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**IMPACT AND POLICY RESPONSES ON THE IMPACT OF COVID-19
ON THE AVIATION INDUSTRY**

Aviation is the activities surrounding mechanical flight and the aircraft industry. Aircraft includes fixed-wing and rotary-wing types, morphable wings, wing-less lifting bodies, as well as lighter-than-air craft such as hot air balloons and airships. Aviation began in the 18th century with the development of the hot air balloon, an apparatus capable of atmospheric displacement through buoyancy. Some of the most significant advancements in aviation technology came with the controlled gliding flying of Otto Lilienthal in 1896; then a large step in significance came with the construction of the first powered airplane by the Wright brothers in the early 1900s. Since that time, aviation has been technologically revolutionized by the introduction of the jet which permitted a major form of transport throughout the world.

The aviation industry is the global transportation network that carries goods and passengers by air. While air travel was only made possible in the early 20th century, the aviation industry now generates billions of dollars in annual revenue. It also provides essential services to numerous other industries, from medicine and national defence to tourism and sports. The bulk of the worldwide aviation industry is involved with the use and manufacture of airplanes.

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Much of the aviation industry is focused on tourism and travel, generating more than \$400 billion US Dollars (USD) globally in revenue per year. Air travel means that almost any location on Earth can be reached in a matter of hours, a vast difference from travel options before the 20th century. Although some passengers become anxious and even nauseous due to air travel, airplanes are widely cited as being among the safest means of transport. Some passengers even travel by air for its own sake rather than to reach a destination; examples include hot-air ballooning, skydiving, and helicopter tours.

Another sector of the aviation industry is concerned with the transport of goods. Air freight is much faster than other means of delivering cargo and readily available in most locations. Thus, aircraft play an essential role in providing supplies to various other industries, ranging from entertainment to manufacturing to medicine. Freight companies such as FedEx and UPS have fleets of jet aircraft specially designed for cargo delivery. Delivery of air freight creates \$50 billion USD in annual revenue around the globe.

The requirements for safely operating a large fleet of aircraft mean that most major airlines operate on very thin profit margins. Safety is of the utmost concern to all sectors of the aviation industry, especially since 11 September 2001. The air-based terrorist attacks of that date had repercussions that nearly crippled the American airline industry. Heightened security measures since that time have changed the nature of air travel and sometimes proved controversial. Despite these drawbacks, the aviation industry remains an essential part of the global marketplace.

The aviation industry is essential to the viability of the U.S. economy, which makes it a prime target for terrorists. The complexity and size of the industry also make it an attractive environment for crime. Understanding the tenuous financial structure of airlines, the aviation industry aids the security practitioner in applying appropriate and practical security measures. Aviation security practitioners must deploy systems, measures, and procedures to counteract both terrorist and criminal perpetrators.

To meet these challenges, aviation security practitioners employ layered security systems that are symbiotic with the global aviation industry. The U.S. Congress establishes policy for protecting U.S. aviation. Federal regulators convert these policies into regulations, which are therefore established as accepted industry practices.

Federal regulators implement and supervise these policies and regulations across all aircraft operators and airports. The 9/11 Commission was tasked to assess facts surrounding the September 11, 2001, terrorist attacks. The 9/11 Commission analyzed and recommended new strategies for adoption within the United States. Because of the 9/11 Commission's work, the largest overhaul of aviation security in U.S. history was implemented. However, to thwart or reduce the risk of crime or terrorist activity, the strategies recommended by the 9/11 Commission must remain ephemeral in evolution and application. The following chapters in this text will help aviation security practitioners or students build on the recommendations made by the 9/11 Commission. Readers of this text will be better prepared to understand, develop, and apply strategies, tactics, and methods that are appropriate and practical to the future needs of aviation security.

Aviation security practitioners or students of aviation security should have a solid understanding of the nature and contributing factors regarding the attacks of September 11, 2001. Therefore, it is strongly recommended that readers review the preceding case study on 9/11.

Aviation law is the branch of law that concerns flight, air travel, and associated legal and business concerns. Some of its area of concern overlaps that of admiralty law and, in many

cases, aviation law is considered a matter of international law due to the nature of air travel. However, the business aspects of airlines and their regulation also fall under aviation law. In the international realm, the International Civil Aviation Organization (ICAO) provides general rules and mediates international concerns to an extent regarding aviation law. The ICAO is a specialized agency of the United Nations.

In the United States and in most European nations, aviation law is considered a federal or state-level concern and is regulated at that level. In the U.S., states cannot govern aviation matters in most cases directly but look to Federal laws and case law for this function instead.

For example, a court recently struck down New York's Passenger Bill of Rights law because regulation of aviation is traditionally a federal concern.

Aviation law, however, is not in the United States held under the same Federal mandate of jurisdiction as admiralty law; that is, while the United States Constitution provides for the administration of admiralty,[1] it does not provide such for aviation law. States and municipalities do have some indirect regulation over aviation. For example, zoning laws can require an airport to be located away from residential areas, and airport usage can be restricted to certain times of day. State product-liabilities law are not prompted by Federal law and in most cases, aviation manufacturers may be held strictly liable for defects in aviation products.

Space law, which governs matters in outer space beyond the Earth's atmosphere, is a rather new area of law but one that already has its own journals and academic support. Much of space law is connected to aviation law.

The COVID-19 pandemic has had a significant impact on the aviation industry due to travel restrictions and a slump in demand among travellers.

Significant reductions in passenger numbers have resulted in flights being cancelled or planes flying empty between airports, which in turn massively reduced revenues for airlines and forced many airlines to lay off employees or declare bankruptcy. Some have attempted to avoid refunding cancelled trips in order to diminish their losses. Airliner manufacturers and airport operators have also lay off employees. Government regulations in Europe and the United States mandated that airlines refund fares when flights are cancelled, but in many cases airlines have instead offered vouchers or travel credits that must be used by the end of the year. (Some airlines have extended the voucher window to May 2022.) Despite pleas from industry lobbyists to expand the regulations to allow travel credits, the US Department of Transportation has reiterated that airlines are obligated to provide refunds for cancelled flights. Travel vouchers are currently allowed when passengers cancel travel plans due to travel warnings, stay at home orders and others. Early March 2020 saw 10% of all flights cancelled compared to 2019. As the pandemic progressed, 40–60% fewer flight movements were recorded in late March with international flights affected the most. By April 2020, over 80% flight movements were restricted across all regions.[9] Research shows that world

recovery of passenger demand to pre-COVID-19 levels is estimated to take 2.4 years (recovery by late-2022), with the most optimistic estimate being 2 years (recovery by mid-2022), and the most pessimistic estimate 6 years (recovery in 2026). Large regional differences are detected: the Asia-Pacific has the shortest estimated average recovery time of 2.2 years, followed by North America in 2.5 years, and Europe 2.7 years. For air freight demand, a shorter average world recovery time of 2.2 years is predicted if compared to passenger demand. On the regional level, Europe and North America are comparable with average recovery times of 2.2 years, while the Asia-Pacific is predicted to recover faster in 2.1 years restrictions.

Air transport is a small but important part of the economy

The air transport sector (passenger and freight) represents only a small share of OECD countries' value-added (around 0.3 % on average, see Figure 1). Yet, strong inter-industry linkages with both upstream and downstream sectors make it an important part of the economy.

First, air transport relies on several upstream sectors: support activities to air transportation (including the operation of airports); aircraft manufacturing; rental and leasing services; and refined petroleum manufacturing (including the blending of bio fuel). In particular, the air transport sector and airports are inherently intertwined. Some airports depend heavily on one or a few companies that use it as a hub. Shared ownership is common, either by private actors (e.g. Lufthansa owning a minority share in Frankfurt's airport) or by the public sector. The OECD Indicators on Product Market Regulation show that in 2018, the public sector was a shareholder of the largest domestic airport in three out of every four OECD countries and of the largest air carrier in one out of three countries. Moreover, aircraft manufacturers are highly dependent on demand from the air transport sector, directly or through leasing companies. Because both the activity level and the strategic decisions concerning air transport, airports and aircraft manufacturing are linked, this brief considers them jointly as the "aviation industry".

Second, air transport is a key input for downstream sectors, as it enables several economic activities by way of trade in goods and especially in services through the movement of natural persons (i.e. mode 4 services trade). Air cargo is essential for the smooth operations of global supply chains. Business travel is an important channel of international knowledge transfer. The availability of non-stop intercontinental flights is an important determinant of the location of large firms' headquarters, even though the impact of airports on local economic activity is debated. The readiness of flights reaching a large number of destinations is also instrumental for tourism, in particular international tourism.

Beyond inter-industry linkages, air transport is characterised by both compliment and substitutability with other modes of transport, especially high-speed rail on short- and medium-haul routes. Under pre-COVID conditions, the International Energy Agency estimated that 14% of global flights could be competitively shifted to high-speed rail. Yet, air

transport remains essential for territorial cohesion and development convergence as it is often the only viable way of connecting peripheral regions.

The change in the behaviour of passengers following the COVID-19 crisis, travel restrictions and the ensuing economic crisis have resulted in a dramatic drop in demand for airline services. According to IATA, passenger air transport measured as revenue passenger kilometre was down 90% year-on-year in April 2020 and still down 75% in August. Collapse in economic activities and trade affected freight, which was almost 30% lower year on year in April and still about 12% lower in August.

The size of the shock has put the liquidity buffers of airline companies under pressure, even if a significant share of its costs are variable (around 50% according to IATA, notably fuel accounting for 25% of the total costs) and the recent drop in oil prices has decreased airlines' operating costs.

In the medium run, airline companies face two uncertainties:

The cost of health-related measures:- Operating costs are likely to increase in the short-run for both airlines and airports because of additional health and safety requirements (e.g. disinfection, PPE, temperature checks or viral tests) before they can be passed on to consumers. Moreover, if implemented for air transport, social distancing measures could force a reduction in the passenger load factor (i.e. the number of seats that can be occupied during a flight) by up to fifty percent.

The shape of the recovery for commercial flights:- International travel restrictions, the contraction of economic activity and changes in transport behaviour by cautious consumers may prevent a return to pre-crisis demand levels, even as lockdowns and domestic travel restrictions measures are loosened in many countries. Commercial air traffic is slow to recover: as of September 2020, the number of flights remains more than 40% below pre-crisis level globally (Figure 2). This hides differences across flight lengths: the drop is even more pronounced for long-haul flights. In the longer run, changes in consumer behaviour may result in structural changes in air transport demand. Even though the rebound of domestic flights in China suggests that traffic may revert to pre-crisis levels, a permanent drop in demand from pre-crisis levels cannot be excluded, either through modal shifts in services trade (e.g. video-conferencing instead of business travel) or, to a lesser extent, through substitution with other modes of transport (e.g. high-speed trains).

The combination of negative demand and supply shocks and the uncertainty around the medium-run outlook create an uncertain perspective for airline companies. Through inter-industry linkages, this uncertainty affects the whole aviation industry. Moreover, the industry remains exposed to a possible resurgence of the pandemic, as governments may impose new air travel restrictions to tackle flare-ups or a potential second wave of infections. This may threaten the existence of some firms in the industry, as production and revenues are likely to remain inferior to pre-crisis levels for some time

Airline companies were in very different situations before the COVID-19 crisis began. In particular, air transport is one of the sectors with the highest dispersion in productivity across firms and, to a lesser extent, in profitability. Airline companies thus entered the crisis with strikingly different abilities to withstand such a shock and heterogeneous prospects for the future.

Bankruptcies or mergers and acquisitions among large companies could have a negative effect on competition in air transport, with possible repercussions on prices. Even if 80% of passengers seats are on routes with several carriers, many of these routes rely on a small number of firms (36% of routes involve only two or three carriers).

Past public policy interventions in the aviation industry have had different rationales. Most interventions have targeted aircraft manufacturers. These firms are usually subject to learning-by-doing and significant economies of scale, which may cause under-investment in technology, innovation or production facilities and, hence, justify public support. Public policies have also aimed at co-ordinating a wide array of suppliers and different know-how, and ensuring aircraft safety. More recently, aircraft manufacturers have also been the target of green industrial policies, seeking to accelerate the shift towards low-carbon aircraft. Beyond supporting aircraft manufacturers, governments have also intervened to preserve employment in large air transport companies.

When it comes to the response to the COVID-19 crisis, most of the sector- or firm-specific measures thus far have targeted air transport. As of August 2020, governments have provided about USD 160 billion of support to airlines (Figure 3). Almost two-thirds of that support consists of direct aid (subsidies, loans, equity, cash injection), while one quarter takes the form of wage subsidies. Interventions have generally taken three forms:

Untargeted support schemes, designed to provide liquidity to firms irrespective of their activity, including the extension of existing job-retention schemes or the introduction of new ones; Sectors schemes (e.g. airlines operating in Australia or the whole aviation industry in France), including those supporting airline workers (e.g. the Payroll Support Program in the United States);

Firm-specific support measures, including partial or total nationalisation, implemented by some countries because of the presence of large companies in the air transport sector (e.g. Alitalia, Lufthansa).

If the crisis lingers, governments may resort more to equity injections. Even if airline companies did not appear to enter the crisis with higher leverage than firms in other sectors, their debt level could increase by as much as 28% in 2020, according to IATA. Absent any equity injection, this would significantly affect their capacity to finance new investments and, for some firms, affect their solvency.

The COVID-19 crisis has reinforced some of the rationales that were previously used to justify support to the aviation industry. In particular, liquidity challenges, increasing debt

burdens and uncertain prospects can jeopardise crucial investments to reduce the industry's carbon intensity, notably the acquisition of more fuel-efficient aircraft.

Whereas industrial policy in the aviation industry has primarily focused on aircraft manufacturers, the crisis exposed the crucial role of air transport and airport infrastructure for the connectivity of peripheral areas (in particular islands). In several countries (France, Greece, Iceland, Italy, Spain, Norway, Portugal), retail tariffs of air carriers for domestic transportation are regulated and sometimes subsidised as a result of a public service obligation on certain routes.

Airports need to adapt new safety and risk management measures in conjunction with operators. A joint publication with Airports Council International (ACI) and IATA was released 'Safely Restarting Aviation – ACI and IATA joint Approach' 12 . This developing from the previous publication from IATA "Restarting aviation following COVID-19" 13 . This considered medical evidence and multi-layered approaches to support the restart of operations. Suggestions included:

- Temperature and symptom screening
- Use of masks and PPE (Personal Protective Equipment)
- Physical distancing
- Cleaning and disinfecting infrastructure
- COVID-19 testing and antibody testing
- Immunity passports
- Measures to assist contact tracing
- As well as measures related to pilot and crew members and their layover experience.

With numerous guidelines and roadmaps to recovery, there is a clear need for a collaborative approach to ensure a level of consistency and cooperation. The creation of task forces such as the COVID-19 Aviation Recovery Task Force (CART), but existing task forces such as The Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) have been integral in coordinating the collaboration to COVID-19 within the aviation industry.

CAPSCA held an online webinar outlining the Public Health Corridor Concept, a recording of which can be found on their website 19. The main emphasis of this strategy involves the use of 'clean' crew, 'clean' aircraft and 'clean' airport facilities to minimise the risk of COVID-19 transmission whilst maintaining flight safety.

These task forces play an important role in driving a collaborative approach to COVID-19 within aviation, including facilitating the restart of aviation operations in a sustainable, safe, secure and orderly manner. A more extensive list of aviation task forces and COVID-19 mitigation measure can be found here.

Currently, the Indian airlines are operating domestic flights at around 80 per cent of their pre-COVID levels. The domestic services are expected to reach their pre-COVID levels by March 2021. With the anti-corona virus vaccination likely to begin from 2021, the Indian

aviation sector is hoping for a much better year as compared to 2020. However, after a new and more infectious corona virus strain emerged in the UK recently, India announced on December 21 that all passenger flights connecting that country will be suspended from December 23 to December 31.

COVID-19 continues to wreak havoc within the airline industry and has weakened airline hubs in the short term. However, we see a continued role for the hub model as traffic starts to come back. It is thus vital that hub carriers make the most of this opportunity to reevaluate their networks and fleets. We believe that there will be fewer hubs in the long term, but that those that remain will be stronger and more profitable if they make the necessary short- and long-term adjustments to their model.



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