STUDY

Requested by the TRAN Committee

European Parliament

Relaunching transport and tourism in the EU after COVID-19

PART III: Aviation sector

Transport and Tourism

Policy Department for Structural and Cohesion Policies
Directorate-General for Internal Policies
PE 690.869 - July 2021

EN

RESEARCH FOR TRAN COMMITTEE

Relaunching transport and tourism in the EU after COVID-19

PART III: Aviation sector

Abstract

This thematic briefing provides the European Parliament's Committee on Transport and Tourism (TRAN) with an overview of the repercussions of the COVID-19 pandemic on the aviation sector, as well as policy recommendations to address the challenges emerging from the crisis.

This document was requested by the European Parliament's Committee on Transport and Tourism.

AUTHORS

PANTEIA: Maria RODRIGUES, Emilia SANDRI, Ljubica KNEZEVIC, Tharsis TEOH
Università degli Studi Roma Tre: Barbara ANTONUCCi, Nicole CUTRUFO, Lidia MARONGIU
Research manager: Ariane DEBYSER, Davide PERNICE
Project, publication and communication assistance: Mariana VÁCLAVOVÁ, Kinga OSTAŃSKA
Policy Department for Structural and Cohesion Policies, European Parliament

LINGUISTIC VERSIONS

Original: EN

ABOUT THE PUBLISHER

To contact the Policy Department or to subscribe to updates on our work for the TRAN Committee please write to: Poldep-cohesion@ep.europa.eu

Manuscript completed in June 2021

© European Union, 2021

This document is available on the internet in summary with option to download the full text at: https://wp.me/p9fhrE-gYr

This document is available on the internet at:
https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2021)690869

Further information on research for TRAN by the Policy Department is available at:
https://research4committees.blog/tran/
Follow us on Twitter: @PolicyTRAN

Please use the following reference to cite this study:
Rodrigues, M; Sandri, E; Antonucci, B; Knezevic, L; Teoh, T;
2021, Research for TRAN Committee – Relaunching transport and tourism in the EU after COVID-19 – Aviation sector, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels
Please use the following reference for in-text citations:
Rodrigues, Sandri, Antonucci, Knezevic, Teoh et al (2021)

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the authors and do not necessarily represent the official position of the European Parliament.

Reproduction and translation for non-commercial purposes are authorized, provided the source is acknowledged and the publisher is given prior notice and sent a copy.
© Cover image used under the licence from Adobe Stock

CONTENTS

LIST OF ABBREVIATIONS

A4E	Airlines for Europe
ACI	Airport Council International
ANSP	Air Navigation Service Provider
ASD	European Aeronautics, Space, Defence and Security Industries
ATAG	Air Transport Action Group
ATKS	Available Tonne Kilometres
CANSO	Civil Air Navigation Services Organization
CEF	Connecting Europe Facility
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EASA	European Union Aviation Safety Agency
EBIT	Earnings Before Interest and Taxes
ECDC	European Centre for Disease Prevention and Control
EP	European Parliament
ERA	European Regions Airline Association
ETC	European Travel Commission
ETF	European Transport Workers' Federation
EU	European Union
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
OECD	Organisation for Economic Co-operation and Development
P2P	Point-to-point
RPKS	Revenue-passenger kilometres
RRF	Recovery and Resilience Facility

SAF	Sustainable Aviation Fuel
SESAR	Single European Sky ATM Research
TRAN	Committee on Transport and Tourism
TFEU	Treaty on the Functioning of the European Union
WHO	World Health Organization

LIST OF FIGURES

EXECUTIVE SUMMARY

KEY FINDINGS

- COVID-19 had **dramatic impacts on the aviation sector**, ranging from a decrease in flight traffic to a severe loss in revenue for airlines and aviation operators. This translated into job cuts and difficulties for the recovery of the sector.
- Consumers are concerned with the correct implementation of sanitation measures. To resume demand, **a strategic approach to encourage travelling** while making passengers feel safe is fundamental.
- **Several emerging trends might affect aviation** both in the mid-term and in the long-run. These mainly relate to the fast recovery of leisure trips; the potential disappearance of the hub-and-spoke model; the increasing digitalization and implementation of sanitation measures; the rise of cargo freight and the growing emphasis on sustainability goals.
- To sustain the recovery of the industry, EU policy-makers should focus on **re-building passengers' confidence**, **supporting aviation operators** and **enhancing existing aviation-related policies**.

The COVID-19 crisis had significant impacts on the aviation sector, bringing passenger traffic in the EU back to its 1995 levels. The pandemic affected the **viability of aviation operators,** as well as **changed the structure of the market and air connectivity**.

April 2020 recorded the largest decrease of **worldwide flights (-55%),** with **traffic figures dropping by 92.8%,** corresponding to **a loss of 1.7 million passengers.** On average, the aircraft load factor was between 50% and 60%, reaching the lowest point of 27%. By the end of 2020, **almost 51% of the total European fleet were grounded**. World city-pair connectivity also decreased, with the number of **unique city-pairs dropping to 36%** compared to the beginning of 2020.

Furthermore, European airlines experienced **revenue losses amounting to €22.2 billion**. European airports lost up to €33.6 billion, as daily movements were reduced by 73% compared to 2019. In addition, **6.4 million** direct aviation and supporting-aviation **jobs in Europe have been lost**, and globally 4.8 million more will be under threat by the beginning of 2022.

The stagnation of economic growth, paired with increasing costs of safety protocols and the often changing travel restrictions, hints to a long period of recovery for the aviation sector.

One of the key factors to relaunch the aviation sector is the ability to restore consumer confidence in air transport. When it comes to travel, surveys suggest that **European consumers prioritize sanitation measures** over ticket prices.

While encouraging PCR testing is important to restart travel, consumers would **prefer to be vaccinated,** ideally travelling to destinations where other individuals are also vaccinated. The roll-out of COVID-19 vaccination programs across the EU is an encouraging factor for the willingness to travel intra-EU from summer 2021 onwards.

A series of measures may be implemented to increase travellers' trust. Firstly, **the use of self-service technologies** can limit unnecessary physical interactions between individuals. **Hygienic practices should be consistently implemented** across aviation facilities, **accompanied by reliable information** to make consumers aware of the premise's safety.

Some consumers do not travel due to the **confusion surrounding the unharmonized entry requirements of Member States**. In this sense, the **Travel Pass Initiative** by IATA and **chatbot technologies** can help inform travellers on travel restrictions. In addition, the **EU Digital COVID Certificate** will be pivotal in easing entry restrictions across EU Member States covering vaccination, test and recovery.

The pandemic has given rise to **trends that will impact the aviation sector** both in the mid- and the long-term. The financial implications for aviation operators caused heavy governmental interventions. While it was crucial to support the sector, it might create long-term financial problems for airlines.

Projections suggest that **leisure trips will recover faster** than business trips. This prescribes a re-evaluation of the airline's flight economics, potentially resulting in the **disappearance or significant downsizing of the business class** and the **development of new flight networks**. Furthermore, the **increasing demand for point-to-point flights threatens the existence of the hub-and-spoke model**. While the latter was functional for connecting flights, point-to-point flights do not require the existence of great central hubs. If demand for point-to-point flights is on the rise, the hub-and-spoke model might become redundant, favouring a more moderate development of aviation infrastructure and smaller airports.

The **digital transformation** will require the integration of enhanced IT in airports and aircrafts. In the long-run, **digitalization will contribute to optimized resources** and reduced operational costs. Similarly, **sanitation measures**, if paired with technology developments, **will ease the constraints of aviation operators**.

Air freight demand has substantially increased. As a result, many airlines **converted their passenger aircrafts into cargo planes**. Further, it is expected that in the long-run, the aviation operators will decide to cooperate more with each other to complement and enhance air travel services.

The **constant opening and closing of networks** also resulted in last-minute changes to flight routes. To counter short-notice changes, airlines, airports and ANSPs need more flexibility in their scheduling, as well as better planning for their revenue management.

Sustainability policies and initiatives are also crucial to relaunch the sector. Nonetheless, **some goals will need to be adjusted** in order to align with the financial struggles that aviation operators are currently sustaining.

In conclusion, three kinds of recommendations are pivotal to support the aviation sector.

Firstly, re-building passengers' confidence in air transport is essential to resume demand. To do so, **measures that provide consistency on the implementation of sanitation measures** and ensure **effective communication** with consumers should be implemented. Furthermore, the implementation of the EU Digital COVID Certificate, travel packages and initiatives and digital solutions can encourage tourism and restore passengers' trust.

Secondly, **aviation players should receive support** through a wide array of means, such as including aviation workers in vaccination plans, harmonizing guidelines to ensure safe and reliable travels, encouraging COVID-19 testing and financially sustaining the air transport industry via strategic plans.

Lastly, **existing policies tackling the green transition should be strengthened** through targeted approaches. For this, the correct allocation of EU funds, coupled with actions that foster support for the aviation sector, may ensure that decarbonization goals are achieved without disproportionately affecting specific market sectors.

1. OVERVIEW OF THE IMPACTS OF COVID-19 ON AVIATION SECTOR

KEY FINDINGS

- The total number of flights in 2020 in Europe was reduced by 55% (or 6.1 million flights) compared to 2019, leading to a reduction of 1.7 billion passengers. The estimations for 2021 expect a recovery to 51% of 2019 levels but only in 2026 are those levels expected to be reached again.
- The Europe aviation sector suffered tremendous economic loss with €22.2 billion net losses for airlines, €33.6 billion revenue losses for airports and €4.8 billion in-year revenue losses for ANSPs.
- The difference in impact on European and non-European airport traffic was significant, as European airports lost 1.32 billion passengers compared to only 400 million passengers at non-European airports.
- 6.4 million direct European aviation jobs and jobs supporting the aviation sector were lost by December 2020. The job loss is forecasted to drop globally by further 4.8 millionby the beginning of 2022.
- The pandemic has caused a decline of more than 50% in connectivity to major economic cities, such as Frankfurt, Paris, and Amsterdam. The long-term risk is that the connectivity of cities established pre-COVID-19 will not be fully recoverable, due to the economic pressure airlines will continue to be confronted with.

1.1. Introduction

This chapter presents the impacts that COVID-19-related travel restrictions, quarantine rules and lockdowns had on the aviation sector. The first section looks at the impact of COVID-19 on aviation operators. The second section looks at the impact of the pandemic on the aviation market structure and connectivity.

1.2. Impacts on aviation operators

The impacts of COVID-19 on the aviation sector have brought traffic levels of European airports back to the levels of 1995. The total number of flights in 2020 in Europe[1] reduced by 55% (or 6.1 million flights) compared to 2019, leading to a reduction of 1.7 billion passengers. The drastically reduced operations has led to €22.2 billion net losses for European airlines, €33.6 billion revenue losses for European airports and €4.8 billion revenue losses for European air navigation service providers (ANSP)[2]. While data on the exact figures of revenue losses for airlines has not yet been made public, a sort of depiction of the situation may be deduced by crossing data. In 2019, IATA forecasted that in 2020 European commercial airlines would accrue a net profit of €6.5 billion[3]. Earnings Before Interest and

[1] Where data from Eurocontrol is mentioned, "Europe" corresponds to the "EUROCONTROL Network Manager Area", encompassing Eurocontrol's 41 Member States and 2 Comprehensive Agreement States, (see the scope here).

[2] An Air Navigation Service Provider (ANSP) is an organisation that provides the service of managing the aircraft in flight or on the manoeuvering area of airport and which is the legitimate holder of that responsibility.

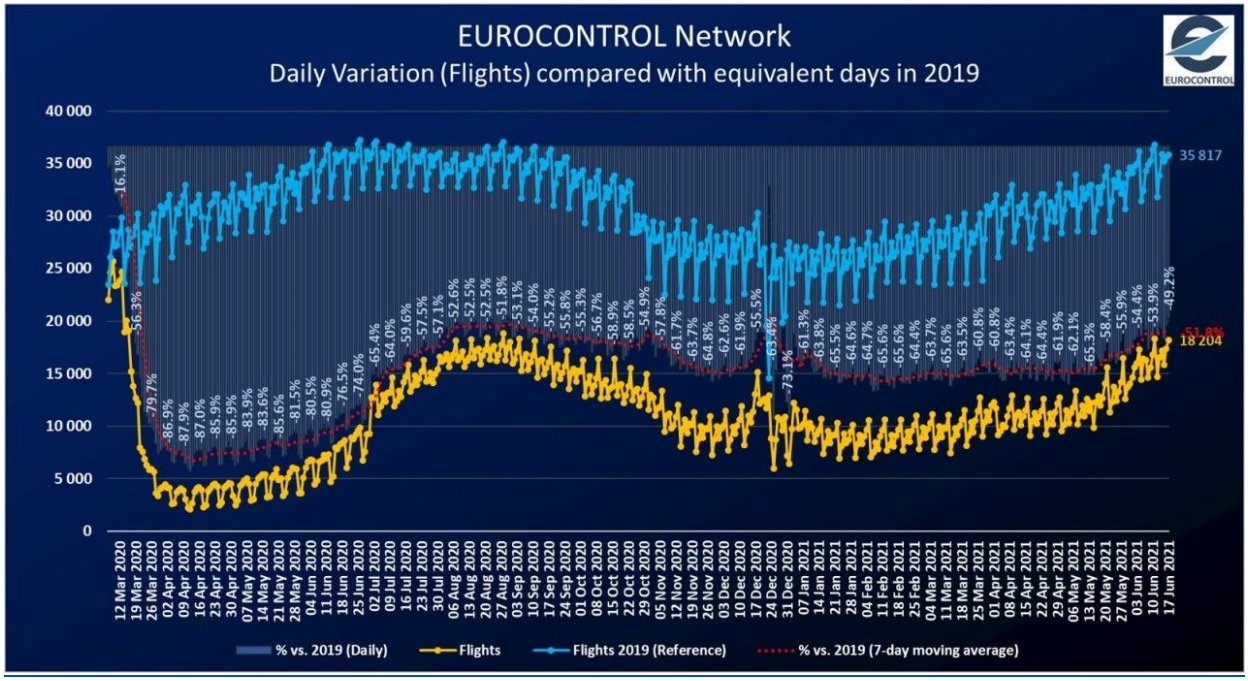
[3] Resulted from our own calculation based on the data provided in the source.

Taxes ("EBIT") margins have instead dropped around 40% in 2020, departing from the annual growth rate in revenue of 87.3°% from 2013 to 2020[4]. If growth rate had followed projections, 2021 would have resulted in profits of more than 7 billion euros. Even though the 40% loss in revenue relates to gross profit and is not directly comparable to net losses, it provides a fair view of the severe decrease in profit experienced by air transport carriers. In addition, the reduction on the average revenue-passenger kilometres (RPKs)[5] globally reached 66% in 2020.

Impacts on traffic

The air traffic volume in 2020 displays a trend that coincides with the incidence of COVID-19 and the travel restrictions or lockdowns that were implemented by Member States (Figure 1). At the beginning of April 2020, when most EU countries entered into lockdown, **traffic reduced by more than 80% compared to the volumes in 2019 (having the lowest point reaching 92.8%)**. The year-on-year difference gradually reduced to around 50% by August 2020, when most countries partially lifted international travel restrictions. Air traffic begun to decline again from September 2020 onwards up until a year-on-year difference of approximately 65% in April 2021, with only a brief peak during the Christmas holidays. With respect to airport traffic, the difference in impact on EU and non-EU airport traffic was significant, as EU airports lost 1.32 billion passengers compared to 400 million passengers lost at non-EU airports.

Figure 1 – Variation in flights compared to 2019 – daily measurements



Source: Eurocontrol. COVID-19 impact on the European air traffic network

The year-on-year reduction in flights departing from and arriving to airports, were not evenly distributed across Member States: varying from percentage reductions of **47%** in Luxembourg to **63%**

[4] ibid.
[5] Revenue Passenger Kilometres ("RPK") is an airline sector metric showing the number of kilometres travelled by paying passengers.

in Ireland. Spain, Italy and United Kingdom recorded a reduction of flights of around - 60%, while France Belgium and The Netherlands were around -52%.

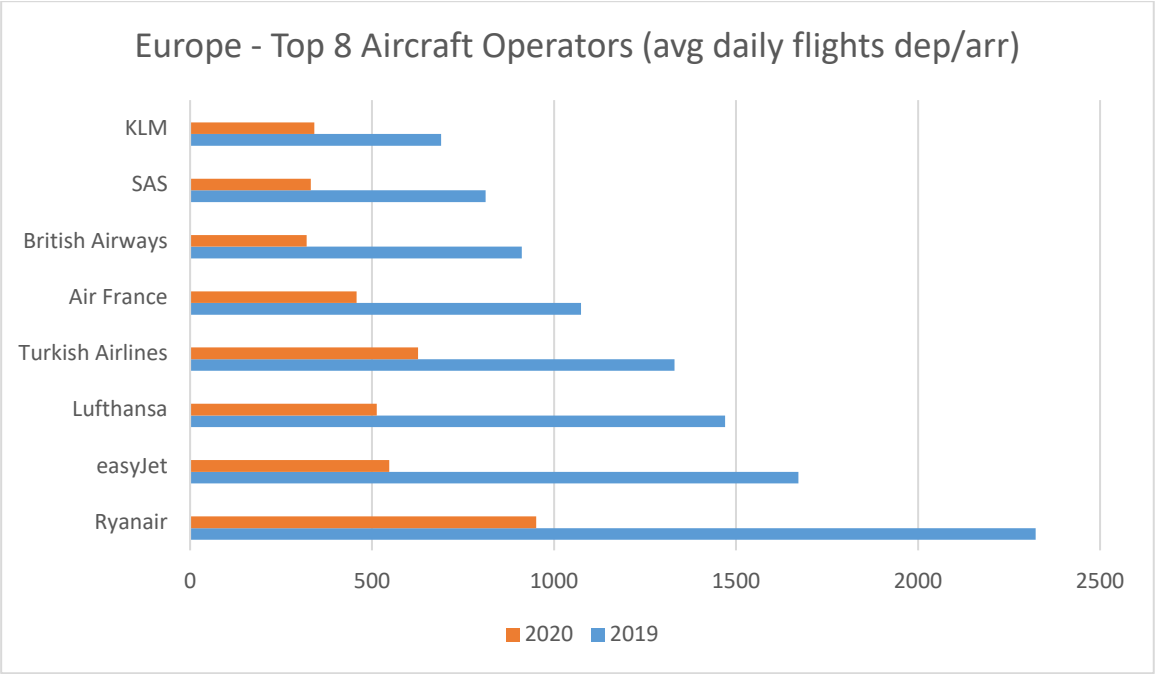
In absolute terms, both Germany and Spain recorded a loss of over 1 million flights. Also, the pandemic affected the **medium-distance flight category** (i.e. flight distances between 500 and 2,000 km, covering international European flights to adjacent regions) **the most, with over 3 million flights lost in 2020 compared to 2019.** Long-haul (flights between 2000 and 4000 km) and ultra-long-haul (i.e. more than 4,000km flights) showed lower rates of decline, due to the relevance of long- and ultra-long-haul flights for cargo operations.

It is important to distinguish between air travel and the air cargo sector, which have been performing quite differently in the last months. At the end of Q3 of 2020, global industrial production was down by 3% year-on-year. Consequently, the global air cargo sector only declined by 8% by the end of September 2020, and was estimated to increase up to 13.1% in 2021, accounting for 36% of airline revenues in 2020.

Impacts on airlines

The **impacts felt in 2020 by European airlines and ANSPs** were significant, with the former experiencing a net loss of €22.2 billion and the latter suffering in-year revenue losses of €4.8 billion. The decrease in demand brought a decrease in the number of daily flights, with leading groups going down by 53%, (e.g. Turkish Airlines) up to 67%, (e.g. Lufthansa and easyJet).

Figure 2 – Europe Top 8 aircraft operators



Source: Eurocontrol. 'What COVID-19 did to European Aviation in 2020, and Outlook 2021' Aviation Intelligence Unit Think Paper #8

Besides the reduction on the number of flights, the aircraft load factor was around 50%- 60%, meaning aircrafts were operating half empty, reaching the lowest point in April 2020 with 27% of occupation.

Airlines also saw 51% of the European fleet grounded by the end of 2020. Madrid Barajas airport grounded 132 aircrafts, which was the highest figure in Europe. Airlines have in parallel communicated the deferrals of purchases and accelerated the retirement of older aircrafts.

Impacts on the market segments were also unevenly distributed. **All-cargo** was the least affected segment, doubling its market share from 3% in 2019 to 6% in 2020. The **Business segment** was overall **25% below**, recovering to near 2019 levels after summer 2020. **Non-scheduled flights**[6] reduced by **43%,** but have been growing since June 2020. The most affected segments were without any doubt **low cost** and **traditional scheduled carriers**, with **drops around 60%**. However, differently from low cost carriers, traditional scheduled carriers were able to benefit from the increase in cargo operations and repatriation, hinting at possible sparks of a potential recovery.

Impacts on airports

The **European airport**s in 2020 were estimated to have received **1.7 billion passengers less than 2019**, with **revenue losses** reaching **€33.6 billion**.

The **reduction on average daily movements** for EU airports in 2020 was around **73% compared to 2019.** The European airport network saw a decrease of 58.6% in aircraft movements compared to 2019. In 2019, the Frankfurt airport figured as the airport with the highest number of movements (i.e. 1,408 average daily movements). In 2020, Amsterdam had the highest number of movements, despite only reaching 644 average daily movements.

Considering that, for airports outside the EU, the reduction of passenger traffic is estimated at 61.9%), EU airports suffered significant passenger losses when compared to non-EU ones. That is primarily because of the size and relative resilience of domestic markets such as the ones of Russia and China. Whilst international markets experienced a fall of 75% in demand, the recovery of the Russian and Chinese markets propelled their economy, boosting confidence and ensuring a renewed growth. The North American airline industry experienced a decrease of 41.5% in demand, once again highlighting the difference that emerges between regions relying on international traffic, (such as Europe), and those with strong domestic markets, (such as the United States, Russia and China).

Impact on transport workers

The COVID-19 pandemic had a strong **impact on transport workers** of the air transport industry. It is estimated that, pre-pandemic, more than 408,000 people aged 20-64 were directly employed in the EU air transport industry. It should be noted that this number, accounting for 0.2% of all employment in the EU, does not include all jobs that are supported by aviation.

In fact, air transport is deeply entangled with upstream and downstream sectors of the market due to its inter-industry connections. Air transport is maintained in place by an apparatus of upstream sectors services: those that provide support, (e.g. operation of airports), aircraft manufacturing, rental and leasing services and refined petroleum manufacturing. Furthermore, it is often the case that airlines have shared ownership of the airports through which they fly, (such as Lufthansa which owns shares of the Frankfurt airport). Aircraft manufacturers also rely on the demand of the air transport sector, both at an activity level and for decision-making related to air transport. Altogether, this means that when the air transport industry suffers, other industries are likely to be affected as well.

[6] Non-scheduled flights are flights which are not conducted in accordance with fixed flying schedules, over specific air routes, to and from fixed terminals.

To cope with the financial crisis, airlines needed to limit their rate of cash burn[7] by cutting operating costs. Total employment in the industry was therefore targeted, resulting in **lower wages and declining unit labour costs.** In addition, IATA forecasts that the decline in employment will lead to a decrease in productivity, with the average employee generating 521,348 Available Tonne Kilometres (ATKs)[8] a year. As reported by IATA, by December 2020 in Europe 6.4 million jobs – including both direct aviation jobs and jobs supporting the aviation sector – have been lost[9], (particularly hitting Spain, Germany and France). Furthermore, IATA forecasted that total employment connected to aviation may fall globally by 4.8 million more by 2022, resulting in a contraction of 43% of employment when compared to the pre-pandemic situation.

Air Transport Action Group indicates that if the potential loss of those 4.8 million jobs affects all sectors that the aviation industry normally supports, 46 million jobs may be under threat, ranging from highly-skilled aviation roles to professionals working in tourism and the global transport system. Moreover, the conditions of air workers have been considerably worsened, the level of safety management provided by airlines is tempered by the economic pressure, and airline personnel is reportedly feeling unsafe to resume working activities. Airline workers' mental health is put to the test by the many developments related to COVID-19, such as furlough[10] and redundancies that forced remaining workers to work more intensively, the implementation of extra emergency and preventive measures increased workload and looming job cuts. Detailed information can be found on the briefing on Relaunching transport and tourism in the EU after COVID-19 - Transport workers.

1.3. Impacts on market structure and connectivity

The COVID-19 pandemic has hit the aviation sector so hard that its mid to long-term effects are expected to have a great **impact on market structure** and **connectivity**. Such effects require the aviation industry to support the resumption of services with new considerations in mind.

Firstly, as reported by IATA, the scale of passenger revenue collapse is so substantial that estimates saw revenue losses amounting to $38.7 billion worldwide, as compared to pre-COVID-19 expectations. In order to face such downsizing, companies need to quickly put an end to cash burns. This will prove difficult due to the semi-fixed nature of most costs that airlines are bound to undertake, such as depreciation of aircrafts and flight equipment, rental and amortization expenses and insurance. Whilst the rollout of COVID-19 vaccines in Europe will be determinant to turn airline companies' cash positive in the last quarters of 2021, the current dramatic drop in demand requires the airline industry to survive by burning through their cash balances. Based on the EUROCONTROL traffic forecast, it appears that traffic figures for aviation actors will begin to resemble the 2019 levels in 2026. EUROCONTROL expects the industry to be able to gain 92% of the total 2019 traffic only in 2024, whilst 2021 is forecasted to reach only half of the 2019 levels.

IATA also researched the extent to which companies in the airline industry can survive through cash burn. On the basis of its analysis, it found that the average airline company would run out of cash after 8 to 9 months. This period matches Q1 and Q2 of 2021 and is before the vaccine is administered to enough people to become effective and before travel restrictions can be relaxed more broadly.

---

7 A cash burn rate is the speed at which a company spends the money that is available to it, when it is not making more money than it spends.

8 An available tonne kilometre is the sum of the products obtained by multiplying the number of tonnes available for the carriage of revenue load (passengers, freight and mail) on each flight stage by the stage distance (one ATK is a metric tonne of available payload space flown one kilometre).

9 Resulted from our own calculation based on the data provided in the source.

10 Defined as a temporary leave of employees due to special needs of a company or employer; in this case, due to economic conditions. The type of scheme depends on the national governments, but usually this covers a percentage of the regular salary.

This could result in either the bankruptcy of some medium and smaller airline companies, the need to provide public support to aviation operators or the increasing presence of governments in sustaining airlines, thus significantly affecting the aviation market structure.

Secondly, the cost of health-related measures and the shape of recovery for commercial flights represent two great uncertainties for companies intending to resume air transport services. On the one hand, fixed costs are likely to increase due to the necessity to implement new safety measures, (such as disinfection, the provision of PPE, viral tests and temperature checks). On the other hand, commercial air traffic may take a prolonged amount of time to recover due to the stagnation of economic growth.

Overall, many mid-term effects of the pandemic risk to undermine the recovery of the industry, essentially changing the market structure within the air transport sector. Most airlines are still in the market only thanks to the financial injections received by governments. Travel restrictions and quarantine measures impede the recovery of the sector and create a weak demand for services. Consumers' new transport behaviour may have enormous consequences for air transport demand. Not only may consumers decide to switch to other types of transport, such as high-speed trains, but also the newly-introduced approaches to services trade, such as video-conferencing and remote-working, are shifts that are likely to become the new normal, affecting the concept of business travel forever. In addition, the continuous digitalization may substantially change the travel experience.

According to the OECD, the correct intervention of governments is essential to allow changes to the market structure to occur while efficiently administering public resources. Even though the air transport industry has often been the target of State aids through loans, injections and nationalizations, the post-pandemic market setting will require targeted measures that allow the sector to grow without undermining competition, for example by ensuring that a balance is struck between supporting specific firms and ensuring a level playing field for all companies.

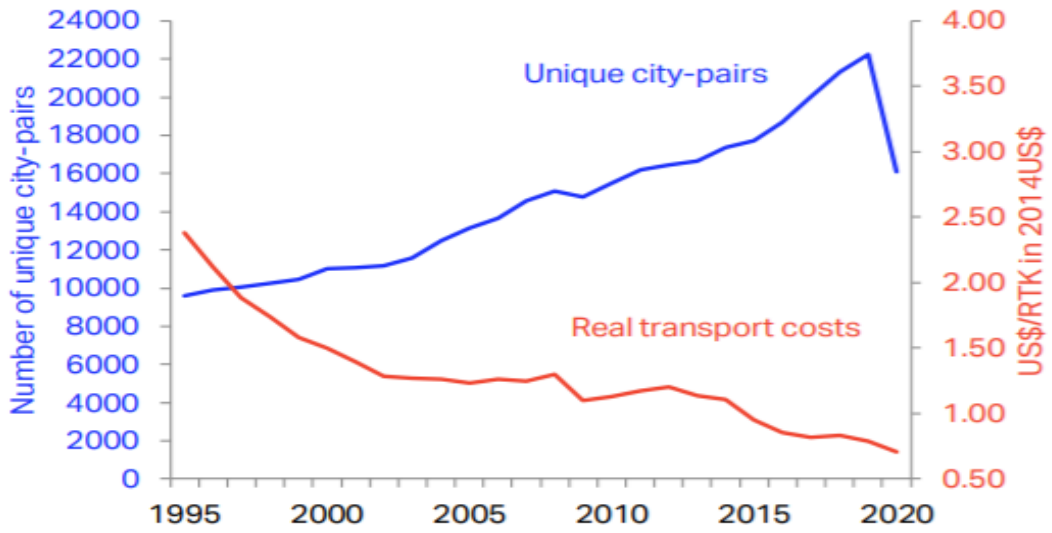
During the first quarter of 2021 the airline sector benefitted from the initial recovery of domestic markets and the gradual reopening of international markets. Nonetheless, global recession, paired with an all-time low consumer confidence, are constraints that delay such recovery. According to IATA's projections, cargo performance will continue to grow, boosting both the economy and revenues for airlines in critical conditions.

COVID-19 pandemic has caused a significant loss in city-pair connectivity[11]. Total connectivity, (which combines domestic and international connectivity), has declined by 68% in Frankfurt, 67% in London and Paris, 66% in Istanbul, 64% in Moscow, and 53% in Amsterdam since 2019. By the end of April 2020, the number of city-pairs was 65% lower than its level in 2019, declining for the first time since the 2007 financial crisis. As per October 2020, the number of city-pairs in the world was 36% lower than its levels at the beginning of 2020. The long-term risk is that a number of city-pair connections established pre-COVID-19, (which, up until the pandemic, had more than doubled since 2000), is not fully recovered due to the economic pressure airlines will continue to experience.

The graph below shows the correlation between the number of city-pairs and real transport costs. Air transport is one of the main drivers of global economic development, and direct connections between cities are the channel guaranteeing an efficient flow of goods and, as well as falling air transport costs.

[11] Air connectivity shows how well a country's cities are connected to each other and to other cities worldwide, and city-pair connections are essentially virtual bridges supporting the flows of key economic activities across markets.

Figure 3 – Unique city-pairs and real transport costs



Source: *IATA. Unique city-pairs and real transport costs*

Comparing how intra-EU traffic flows have changed in 2020 (country-pairs within Europe), it appears that domestic flows predominated. In fact, while in 2019 three of the top 10 country pairs consisted in international intra-EU travel, flying from one country to another, in 2020 only 2 city-pairs appeared in the top 10 country pairs, substituting international travel with domestic flights.

Domestic flows in Norway increased from the 8th position in 2019 to the 3rd one in 2020. French domestic flows occupied in 2020 the first position, previously held by Spain. Domestic flow in United Kingdom dropped to 7th position, being previously in the top 3. The first non-domestic flow in the top 10 correspond to United Kingdom-Spain, still 70% below 2019 levels. Only Southern Africa (-44%) and Asia/Pacific (-47%) were less affected than intra-Europe flows (-54%).

Regarding the specific impact of the COVID-19 crisis on airlines. Ryanair, Europe's largest airline in 2019 and still in 2020, shrunk its number of flights by 59%, from a daily operating average of 2,323 daily flights in 2019 to 951 in 2020. Two of the 10 top airlines also underwent major changes. Firstly, Eurowings was downsized by parent company Lufthansa in April 2020, with a decline in flights of 69% as compared to 2019. Secondly, Norwegian Air Shuttle entered bankruptcy protection and decreased daily flights by 73%.

While the historically deep losses represented by COVID-19 prevail, financial performance should start to grow again towards the end of 2021. IATA predicts that the re-opening of borders from mid-2021 onwards, hopefully allowed by the higher number of vaccinated individuals, will be the main driving force behind the increase of revenue. At the same time, while costs will still be considerably high, IATA's forecasts suggest they will not outweigh profit estimations, constituting an enhanced financial performance and a positive close of 2021.

2. HOW TO REBUILD CONFIDENCE IN AIR TRANSPORT?

KEY FINDINGS

- Hygiene and sanitation measures, such as guaranteed physical distance, recommended cleaning protocols for cabin and airports, aviation staff wearing mask and protective equipment, instead of ticket prices, have become the key factors to travel. These should be clearly communicated.
- PCR testing does not increase travellers' confidence, rather travellers would feel safe to travel if they and others were vaccinated.
- Travellers reported that they feel optimistic about travelling again in 2021, based on the on-going vaccination campaign and the approved "vaccine passport".
- Most airlines and airports have adopted digital solutions to limit physical interaction, support hygiene and safety protocols, enhance communication with passengers, and provide the flexibility to cancel flights.
- A few Member States are easing insolvency laws to relaunch travel and temporarily relieve companies from financial burdens.
- The EU has put in place the EU Digital COVID Certificate, which will permit persons, who have been vaccinated, received a negative test result, or recovered from COVID-19, to travel more easily between Member States.

2.1. Introduction

Restoring travellers' confidence is essential to relaunch the aviation industry. To this end, understanding what travellers' consider as prerequisites to resume travelling is essential.

This chapter focuses on the short term trends, starting with a description of the travellers' expectations, attitudes and behaviour captured in recent surveys that sets the requirements to relaunch aviation. The second part of the chapter gives an overview of the short term measures adopted by several actors, including a set of good practices implemented by airlines, airports and Member States. To rebuild travellers' confidence and relaunch the aviation sector, airlines and airports can adopt measures to guarantee safe and secure travelling and launch initiatives to encourage tourism.

2.2. Expectations, attitudes and traveller behaviour: surveys overview

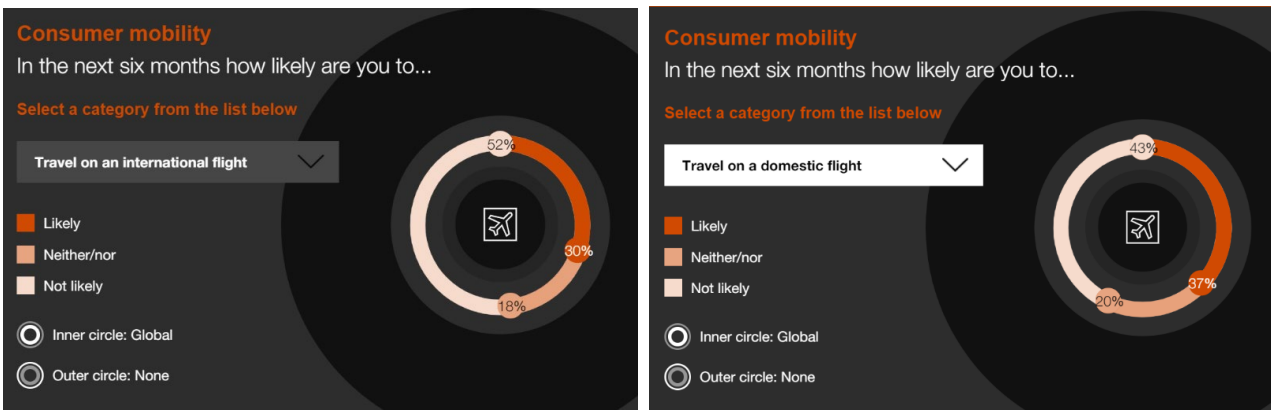
In order to increase travellers' trust, it is pivotal to understand what travellers look for in this period of uncertainty due to the pandemic. Once countries implemented stay-at-home measures, travellers have switched from a trustworthy and relaxed approach to travel, to the need to have control of their surroundings. As a result, 40% of surveyed individuals in May 2020 reported they would not fly to their next holiday destination. Within the group that travelled for leisure at least once in 2019, 80% intended to drive to their next vacation destination. However, 90% of consumers planned to travel again within one year from the relaxation of restrictions, although one third of this group foresees to fly less than they did in 2019.

Through a survey carried out in May 2020, PWC estimated that consumers[12] have become so concerned with protecting themselves from the virus that 43% of them were willing to pay more for trips where physical distancing is guaranteed. As a consequence, when choosing an airline some factors have changed in terms of importance for consumers. According to a survey carried out by Inmarsat in October 2020, 68% of respondents found cabin cleanliness more important than before, 47% were more concerned with travel prices and 44% found airline reputation to be a more decisive factor when making their choice.

In addition, 75% of surveyed individuals reported that they feel safer when they see employees wearing personal protective equipment (PPE) and read reviews on sanitation written by third-parties. Almost 85% of consumers confirmed that information from hotels and air services about safety will influence their decision to travel, and 40% were unsatisfied with the information made available by leisure service operators concerning safety protocols. It appears that the pandemic made safety and cleanliness of aircrafts the most important considerations, when booking a flight.

Despite the increasing roll-out of the COVID-19 vaccine, the attitude of consumers towards air travel has not changed in the last period. A survey conducted by the European Commission in March 2021 concluded that 80% of the surveyed consumers did not intend to make travel plans until the situation is back to normal in their home country. At the global level, the June 2021 Consumer Global Insights Survey held by PWC revealed that only 30% of surveyed individuals are likely to travel in 2021 on an international flight, while 37% are likely to travel on a domestic flight[13].

Figure 4 – Consumer mobility survey results



Source: *PWC. Global Consumer Insights Survey*

Surveys offer interesting insights also on the trust that passengers have with regard to COVID-19 testing and the COVID-19 vaccine. While getting tested is basically a requirement nowadays to travel, according to the 2021 Global Rescue Travel Survey, PCR testing does not increase travellers' confidence. 73% of the interviewed reported they would feel safer during a trip if they had received the COVID-19 vaccine. 69% would also like other travellers to be vaccinated[14]. Based on a survey carried out by Allianz[15], 66% of respondents also feel safer when everyone in airplanes and airports wears face masks,

[12] Consumers and travellers are used as synonyms in this report.

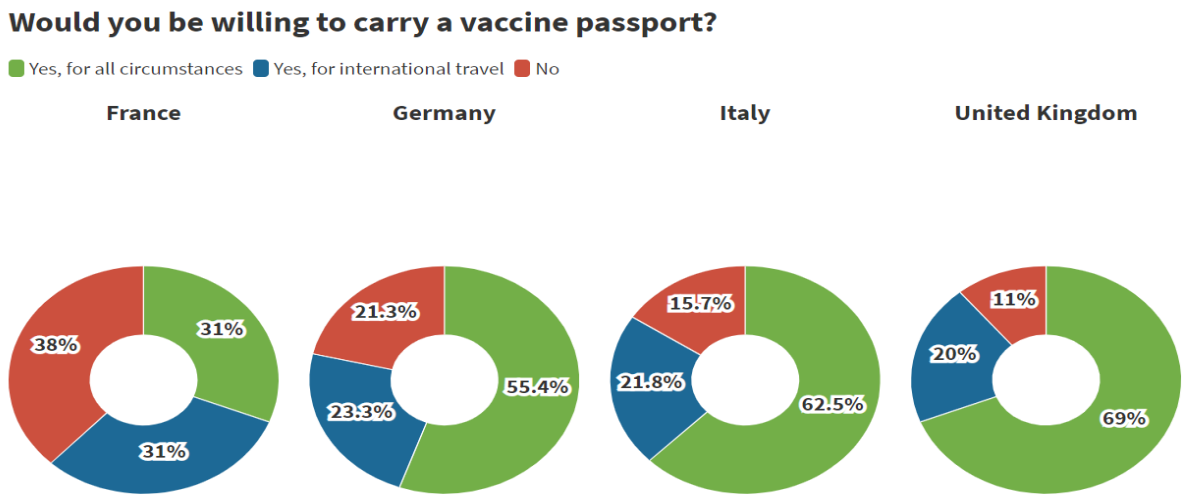
[13] The survey was carried out in June 2021, including 22 territories and more than 8,600 consumers. Surveyed individuals come from Australia, Brazil, Canada, China, Egypt, France, Germany, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Mexico, Netherlands, Philippines, Russia, Saudi Arabia, Singapore, South Africa, Spain, Thailand, United Arab Emirates, United States, Vietnam.

[14] The survey included more than 2,000 of Global Rescue Travel's current and former members between Jan. 26-31, 2021.

[15] Allianz is an international financial services provider offering insurance and asset management products.

while 59% would like having blocked seats/limited capacity on planes. 58% of travellers expect advanced sanitizing efforts at airports and hotels, and 47% of respondents reported that being around vaccinated individuals when travelling would make them feel safer. By the same token, the spread and the reaction to the disease appears to have an effect on travellers' perception. They feel encouraged to travel if the cases are declining in the destination (as reported by 44% of respondents)[16]. Additionally, as reported in a 2021 survey by Travel Pulse, 41% of respondents would feel safe if asked for a proof of a negative COVID-19 test at arrival at destination.

Figure 5 – Willingness to carry a vaccine passport as reported in surveys



Source: *Euronews-commissioned survey between February 25 and March 1. Sample size 1,500 in each country. Carried out by Redfield Wilton Strategies.*

For what concerns the possibility to **implement a vaccine passport**, surveys conducted in France, Germany, Italy and the United Kingdom suggest that, on average, 54.5% of the population would be in favour to carry a vaccine passport in all circumstances[17].

For example, in France 62% of surveyed individuals were for a vaccine passport. According to the survey carried out in Italy, while 67.5% accept the need for a green pass to travel, 54% believe that the passport could be released also to immunised people or after a negative PCR test result. As for the confidence in the vaccine, only 33% of the interviewed Italians state that they would feel safe to travel to high-risk destinations, even if vaccinated. 62% of surveyed Spaniards are in favour of creating a vaccine passport. Out of the remaining 38% of individuals, most of them are against the passport because they perceive it as a threat to the freedom of mobility of those that do not wish to have it or believe that it generates prejudices against those who do not hold the passport. In general, the fragmented scenario as to where to go, when to go and what will be open when reaching a destination, represents a problem of uncertainty for would-be travellers. Furthermore, uncertainty on the safety measures taken by airlines, the health standards at the airport, and the spread of the disease at the destination are some elements impacting travellers' trust and their willingness to travel. A global coordinated approach is needed to gain travellers confidence with the assumption that technology and vaccines will play an important role.

[16] The survey included Allian'z U.S. based customers and was carried out in 2021.
[17] Resulted from our own calculation based on the data provided in the source.

The "2021 Monitoring Sentiment for Domestic and Intra-European Travel", a research carried out by the European Travel Commission in April 2021 shows that 56% of the individuals are feeling positive about taking their summer holidays, of which citizens of Poland, Italy, Austria, Germany and the Netherlands are in the top 5. 27% still feel reluctant to do so in the next six months. Vaccination is the main travel prerequisite with 48% of travellers feeling more confident about planning trips in the next six months. Air travel is mentioned by 17% of all Europeans surveyed as the most worrying part of the trip, as opposed to being exposed to other individuals while visiting touristic locations.

A recent survey from Booking.com done in February 2021 shows the optimism for American travellers: with the start of the vaccination campaign, 71% of respondents felt hopeful and optimistic about travelling in 2021. Young consumers aged between 18 and 40 years old will most likely lead the recovery in flight demand, since they form the group who is most eager to return travelling.

For what concerns the behaviour of 65 and above age group passengers, statistics show an unexpected turnover in willingness to travel again by air. This age group forms an important segment of the market, potentially growing and complementing the demand of younger individuals. Despite the fact that this group has been affected by COVID-19 much more than its younger counterpart, more than 60% of the surveyed passengers want to travel again by flight within the next year. Furthermore, at the time of the survey this group ranked vaccines as the third most important factor influencing travel decisions. Since in most countries 65+ aged individuals are now vaccinated, (as, in fact, most countries drew up vaccination lists per age groups, starting from eldest groups to the youngest ones), it is expected that the group's likelihood to travel has increased now. However, the factors in choosing a specific company will most likely change, prioritizing safety in travelling to and from airport facilities and reducing the importance of flexible ticket booking and quarantine rules.

One may expect the initial restart will benefit travellers as airlines will most likely keep prices low to fill the airplanes, with a view of China's example, where flight tickets were sold at the price of a coffee. In the long run, "decreased competition, the burden of paying back government loans, and potential health-related operational measures" would raise the ticketing prices back up.

2.3. Measures adopted to increase travellers' trust

Based on the surveys mentioned above, a series of initiatives can ease travellers' worries and restore their confidence in travelling. The main common concern is with the implementation of hygiene and sanitation measures to limit contagions. For this reason, some initiatives include the **widespread usage of self-service technologies** that limit contact between people, such as discussed in the NEXXT Concept Paper[18]. **Digital solutions** are essential to **limit touchpoints and interactions** throughout a trip, and passengers expect, in order to become independent and autonomous, an acceleration in the digital transformation of air transport services.

Another useful initiative is to ensure that **all workers are equipped with protective equipment**. This is not only fundamental to protect employees, but it increases the perception that safety is taken as a serious matter and can help to make consumers feel protected. For instance, cleaning and disinfecting personnel could have distinct uniforms for their role and function to be easily identified.

Even though flight demand is expected to resume, the nature of such demand seems to be changing. Consumers intend to fly again, but based on the surveys and recent behaviour, they are likely to prioritize safety over the competitiveness of ticket prices. Therefore, it is essential that airlines are quick

[18] NEXXT (New Experience Travel Technologies) is a joint initiative of ACI and IATA. Through a Concept Paper, NEXTT intends to leverage the latest technology developments to address the predicted capacity constraints faced by airports.

in deciphering such requirements and react accordingly, for example by making hygiene practices a top priority and ensuring that such protocols satisfy consumers' concerns. In this sense, the initiatives run by ACI to **reward airports' health and safety new measures** best practices around the world have been fundamental to regain trust with passengers. It is important that airlines and airports prove consistency in the implementation of health-related measures. In addition, it is crucial for airlines to build a trustworthy reputation.

Different companies have rolled out **digital health passports** on several popular routes on different airlines, while **enhancing communication with passengers through their apps and websites**. Passengers need to feel secure that the **same high level of safety protocols are adopted in all aircrafts and airport facilities that they plan to use,** as this is what will make them choose whether to fly or travel through different means. Consumers are willing to pay more for a flight where social distance is ensured. This can be achieved by sharing **more information on safety policies**, as well as the official institutional sources backing up such policies. In this sense, technology really plays a key role to rebuild confidence when it comes to providing information to passengers and minimizing passenger contact with airline crew or other passengers. As suggested by ACI, communication should become clear and efficient, offering timely answers to questions on health and safety processes in place. This way, consumers are empowered with sufficient information to make an informed choice.

During the unravelling of the pandemic, customers' interactions with airlines increased exponentially. Customer service and contact centres are amongst the departments that were hit most profoundly by the crisis. In order to provide suitable customer services while relieving such departments from the pressure they currently experience, airlines could make wider use of chat-bot software. One example observed was the creation of chat-bots platforms where passengers can obtain reliable information tailored to the individual's requests. AirChat is a software already in place that provides airlines and airports with the possibility to **send real-time messages and notifications to users through messaging platforms** such as Messenger, WhatsApp, Viber and Web-chat. The tech giant Apple has also taken a step in this direction by integrating in its app Apple Maps, the ACI's airport COVID-19 health measure data. When searching the location of a specific airport on Apple Maps, users will be able to find the airport's measures with regard to COVID-19 as collected by ACI. This supports airports communicating to passengers the safety measures implemented. The increased integration of software for social decision-making can help interpret and address passengers' question in a consistent way.

Furthermore, many concerns on air travel are dictated by the complex entanglement of quarantine rules and testing in different countries. Where consistency in this respect is not achieved, flight demand is unlikely to resume before the easing of travel restrictions. Therefore, authorities and stakeholders should coordinate measures and deliver accurate information on entry or travelling requirements for each destination. It is essential that all actors in the industry prepare for fast decision-making procedures, in order not to confuse travellers.

To this end, the **Travel Pass Initiative** put forward by IATA seems to boost consumers' confidence. The Travel Pass creates a global and standardized digital platform to verify and inform passengers of countries regulations concerning COVID-19. It consists of four modules regarding (i) health requirements per country; (ii) the location of testing and vaccination centres in each destination; (iii) an app for labs to safely send test results to users and (iv) a travel pass app to digitally manage travel documents. The Travel Pass initiative helps to ensure the safety conditions needed to travel are restored, which in turns increases consumer confidence and may help to relax travel restrictions. The Travel Pass app is available for download and may be used by travellers whose airlines adhere to the initiative.

With the rollout of vaccines gaining pace, Member States and the EU are **exploring how (digital) documents** can help to reopen borders by identifying individuals that are already protected. France tested an app-based travel pass that stores negative COVID-19 test results and should soon allow vaccination certificates on flights to Corsica and its overseas territories. In October 2020, Estonia and the WHO started a pilot for a digital vaccine certificate. Sweden should do the same by summer. Outside of the EU, China put in place an app-based health code system that uses travel and medical data to give people a colour that represents their likelihood to have the virus, while Bahrain launched a digital COVID-19 vaccine passport in February 2021. In February 2021 Israel launched a vaccine passport guaranteeing easy access for vaccinated individuals to restaurants and cultural events. The passport also exempts them from quarantine rules. In India, vaccinated people are given a QR code based electronic certificate.

The EU worked on a common approach for all Member States and the European Commission put forward on the 17th of March a proposal to introduce a Digital Green Certificate to support resuming consumers' demand. On May 2021, the European Parliament and the Council reached an agreement on the "EU Digital COVID Certificate". The EU Digital COVID Certificate is a certificate proving that a person has either (i) been vaccinated, (ii) received a negative test result, or (iii) recovered from COVID-19. It aims at protecting travellers and ensuring that restrictions are minimised, supporting free movement throughout the EU. To function, a gateway has been built by the European Commission through which all signatures by institutions making the certificate valid can be verified across the EU. Member States have also developed, with the help of the Commission, software and apps to issue and verify certificates. Member States shall not impose additional travel restrictions on the holders of the Digital COVID Certificate, unless such measures prove necessary and proportionate to safeguard public health. The EU Digital COVID Certificate is considered a temporary measure valid across the EU and countries of the Schengen Area, (valid for 12 months as from 1 July 2021), but its application may be extended upon a proposal by the Commission, in case the epidemiological situation of COVID-19 requires so.

As mentioned in Section 2.2, the Certificate received wide support from consumers. At the beginning of June 2021, the Parliament greenlighted the proposal for the Certificate, resulting into a Regulation on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates to facilitate free movement during the COVID-19 pandemic. Some lawmakers and civil right groups have raised equality and privacy concerns, but for what concerns airlines, they have welcomed such initiative, (which comes as the result of several calls to the EU for a coordinated approach with regard to COVID-19 measures).

The box below presents an overview of good practices adopted by airlines, airports and Member States to support relaunching air travel transport.

Good practices adopted by airlines, airports and Member States:

British Airways expanded the trial of the **VeriFLY, a digital health app helping airlines to verify passengers' travel credentials for certain destinations,** across all International flights operating into the UK from February 15 2021.

EasyJet introduced the Protection Promise, a guarantee to refund customers in case they cancel their holiday, with the possibility to make changes to their journey up to 28 days before the travel and receive the deposit back as credit.

Air France and **Ryanair** recently launched trial digital passes (March 10th 2021) and started offering solutions to passengers to easily store their health information for checks while traveling. In particular, **Ryanair** "COVID-19 Travel Wallet" will allow passengers to save COVID-19 documents. **AirFrance** has also communicated the company's commitment to a safe and flexible trip on their website with a page dedicated to the campaign "AirFrance Protect".

Australian carrier **Qantas** is planning chartered flights across Antarctica, starting in November, which will allow passengers to board a 787 Dreamliner.A similar aerial sighting "tour" experiment was followed by **EVA Air,** which scheduled a flight from/to Taiwan with a Hello Kitty-themed A330 Dream jet, and **ANA**, selling a short "scenic flight in Japan in August", which the airline said sought to replicate "the Hawaiian resort experience," with 300 travelers boarding the 1.5 hour flight. While the initiatives by Qantas, EVA Air and ANA may reboot the aviation sector by attracting consumers with interesting offers just for the purpose of flying, they also spark controversies in that they fail to include sustainability considerations.

"Travel with confidence" is an initiative undertaken by **American Airlines**, consisting of a website sessions dedicated to health and safety communication to passengers. Some of the new measures in place include: latest travel and health regulations, greater flexibility to reschedule a trip and a clear call to download their mobile health passport app with instructions about the COVID-19 testing steps to take to fly.

Helsinki Airport was awarded the ACI's Airport Service Quality Award, rating it as the best European airport for its size category (15–25 million passengers) in 2020. Such award comes in recognition of the excellent implementation of the sanitation measures to prevent contagions within the premises. The Airport requires passengers to wear facemasks, maintain distance from other passengers and use self-service machines for any luggage to check in. Furthermore, the Airport provides spots for COVID-19 testing, ensures intensified cleaning throughout all its terminal and has arranged more than 300 hand sanitizer stations for passengers.

Munich Airport received the ACI Airport Health Certificate for the successful implementation and compliance with the sanitation measures prescribed by ICAO Council's Aviation Recovery Task Force and the joint EASA/ECDC Aviation Health Safety Protocol. Munich Airport is successful because it provides the same high-degree of sanitation and hygiene across all areas (i.e. entry and exit spots, check-in counters, boarding gates and lounges), thus ensuring consistency and restoring consumers' confidence.

In order to sustain airlines against insolvency and protect them from bankruptcy, at the outbreak of COVID-19 **Germany** changed its insolvency law through the COVID-19 Act. This temporarily suspends the obligation to file for insolvency and limits the liability of directors where insolvency is caused by COVID-19.

Greece reached an agreement with **Israel** which allows vaccinated individuals from both countries to visit the other State without the need to follow quarantine rules or testing. This would facilitate the travelling for all persons who have been vaccinated against COVID-19.

3. EMERGING TRENDS AND POTENTIAL MID - TO LONG-TERM EFFECTS ON THE AVIATION SECTOR

KEY FINDINGS

- The weak financial situation of airlines and airports brought about the need of state aid and relief, increasing the level of state ownership. The aviation sector's financial constraints might affect its capacity to invest in the digital and green transition.
- Recovery of the sector will be driven primarily by leisure trips, with a slow recovery of business travel.
- As the recovery is expected to be led by leisure trips and the preference for direct flights, it might induce a shift from the hub-and-spoke towards point-to-point connectivity.
- Digitalisation and automation can make some processes more cost effective for airlines, airports, and air traffic management, while also enhancing the customer's travel experience.
- Air freight demand is expected to keep increasing, as it follows e-commerce growth.
- The fast-changing nature of travel restrictions requires companies to react quickly in their decision-making and therefore, flexibility is needed.

3.1. Introduction

The impacts of the pandemic, the behavioural changes of the future travellers, and the measures adopted by the aviation sector have led to several emerging trends, both as new challenges for the aviation sector and opportunities to relaunch aviation in a more sustainable way. This chapter presents eight emerging trends and potential medium to long term effects of COVID-19, and explores their implications for the aviation value chain.

3.2. Emerging trends and their implications for the aviation sector

3.2.1. Rising debt of the aviation sector: stronger state involvement

The reduction of revenues and the weak financial situation of airlines and airports resulted in the need for state aid and relief, thereby **increasing the level of state ownership and state influence over air transport services.** In some situations, the received state aid is combined with an increase or reintroduction of government shareholdings, e.g. TAP Air Portugal.

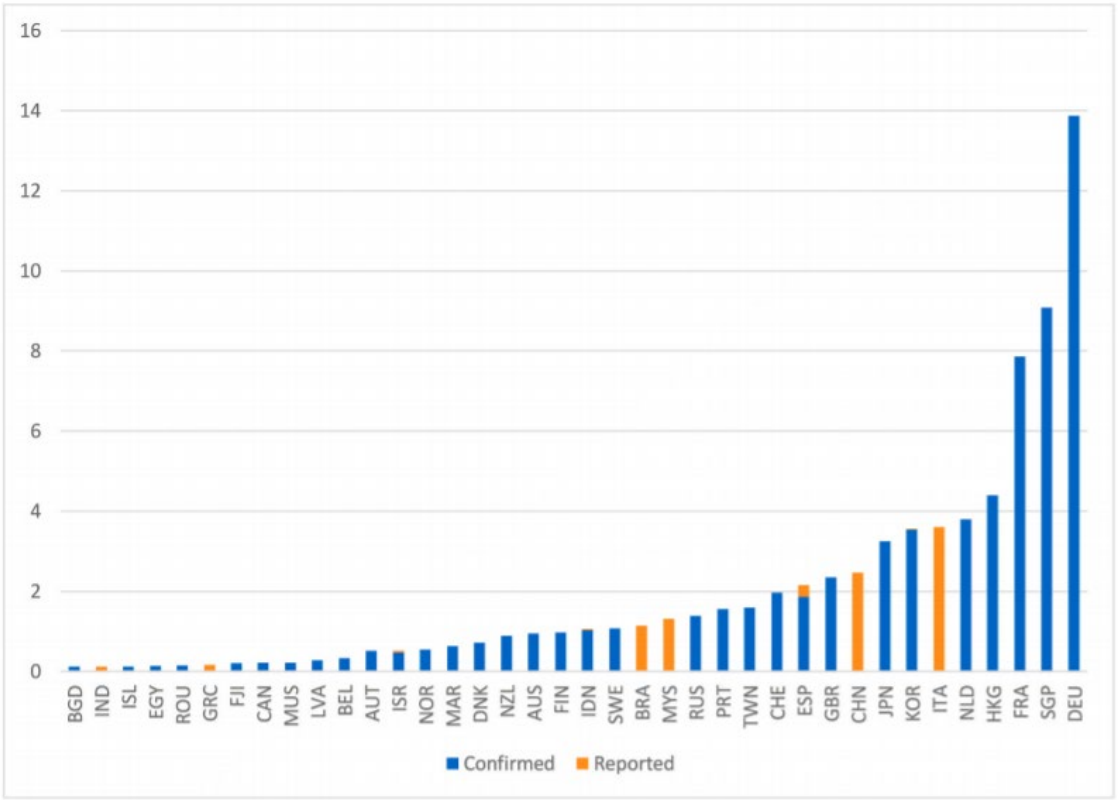
One possible outcome of the increase of debt is that companies might increase ticket prices to finance repayment.

Besides this, the financial constraints may also hamper or reduce the capacity of the aviation sector to carry out the much-needed upgrade of its infrastructure. The current low travel demand and the consequentially low revenues make it difficult for the sector to invest in digitalisation, new aircrafts, more sustainable fuels, and greener infrastructure. However, expenditures will definitely be needed in the future.

Implications of the financial "struggle" along the aviation value chain

From a financial point of view, a few companies announced they would cease their business activities. For example, in the initial phase of the crisis, Air Italy and CityJet announced they would exit the market due to bankruptcy, while Norwegian Air Shuttle, British Airways, Lufthansa and Virgin Atlantic considered withdrawing from specific markets. Despite the loss of revenue, the number of airlines that filed for bankruptcy has been lower than expected. The primary reason for this is due to the fact that from March until May 2020 – when most countries worldwide were in a full lockdown and almost all air fleets were grounded – many European airlines requested the intervention of State governments through loans, equity injections, tax deferrals, subsidies or state guarantees. Since then, such aid has been granted almost uninterruptedly, topping $227 billion in March 2021 (approximately €187 billion). The graph below displays the amount of financial support received by States starting at $100 million.

Figure 6 – Government support to airlines in the aftermath of the COVID-19 pandemic



Source: Abate, M. et al (September 2020) 'Government support to airlines in the aftermath of the COVID-19 pandemic' Journal of Air Transport Management vol 89.
The Y Axis corresponds to financial support, starting at US$100 million for ease of presentation.

In particular, a few European airlines, such as Lufthansa and Air-France KLM have been able to receive substantial state aid. Lufthansa received a German government support package of €9 billion. Air-France KLM received support of approximately €10 billion from France and The Netherlands. With the State aid, several states increased the ownership of the companies, which means they will have higher influence and deciding power about airlines restructuring strategies.

A few companies have reacted by applying the least possible amount of changes to their business strategy in hope that, post-COVID-19, preserving the status quo would prove competitively advantageous. This is the case of Ryanair, who intends to even intensify price competition when it will increase its flight operations again. Other airlines have devised long-term strategies instead to face

the increasing sustained costs: Air France announced it would restructure its domestic network, grounding their A-380 aircrafts[19] and decreasing the number of flights; Austrian Airlines intends to reduce its fleet by 25% and management by 30%; Brussels Airlines will reduce its fleet by 30%; EasyJet plans to cancel aircraft orders, decreasing its fleet; Helvetic Airways will stop its growth strategy and Lufthansa intends to cut its future fleet, grounding A-380s permanently. This will also have a negative consequence for aircraft manufacturers. Before COVID-19, air traffic was expected to keep growing and therefore aircraft manufacturers were producing more aircrafts. The current change, forced airlines to cancel some orders and manufacturers will have a problem of overproduction, which will lower aircrafts price.

Government aid proved essential for air transport companies whose revenue dramatically decreased, and the continuous rate of cash burn outpacing the airlines' incomes might call for even more support in order to guarantee companies' survival. In fact, banks and lessors have devised very stringent conditions for their credit due diligence of airlines, and government support is a major driving factor to secure finance from commercial banks and capital markets. Whilst state intervention is critical to keep airlines alive, it is expected that only the vaccine roll-out will effectively strengthen companies' revenue and allow them to remain in the market.

Although government support is essential to sustain airlines and manufacturers through the COVID-19 crisis, its long-term effects might have a considerable impact on air transport companies. Fitch Ratings predicts that, after the pandemic, there will be fewer airlines operating in more competitive markets. This will prescribe the need for strengthening companies' capital structures by deleveraging, executing cost and capex[20] saving programmes. It would imply establishing rigid strategies to remain competitive in place. Companies that have been granted governmental aid with significant strings attached to it, may need to cut operational costs and improve financial flexibility, in order to deleverage and refinance government loans.

3.2.2. Slow recovery of business travel compared to leisure travel

According to the survey results presented in chapter 2 the recovery of air traffic will be slow (55% of 2019 levels this year, 92% is expected for 2024) and will be driven primarily by leisure trips, e.g. for holidays and personal visits. As showcased by the travel following 9/11 attack on the World Trade Centre and the 2008 global financial crisis, crises tend to decrease the demand for business travel, while leisure trips are the first ones to rebound. In addition to this, a high percentage of passengers might not travel anymore for business purposes. Remote working – together with other forms of flexible work – have developed quite well during the lockdowns, and they are likely to become part of the permanent working arrangements. Many Fortune 500 companies intend to reduce travel expenditure by 50% within 2022.

Implications of the lack of recovery of business trips along aviation value chain

The decrease of demand for business trips implies that, in the mid-term, airlines with a business model focused on passengers traveling for work purposes – such as British Airways and Lufthansa – will experience a slow recovery. The change in this trend also prescribes long-term effects: companies may need to rethink their business models and might consider switching emphasis to foster leisure travel demand. For example, since high-fare packages – such as premium seats and business class – are mostly used in business trips, it is likely that aircraft cabins will have to be re-arranged to accommodate less business travellers. Currently, airlines that rely on leisure trips and that pay less attention to

[19] The aircraft Airbus A380 is the largest passenger and most expensive airliner in the world.

[20] Capex (Capital expenditures) are the funds used by a company to purchase major physical goods or services that the company will use for more than one year.

premium clients, such as Ryanair and EasyJet, have smaller business-class cabins when compared to the Lufthansa fleet. In addition, the decrease in business trips may boost the development of a different kind of network. During the last couple of years, airlines increased flights via hubs to smaller cities to satisfy business travel demand. However, based on consumer surveys, it is expected that travellers will prefer to cover shorter distances through other means of transport, for example by car. Furthermore, there are initiatives to reduce flights, such as the recent decision of the French government to ban short-haul domestic flights where train alternatives exist, which calls for new planning across networks. Airports that are more dependent on business trips, such as Frankfurt Airport, Amsterdam Airport Schiphol and Munich Airport, will also be affected, as their revenues will be lower.

3.2.3. Shift from hub-and-spoke to point-to-point connectivity

Another trend observed in the surveys indicate that domestic flights using point-to-point (P2P) model might become more popular in the mid-term. In fact, during the various waves of the pandemic, the market that showcased the highest resilience and quickest recovery is the one of domestic flights. Airlines with a strong domestic presence have displayed a faster recovery than those relying on international markets. This is due to the fact that Member States would relax restrictions firstly within their own territory, before coordinating with other authorities to allow inter-State travel. Domestic routes are mostly P2P transit, therefore connecting flights are quite low in demand. Furthermore, the risk of contracting the virus paired with the ever-evolving nature of quarantine and testing rules pushed passengers to prefer non-stop travel.

Implications of the reduction of connecting flights

The consequences of the COVID-19 crisis and sustainability targets on the survival of the hub-and-spoke model are also significant. On one hand, the decrease in demand for connecting flights might have implications for the mid-term recovery of hubs. In the hub model, a high number of flights could be offered to passengers. This model yielded high benefits because the demand for connecting flights increased throughout the last years. However, if this demand decreases, the high frequency of flights may not be warranted any more. Instead, large airplanes flying less frequently and with less routes may be sufficient to meet demand and related costs requirements. That said, the increase in leisure trips might provide partial support to hubs in the long-term. Since leisure trips, which are normally price-sensitive, are increasing at the expense of business trips, the amount of connecting flights might grow thanks to their relatively higher affordability compared to P2P travel. Nevertheless, it remains to be seen whether consumers will act on the basis of the picture emerging from surveys, which is to say to prioritize direct flights for safety reasons.

On the other hand, the pursuance of sustainability strategies to meet environmental concerns prescribes a decrease in the popularity of the hub model. The evolving technology supporting greener aircrafts led to the creation of long-range airplanes that fly thinner city-pairs non-stop. It is reported that 65% of these new aircrafts purchased are point-to-point types. These aircrafts are unsuitable for interconnecting routes. Moreover, connecting flights require more fuel consumption. Since environmental concerns were already on the agenda of both consumers and aviation actors, from this perspective the demand for flights necessitating the hub-and-spoke model is likely to decrease.

It is challenging to forecast what the survival chances of the hub-and-spoke model are. At present, the quick recovery of domestic flights – paired with travel restrictions and a decrease in the production of aircrafts that fly connecting routes – suggest that we may expect at least a mid-term evolution of hubs to adapt to the changing demand.

3.2.4. Digital transformation

Digitalisation is one of the trends that accelerated during COVID-19 crisis. It can increase the capacity and resilience of airport systems while at the same time support measures to restore traveller confidence.

Information technology (IT) and automation have been facilitating operational and commercial processes in the aviation sector for a long time. Between 2016 and 2019, airlines and airports have increased their IT expenditure by 60%, which can reach 5-6% of their annual revenue worldwide. At the European level, the investment by airports on IT infrastructure has increased by 70% between 2016 and 2019, e.g. for security processes and self-service terminals. As reported by ACI, worldwide airports globally have increased their spending on IT upgrades, using on average 5.46% of the revenues of 2020, which amount to approximately $3.5 billion), on IT. Some examples of digital solutions that can be expected to be trending in the medium-long term are for instance, digital solutions that aim to limit physical contact and interactions, digital travel credentials, consumer-centric mobile apps, digital control for air traffic management, and blockchain[21] for the aviation industry.

Implications of the digital transformation

Digitalisation and automation can make some processes more cost effective for airlines, airports, and air traffic management, while also enhancing the customer's journey. In the medium term, this can optimize resources, cut down operating costs, and quicken check-in and boarding processes. However, this means that an adequately sized budget for adopting the IT and automation solutions will need to be allocated, which could be quite challenging in the short term with the cash-flow issues facing the sector.

3.2.5. Health measures: higher hygiene and sanitation standards

Businesses also need to reconsider their role to address changes in health-related matters. Since consumers feel safer in environments where sanitation measures are properly implemented and respected, airlines and aviation actors must adapt to guarantee hygiene and safety within their premises. This might include different measures for the mid-term and the long-term. Therefore, sufficient budget needs to be allocated for the various recovery phases of the aviation sector.

Implications of the increasing standards of hygiene and sanitation measures

Additional budget for hygiene and sanitation measures has to be allocated by airlines and airports to keep up with higher standards. With regard to the newly adopted sanitation measures requirement, IATA and ACI introduced NEXXT, a series of initiatives to implement technology to relief airports and air transport operators of constraints caused by health-related measures. NEXXT recommends the introduction of 'off-airport activities' such as a) remote processing for travel authorization (e.g. visas) and baggage drop-off points across cities to limit congestion in airports and advanced processing using technology to create personalized experiences for passengers, staff while enhancing airport security. It also recommends an improved focus on health by improving contact tracing and coordination between airports and authorities to limit the spread of the virus and easing through the Travel Pass Initiative and EU Digital COVID Certificate. To cope with these changes, airlines need to be frontrunners in implementing these new initiatives, which again implies additional funds to invest in innovation.

[21] Blockchain technology is a valuable tool to manage great amounts of data in a secure way. As such, the airline industry should consider implementing it to, within others, track baggage and cargo, verify the identity of passengers, create smart ticketing systems and handle aircraft maintenance.

3.2.6. Air freight demand increase

As mentioned in chapter 1, the cargo segment contributed to a high extent to airlines revenue received in 2020.

A change in the business model of companies may spur the sudden growth in air cargo demand. In fact, the sudden short-term "boom" for the urgent delivery of medical protective equipment and online shopping resulted in many airlines accruing revenue through temporary provision of cargo delivery services. According to Airline Analyst, among the 21 airlines worldwide that achieved positive profits during Q3 of 2020, cargo revenue accounted for an average of 49% of revenue.

Implications on e-commerce and air freight demand increase:

To quickly counter the crisis, airlines have also tried to convert passenger aircrafts in cargo freight, so as to increase revenue through the growth in cargo demand. Austrian Airlines, Icelandair and SWISS reconfigured their aircrafts for cargo operations, while Lufthansa engaged its Lufthansa Technik to offer cargo conversion services. Due to the additional profits generated by this sector and to counter the drawbacks of the continuously evolving travel restrictions, air transport companies may decide to change their business model and carry more cargo operations in the future. In the long-term, some companies plan to cooperate more with each other to complement and enhance air services, for both air freight and passenger transport services. For example, Air France-KLM plans to begin a transatlantic joint-venture with Delta Air Lines and Virgin Atlantic; British Airways will organize a joint venture with Qatar Airways; Volotea is launching 40 new routes for the summer; and Wizz Air intends to enter new markets in Europe by also increasing the scale of their Abu Dhabi venture.

With leisure trips resuming and e-commerce keeping up the growing trend, airlines would need to make sure that enough air cargo fleets are available and a high number of flight slots would be needed.

3.2.7. Last minute changes requires flexibility and fast decision-making

It is clear that the fast-changing nature of travel restrictions requires companies to react quickly in their decision-making. Long-term fleet, infrastructure, network planning and scheduling must take into account the continuous opening and closing of countries' borders. Many different scenarios and operational plans should be devised in attempts to tactically capture demand to enable the airlines to choose in real-time the best one to operate.

Revenue management[22] also needs to be rethought. Traditionally, revenue management focused on optimization of seats vis-à-vis the high demand for tickets. Now, airlines have more capacity than the number of passengers who are actually going to fly. Revenue management should adapt by gathering the low demand and adjusting prices depending on the availability of travellers who are willing to pay.

Implications of the need for flexibility:

Airlines, airports and ANSPs need some degree of flexibility and to be able to make last minute changes according to the demand for a specific flight or route. They might require several options according to different potential situations to be able to cope and act faster according to the situation happening on a specific moment. Their planning and revenue management approaches needs to be revised in order to cope with this. The mid- to long-term impacts of their increased flexibility will be generally positive, since they will help companies to keep up with the evolving nature of the aviation industry and pivot services to stay afloat during the crisis. However, the need to run several schedules and employ pilots and crew in the last-minute will also carry additional costs. While these expenditures may be relatively high up-front, once the system is put in place, marginal costs will be proportional to the revenue. As a consequence, companies will be able to adjust their budget to accommodate the growing demand for

[22] Revenue management is the application of disciplined analytics that predict consumer behaviour at the micro-market levels and optimize product availability and price to maximize revenue growth.

flexibility. Nevertheless, bearing in mind the financial constraints that they are currently facing, this could be challenging.

3.2.8. Sustainability and policies towards decarbonisation targets

The growth of domestic flights also encounters difficulties vis-à-vis the attempts to meet EU decarbonization goals. While this trend is not strictly related to COVID-19, it is important to note that the last years have been characterized by institutional efforts to strategically reduce the impact of EU industries on the environment – including the aviation sector – and ensure more sustainability. A set of instruments have been adopted to this end.

The **European Green Deal** and its plan to turn Europe into the first "climate-neutral" continent by 2050 is to be achieved through a set of measures to reduce Europe's emission of greenhouse gases. Since one of the policy areas of the European Green Deal relates to sustainable mobility, the Green Deal has important implications for the aviation sector. In the EU, aviation is responsible for roughly 3.8% of total CO2 emissions, making it the second biggest source of transport greenhouse gas emissions after road transport.

In the Communication, the Commission highlighted that, "to achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050". According to IATA, a series of actions needs to be fostered to ensure that this aim is not achieved by imposing taxes to disincentivize emissions. A proper package of measures is called for to complement the positive steps that companies are already taking to comply with relevant policies. Since 2009, when sustainable alternative fuels were green lighted for use in commercial operations, more than 215,000 flights utilized low carbon fuel. However, prior to the outbreak of the COVID-19, ICAO estimated that by 2045 international aviation emissions could triple compared to 2015, a concerning forecast that definitely requires a more conscious approach.

A series of policies have been put in place to support the implementation of the European Green Deal. The European Sustainable and Smart Mobility Strategy presented in December 2020 consists of an action plan of 82 initiatives that will set the direction for mobility and transport until 2050. One of the intentions is to **create zero-emission airports**, for example by promoting sustainable air transport and by **bringing to market zero-emission large aircrafts** by 2035. In addition, the Strategy aims at fostering ambitious standards for the design and operation of aircrafts, with the aim of reducing their emissions and investing funds for air fleet renewal and prioritizing technological advances.

The Sustainable and Smart Mobility Strategy has been welcomed by ACI, CANSO, A4E, ASD and ERA, with the important caveat that the toll taken by the COVID-19 crisis on the industry's revenue and resources cannot be overlooked when devising measures to implement the strategy. All five European aviation associations called for close cooperation between EU institutions and airlines, in order to ensure that the execution of the strategy aligns the new regulatory framework with the industry's challenges.

Another initiative to bring about changes in airlines' business models is the 2015 EU Aviation Strategy. The Strategy aimed at growing European aviation through a series of measures that (i) provide a wider external dimension to EU aviation policy; (ii) tackle limits to growth, (such as by improving connectivity and airport services); (iii) comply with environmental and safety standards by encouraging the green transition and (iv) boost innovation and technology in the industry. In terms of sustainability, the Strategy required regular monitoring on the environmental impacts of initiatives that are implemented throughout the EU to complement decision-making with information. Furthermore, the Strategy supports current research for greener technologies, in order to contribute to the reduction of the aviation's environmental impacts.

One of the key targets of the EU Aviation Strategy is the completion of the Single European Sky. This initiative undertaken in 2004 aims to reform management for the increasing EU air traffic growth while ensuring safety, cutting costs and guaranteeing environmentally-friendly conditions. To meet sustainability concerns, the performance scheme of the Single European Sky already includes an environmental performance of air navigation service provision, requiring airlines to adapt and work for the development of better environmental indexes. While this ambitious plan was devised more than a decade ago, the lack of cooperation between EU Member States makes this policy still far from being achieved. For this reason, the EU Aviation Strategy intended to foster better collaborations to deliver a competitive air traffic network and state of the art technology.

The expected revision of the **EU Emission Trading System Directive** is also fundamental in achieving carbon neutrality, and bears consequences for the business model of airlines. Under the current Directive, the EU sets a certain cap on the total amount of greenhouse gas emissions in order to cut emissions where it costs the least to do so. This promotes low carbon technologies without abruptly interfering with the companies' operations. In 2021, the Commission proposed to revise the Directive to meet the intermediate target of reducing greenhouse gas emission of 55% by 2030. Such a revision would expand the scope of the ETS, implementing the Carbon Offsetting and Reduction Scheme for International Aviation and adding new tradable allowances for companies. The initiative "ReFuelEU Aviation" is also quite relevant: it intends to encourage the supply and demand for sustainable aviation fuels in the EU, in order to decrease the environmental impacts of air transport and work towards the EU decarbonization goals.

One more important initiative to ensure the aviation's green transition in a post-COVID-19 world is **SUSTAINair**, a project within the framework of **Horizon 2020** to increase resource efficiency and aircraft performance and decrease waste and costs. The project aims at tackling sustainability and abating costs for the air transport industry by implementing the "4Rs" of the circular economy: redesigning, repairing, reusing and recycling.

4. RECOMMENDATIONS FOR EU POLICY MAKERS

KEY FINDINGS

- In order to rebuild passenger confidence, it is recommended that hygiene and sanitation protocols at airports and in aircrafts are harmonised and coordinated across the EU Member States, both by facilitating the exchange of best practices, as well as by disseminating guidelines and advice produced by the ECDC.
- The implementation of various digital solutions could reduce physical interaction, an important measure to curb the spread of the virus, while improving the customer experience, for instance in managing and personalizing their trips.
- Fiscal measures will be important to better support the aviation sector and maintain transport connectivity. Nevertheless, it is important that the terms of the financial support are strict and targeted to protect competition and safeguard business dynamics.
- As the industry is struggling financially, dialogue between EU institutions and stakeholders will be needed to ensure that pre-COVID plans and arrangements to meet sustainability objectives can be carried out or, if necessary, adapted.
- Investments towards the entire aviation value chain, such as towards the development and use of sustainable aviation fuels, as well as in research activities on air traffic management and digitalization are essential to support the sustainability efforts of the sector.

4.1. Introduction

This chapter provides recommendations on how authorities, notably at the EU level, can support the aviation sector recovery.

To ensure the recovery of the air transport sector, three areas are considered critical and need intervention. The recommendations will therefore focus on how EU policies and measures can help to a) rebuild passenger confidence in air transport, b) better support aviation stakeholders and c) strengthen existing policies defined for the sector.

4.2. Recommendations

4.2.1. Rebuild passenger confidence in air transport

The most urgent recommendation to relaunch air travel is to quickly rebuild passenger confidence. This will increase air traffic and therefore the direct revenues. This can be reached with airlines and aviation measures but also with measures that aim to relaunch tourism, as people appear to travel more and more for leisure purposes.

The recommendations proposed focus on the promotion of harmonised hygiene and sanitation protocols; improved communication and coordination between Member States for what concerns travel restrictions, quarantine rules and safety protocols; introduction of the EU COVID-19 certificate;

EU/Member States campaigns supporting air travel, and digital solutions to limit touchpoints and interactions.

- **Promote the consistent implementation of EU harmonised and coordinated hygiene and sanitation protocols throughout airport facilities and aircrafts.**

While on the basis of Art. 6 TFEU the protection and improvement of public health is not an exclusive EU competence, under Art. 4 TFEU the EU may legislate on shared safety concerns in public health matters. The dual nature of these competences is reflected in Art. 168 TFEU, which empowers the EU to adopt incentives in matters related to the protection of human health, (Art. 168(5) TFEU) and support cooperation between Member States (Art. 168(2) TFEU). As provided in chapter 2.2, consumers are concerned with the risks associated to travelling and contracting COVID-19. To restore confidence in air transport, it is necessary to assure the public that hygienic measures are in place and are consistently implemented across Member States' airport facilities and aircrafts. In this sense, the EU can complement Member States' actions by coordinating and facilitating the exchange of best practices. In addition, the ECDC – the agency responsible for monitoring diseases and coordinating responses – may contribute by disseminating guidelines and advice on safety measures produced by official health experts and scientists.

- **Improve communication and coordination between Member States with regard to travel restrictions, COVID tests and quarantine rules.**

Next to safety concerns, consumers are concerned with the ever-changing nature of limitations across Member States. The lack of accurate information on travel restrictions lowers travel demand. To tackle this issue, EU policy should ensure that travellers have access to accurate information on entry requirements per country destination. The EU has already launched Re-Open EU, an interactive map with real-time travel information on restrictions and safety protocols adopted in each Member States. While this is a resourceful initiative on governmental measures, it is still far too common that airports, airlines and even private labs specialized on COVID-19 testing deliver conflicting or inaccurate information on travel requirements. This leaves passengers confused and unwilling to travel. To this end, the EU should promote better communication between authorities and stakeholders, for example by integrating in the platform Re-Open EU information on general actions undertaken by private entities to ensure safety in their premises.

Airlines should provide straightforward information on protocols to follow when leaving a country and entering another one, when customers are purchasing their tickets. This information also should be generally available on the airlines website and kept updated.

- **EU Digital COVID Certificate.**

The creation and implementation of the EU Digital COVID Certificate is pivotal to facilitate free movement within the EU while protecting citizens from the spread of COVID-19. On April 2021, the European Parliament adopted its negotiating position on the new "EU Digital COVID Certificate"[23] instead of Digital green Certificate as proposed by the Commission. On May 20th, 2021, the Parliament

[23] 'EU COVID-19 certificate - instead of Digital Green Certificate, as proposed by the Commission - should be in place for 12 months and not longer. However, EU COVID-19 certificates will neither serve as travel document nor become a precondition to exercise the right to free movement. Holders of an EU COVID-19 certificate should not be subject to additional travel restrictions, such as quarantine, self-isolation or testing, according to the Parliament. MEPs also stressed that, in order to avoid discrimination against those not vaccinated and for economic reasons, EU countries should "ensure universal, accessible, timely and free of charge testing".'

and the Council agreed on a Regulation on the EU Digital COVID Certificate that entered into force on July 1st, 2021. To make it useful to restore consumer confidence for this summer, it is of paramount importance that preparatory and implementation works, (such as the Certificate's phasing-in) are carried out as equivalently as possible across all Member States. It is therefore essential that the EU continues to provide support to Member States, as it is already doing through the creation of the gateway to verify the EU Digital COVID Certificates, to ensure that the purpose of the Certificate remains valid ahead of the summer season.

- **EU and Member States campaigns promoting air travel and tourism.**

As previously outlined, whilst business trips will experience a slow and difficult recovery, leisure trips are on the rise. Travelling for leisure is mainly driven by vacations. For this reason, even though tourism is not at the core of this thematic briefing, measures that encourage tourism will positively impact the demand for leisure trips. This is important when considering the financial struggles caused by COVID-19 to aviation: despite the economic help received from governments and supranational institutions, a real revival of air transport services will only occur once people start travelling again on a solid basis. Measures that encourage tourism should therefore be considered as part of the wider plan to quickly prompt consumers to travel by airplane again.

As highlighted in the section on good practices, Member States are already devising measures to relaunch tourism within their own territory. Yet, to resume inter-State tourism and not only domestic travel, targeted EU action is still needed. In May 2020 the Commission adopted a series of initiatives to re-start transport and tourism safely: the tourism package offered special guidance on safety measures for hospitality establishments and enhanced travellers' rights. A further step in this direction consisted in supplementing Member States' campaigns with EU initiatives that encourage travel among Member States. These could be modelled on the basis of the actions undertaken by the EU in 2018 for the EU-Chinese Tourism Year, which consisted in intensified communication with consumers via promotional messages. While this example relates to extra EU travel, a transposition of such model to intra-European travel could benefit tourism across Member States. The European Travel Commission may promote activities by displaying Member States special tourism offers on a wide scale, to achieve high social media coverage. To restore consumers' confidence and facilitate intra-EU travel, promotional messages should stress the safety measures that are in place in each destination and, simultaneously encourage the usage of the EU Digital COVID Certificate.

- **Support the digital transformation of the air transport industry.**

To limit the spread of COVID-19, it is essential to reduce the physical interaction between individuals. In a way, the advent of the pandemic may provide opportunities to achieve the goal of digitalising the European industry. Smart solutions include the creation and implementation of interactive software that allow consumers to manage and personalize their trip without their physical presence in an airport. The EU is already supporting an overall digital transformation across European sectors through its financing programs, but better results can also be achieved by promoting initiatives such as ACI and IATA's NEXXT Concept Paper. Continuous support to research programs such as SESAR will also tackle the current fragmentation of the European sky, organizing air traffic in a way that is more efficient, incorporating technological elements to create a better-performing air traffic management system.

4.2.2. Better support to the aviation sector

To assist the aviation sector it is important to better support the entire aviation value chain, as implications are felt by airlines and airports but also by manufacturers, service providers, upstream and

downstream sectors of the aviation industry. Recommendations focus on including transport workers in vaccination plans; encouraging systematic COVID-19 testing in the framework of the EU Digital COVID Certificate; harmonizing EU guidelines to allow safe travel and supporting financial measures that are targeted to certain specific parameters, necessary for the recovery of the industry.

- **Include frontline aviation workers in vaccination plans.**

Air transport has proven essential in the delivery of the COVID-19 vaccine. According to IATA, global distribution of the vaccine should require the utilization of 8,000 Boeing 747 aircrafts. Air services have played a pivotal role also in the delivery of medical material and protective gear, and the recovery of the air industry will be undoubtedly one of the driving engines for the economic recovery as well. For this reason, air transport workers must be able to resume working activities timely and safely. The best way to ensure this is by designating frontline aviation workers as "key workers" for the roll-out of the COVID-19 vaccine. This is in line with the many calls made by IATA and the ETF, as well as the proposed Roadmap for Prioritizing Uses of COVID-19 Vaccines made by the World Health Organization's Strategic Advisory Group of Experts on Immunization (SAGE). In line with their competence to choose the order of groups for the vaccine roll-out, Member States should include air transport workers in priority groups. This is aligned with what recommended by the Commission in its strategy for the deployment of the vaccine.

- **Allow for a safe re-opening of borders using systematic COVID-19 vaccination and testing.**

Travel restrictions and quarantine rules are pivotal to contain the spread of the virus, but they also discourage the recovery of the industry. A solution to support airlines in the critical decrease of demand they are facing consists in implementing measures that allow passengers to travel while limiting contagions. In this sense, the EU COVID-19 Certificate is fundamental to restore travel. In fact, encouraging systematic COVID-19 testing for all passengers that intend to travel through Member States is a short-term measure that allows countries to relax restrictions and reopen borders. In the long-run, the roll-out of the COVID-19 vaccine hopefully will enable borders to remain open. ICAO has created a Testing and Cross-Border Risk Management Measures Manual, which by providing guidelines for measures to test passengers for COVID-19, ensures that the air transport system can deliver safe services without importing or transmitting the virus. At the EU level, where vaccination plans are yet to be completed, policies that favour testing as a routing health screening method could help reduce contagions which, in turn, would allow Member States to reduce travel restrictions and quarantine rules.

- **Create EU harmonised and coordinated guidelines.**

EU institutional bodies and international agencies have enacted many guidelines to safely resume air travel in times of the pandemic. The COVID-19 Aviation Health Safety Protocol enacted by EASA and the ECDC, as well as the CART Take-off Guidance and the Manual on Testing and Cross-border Risk Management Measures by ICAO are some of the instruments defining working protocols for aviation operators. Many of these documents complement each other's initiatives with valuable suggestions targeting the whole aviation sector, from management of passengers during check-in times to disinfection control sheets for aircrafts. To provide a comprehensive framework, EU agencies should consider and review policy documents by international organizations and include measures that are not yet present in EU guidelines. Furthermore, before harmonising and enforcing such initiatives the

EU should foster discussions with sector stakeholders as to ensure that measures' implementation does not come at the detriment of any actors of the aviation industry.

- **Support fiscal measures that preserve employment, competition, business dynamics and connectivity.**

When supporting the aviation sector, EU targeted action should consider the following four parameters: industry employment, competition among aviation operators, business dynamics and regional connectivity. On a national level, State aid may play a critical role in supporting the industry. On the basis of Art. 107(1) TFEU, EU law generally prohibits States from aiding undertakings in order to protect competition. Nonetheless, where governmental support to undertakings promotes the economic development and integration of the internal market, it may be compatible with EU law provisions. Generally, State aid will fall in the scope of EU law where the relevant measures (i) are public resources being channelled to public/private undertakings; (ii) confer a selective advantage to certain undertakings; (iii) distort or threaten to distort competition by favouring one undertaking and (iv) affect trade between Member States. During the outbreak of the COVID-19 pandemic, the EU found itself in the position of temporarily repealing its stringent rules on State aid to allow Member States to support their economy. This was achieved through the adoption of a Temporary Framework in April 2020, (lastly amended in January 2021). The Framework finds its legal basis in Article 107(3)(b) TFEU, allowing States to mitigate the social-economic impact of the COVID-19 crisis in line with other EU State aid rules, (such as Art. 107(2)(b) TFEU, permitting Member States to compensate specific companies or sectors for the damages directly caused by exceptional occurrences).

In terms of budget, the EU has approved Member States' financial measures to help their economies' recovery. By the end of August 2020, the EU approved state aids worth €1.358 billion granted by Member States to their respective economies to tackle the impact of the COVID-19 outbreak. In addition, in 2020, the EU adopted NextGenerationEU, the most ambition recovery plan in the history of the Union. The Plan consists of a stimulus package worth €2.018 trillion in current prices, formed by the EU's long-term budget for 2021 – 2027 of €1.211 trillion and by the sum of €806.9 billion especially granted in occasion of NextGenerationEU[24]. Altogether, these instruments serve to iron out the differences between Member States' budgets, to ensure that all States are able to equally cope with the crisis despite their financial situation.

Sustain employment

With more than 6.4 million aviation jobs in Europe being lost due to the COVID-19 crisis, it is imperative that European institutions provide financial help to protect employment in the air transport sector. Even though in 2020 Member States adopted financial measures to sustain the recovery of airlines, the traffic level decrease now requires State support to be granted to the entire aviation value chain to avoid its collapse. Therefore, an EU-wide plan is needed to guarantee that financial relief measures extend far beyond the possibilities of each Member State's liquidity only. ACI and ETC have also made calls to the European Commission, asking for a coherent COVID-19 state aid framework for the air transport industry. While the current COVID-19 recovery plan provides Member States with a considerable amount of financial help, more flexible and effective rules are needed to enable countries to spend EU funds for the assistance that airports need.

[24] The Regulation on EU's multiannual financial framework (MFF) for 2021-2027 provides for a long-term EU budget of €1.074.3 trillion for the EU27 in 2018 prices.

In addition, the EU is currently reviewing Regulation No 1008/2008 on the Operation of Air Services in the EU. The Regulation brought the liberalization of air transport services in the EU, essentially organizing the European internal market for aviation. Recently, the Commission launched a review of such legal instrument in the view of unintended effects that the Regulation had on the market and on employment. In terms of labour, the Regulation allows companies to choose operational basis for their undertakings across the EEA. This possibility allowed companies to place their corporate seats in States with favourable legal regimes, both in terms of taxes and employment. While this scenario is perfectly envisioned under the Regulation, the practice of companies to establish their headquarters in Member States' territory where the airlines performs little to none flight operations – such as Malta and Ireland – has given rise to allegations of "rule shopping". In this sense, the review of the Regulation should be two-folded, ensuring that (i) it is still possible to establish an undertakings' corporate seat in a specific Member State in view of its favourable conditions, (which is allowed under the jurisprudence of the Court of Justice of the European Union[25]); (ii) conditions of labour costs and wages across Member States are harmonized in the name of improving the internal market's functioning. Altogether, this would ensure that the *acquis communautaire* is observed, while avoiding to penalize workers from a specific country.

Protecting competition

The financial burden that the pandemic imposed on airlines threatens their recovery. All airlines have suffered gigantic losses, but some are still in the market only thanks to the continuous governmental aid they receive. While it is essential that Member States continue to help the financial recovery of the industry, preserving market competition and the competitive neutrality of Member States should remain a priority. This is necessary to ensure that Member States do not disproportionately support flag carriers vis-à-vis other airlines that requested equity injections, which in turn would diminish access of foreign companies to domestic markets. ERA also called for selective support measures that do not distort competition, to guarantee equal opportunities and non-discrimination in the internal market. In addition, as demonstrated by the OECD, where state-owned enterprises are subject to less market pressures than private firms they tend to display lower returns on equity, making governmental support almost detrimental for their success. The adoption of the Temporary Framework encouraged Member States to provide non-selective support to undertakings, since it abrogated many rules on non-discrimination and equality among undertakings. In this sense, State aid rules did not need particular adaptation due to the temporary suspension of stringent EU laws. However, EU policies should ensure that the EU COVID-19 support measures are not utilized in a manner contrary to competition principles – preferring national industries over competitors – by imposing transparent and detailed conditions to access funding. For instance, since the pandemic has had a dramatic effect on revenues, the cost structure to examine before a State grants compensation should be identified in the average of monthly-reported amounts of profit and loss accounts of the last two months before the COVID-19 outbreak, to give the real picture. This cost structure should become the ceiling to pinpoint eligible costs undertaken by companies. In the context of the Temporary Framework, the EU could adopt more detailed policies to guarantee that compensations do not exceed the difference between average revenues observed during the selected months and such cost structure.

Safeguard business dynamics

Governments currently support the aviation industry through many measures such as loans and equity injections. However, support should not be blindly ensured to every company in difficulty, but, instead,

[25] Case C-212/97 *Centros Ltd contro Erhvervs- og Selskabsstyrelsen* Court of Justice of the European Union. ECLI:EU:C:1999:126. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:61997CJ0212&from=IT.

it should target firms that are solvent and likely to return profitable once economic conditions improve. As in regular market dynamics, governments should permit the exit of non-viable companies from the market, to allow a more efficient redistribution of resources across the market. The failure of a few companies can actually boost competitiveness among market participants and promote the success of those firms that are able to weather financial difficulties. Therefore, similar to the previous recommendation, EU policies should ensure that when Member States access the available financial aid measures, they only allocate relief packages to companies, if it does not distort the market, promotes efficiency and ensures competition.

Maintain regional connectivity

While the potential decrease of the need of the hub-and-spoke model may contribute to decarbonisation of the aviation sector, which is an important milestone for the whole EU industry, regional connectivity must be maintained for the success of the internal market. The fact that some air transport companies filed for bankruptcy or exited specific markets impacts the number of routes that remain available throughout the EU. Therefore, the financial problems of airlines can explain the decrease in number or routes. To the end of ensuring high connectivity levels, it is essential that the EU supports not only financially viable companies, but also airlines that fly routes contributing to maintain open as many city-pairs as possible.

4.2.3. Strengthen existing policies defined for the sector

Financial constraints may jeopardize the capacity for the sector to reach targets set in policies defined before COVID-19 pandemic such as the European Green Deal, the Sustainable and Smart Mobility Strategy and the EU Aviation Strategy. While the pursuance of decarbonization goals is an important target on the European agenda, the capacity to invest in innovation and research might be compromised due to the economic struggles the market finds itself in. To this end, the following recommendations revolve around adjusting the feasibility of the decarbonization targets; guaranteeing that national recovery and resilience plans consider aviation sector and are eligible for EU funding; allocating funding for sustainability initiatives; ensuring that EU funds for transport properly consider support for the aviation sector; fostering dialogue between stakeholders in the adoption of Single European Sky initiatives and extending the temporary relief from airport slot use requirements.

- **Advance sustainability targets while considering the industry's financial struggle.**

Sustainability is key and will undoubtedly be one of the most important factors for the recovery of the air transport sector. As provided in chapter 3, most steps taken by the EU to achieve the decarbonization goals of the European Green Deal were adopted before the outbreak of COVID-19. For this reason, carbon-offsetting plans that were devised before the pandemic, (such as CORSIA, or the European Sustainable and Smart Mobility Strategy), may now have unrealistic goals, bearing in mind the financial losses of the sector. For example, as mentioned by ACI, CANSO, A4E, ASD and ERA, the Sustainable and Smart Mobility Strategy must be implemented through measures that consider the decreasing resources of the industry. As a consequence, EU policies need to ensure that a dialogue between EU institutions and stakeholders is established to guarantee the feasibility of plans.

- **Extend the temporary relief from airport slot use requirements.**

In order to protect airlines and the environment, the EU temporarily lifted rules related to airport slot use requirements from the start of summer 2021. These rules would have been detrimental both for

companies and the green transition, since they would have required airlines to run empty flights merely for the sake of keeping slots for the next year. To avoid this, airlines were granted the opportunity to return to 50% of their slot series before the beginning of summer in 2021, at the condition that airlines use at least 50% of remaining slots to keep them. The Commission is also empowered to change the minimum utilization rate between 30% and 70% to address flexibility depending on different air traffic levels. While the measure is now in place for the summer season, the waiver should be extended further on. In fact, where the exemption is not prolonged, the industry might lose flexibility to respond to the dramatic decrease in passenger demand. Since, as announced by IATA, the airline industry is not going to be able to recover all capacity lost to COVID-19, and airlines will emerge much smaller in the post-pandemic world, extending the slot waiver is pivotal to match capacity and ensure the best use of available infrastructure.

- **Ensure that national recovery and resilience plans include support for the aviation sector.**

To sustain the market, on February 11th, 2021 the Council adopted a regulation establishing the Recovery and Resilience Facility (RRF), a fund consisting of €672.5 billion made available for Member States in the forms of loans and grants, to support national reforms and investments. Where Member States set their reform and investment agendas to include the aviation sector in national recovery and resilience plans, the EU can intervene to foster support. Under the RRF, Member States are invited to draw up national recovery plans to be submitted to the European Commission for assessment. In its examination, the Commission should prioritize Member States' initiative that include aviation-related projects, to ensure that funding is especially dedicated to measures covering areas such as green transition, digital transformation, health and resilience, and policies for the next generation including education and skills.

- **Encourage investments and allocate EU funding towards the sustainability of the aviation industry.**

The halt that the aviation sector has experienced during the COVID-19 crisis reduced significantly emissions worldwide. The temporary grounding of much of the air fleet also meant the retirement of the oldest aircrafts, such as A-380s, as Air France and Lufthansa have already announced. The sector will soon be in a position to re-start its services, and through the right instruments, sustainability may become a paramount criterion in such recovery. It is necessary to underscore that financial struggles impinge upon the decarbonization goals set forth by the EU. Similarly, the drop in oil prices experienced during the pandemic did not favor low-carbon investments, in that airlines benefitted from relatively cheap fuels to run flights. As a consequences, the targets of projects such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) have already been tampered by the crisis. When CORSIA was devised, ICAO calculated the emission baseline on the basis of the average traffic/emission of 2019 and 2020, forecasting an annual growth in traffic of 5%. However, airlines are likely to keep offering less and less seats in the upcoming times due to financial constraints. Using the data gathered in the past would mean an unrealistic reduction in the CORSIA baseline calculation, such as 30% more stringent targets, with considerable additional burdens for air operators in times of the COVID-19 crisis. For this reason, in June 2020 ICAO decided to calculate the CORSIA baseline only by reference to 2019 emissions, postponing the achievements of specific decarbonization goals. To ensure the pandemic does not endanger further implementation plans of the European Green Deal, it is essential that EU policies encourage investments in cleaner aircrafts and sustainable aviation fuel (SAF), helping firms to undertake the sustainability path. Therefore, the EU should adopt guidelines that encourage MSs to provide funding primarily to air transport companies displaying the intention to take commitments and improve their environmental performance. Such approaches will help airlines to achieve ensure more resilience and viability in the long-term.

- **Support investments focusing on the sustainability of the whole aviation value chain.**

As provided in chapter 1.1, aviation is connected to many other upstream and downstream market sectors: companies operating airports, aircraft manufacturing, rental and leasing services and many more. As airlines prepare to resume services, stakeholders have the opportunity to relaunch the industry through more conscious approaches. However, since what occurs in air transport affects other industries, an efficient strategy ensuring the green transition should encompass measures that consider other market sectors connected to aviation. For example, basic choices such as the utilization of sustainable aviation fuels as opposed to traditional fuel will impact the industries of refined petroleum manufacturing. In this respect, EU policies can complement governmental actions by creating holistic funding plans that support the entire aviation value chain, giving the chance to all aviation actors to reconfigure their sectors and work more in line with sustainability.

- **EU research funding should be used to support the aviation sector.**

Specifically, EU funds such as Horizon Europe, Connecting Europe Facility (CEF), SESAR, RRF and SUSTAINair are essential instruments to support the recovery and relaunch of the aviation sector. While some of these instruments are specifically designed for the aviation sector, most of them address all modes of transportation. In particular, CEF is a key instrument designed to generate financial support for projects that address gaps in the current management structure of inter-connected European networks. The scheme provides many opportunities for delivering higher performances and advance technologies across transportation facilities, improving the general running of airports and setting the base for long-term growth and sustainability. To the end of reforming infrastructures and working towards the green transition, the EU should ensure that these funding instruments are accessed and utilized especially to accelerate the technological and smart development of air transport. The aviation sector is one of the transportation industries that were mostly hit by the COVID-19 crisis, therefore funding should be largely devoted for enhanced air traffic management, digitalization and usage of cleaner fuels.

- **Foster a dialogue for the Single European Sky proposals.**

Where the management of air traffic services is not uniformed across European countries, unnecessary costs need to be sustained and sustainability is not achieved. It is necessary to address the economic regulation and airspace management of European skies, to optimize organization and create more sustainable routes across the EU. The Single European Sky proposals currently being discussed by EU institutions provide opportunities to drive down costs while ensuring a scalable capacity for the future. They can help to modernize air traffic management while ensuring environmentally friendly conditions. In order to accelerate the adoption of such proposals while protecting the interests of all industries, the EU should foster collaboration between the different operational stakeholders, such as airlines, airports and air navigation service providers.

Annexe I: Chapter 4 provides recommendations on how authorities can support the aviation sector recovery based on the trends and due implication analysed in chapter 3.

This table indicates to which trends the recommendations relate to.

EMERGING TRENDS / RECOMMENDATIONS	Rising Debt & National isation	Digital transformation of the industry	Slow recovery of business trips	Shift of the hub-and-spoke model	Health measures & protocols	Increase in cargo operations	Need for extra flexibility	Sustainability targets
Rebuilding passengers' confidence Through the effective implementation and communication of sanitation measures; support for the digital transformation of the industry; promotion of tourism and air travel and the usage of COVID-19 certificates…	●	●			●			
Supporting aviation stakeholders Through the adoption of fiscal measures; maintaining regional connections, including aviation workers in vaccination plans and encouraging COVID-19 testing…	●		●	●	●			
Strengthening existing policies By advancing sustainability, focusing on sustainable investments for the aviation sector, considering the whole aviation value chain in recovery plans, using research funding for the aviation industry and extending relief from airport slot requirements…	●					●	●	●

REFERENCES

- Abate, M. et al (September 2020) 'Government support to airlines in the aftermath of the COVID-19 pandemic' *Journal of Air Transport Management* vol 89 DOI: 10.1016/j.jairtraman.2020.101931.
- AALEP. (2020) 'Europe's Aviation Industry Stakeholders' [Online]. Available at: http://www.aalep.eu/europe%E2%80%99s-aviation-industry-stakeholders (Accessed 3 May 2021).
- ACI. (March 2021) 'Airports invest in technology to advance industry recovery' [Online]. Available at: https://aci.aero/news/2021/03/11/airports-invest-in-technology-to-advance-industry-recovery/.
- ACI. (June 2020) 'COVID-19: Restoring passenger confidence amid the crisis' [Online]. Available at: https://blog.aci.aero/covid-19-restoring-passenger-confidence-amid-the-crisis/.
- ACI. (February 2021) 'Europe's airport 2020 passenger traffic back to 1995 levels' [Online]. Available at: https://www.aci-europe.org/media-room/303-europe-s-airport-2020-passenger-traffic-back-to-1995-levels.html.
- Aeroporti di Roma. 'SESAR programme' [Online]. Available at: https://www.adr.it/web/aeroporti-di-roma-en-/sesar-programme (Accessed 4 May 2021).
- AirChat – website: https://airchat.ai/.
- AirFrance. 'AIR FRANCE PROTECT: OUR COMMITMENT TO MAKING YOUR TRIP SAFE AND FLEXIBLE' [Online]. Available at: https://www.airfrance.fr/FR/en/common/page_flottante/engagement-air-france-protect.htm (Accessed 4 May 2021).
- Airlines. (January 2021) 'The impact of COVID-19 on aviation' *Airlines IATA* [Online]. Available at: https://airlines.iata.org/news/the-impact-of-covid-19-on-aviation.
- Airport Business. (March 2021) 'Helsinki Airport wins two awards: best airport in Europe in its size category and recognition for hygiene measures during COVID-19' [Online]. Available at: http://www.airport-business.com/2021/03/helsinki-airport-wins-two-awards-best-airport-europe-size-category-recognition-hygiene-measures-covid-19/.
- Airport Business. (July 2020) 'Key aviation stakeholders discuss COVID-19 impact and recovery' [Online]. Available at: http://www.airport-business.com/2020/07/key-aviation-stakeholders-discuss-covid-19-impact-recovery/.
- Airport World. (March 2021) 'Apple Maps to show ACI's airport COVID-19 health measures data' *ACI* [Online]. Available at: https://airport-world.com/1007257-2/?fbclid=IwAR1HChFe4nLIxesSSodPwojIrFoZ_YHIlIWxOy73PmgxK3xgxDQuL-USiHU.
- Airport World. (March 2021) 'Hygiene and customer service remain top priorities for airports' *ACI* [Online]. Available at: https://airport-world.com/hygiene-and-customer-service-remain-top-priorities-for-airports/.
- Albers, S., Rundshagen, V. (July 2020) 'European airlines' strategic responses to the COVID-19 pandemic (January-May, 2020)' *Journal of Air Transport Management* vol 87 DOI: 101016.
- Al-Khateeb, A. (April 2021) 'How global tourism can become more sustainable, inclusive and resilient' *World Economic Forum* [Online]. Available at:

https://www.weforum.org/agenda/2021/04/how-global-tourism-can-become-more-sustainable-inclusive-and-resilient/?fbclid=IwAR1xW52NTO0i-4-WarP09zOx7X55pnQANjUolqGSqIOpI3UgFQ5MwZGfXZw.

- Amaro, S. (March 2021) 'Airlines are changing their flight destinations after the devastating shock of Covid' *CNBC* [Online]. Available at: https://www.cnbc.com/2021/03/05/airlines-changing-business-to-answer-post-pandemic-demand-for-holidays.html.
- American Airlines. 'Travel with confidence' [Online]. Available at: https://www.aa.com/i18n/travel-info/travel-with-confidence.jsp (Accessed 3 May 2021).
- Ansa. (April 2021) 'Al via See Sicily, su tre notti una gratis' *ANSA ViaggiArt* [Online]. Available at: https://www.ansa.it/canale_viaggiart/it/regione/sicilia/2021/04/19/al-via-see-sicily-su-tre-notti-una-gratis_c817f374-cbd1-4f8b-9a01-9d710712fea3.html.
- Bacchi, U. (April 2021) 'Coronavirus vaccine passports: everything you need to know' World Economic Forum [Online]. Available at: https://www.weforum.org/agenda/2021/04/coronavirus-covid19-vaccine-passports-travel/
- BBC. (April 2021) 'France moves to ban short-haul domestic flights' *BBC News* [Online]. Available at: https://www.bbc.com/news/world-europe-56716708#:~:text=French%20lawmakers%20have%20moved%20to,and%2Da%2Dhalf%20hours.
- Bochkarev, D. 'The European Green Deal: Saving the Planet or Protecting the Markets?' *Istituto Affari Internazionali* [Online]. Available at: https://www.iai.it/en/pubblicazioni/european-green-deal-saving-planet-or-protecting-markets#:~:text=The%202019%20European%20Green%20Deal,to%20net%20zero%20by%202050.&text=Brussels%20defends%20the%20internal%20market,product%20certifications%20in%20the%20EU (Accessed 4 March 2021).
- Booking.com (April 2021) 'NEW BOOKING.COM RESEARCH SHINES LIGHT ON U.S. TRAVELERS' OPTIMISM AND CONFIRMS THAT THERE IS HOPE ON THE HORIZON FOR GETTING BACK TO TRAVEL IN 2021' [Online]. Available at: https://news.booking.com/en-us/new-bookingcom-research-shines-light-on-us-travelers-optimism-and-confirms-that-there-is-hope-on-the-horizon-for-getting-back-to-travel-in-2021/.
- Boon, T. (February 2021) 'British Airways Is Streamlining Travel With Health Passports' *Simple Flying* [Online]. Available at: https://simpleflying.com/british-airways-health-passports/.
- Bouwer, J., Saxon, S., Krishnan, V. (November 2020) 'Will airline hubs recover from COVID-19?' *McKinsey & Company* [Online]. Available at: https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/will-airline-hubs-recover-from-covid-19.
- Bouwer, J., Saxon, S., Wittkamp, N. (April 2021) 'Back to the future? Airline sector poised for change post-COVID-19' *McKinsey & Company* [Online]. Available at: https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/back-to-the-future-airline-sector-poised-for-change-post-covid-19.
- Cambridge Dictionary – definition of "cash burn rate" [Online]. Available at: https://dictionary.cambridge.org/it/dizionario/inglese/cash-burn-rate.
- Chandran, R. (December 2020) 'As COVID-19 vaccines launch, digital certificates seen deepening inequalities' *Reuters* [Online]. Available at: https://news.trust.org/item/20201217095555-4jfoa.

- Christoff, J. (March 2021) 'Consumer Confidence in Travel Gets a Boost as Vaccines Roll Out' *Travel Pulse* [Online]. Available at: https://www.travelpulse.com/news/features/consumer-confidence-in-travel-gets-a-boost-as-vaccines-roll-out.html.
- Cockrell, C., Fiorilli, F. (July 2020) 'SUSTAINABLE AVIATION: HOW COVID-19 MOVED THE CORSIA GOALPOSTS' *Hfw* [Online]. Available at: https://www.hfw.com/downloads/002222-HFW-Sustainable-Aviation-How-Covid-19-moved-the-CORSIA-goalposts.pdf.
- CORDIS. 'NEW HORIZON 2020 PROJECT SUSTAINAIR TO PROVIDE FLIGHT PATH FOR GREEN DEAL TRANSITION' *European Commission* [Online]. Available at: https://cordis.europa.eu/article/id/429554-new-horizon-2020-project-sustainair-to-provide-flight-path-for-green-deal-transition (Accessed 30 April 2021).
- EASA & ECDC. (June 2020) 'COVID-19 Aviation Health Safety Protocol' [Online]. Available at: https://www.easa.europa.eu/document-library/general-publications/covid-19-aviation-health-safety-protocol.
- EASA. (2020) 'Review of Aviation Safety Issues Arising from the COVID-19 Pandemic' [Online]. Available at: https://www.easa.europa.eu/sites/default/files/dfu/review_of_aviation_safety—_issues_from_covid-19_final_0.pdf.
- EasyJet. 'COVID COMMITMENTS' [Online]. Available at: https://www.easyjet.com/en/holidays/info/covid-19-response (Accessed 4 May 2021).
- ECA. (2020) 'COVID-19 crisis and its effects on aviation mental health' [Online]. Available at: https://www.eurocockpit.be/news/covid-19-crisis-and-its-effect-aviation-mental-health.
- EGIS / SEO. (July 2020) 'Study on the economic developments of the EU Air Transport Market' *European Commission* DOI: 10.2832/561694.
- ETF. (February 2021) 'Inclusion of frontline aviation workers in vaccination plans is key to European economic recovery' [Online]. Available at: https://www.etf-europe.org/inclusion-of-frontline-aviation-workers-in-vaccination-plans-is-key-to-european-economic-recovery/.
- ETF. (January 2021) 'Ground handling sector fights for its survival as more than half of airport-based workers are out of work' [Online]. Available at: https://www.etf-europe.org/ground-handling-sector-fights-for-its-survival-as-more-than-half-of-airport-based-workers-are-out-of-work/.
- Eurocontrol. 'COVID-19 impact on the European air traffic network' [Online]. Available at: https://www.eurocontrol.int/covid19 (Accessed 3 May 2021).
- Eurocontrol. 'EUROCONTROL ATM Lexicon' [Online]. Available at: https://ext.eurocontrol.int/lexicon/index.php/Main_Page.
- Eurocontrol. (2020) 'Performance Review Report' [Online]. Available at: https://www.eurocontrol.int/sites/default/files/2021-03/eurocontrol-draft-performance-review-report-prr-2020.pdf.
- Eurocontrol. (1 January 2020) 'What COVID-19 did to European Aviation in 2020, and Outlook 2021' *Aviation Intelligence Unit* Think Paper #8.
- Euronews. (March 2021) 'COVID-19 vaccine: French, Germans and Italians unhappy over rollout strategy, Euronews poll shows' [Online]. Available at: https://www.euronews.com/2021/03/10/covid-19-vaccine-french-germans-and-italians-unhappy-over-rollout-strategy-euronews-poll-s.

- EUROSTAT 2020. 'How many people work in air transport?' https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20200525-1.
- European Commission. 'A European Green Deal' [Online]. Available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#policy-areas (Accessed 4 May 2021).
- European Commission. 'An Aviation Strategy for Europe' [Online]. Available at: https://ec.europa.eu/transport/modes/air/aviation-strategy/external_policy (Accessed 4 May 2021).
- European Commission. (March 2021) 'Commission's new consumer survey shows impact of COVID-19 and popularity of 'greener' choices' [Online]. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_1104.
- European Commission. (December 2015) 'COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS An Aviation Strategy for Europe' COM(2015) 598 final *Eur-Lex*.
- European Commission. (October 2020) 'COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Preparedness for COVID-19 vaccination strategies and vaccine deployment' COM(2020) 680 final *Eur-Lex*.
- European Commission (December 2020) 'COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Sustainable and Smart Mobility Strategy – putting European transport on track for the future' COM(2020) 789 final *Eur-Lex*.
- European Commission. (March 2021) 'Coronavirus: Commission proposes a Digital Green Certificate' [Online]. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_1181.
- European Commission. 'Digitising European Industry' [Online]. Available at: https://ec.europa.eu/digital-single-market/en/digitising-european-industry (Accessed 4 May 2021).
- European Commission. 'EU Emissions Trading System (EU ETS)' [Online]. Available at: https://ec.europa.eu/clima/policies/ets_en (Accessed 4 May 2021).
- European Commission. (July 2019) 'EVALUATION of the Regulation (EC) No 1008/2008 on common rules for the operation of air services in the Community' SWD(2019) 295 final [Online]. Available at: https://ec.europa.eu/transport/sites/transport/files/legislation/swd020190295.pdf.
- European Commission. 'Mobility Strategy' [Online]. Available at: https://ec.europa.eu/transport/themes/mobilitystrategy_en (Accessed 4 May 2021).
- European Commission. 'Overview of the State aid rules and public service obligations rules applicable to the air transport sector during the COVID-19 outbreak' [Online]. Available at: https://ec.europa.eu/transport/sites/transport/files/state_aid_pso_rules_covid-19_air.pdf.
- European Commission (March 2021). 'Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a framework for the issuance, verification and acceptance of interoperable certificates on vaccination, testing and recovery to facilitate free movement during the COVID-19 pandemic (Digital Green Certificate)' COM(2021) 130 final 2021/0068(COD) *Eur-Lex*.

- European Commission. 'Questions and answers on COVID-19 vaccination in the EU' [Online]. Available at: https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/safe-covid-19-vaccines-europeans/questions-and-answers-covid-19-vaccination-eu_en#06 (Accessed 4 May 2021).
- European Commission. 'Recovery and Resilience Facility' [Online]. Available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en (Accessed 30 April 2021).
- European Commission. 'Recovery plan for Europe' [Online]. Available at: https://ec.europa.eu/info/strategy/recovery-plan-europe_en (Accessed 19 May 2021).
- European Commission. 'Reducing emissions from aviation' [Online]. Available at: https://ec.europa.eu/clima/policies/transport/aviation_en (Accessed 4 May 2021).
- European Commission (September 2008). 'Regulation (EC) No 1008/2008 of the European Parliament and of the Council of 24 September 2008 on common rules for the operation of air services in the Community' O.J. L 293.
- European Commission. 'Single European Sky' [Online]. Available at: https://ec.europa.eu/transport/modes/air/ses_en (Accessed 30 April 2021).
- European Commission. 'Sustainable aviation fuels – ReFuelEU Aviation' [Online]. Available at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12303-Sustainable-aviation-fuels-ReFuelEU-Aviation_en (Accessed 19 May 2021).
- European Commission. 'Sustainable Mobility – the European Green Deal' [Online]. Available at: https://ec.europa.eu/transport/themes/sustainable_en (Accessed 30 April 2021).
- European Commission. 'The State Aid Temporary Framework' [Online]. Available at: https://ec.europa.eu/competition-policy/state-aid/coronavirus/temporary-framework_en (Accessed 20 May 2021).
- European Commission. 'Tourism – Internal Market, Industry, Entrepreneurship and SMEs' [Online]. Available at: https://ec.europa.eu/growth/sectors/tourism_en (Accessed 4 May 2021).
- European Council. 'Timeline - Council actions on COVID-19' *Council of the European Union* [Online]. Available at: https://www.consilium.europa.eu/en/policies/coronavirus/timeline/?utm_source=linkedin.com&utm_medium=social&utm_campaign=2021-03-25-EUCO-covid-timeline&utm_content=vignette (Accessed 3 May 2021).
- European Travel Commission. (April 2021) 'MONITORING SENTIMENT FOR DOMESTIC AND INTRA-EUROPEAN TRAVEL – WAVE 6' [Online]. Available at: https://etc-corporate.org/reports/monitoring-sentiment-for-domestic-and-intra-european-travel-wave-6/.
- European Parliament. (April 2021) 'EU COVID-19 certificate must facilitate free movement without discrimination' *EP News* [Online]. Available at: https://www.europarl.europa.eu/news/en/press-room/20210422IPR02606/eu-covid-19-certificate-must-facilitate-free-movement-without-discrimination.
- EU-China Tourism Year 2018 – website: https://ecty2018.org/.

- European Union. (March 2020) 'INFORMATION ON THE PACKAGE TRAVEL DIRECTIVE IN CONNECTION WITH THE COVID-19' [Online]. Available at: https://ec.europa.eu/info/sites/default/files/coronavirus_info_ptd_19.3.2020.pdf.
- European Union. 'Re-open Eu' – website: https://reopen.europa.eu/en.
- Financial Mirror. (January 2021) 'Cyprus tourism to go big on digital campaign' [Online]. Available at: https://www.financialmirror.com/2021/01/13/cyprus-tourism-to-go-big-on-digital-campaign/.
- Finavia. 'Air travel during Covid-19' [Online]. Available at: https://www.finavia.fi/en/air-travel-during-covid-19?id=5639 (Accessed 3 May 2021).
- Garrow, L., Lurkin, V. (January 2021) 'How COVID-19 is impacting and reshaping the airline industry' *Journal of Revenue and Pricing Management* vol 20, issue 3.
- Globe Hunters. 'The World's Best Airports for Business Travellers' [Online]. Available at: https://www.globehunters.com/best-airports-for-business-travellers/ (Accessed 19 May 2021).
- GlobalRescue. (March 2021) '2021 TRAVEL SURVEY: TRAVELERS FEEL SAFER WITH A VACCINATION, NOT TESTING' [Online]. Available at: https://www.globalrescue.com/common/blog/detail/Safer-with-a-Vaccination/.
- Federal Aviation Administration. 'Aircraft Operating Costs' *Government of Canada* [Online]. Available at: https://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/media/econ-value-section-4-op-costs.pdf.
- Graham, A., Kreimarik, F., Kruse, W. (August 2020) 'Attitudes of ageing passengers to air travel since the coronavirus pandemic' *Journal of Air Transport and Management* vol 87 DOI: 101865.
- Heuking Kuhn Luer Wojtek (June 2020) 'GERMAN INSOLVENCY LAW: COVID-19-SUSPENSION OF DUTY TO FILE FOR INSOLVENCY ENDED ON 30 SEPTEMBER 2020 FOR ILLIQUID COMPANIES' [Online]. Available at: https://www.heuking.de/en/news-events/articles/german-insolvency-law-covid-19-suspension-of-duty-to-file-for-insolvency-ended-on-30-september-2020.html.
- IATA. (December 2019) 'After Challenging Year, Improvement Expected for 2020' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2019-12-11-01/.
- IATA. 'Air Connectivity' 2020' [Online]. Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/air-connectivity-measuring-the-connections-that-drive-economic-growth/.
- IATA. (November 2020) 'Deep Losses Continue Into 2021' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2020-11-24-01/.
- IATA. (2020) 'Economic Performance of the Airline Industry'.
- IATA. (December 2020) 'European Air Transport COVID-19 Impacts and Recovery to be Worse than other Regions' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2020-12-10-01/.
- IATA. (December 2020) 'IATA Renews Call on Governments to Consider Aviation Workers as Essential for Vaccination' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2020-12-15-01/.
- IATA. 'IATA Travel Pass Initiative' [Online]. Available at: https://www.iata.org/en/programs/passenger/travel-pass/ (Accessed 30 April 2021).

- IATA. (December 2020) 'Impact of COVID-19 on European Aviation and Economies' [Online]. Available at: https://www.iata.org/contentassets/7dc1ea282f944da29dc3fa62bfe57067/december-european-covid-impacts.pdf.
- IATA. (December 2019) 'Opportunity for Aviation in Europe's Green Deal' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2019-12-10-01/.
- IATA. (April 2021) 'Reduced Losses but Continued Pain in 2021' [Online]. Available at: https://www.iata.org/en/pressroom/pr/2021-04-21-01/.
- IATA. (October 2020) 'The NEXTT Vision in a post-COVID-19 World' *IATA & ACI* [Online]. Available at: https://www.iata.org/contentassets/bf24e4583c4f4e6398e3ec0b9f6335ed/nextt-vision-post-covid-19-world-1.pdf.
- ICAO. 'Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)' *ICAO Environment* [Online]. Available at: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx (Accessed 30 April 2021).
- ICAO. 'Council Aviation Taskforce Report – Recommendations' [Online]. Available at: https://www.icao.int/covid/cart/Pages/Recommendations.aspx (Accessed 4 May 2021).
- ICAO. (March 2021) 'Council Aviation Taskforce Report – Take-off: Guidance for Air Travel through the COVID-19 Public Health Crisis Third Edition'.
- ICAO. (June 2020) 'ICAO Council agrees to the safeguard adjustment for CORSIA in light of COVID-19 pandemic' Online]. Available at: https://www.icao.int/Newsroom/Pages/ICAO-Council-agrees-to-the-safeguard-adjustment-for-CORSIA-in-light-of-COVID19-pandemic.aspx.
- ICAO. (2021) 'TESTING AND CROSS-BORDER RISK MANAGEMENT MEASURES MANUAL – Second Edition' DOI: 10152.
- ICAO. 'Trends in Emissions that affect Climate Change' *ICAO Environment* [Online]. Available at: https://www.icao.int/environmental-protection/Pages/ClimateChange_Trends.aspx (Accessed 4 May 2021).
- Il Giornale d'Italia. (March 2021) 'Sondaggi politici Swg oggi: cosa pensano gli italiani sul passaporto vaccinale' [Online]. Available at: https://www.ilgiornaleditalia.it/news/politica/134043/sondaggi-politici-elettorali-swg-oggi.html.
- INEA. 'Connecting Europe Facility' *European Commission* [Online]. Available at: https://ec.europa.eu/inea/en/connecting-europe-facility (Accessed 30 April 2021).
- Inmarsat. 'Increased digitalisation critical to rebuilding passenger confidence' [Online]. Available at: https://www.inmarsat.com/en/insights/aviation/2020/increased-digitalisation-critical-to-rebuilding-passenger-confid.html (Accessed 30 April 2021).
- Inmarsat. 'Rebuilding passenger confidence is key to aviation recovery' [Online]. Available at: https://www.inmarsat.com/en/insights/aviation/2020/rebuilding-passenger-confidence-is-key-to-aviation-recovery.html (Accessed 30 April 2021).
- Ipsos Mori. (March 2021) 'Majority of Britons support vaccine passports but recognise concerns in new Ipsos MORI UK KnowledgePanel poll' [Online]. Available at: https://www.ipsos.com/ipsos-mori/en-uk/majority-britons-support-vaccine-passports-recognise-concerns-new-ipsos-mori-uk-knowledgepanel-poll.

- International Airport Review. (January 2021) 'European aviation industry urges EU to update COVID-19 state aid framework' [Online]. Available at: https://www.internationalairportreview.com/news/150403/european-aviation-eu-covid-19-state-aid-framework/.
- International Airport Review. (December 2020) 'European aviation industry welcomes EC's Sustainable and Smart Mobility Strategy' [Online]. Available at: https://www.internationalairportreview.com/news/146664/european-aviation-sustainable-smart-mobility-strategy/.
- Law Insider. 'Non-Scheduled Flights definition' [Online]. Available at: https://www.lawinsider.com/dictionary/non-scheduled-flights#:~:text=Non%2DScheduled%20Flight(s), to%20and%20from%20fixed%20terminals (Accessed 19 May 2021).
- Langer, T. (April 2020) 'How can you stabilize and rebuild customer confidence during and after the Corona crisis?' *Lufthansa Systems* [Online]. Available at: https://www.lhsystems.com/blog-entry/how-can-you-stabilize-and-rebuild-customer-confidence-during-and-after-corona-crisis.
- Mazareanu, E. (September 2020) 'Leading airline groups in Europe in 2019, based on revenue (in billion U.S. dollars)' *Statista* [Online]. Available at: https://www.statista.com/statistics/201067/europes-25-largest-airline-groups-based-on-revenue/.
- Mena Roa, M. (March 2021) ' El 62% de españoles, a favor del pasaporte de vacunación europeo' *Statista* [Online]. Available at: https://es.statista.com/grafico/24441/personas-en-espana-a-favor-en-contra-de-la-creacion-de-un-pasaporte-de-vacunacion-en-europa/.
- Mendes Pereira, M., Marcelino, C. (September 2020) 'State aid rules in pandemic times: Flexing or bending?' DLA Piper [Online]. Available at: https://www.dlapiper.com/it/italy/insights/publications/2020/09/antitrust-matters-august-2020/state-aid-rules-in-pandemic-times/.
- Mikosz, S. (2020) 'No Connectivity, No Economic Growth' *IATA Global Media Days* [Online]. Available at: https://www.iata.org/en/iata-repository/pressroom/presentations/connectivity-study-briefing-gmd2020/.
- Miller, J., Nebehay, S. (December 2020) 'WHO looks at possible 'e-vaccination certificates' for travel' *Reuters* [Online]. Available at: https://news.trust.org/item/20201203103515-cflbx.
- Munich Airport. (January 2021) 'Press: ACI Airport Health Certificate' [Online]. Available at: https://www.munich-airport.com/press-aci-airport-health-certificate-10535753.
- OECD. (October 2020) 'COVID-19 and the aviation industry: Impact and policy responses' [Online]. Available at: https://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-aviation-industry-impact-and-policy-responses-26d521c1/.
- OECD. (April 2020) 'Equity injections and unforeseen state ownership of enterprises during the COVID-19 crisis' [Online]. Available at: https://www.oecd.org/coronavirus/policy-responses/equity-injections-and-unforeseen-state-ownership-of-enterprises-during-the-covid-19-crisis-3bdb26f0/.
- OECD. (June 2020) 'The COVID-19 crisis and state ownership in the economy: Issues and policy considerations' [Online]. Available at: https://www.oecd.org/coronavirus/policy-responses/the-covid-19-crisis-and-state-ownership-in-the-economy-issues-and-policy-considerations-ce417c46/.
- Pearce, B. (May 2020) 'COVID-19 – Cost of air travel once restrictions start to lift' *IATA* [Online]. Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/covid-19-cost-of-air-travel-once-restrictions-start-to-lift/.

- Pearce, B. (June 2020) 'COVID-19 – Outlook for the airline industry 2020-2021' *IATA* [Online]. Available at: https://www.iata.org/en/iata-repository/publications/economic-reports/airline-industry-economic-performance-june-2020-presentation/.
- Pearce, B. (November 2020) 'Outlook for Air Transport and the Airline Industry' Annual General Meeting, *IATA* [Online]. Available at: https://www.iata.org/en/iata-repository/pressroom/presentations/outlook/.
- Pickup, B. (May 2020) 'Passengers refused boarding amid testing confusion' *BBC News* [Online]. Available at: https://www.bbc.com/news/business-57243205.
- Portugal Travel Insurance. 'Travel to Portugal with protection from COVID-19' [Online]. Available at: https://www.portugaltravelinsurance.com/ (Accessed 30 April 2021).
- PWC. 'Four fault lines show a fracturing among global consumers' PWC Global [Online]. Available at: https://www.pwc.com/gx/en/industries/consumer-markets/consumer-insights-survey.html (Accessed 19 May 2021).
- PWC. 'How to restore confidence in travel during an uncertain time' *PWC United States* [Online]. Available at: https://www.pwc.com/us/en/industries/consumer-markets/library/how-to-restore-confidence-in-travel-during-covid-19.html (Accessed 30 April 2021).
- Reuters. (February 2021) 'Bahrain launches digital COVID-19 vaccine passport' [Online]. Available at: https://news.trust.org/item/20210217092723-l678r/.
- Rizhlaine, F. (January 2021) 'CORONAVIRUS: FRENCH PEOPLE FOR A VACCINAL PASSPORT, A SURVEY SAYS' *Sortir-à-Paris* [Online]. Available at: https://www.sortiraparis.com/news/in-paris/articles/241020-coronavirus-french-people-for-a-vaccinal-passport-a-survey-says/lang/en.
- Rooley, J. (July 2020) 'How COVID-19 has affected the aviation industry and its approach to risk' *Willis Tower Watson* [Online]. Available at: https://www.willistowerswatson.com/en-GB/Insights/2020/06/how-covid-19-has-affected-the-aviation-industry.
- SchengenVisa Info News. (February 2021) 'Greece-Israel Travel Agreement Causing Polemics in EU' [Online]. Available at: https://www.schengenvisainfo.com/news/greece-israel-travel-agreement-causing-polemics-in-eu/.
- SESAR. 'SMART AND SUSTAINABLE AVIATION FOR EUROPE' [Online]. Available at: https://www.sesarju.eu/ (Accessed 4 April 2021).
- Street, F. (October 2020) 'What happened on the Qantas flight to nowhere' *CNN Travel* [Online]. Available at: https://edition.cnn.com/travel/article/qantas-flight-to-nowhere-passenger-experience/index.html.
- The Local. (April 2021) 'Corona passport: What you need to know about Danish Covid-19 vaccine and test documentation' *TheLocal DK* [Online]. Available at: https://www.thelocal.dk/20210406/corona-passport-what-you-need-to-know-about-danish-covid-19-vaccine-and-test-documentation/.
- Tomaselli, R. (May 2021) 'IATA Chief Says Airlines Will Not Recover All Lost Capacity' *Travel Pulse* [Online]. Available at: https://www.travelpulse.com/news/airlines/iata-chief-says-airlines-will-not-recover-all-lost-capacity.html.
- Tozer-Pennington, V. (2021) 'The Aviation Industry Leaders Report 2021: Route to Recovery' Airline Economics – *KPMG*.

- Travel Professional NEWS. (April 2021) 'Allianz Survey: Vaccines to Inject a Major Boost in Traveler Confidence' [Online]. Available at: https://www.travelprofessionalnews.com/allianz-survey-vaccines-to-inject-a-major-boost-in-traveler-confidence/.
- Treaty on European Union. (9 May 2008) O.J. 115.
- Treaty on the Functioning of the European Union. (9 May 2008) O.J. 115.
- UNWTO. 'COVID-19: Measures to Support Travel and Tourism' [Online]. Available at: https://www.unwto.org/covid-19-measures-to-support-travel-tourism (Accessed 30 April 2021).
- WHO. (November 2020) 'WHO SAGE Roadmap For Prioritizing Uses Of COVID-19 Vaccines In The Context Of Limited Supply' [Online]. Available at: https://cdn.who.int/media/docs/default-source/immunization/sage/covid/sage-prioritization-roadmap-covid19-vaccines_31a59ccd-1fbf-4a36-a12f-73344134e49d.pdf?sfvrsn=bf227443_36&download=true.
- Xerri De Caro, S. (October 2020) 'Malta: The Use Of Blockchain In Aviation' *Mondaq* Online]. Available at: https://www.mondaq.com/fin-tech/994262/the-use-of-blockchain-in-aviation#:~:text=Potential%20use%20cases%20of%20Blockchain%20in%20Aviation&text=As%20such%2C%20blockchain%20can%20aid,times%20across%20the%20value%20chain.&text=The%20use%20of%20blockchain%20can,verifying%20the%20identity%20of%20passengers.
- Zuidberg, J., Schomann, J., De Villers, M., Marquis, C., Emojevbe, R. (February 2021) 'Study on the economic developments of the EU air transport market' *European Commission* DOI: 10.2832/561694.

This thematic briefing provides the European Parliament's Committee on Transport and Tourism (TRAN) with an overview of the repercussions of the COVID-19 pandemic on the aviation sector, as well as policy recommendations to address the challenges emerging from the crisis.

PE 690.869
IP/B/TRAN/2020-093

Print ISBN 978-92-846-8320-8 | doi:10.2861/61585 | QA-03-21-316-EN-C
PDF ISBN 978-92-846-8321-5| doi:10.2861/039605 | QA-03-21-316-EN-N