a long-term vision of their air connectivity needs and airlines' commercial standing when defining what financial aid to make available. During the COVID-19 crisis, flight cancellations have had mostly a serious impact on islands and peripheral regions, many losing all international connections. Many governments supported routes providing essential air connectivity before the crisis. Since the crisis, some have introduced new aids where financial support was provided for services on particular routes rather than to specific carriers. The benefit of such an approach is its focus on connectivity outcomes. Subsidies should be non-discriminatory toward carriers, including specific clauses to ensure that they will be periodically revised and revoked once the crisis is over.

D. A return to hub-and-spoke operations could be foreseen in some cases. During the early 21st century, airlines globally used 300-seats planes such as the Boeing 787 Dreamliner and the Airbus A350 to connect new city pairs, linking secondary cities to each other, bypassing the hubs. After COVID-19, however, with a severe curtailment to international routes, only the main routes will survive.

E. The Governments should re-think the ownership of privately-owned national carriers, reversing 40 years of liberalization. The national government's ability to protect air routes into their territories, while loosened over decades, provided some cover after 2001 September 11, with insolvencies limited to Belgian national carrier Sabena and Swissair in Europe while US airlines were able to enter bankruptcy protection.

3.3 How the new market environment impacted—reactions from low-cost carriers

Low-cost carriers (LCCs) have presented a better reaction to the crisis than the incumbents in financial terms because of the more flexible network they own (the leading European airlines canceled almost totally intercontinental Europe—USA flights). LCCs' business model seems to be more robust and has proved to be resilient in the face of many previous crises. It is likely that LCC's will be structural winners again. Still, looking at both the USA and the European market, the responses to the crisis by the leaders in this segment were quite different as described next.

3.3.1 Southwest Airlines

It is a US airline known as the major low-cost carrier worldwide. As of 2014, Southwest connects 93 cities in 41 states, Puerto Rico and overseas, although most routes are within the United States.

In the pre-COVID-19 era, Southwest Airlines operated nearly 30,000 flights a week. By mid-April 2020, its weekly seat supply was 2,401,224 seats, putting it ahead of its national competitors and the leading Chinese airlines. Late April to mid-May brought the lowest flights in the United States over a decade, but as the restrictions began to ease, the major airlines, namely American Airlines, Delta, and United, improved their supply. Southwest increased its capacity to 15,000 flights/week in early June plus other 5000 flights at the end of June, while the three majors applied a more conservative strategy, approaching 10,000 flights/week. By early August 2020, Southwest operated around 21,000 flights/week, thus maintaining its leadership in the US market ahead of its top competitors, that is, China Southern, China Eastern, American and Air China, Delta, ANA, Wizz Air, Xiamen, and Qatar.

Such success is due to a well-defined operating strategy: the airline has limited sections of each plane dedicated to business or first-class seating, allowing more capacity on each flight. Besides, it manages only a few international flying. It is most successful in US areas where lockdowns are limited or delayed, likely serving many smaller hubs in the Midwest and Western regions.

3.3.2 Ryanair

Ryanair is the largest and most profitable European LCC, operating 450 Boeing 737—800 aircraft, generating €1 billion profits with 149 million passengers flown in its last financial year. As Europe moved into lockdown,

Ryanair was entirely grounded until July 2020, when it began to reintroduce around 40% of its average capacity. It moved over 4 million people in July 2020 with a load factor of 72%, representing a fall of 70% versus 2019. A progressive ramp-up was planned to thank also to the government financial aids of €4.1 billion. Still, a tight quarantine regime restrained the Company in its home country, Ireland and the UK, imposed on visitors returning from holidays countries such as France, Spain, and Croatia. Thus, Ryanair cut the planned September—October capacity by 20% by indicating a possible contraction in the airline capacity also over this year.

3.3.3 EasyJet

It's the second largest European LCC, operating over 300 Airbus A320 aircraft and flying 96 million passengers in the financial year ended September 2019. easyJet began its restart flying program in mid-June 2020, with activity limited to only 10 aircrafts, operating mainly in the French and UK domestic markets. Since then, it has stepped up activity and had planned to be at 40% of normal capacity by September 2020, already considerably more cautious than Ryanair. easyJet will have a fleet of around 30 fewer planes in the coming months, while the 24 aircraft delivery will be postponed beyond 2025. All of this means that the Company was unable to maintain its current network size and shape without reducing capacity in the face of the COVID-19 crisis. Given that a fundamental part of easyJet's strategy is to preserve number one and two positions in key slot constrained airports, it has its work cut out simply defending these positions as other airlines see an opportunity to move in and claim territory.

3.3.4 Wizz Air

The Hungarian LCC Wizz Air handled 40 million passengers delivering €281million profit for the past financial year. As the COVID-19 crisis has reduced its power, Wizz Air has moved more quickly than its rivals to higher activity levels. By July 2020, it operated nearly 75% of planned capacity and carried 47% of its regular traffic with 1.8 million passengers handled. Moreover, 200 new routes and four new bases were also announced. To enable these new opportunities 22 aircraft in the current fleet have been moved. It is also balancing its fleet toward larger aircraft, shifting from the A320 with 180 seats to the A321 version with up to 239 seats. This will further reinforce its capacity growth. The larger type accounts for around 50% of the fleet and rises to almost 90% by 2027. Ryanair will remain far ahead, but Wizz Air's size will increase relative to easyJet,

due to the latter's growth constraints. Wizz Air is gradually moving beyond its core territory and is confident in coming up against its competitors in some of their more productive leisure markets in Western Europe. This is a calculated risk, but with the benefit of a very low-cost base overall and specifically the lower unit seat costs with its increasing number of Airbus A321 will drive, the airline appears well placed to handle a substantial improvement of its performances.

4. How the industry is going to face the crisis

This section describes the core measures put into action by the main incumbents and low-cost air carriers to cope with the global crisis's economic impacts. Although the flight restrictions were imposed at the country level, a common approach in implementing actions at the international levels can be recognized. To this end, the recurring measures—in terms of fleet and capacity optimization, resizing of airline capacity because of the introduction of seat spacing measures, synergies between alliances, postponement of new aircraft orders and review of leasing contracts—are presented, thus going to investigate the stability of the respective business models, according to the different airlines' viewpoints.

4.1 How major airlines have been considering to face the mid-term issues

One of the features of the COVID-19 sanitary emergency was the virus's geographical spread, which appeared in Asia and then affected the rest of the world in the space of just over a month.

Most airlines tried to keep their schedule unchanged until mid-March 2020 when drastic mobility restrictions were imposed. Among them, a common policy response across the world was the border closures that, in turn, resulted in a sudden drop in the flight's number, first intercontinental and international ones. As a result, global markets suffered a stronger impact than domestic ones, and, to this end, it is likely to be expected that long-haul connections will be the last to be reestablished. Moreover, due to travel bans and restriction setting at the national level, such a process likely occurs unevenly worldwide. On the contrary, at least at the early of crisis, the national market experienced a less incisive and heterogeneous reaction, as it was lived as a sort of airlines' buffer to preserve a certain level of operation, just before the stop of air traffic during the late March 2020 lockdown. According to the above, the major airlines were the main losers, and they will be so, both in the medium and long-run.

Following what previously discussed, it is quite evident that most airlines worldwide searched the first aid through government grants, loans at preferred conditions/state guarantees, or subsidies. It is equally clear that without such a government-based strategy, all the leading airlines would not have been able to safeguard their financial status quo and, in some cases, avert the risk of bankruptcy.

Besides, to cope with such a dramatic impact on air carriers' assets and meet the governments' safety requirements, all the airlines were obliged to implement further countermeasures by resizing both the fleets' and aircrafts capacity. While a relevant transport demand drop has directly imposed the former, the latter are related to the social distancing due to seat spacing measures within the aircraft.[7]

Although the flight restrictions were imposed at the country level, common measures and actions implemented at the global level can be recognized. The main ones deal with a proper reorganization of fleets, fleet conversion from passenger to cargo, synergies between alliances, postponement of new aircraft orders and rearrangement of leasing contracts.

As far as the reorganization of the fleet is concerned, it can be achieved:

- By cutting fleets—i.e., Austrian Airlines (−25%) Brussels Airlines (−30%) or planning a deep reduction into the near future, i.e., Lufthansa;
- By replacing larger and older wide-body aircraft (i.e., the B747 and the A380) with narrow-body aircraft for long-haul routes. The above has been carried out along with working together with regional airlines to have a feeding fleet more appropriate for shorter links. This is the case of Air France bringing forward A-380 retirement, restructuring its domestic network with fewer flights and more low-cost connections (by Transavia) as well as Lufthansa itself grounding A380s likely permanently and replacing 20% with smaller aircrafts.

As an immediate response to the economic crisis, the most dynamic airlines started converting (temporary or permanently) their fleet by reconfiguring their airplanes to cargo. Such a change in the airframe implies

[7] According to the European Union Agency for Aviation Safety (EASA) guidelines, the obligation of 1-m interpersonal distance onboard aircraft was confirmed. It is permitted to derogate from that, if carriers, in addition to meeting a series of requirements, will define with airport managing bodies specific procedures that allow boarding of hand baggage of permitted dimension for placement in the overhead bins putting in place appropriate and selective embarking/disembarking measures about assigned seats on board (source: ENAC).

removing passenger seats and fitting freight pallets on seat tracks. Austrian airline was among the first to opt for this solution, followed by Icelandair and Swiss Air. In September 2020, German maintenance specialist Lufthansa Technik started converting an Airbus A380 to offer temporary from-passenger-to-cargo modification services. In this context, the health emergency has been a catalyzer for new air market logistics, mostly related to the supply of essential medical equipment and medicines.

In a middle and long-run perspective, a further measure deals with the exploitation of synergies between alliances. Such a strategy allows air carriers to consolidate or extend their network, thus providing customers with more compelling and competitive travel options and, at the same time, achieving cost savings and better economies of scale. Among the leading incumbents choosing such an approach, Air France-KLM signed a joint venture agreement with the US company Delta Air Lines and the British airline Virgin Atlantic in early February 2020, just before the sanitary emergency. Besides, British Airways engaged in a UK—Australia partnership with Qatar Airways that came into effect on May 29, 2020 and will run for five years.

Such new partnerships shift the balance by creating new market equilibria, apparently disjointed each other, but affecting the air industry dynamics internationally. Proof of that is the announcement made in mid-May 2020 by Etihad Airways, Qatar Airways' Middle Eastern rival, about its intention to restore service from Melbourne to London Heathrow, via its Abu Dhabi hub, after its suspension due to the COVID-19 crisis. At the same time, Emirates Airlines started in May 2020 to open new intercontinental connections from Dubai, also offering a seamless flight experience to customers traveling between the United Kingdom and Australia.

A further key point deals with postponing new aircraft's orders along with reviewing leasing contracts. According to data retrieved by IBA's intelligence platform (cf. IBA.iQ, 2020), it is expected that older aircraft will be considered surpluses to airlines' requirements over the next 18 months. This may be likely translated into more than 1800 12-year-old widebody aircrafts[8] to be alienated by the global airline system shortly.

[8] IBA has identified 4-engine type are the vulnerable ones, such as the Boeing 747 and Airbus A380, in addition to older twins including Boeing 777-200/ER/LR models, Airbus A340s and mature A330s as those likely to suffer most.

However, the considerable fall in airlines' revenues under their almost complete impossibility to operate along with a drop in travelers' confidence around future bookings—thus avoiding capturing the benefits of the advance ticket sales practice—required carriers to scale back their growth. This implies that leading airlines are rushing to postpone aircraft deliveries in 2020. They are still reevaluating long-term orders while trying to reorganize their strategies considering the industry's austerity prospects extended well beyond 2021.

4.2 The reactions of low-cost carriers

In the low-cost market, a dichotomous scenario emerges. There is the drama of closing several air carriers not able to contain the economic impact derived from the safety restriction measures on passenger traffic. This is contrasted by a different reality in which airlines have enough resources to manage such a complex situation. In some cases, they can take opportunities from this crisis, for example, by reconsidering their fleet configuration or extending their network by using new hubs no longer congested by the presence of incumbent carriers.

On the one hand, Europe's ultra-cheap flights could disappear due to the most fragile airlines' closure in the "low-cost" market. In this regard, the privately owned Italian airline Air Italy ceased operations in February 2020; in the same month, the Turkish carrier AtlasGlobal Airlines was filed for bankruptcy while the Norwegian-owned Swedish airline Braathens was filed for court administration in April 2020 and Lufthansa closed its subsidiary Germanwings. Again, the British carrier Flybe went into administration after the COVID-19 outbreak. On the other hand, the historical players of such a "no-frills" market live their match according to different strategic plans, all thought for surviving and, in some cases, to enlarge their market shares or conquer new ones.

In this context, easyJet falls into the former group, deciding to cancel new aircraft orders and, at the same time, rearranging a leaner fleet. As well, Sun Express, born as a joint venture of Lufthansa and Turkish Airlines, has revised its strategy in the running by switching a part of its aircraft fleet to cargo operations. Conversely, Helvetic Airways falls in the latter group. To tackle the current situation due to COVID-19 induced crisis but positioning itself as ideally as possible for the future, the Swiss regional airline is diversifying its fleet capacity by acquiring four larger E195-E2

Embraer aircraft.[9] Besides, the Spanish low-cost airline Volotea has planned 40 new seasonal routes while Wizz Air expects to enter new markets in Europe and increase ancillary service-related business.

Finally, as one of the leading companies at the global level for traffic volume and the undisputed queen of European low-cost carriers, Ryanair still has the power of driving the air market dynamics both in terms of connectivity and price competition. Numbers in hand, after just under two months from the reopening of the skies, Ryanair has flown 99% of its airplanes, followed by Wizz Air with 97%, at the same time, easyJet has made 71% of its fleet available. Ryanair's strategic plan is evident: to put their entire fleet into circulation to grab the European market, the most flexible one, considering that, from a global perspective, intercontinental flights will require a lot of time before reaching the numbers of 2019. Despite the still uncertain prospects affecting the LCCs industry, Ryanair seems to be once again decreed leader of the European market. As previously mentioned, it is the carrier with the biggest fleet (around 450 aircraft against WizzAir's 130), which may be translated into 1900 flights/day: a value more than two and a half times higher than what was achieved by *easyJet* (700 flights/day).

It is still challenging to get an idea of how long the aftermath of the crisis will be and what further measures could be put in place by the airlines to contain the economic damage and plan their recovery. However, what is clear to date is the widespread awareness that the most efficient narrow-body aircraft used to bypass hubs will be useful also to low-cost airlines for long-haul traffic revitalization. Besides, the significantly lower traffic levels than in the past, the potential entry of new competitors in hub airports (i.e., Wizz Air), the late recovery of long-haul demand as well as the reduction in feeding traffic indicate that the strategic challenge could be played mainly in primary hub airports: i.e., Dubai is one of them for many LCCs.

5. Conclusions

The worst global crisis has hit the aviation sector ever since: an air traffic drop of more than 90% along with entire aircraft fleets grounded all around the world featured half of 2020.

[9] The Embraer E195-E2 strikes a good balance between seating capacity (between 120 and 150 seats), range, fuel consumption, and environmentally friendly operation. It seems to have virtually no competitor in the regional aircraft segment.

Recovery will be slower than originally expected, and even if traffic increase signals mainly in domestic markets were arising, it is commonly recognized that 2019 air traffic levels will be likely achieved not before late 2024 at best! Added to that, the scenario of business traffic is featured by drastic and permanent drops in international demand because of radical changes in customer behaviors shifting to digital videoconferencing.

At the global level, airlines, regardless of financial background and fleet size, all immediately reacted with capacity reductions. Nevertheless, the operating model has been deeply hurt in its key fundamentals, namely, aircraft and capacity productivity. The above has also given rise to undeniable and unpredictable consequences involving the medium and long-run.

Governmental support at the global level has played a crucial role in avoiding most airlines falling bankrupt by providing several social measures and fiscal incentives. However, in some countries, governmental initiatives moved-up to acquisitions of shares and new nationalization models, thus determining a potential conflict between the State's dual role of "regulator" and "shareholder" Besides, most support was devoted to domestic flag carriers, thus triggering strong reactions from leading low-cost carriers claiming against asymmetric incentives criteria.

Despite the context described in this chapter, since it has been said "in the worst scenarios, a great opportunity arises" the post-pandemic setting will surely provide the leading airlines with a unique chance to reset their business models. It will be possible to translate it into reality by rethinking the airline paradigm according to several emerging value drivers, mainly traced to both the aircraft fleet purchasing and ground and flew personnel recruiting processes. The former would be due to the lowest fleet ownership cost ever. Indeed, the abnormal availability of aircrafts grounded will determine unique opportunities to buy a new and second-hand fleet at the cheapest conditions ever. The above implies that the smartest carriers with financial solidity could place an order at up to 70% discount versus previously listed prices for both new and second-hand aircraft.

The latter would be linked to a highly efficient labor market. As a matter of fact, there will be an unprecedented excess of pilots and crews on the market, allowing air carriers to renegotiate contractual agreements much more in line with the current traffic demand conditions. That would also be an excellent opportunity to recover competitiveness on the cost per available seat kilometer.

Finally, on the top-line potential revenue, the adoption of new management tools implementing recent developments in data analytics technologies and AI would allow establishing new criteria of value-based segmentation, dynamic pricing and customer management, thereby boosting revenue growth.

Combining such drivers will likely determine a new competitive landscape where boundaries between full-service carriers and low-cost ones will disappear, thus paving the way for establishing a new post-pandemic airline model.

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