Note: Mayday, Mayday, Mayday! Responding to Environmental Shocks: Insights on Global Airlines' Responses to COVID-19

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Abstract

The COVID-19 pandemic in 2019/2020 ushered in a new turbulent and chaotic global environment where governments not only placed temporary restrictions on people's movements, but also mandated limits on business activities. However, lacking in the contemporary scholarly discourse is a deeper understanding of how businesses respond to such pandemics. In this *research note* (RN), a conceptual framework of firms' responses is advanced. Using the global airline industry, the analysis delineates a host of internally generated and externally imposed firms' strategic and tactical responses to the pandemic including in-flight service changes, flight cancellations, seeking emergency aids and financial supports, and firm closures. The analysis demonstrates that in responding to the crisis, many airlines sought to minimise erosion of long-developed knowledge, market capabilities, route networks, access to airports, customer base and relationships/trust with customers prior to COVID-19 to equip them for recovery. The wider implications for academics, managers and governments are outlined as the effects of COVID-19 continue to unfold.

Keywords: airlines; COVID-19; institutions; strategies; business environment.

1 Introduction

The epic transmission of COVID-19 across multiple countries with such a precipitous negative shock on national economies and accompanying social distancing measures to halt human-to-human transmissions makes it one of the most unparalleled events in modern times (see World Health Organization (WHO), 2020a, 2020b). Nowadays, the popular press is replete with COVID-19 pandemic stories which continue to unfold across the globe affecting over 170 nations and territories (Lipsitch, Swerdlow & Finelli, 2020; The Economist, 2020a; 2020c; WHO, 2020; Worldometers, 2020; see also ; Craighead, Ketchen Jr, & Darby, 2020; Govindan, Mina, & Alavi, 2020; Cai & Choi, 2020). In many service-oriented economies and industries such as air travel and tourism, the COVID-19 pandemic and accompanying social distancing measures have virtually hampered business activities. In the midst of this epical changing global business environment, we are also often confronted with a myriad of unknowns and difficult challenges which force regulators, governments and businesses to respond. A plethora of research efforts has been directed at investigating pandemics (see also Lipsitch et al., 2020; Choi, 2020; Loske, 2020; Yu, Sun, Solvang & Zhao, 2020) and much of the prior academic literature on pandemics has tended to focus on the mortality rates, government policies and transmission mechanisms (see Nigmatulina & Larson, 2009). Thus, a notable and significant shortcoming in the existing research is the very limited insights on businesses' response to health crisis/pandemics. As demonstrated by past studies, "how companies respond to unforeseen disruptions such as pandemics or outbreaks remains limited" (Amankwah-Amoah, 2016a, p. 385). Recent research suggests that this necessitates a deeper understanding as to how businesses respond to the pandemic (Wenzel, Stanske & Lieberman, 2020).

Against this backdrop, the objective of this research note (RN) is to examine how airlines' have responded to COVID-19 and factors that facilitate, shape or constrain their responses. The airline industry

is one of the most global industries (Doganis, 2006), heavily impacted by governments' restrictions on people movement (detailed analysis will follow shortly) and as such represents a fertile ground for exploring how firms respond to crisis. This study is also motivated by the growing importance and somehow increasing frequency of global health pandemics and the need for a better understanding of how governments, companies and international organisations not only attempt to anticipate these challenges but also respond to their occurrences. More than 29 million COVID-19 cases and 900,000 fatalities have been reported globally, demonstrating the importance of this issue (WHO, 2020b; Worldometers, 2020).

The analysis makes pivotal contributions to the literature. First, in light of the evolving and unprecedented nature of COVID-19 and its impact on businesses and way of life (Lipsitch et al., 2020; WHO, 2020), this study contributes to the ongoing discourse by providing preliminary analysis of a host of airlines' responses to the crisis, shedding light on factors that facilitate, shape or constrain their responses to the crisis. In addition, although some studies have explored the issue of pandemics (see Ivanov, 2020), these have often been done in isolation from businesses' action and responses to such events. In this direction, an integrated framework of analysis was developed and utilised to analyse firms' responses to crisis, encapsulating the nature and timing of a host of strategic and tactical responses to the COVID-19 pandemic. Our analysis rectifies the oversight and offers insights into the short- and long-term responses adopted by airlines. Furthermore, although there are studies on firms' responses to crisis (Mishra, 1996) and the timing of responses (see Wenzel et al., 2020), these two streams of scholarly works have emerged and developed insolation. The paper extends the literature by integrating these two largely divergent approaches to contribute to the ongoing conversation of the effects of the COVID-19 pandemic on global businesses by focusing the global airline industry.

The sections that follow present a review of literature on firms' responses to environmental jolts. After using the review to develop an organising framework, we then present the main findings using the integrated framework, followed by discussion of the implications.

2 Firms' Responses to Environmental Jolts: An Organising Framework

Environmental jolts can be defined as "transient perturbations whose occurrences are difficult to foresee and whose impacts on organisations are disruptive and potentially inimical" (Meyer, 1982, p. 515). During crisis, some firms may seek to preserve their key employees, market knowledge and resources, whilst concurrently striving to minimise the adverse effects of sudden changes in the business conditions (Amankwah-Amoah, 2016a; Wenzel et al., 2020). A good example in the global airline industry is that following the COVID-19-induced crisis, British Airways (BA) decided to bring forward its decision to

discontinue Boeing 747 fleets as part of its recovery strategy. The airliner once dubbed the "Queen of the Skies", the "most recognisable" among the public as well as the preferred choice of global airlines for long-haul routes (Flight International, 2020; Specia, 2020). By joining other global airlines such as Qantas that have phased out or in the process of phasing out their 747s fleets (Specia, 2020), BA was able to usher in a new recovery approach to counteract the COVID-19 effects. According to the Flight International (2020, p. nd), the withdrawal of the 747's from service crucially eliminated a fleet that "represents higher operating costs from both fuel-burn and maintenance perspectives". This shift also epitomizes a new era where airlines are increasingly embracing new generation fuel efficient aircrafts (Flight International, 2020; Specia, 2020).

To explore the issue of firms' responses to jolts, we situate our analysis within the literature on timing and locus of causality of organisational actions/inactions/failure. Time is a pivotal dimension in firms' responses to jolts/events and its effects may be difficult to determine. Past studies have demonstrated that timing is a key resource which can grant an organisation a first- or late-mover advantage in the face of crisis (Lieberman & Montgomery, 1988, 1998; Makadok, 1998) and can also be harnessed in devising suitable responses by firms to environment-altering events (Grzymala-Busse, 2011). Linked to timing is availability of information, resources and cost, which could determine whether the organisation, actors or decision-makers act in a proactive or reactive manner (Grzymala-Busse, 2011). Thus, there is a shorter-term and longer-term dimension to firms' responses shaped by the duration or nature of the event (Aguinis & Bakker, 2020).

The duration of events can determine the nature of its effect on firms' activities as well as the availability or diversity of resources and expertise that firms can mobilise and deploy to contain/respond to crisis. Grzymala-Busse (2011, p. 1289) observed that, "where negative externalities exist, early movers are advantaged" due to pioneering costs of responding to the event. Late arrivals in responding to negative external events have the opportunity to observe and learn from other firms and therefore are more likely to be effective in devising their responses (see Lieberman & Montgomery, 1988; Makadok, 1998). Over time, some firms may opt to scale back their operations (retrenchment) to reduce costs, and develop networks and markets in response to an unfolding crisis (Bruton, Ahlstrom & Wan, 2003). This approach, in tandem with curtailing the business scope (De Figueiredo, Feldman and Rawley 2019), is likely to span over both a short-term and long-term strategy (see Bluedorn & Ferris 2004; Bluedorn & Martin 2008). Broadly speaking, short-term responses may focus on meeting immediate environmental demands and ensuring immediate survival of the business, whereas, long-term responses are designed to focus on future periods and entailed enduring set of actions, which can be a number of years (see Bluedorn & Ferris 2004;

Bluedorn & Martin 2008). At the effects of crisis unfold, some firms that display ineffectiveness or failure to respond may be forced to exit the industry (Amankwah-Amoah, 2016b). For new firms, survival is often paramount which often precipitate short-term oriented strategy.

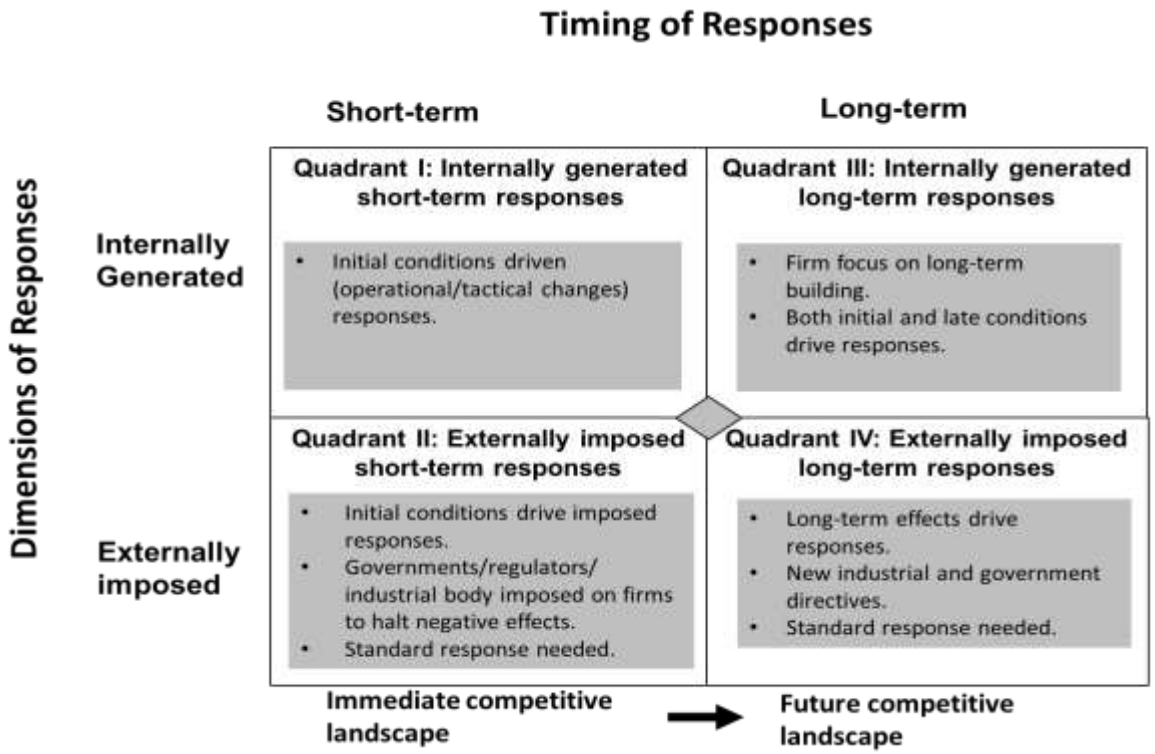
Underpinning literature pertaining to the locus of causality is useful in understanding the issue. Here, there are two main schools of thought: voluntaristic and deterministic views (Amankwah-Amoah, 2016b; Amankwah-Amoah et al., 2020; Mellahi & Wilkinson, 2004; Whetten, 1987; Zhang et al., 2019). The deterministic perspective views organisational actions as being driven by external factors such as government directions, economic recession, declining demand and luck, over which managers have limited or no control (Amankwah-Amoah, 2016b). Often government-mandated actions can drive small and financially weak firms into bankruptcy. Given that legitimacy is conferred by organisational stakeholders, they can also force a firm to act or adopt a set of measures to maintain its existence (Perrow, 1970). Thus, government pressures can force firms to adopt a course of action irrespective of the impact on the firms' operations.

Businesses are viewed as victims of crisis or unpredictable circumstances in their business environment e.g. natural disasters such as flash flooding, tornadoes, landslides, earthquakes, sinkholes, volcanic eruptions, heat waves and droughts. These events can suddenly alter the business environment, culminating in closure, redesign of the business model or firms actually closing down. Many firms are often unable to fully capitalise on their existing resources and expertise to identify and neutralise environmental threats, which often forces closure of the business (Delmas & Toffel, 2008). In contrast to the other perspective, the voluntaristic perspective traces actions, inaction and firm failure to managers, workers and characteristics of the organisation such as resource and expertise (Amankwah-Amoah et al., 2018; Mellahi, & Wilkinson, 2004). Extending previous research, we contend that firms' ability to respond to a global outbreak is predicated on its firm-specific assets which denotes resources and expertise of the firms including relationships nurtured over time. From this literature, we contend two types of firm responses: internally designed/generated and externally imposed.

In keeping with insights from the timing literature, we contend two dimensions of timing: short-term and long-term. Thus, businesses respond to crisis either in the short term or long term via utilisations of their own expertise and resources or requirements/set of actions imposed on an industry by external entities/parties, as shown in Figure 1. Externally imposed responses are driven by external/institutional factors such as governments, industry bodies and societies to ensure standardisation of responses and securing wider participation of all firms in the industry for the proposed course of action. It stems from actions of external actors of the organisation or simply an outcome of regulatory, political, social and

economic changes. However, externally imposed courses of action tend to be detached from organisation-specific problems and shortcomings which can amplify organisational problems. With internally generated responses to crisis, the organisation has direct ownership and influence in devising and carrying out the course of action with the aim of ensuring its long-term survival. They are carefully designed organisational approaches and sets of actions informed by the organisation's knowledge, experiences and market knowledge. Anchored in the internally generated course of action is deployment of firm-specific key resources and expertise to respond to or neutralise the external threats (McCutchen Jr, 1993).

Figure 1: A Unified Organising Framework of Firm Responses



When crises/jolts emerge, they often release the constraints on organisational-decision makers and their latitude to act, thereby opening up a wider range of strategic options, ammunitions and actions for firms (Bryson, 1981; Wenzel et al., 2020) including different engagements with governments, customers, clients and suppliers. Firms are likely to face imposed responses as well as sets of actions during crisis. It is, therefore, expected that firms may be motivated to embrace internally initiated as well as externally imposed responses to develop new relationships with political actors to secure access to financial and political resources in both the short term and long term to ensure survival of their businesses. The above

dialogue suggests that during crisis, different firms in an industry would likely exhibit some of these different responses.

Crossing the pillars produces the 2 × 2 matrix of firm responses to external environmental shock. As demonstrated in Figure 1, internally generated short-term responses (Quadrant I) describes the short-term operational and tactical responses to the unfolding organisational crisis. This is where early-warning signals or cues necessitate modifications in the processes, routines, strategy and structures of the organisation. Externally imposed short-term responses (Quadrant II) is where early-warning signals or cues of crisis lead to an external actor-imposed course of action to curtail the negative effects. The internally generated long-term responses (Quadrant III) is where the crisis demands long-term strategic and operational responses within the firms to prepare for the post-crisis environment. The externally imposed long-term responses (Quadrant IV) focuses on long-term political network development and leveraged overtime to enhance the competitiveness of the firms.

3 Airlines' Responses to COVID-19

Online Supplementary Appendix 1 provides a more general overview of the global airline industry and COVID-19 as the research setting. Following and applying Figure 1, we delineate the responses adopted by airlines around the globe, and the internal and external factors that facilitated or impinged on responses. Online Supplementary Appendix 2 provides additional details on the dimensions of the quadrants with illustrative examples.

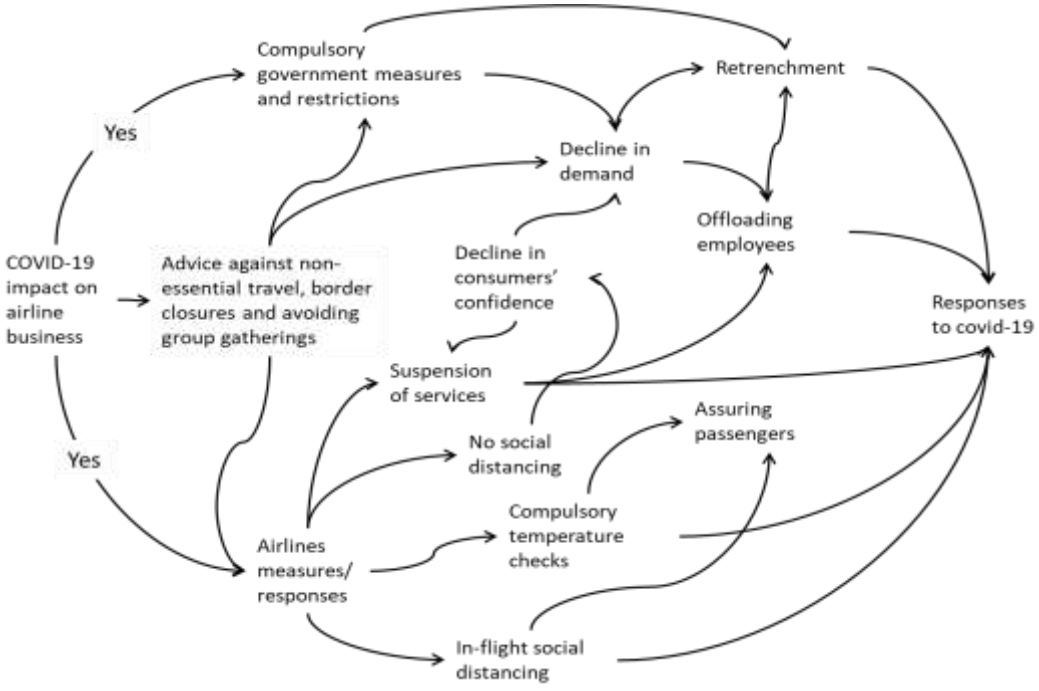
Quadrant I: Internally generated short-term responses

Quadrant I displays a situation where firms deduced internal responses to crisis with a largely short-term focus. In the preliminary stage, most airlines sought to make modest changes, focusing on environmental scanning associated with the virus and governments' directives on travel to the affected area and WHO directives. In January 2020, Turkish Airlines was amongst others who conveyed their decision to assess the situation (Dunn, 2020c). Some of the early efforts by airlines focused on providing additional safety measures and suspending some services to minimise the risk of transmission. Given that the coronavirus transmits via human-to-human contact and microscopic droplets through coughing and sneezing, it makes it difficult to deliver people-to-people services (Hester, 2020). Several tactical responses were adopted during this phase including deep cleaning planes before take-off. For many airlines, cleaning staff were required to put on protective suits in helping to disinfect aircraft against the coronavirus (Cornwell, 2020). Such initiatives were further backed by airlines such as Cathay Pacific who reassured their customers of

measures being taken by highlighting the "intensifying disinfection of aircraft after landing, making cabin crews don gloves and masks, removing blankets, magazines and pillows, and adding safeguards to the in-flight food and drink service" (Lee, 2020 p. nd).

As the crisis unfolded, many airlines started moving towards introducing some elements of in-flight social distancing, compulsory temperature checks and demanding that passengers put on masks (Lee, 2020). Generally, the social distancing measures adopted by airlines sought to curtail social interaction between employees, employees and customers as well as between customers, with the aim of halting the elevation of potential risk to people. Without effective social distancing measures to stem or curtail coughing and sneezing in close proximity of others (Chaudhary & Maidment, 2020), airlines can potentially expose employees (in-flight crew) to the health risks stemming from the coronavirus outbreak. This was particularly relevant to the industry as the threat of virus transmission to the airlines' in-flight crew might force them to opt for self-preservation over customer/passenger care, thereby compromising their duty of care. Some airports also adopted similar measures to reduce interaction between people and restrict large gatherings at their premises to curtail the spread of the virus.

Figure 2: A Network Model of Effects of Social Distancing on Airline Business Model



Nevertheless, the social distancing approach recommended by many governments was "nearly impossible to accomplish on an airplane" (Hester, 2020, p. nd). In-flight attendants work in tight spaces (often within 6 feet of their and customers, i.e. the distancing recommended by US Centers for Disease Control and

Prevention), and make regular contact with passengers, pushing beverage carts up narrow aisles, reaching over customers to serve food and beverages and standing at arm's length from customers to perform mandatory safety demonstrations (Hester, 2020, p. nd). In addition, flight attendants generally do not possess the expertise of medical doctors and healthcare professionals, and are therefore incapable of dealing with in-flight medical emergencies associated with someone with coronavirus (Hester, 2020). The effects of social distancing on the global airline business model are reflected in Figure 2. Online Supplementary Appendix 3 provides examples of multiple airlines that adopted this approach during the crisis period.

Quadrant II: Externally imposed short-term responses

Quadrant II demonstrates a situation where a set of actions are imposed on the industry. Owing to the outbreak, a new directive was issued from WHO for the aviation industry and aviation personnel focused on the operational considerations to help halt the transmission of COVID-19. The proposed measures for in-flight and all personnel re-emphasised hand hygiene, social distancing, respiratory etiquette and seeking medical advice on suspected cases (WHO, 2020c). In line with WHO's *Guide to Hygiene and Sanitation in Aviation*, some of the operational responses emphasised enhanced cleaning and disinfection which covers airports and service providers (WHO, 2020c). In addition, it re-emphasised post-event cleaning procedures and disinfecting contaminated surfaces following notification of suspected cases (WHO, 2020c). In relation to prior analysis, the observation about in-flight social distancing was further buttressed when India's Directorate General of Civil Aviation (DGCA) suggested that airlines adopt in-flight social distancing by keeping at least one metre between passengers at airport check-ins and security counters as well as keeping the middle seats empty on flights empty to minimise contact between passengers (Indiatoday, 2020). For instance, in an attempt to avert second outbreaks in China, the government limited inter-China flights for both Chinese and foreign airlines by allowing just one flight a week and each flight was not to exceed 75% capacity (BBC, 2020d). The effects of the crisis are further demonstrated when in Europe, for instance, largely due to government-imposed measures, all but a few "essential routes" on domestic and neighbouring markets remain functional, largely to allow critical travel, cargo, medical supplies and repatriation of nationals (Dunn, 2020d). In March 2020, following the Australian government's guidelines and suggestions, Qantas and Jetstar suspended some scheduled international flights (Cirium, 2020d). For the Qantas Group, the grounding of around 150 aircraft reduced its international capacity by around 90% and domestic by 60% (Cirium, 2020d).

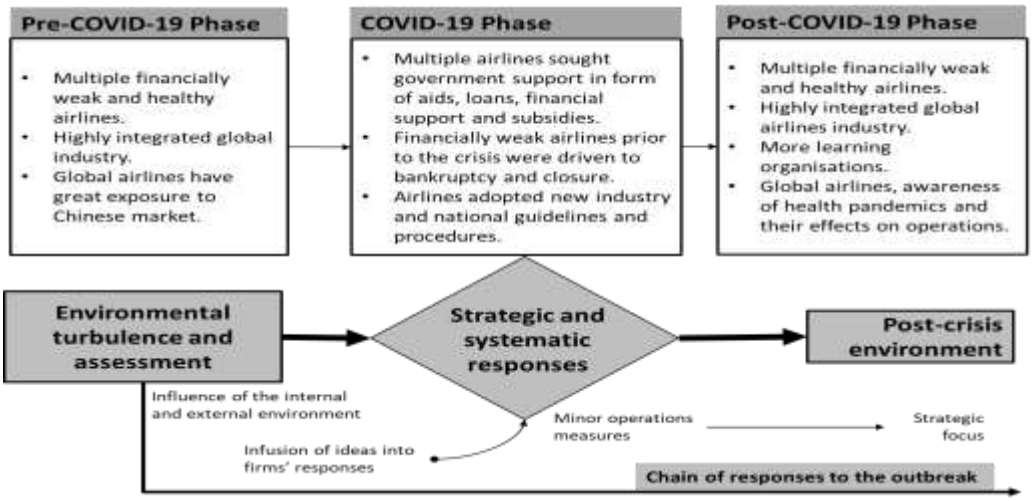
Quadrant III: Internally generated long-term responses

Quadrant III focuses on strategic and operational activities developed and employed by firms to respond to and prepare for the post-crisis period and recovery of services. In the past, most firms were assumed to be passive recipients of events in their external environment. However, it was observed that in the face of a partial or full lockdown in most nations, airlines engaged in corporate political activities where they engage with policymakers to enact the "rule of the game". Our analysis indicates that at the same time, many sought to lobby governments for aid packages to help them overcome the sharp decline in demand. Following the cessation of flights and governments' restrictions on flights, many airlines starting burning through cash reserves, further diminishing their financial positions and making failure more likely (Cirium, 2020f). Accordingly, some airlines such as Virgin Australia and Air New Zealand sought government financial support to help them overcome their predicament (Cirium, 2020f). As the industry group, the IATA made calls for support and cautioned of dire consequences facing the industry with global revenues from ticket sales falling as much as £215bn (BBC, 2020a, 2020b). To offset the negative effects of these dramatic changes culminating in loss of revenue, some airlines pursued cost-reductions via offloading workers, terminating affected routes and encouraging some employees to work from home. The state-owned, and one of the world's biggest long-haul airlines, Emirates, adopted measures such as a temporary 25% to 50% basic salary reduction for employees to help them keep highly skilled employees as well as minimise or avoid job losses (Cornwell, 2020; Klar, 2020). This was also designed to enable it to mobilise employees and resources swiftly to resume services for customers when conditions improve and the outbreak is controlled (Cornwell, 2020; Klar, 2020).

Quadrant IV: Externally imposed long-term responses

Quadrant IV demonstrates the wider and long-term effects of the imposition of action on firms and living through this post-COVID environment. Here, measures such as in-flight social distancing policies, government-mandated air travel restrictions and other externally imposed measures are key. Long-term consequences are predicated on the effects of short-term imposed directives and measures on the industry. In this direction, the International Air Transport Association in collaboration with the World Health Organization have developed guidelines to guide cabin crew and airport workers, e.g. captains are required to inform air traffic control of suspected communicable disease (IATA, 2020b). Indeed, the IATA represents around 290 airlines, accounting for 82% of overall air traffic, and develops industry-wide policies on pivotal issues. Figure 3 presents graphically the changes and shift from pre-COVID to post-COVID environment and firms' recovery strategy.

Figure 3: Phases of Changing Environment



4 Conclusion

In this research note, we set out to examine how airlines' have responded to COVID-19 and factors that facilitate, shape or constrain their responses. A unified conceptual framework was developed to capture the internally generated and externally imposed strategic and tactical responses over both the short and long terms. The study highlighted the host of factors that impinged on and shaped airlines' decisions and responses to respond to the threat such as government-mandated actions in terms of travel restrictions, quarantines and social-distancing schemes. The government-mandated and other external constraints curtailed firms' strategic investment and route network decisions, thereby altering the competitive positions of many airlines and further weakening already weak airlines and financially healthy ones. One notable innovation was the introduction in-flight social distancing into the airline business model with long-term implications in terms of in-flight arrangements, high-density seating and in-flight services. Taken together, in responding to the crisis, airlines sought to minimise the erosion of long-developed market capabilities, route networks, and prior relationship of trust with customers. From a practical standpoint, the analysis underlines the need for the aviation industry and governments to ensure that the new in-flight social distancing policies do not translate into expensive procedures that make quality in-flight arrangements and high-density seating difficult to achieve.

Limitations and directions for future research discussions

In interpreting the present study, one must bear in mind some notable limitations. First, it is worth pointing out that the crisis is ongoing and therefore the analysis only represents a snapshot of the current state of affairs and firms' actions. Thus, future studies could systematically examine the post-crisis and recovery strategies adopted by airlines. Second, the 2 × 2 matrix offers opportunity for future research to examine

the effects of different approaches among different types of airlines such as traditional legacy airlines and low-cost carriers. Future studies could also examine the effects of in-flight social distancing on the traditional hub-and-spoke and point-to-point networks, in-flight catering services, fleet utilisation and seat allocation. This is important given that in-flight social distancing has potential of curtailing high-density seating that typify short-haul services and some long-haul services. To stimulate a much deeper understanding of the effects of COVID-19 on businesses, future studies could pursue these fruitful avenues.

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ONLINE SUPPLEMENTARY APPENDICES

Online Supplementary Appendix 1: The Global Airline Industry and COVID-19

A useful way to view the global airline industry is through the waves of deregulations and liberalisations ushered in by governments around the globe, underpinned by the notions of limited government and limited intervention in industries and businesses (Amankwah-Amoah, 2015; Amankwah-Amoah & Debrah, 2010, 2011; Doganis, 2006). Despite the progress, the industry has faced many challenges including the severe acute respiratory syndrome (SARS) outbreak, the Global Financial Crisis of 2008, the September 11 attacks and the Ebola outbreak in West Africa. In the past couple of years, there has been a view that global airlines have successfully circumvented the negative effects of the Global Financial Crisis of 2008. However, between late 2019 and early 2020 the coronavirus outbreak emerged and spread from Wuhan, China to countries around the world. When the World Health Organization (WHO) noted Europe as being one of the epicentres of the COVID-19 pandemic in mid-March 2020, air travel was already under severe government restrictions (Dunn, 2020b). Firms in industries such as airlines, travel and retail that depend on consumer discretionary spending for success and even survival were heavily affected, with wider effects on the national economies (Hsu & Flitter, 2020). When China emerged as an integral player in the global economy, many of its cities also became more connected to the rest of the world. This was further exemplified by the fact that Cirium's data on schedules indicate that airlines offered 332,861 departing seats from Wuhan in January 2020, a twofold surge over the numbers for January 2010 and threefold from January 2003 during the SARS outbreak (Waldron, 2020).

Besides banning or curtailing large-scale people gatherings, the virus preventative measures curtailed or halted service-oriented businesses such as airlines and restaurants. There was a concern that many airlines would unknowingly carry infected passengers, thereby facilitating the global spread of the virus. Governments around the globe issued guidelines against not only travel to non-essential China but also international travel. As countries issued national stay-at-home orders and mandated the closure of most business premises, it became a public healthcare and strategic necessity for airlines to halt most of their operations. The wider impact surpassed the effects on the industry by the September 11 attacks. The International Air Transport Association (IATA) noted that worldwide revenues from ticket sales for the industry could decline by as much as $252bn (around a 44% decline compared with 2019) if the restrictions and travel bans persist for just three months (BBC, 2020b).

According to the IATA (2020a), the COVID-19 outbreak is expected to cost the aviation industry US$113 billion. Growing consumer, government and public concerns over COVID-19 prompted businesses to pursue a range of strategies geared towards maintaining their operations whilst addressing social concerns. For instance, by late March 2020, air traffic volumes in the UK had dropped 77% (a shift from 6,224 flights in March 2019 to 1,415 flights by 25 March 2020), 80% in Germany, 82% in France, 85% in Spain and 88% in Italy, with the few limited flights providing essential services such as medical supplies and equipment/goods delivery (NATS, 2020). These figures exemplify the severe impact of COVID-19 on air transport which are manifested in terms of the number of cancellations of booked trips and governments imposing travel bans, which culminated in around $113bn in lost sales noted by the IATA (The Economist, 2020d). The speed of change and all-encompassing nature of the effects have prompted a quest for a better understanding of how best to respond.

Online Supplementary Appendix 2: Additional Quadrant and Contextual Analysis

Code	Quadrant description and some key examples of some airlines	Summary of effects and responses
Quadrant I: Internally generated short-term responses	To further illustrate this quadrant, in March 2020, Air New Zealand proposed making empty seats between passengers obligatory (an element of its in-flight social distancing) as a means of helping to minimise transmission of the virus (Lee, 2020). This was intended as a confidence-building measure on the part of the airlines to protect their customers. Some airlines in the Asia-Pacific region took the lead with Air New Zealand in forcing some passengers to sit apart, and Cathay Pacific Airways and Virgin Australia also offered passengers the option of sitting next to an empty seat (Lee, 2020). Some airlines including American Airlines and United Airlines sought to implement some social distancing by not seating customers in middle seats where possible as well as allowing some seat changes upon request (Johnson, 2020; Amankwah-Amoah, 2020). Cam Wallace (https://twitter.com/CamWallace_NZ), Air New Zealand's chief revenue officer noted on their measures: *"Our commercial team are implementing protocols to ensure appropriate distancing on flights … The team are working on amending seat maps and implementing restrictions on sales for flights to allow distancing. This will remove significant seat capacity especially on regional services … The commercial team have implemented the distancing seating maps for domestic jet and regional services!".* Most major airlines sought to implement elements of social distancing by also limiting in-flight refreshments to minimise contact between employees and customers ((Johnson, 2020; Amankwah-Amoah, 2020). Some also encouraged customers to bring their own beverages and food. For carriers such as Delta Air Lines, the beverages on some flights were limited to bottled water depending on the journey length (Johnson, 2020). Similarly, the dual effects of the crisis were further demonstrated when other airlines such as Alaska Airlines offered the option of being able to cancel or reschedule a flight if your seat was not within a good social distance from other passengers. With regard to temperature checks, major Korean carriers and Taiwan's China Airlines and Eva Air indicated that travellers' forehead temperature would be taken and those with over 37.5 degrees Celsius or travellers objecting to being checked would be refused boarding, and during flights passengers had to wear masks other than when eating or drinking (Lee, 2020). The in-flight social distancing and other measures were internally designed but also influenced by the external forces to help airlines fortify their business or reduce the depletion of financial resources. It must be noted that the intent of governments financial support is often to provide stability and minimising the financial strains faced by the airlines. ***Termination and suspension of services*** Among the possible strategic options to address the crisis, most of the world's airlines opted to temporarily halt flights as the virus transmission unfolded due to the dwindling number of passengers and governments imposed border controls and restrictions (Dunn, 2020). In January 2020, Singapore Airlines announced a reduction in flights to cities such as Beijing and Shanghai Pudong, and SilkAir to cities including Chongqing, Chengdu and Shenzhen as the virus continued to spread and disrupt travel	In-flight social distancing, compulsory temperature checks and demanding that passengers put on masks. Intensifying disinfection of aircraft after landing. Institute remote working and facilitate working from home. Airlines suspend and cancel flights. Offloading temporary and permanent workers.

	in the country (Chua, 2020c). SIA's low-cost affiliate, Scoot, also suspended flights to China due to the weak market demand for air travel and the operational constraints imposed on airline businesses (Chua, 2020c). These approaches were not in isolation from the trend in the industry but simply mimicked what many airlines in the region and beyond adopted. Echoing this move, in January 2020, Air Canada announced the decision to suspend all direct flights to Shanghai and Beijing as the Canadian government issued guidelines against non-essential travel to mainland China (Cirium, 2020e). In a similar vein, in January 2020, Lufthansa Group also halted services to Shenyang, Nanjing, Beijing and Shanghai, and BA suspended flights to mainland China (Kaminski-Morrow, 2020b). When WHO declared the outbreak a Public Health Emergency (Chua, 2020c), other airlines followed suit, including Vietnam's VietJet, Air Astana, Air New Zealand (Auckland-Shanghai routes) and Indonesia's Lion Air Group, In January 2020, British Airways suspended services to mainland China following the UK government's Foreign Office mandate against all but essential travel to the country (Kaminski-Morrow, 2020a). Similarly, Virgin Australia temporarily reduced domestic capacity by around 50% and reduced international flights, all attributed to the travel restrictions stemming from the virus leading to reduced demand for air travel (Chua, 2020b). The waves of suspensions/cancellations continued in the subsequent months from January and extended beyond just inter-China routes to within regions/continental routes in Africa, Asia, Europe, Latin America and beyond. Some airlines such as Air Malta halted operations in line with the Maltese government's directive to end commercial air travel but the airline also sought to operate some services for humanitarian purposes (Cirium, 2020a). By early April 2020, 80% of flights across Europe were grounded (Dunn, 2020d). The magnitude of flights cancellations was further exemplified by the fact that the largest airlines in Europe (Air France-KLM, EasyJet, Lufthansa, IAG and Ryanair) were operating at around 90% reduced capacity (Dunn, 2020d). In the UK, for instance, airlines such as Virgin Atlantic and BA-owner IAG reduced capacity by 75% whilst elsewhere Norwegian Air and many other airlines cancelled numerous flights (BBC, 2020a, 2020b). Following WHO's declaration of COVID-19 as an international public health emergency, airlines across the globe suspended some services (Dunn, 2020c). Suspension of cancellations "rules" Although Canada allowed airlines to give travel vouchers rather than cash refunds for abandoned flights (The Canadian Transportation Agency, 2020), this prompted a call for the European Commission and UK governments to adopt a similar approach. Our review suggests that some cash-strapped European airlines lobbied to try to defer European Union rules that require airlines to provide a refund for cancellations within a week. They rather sought to issue vouchers to clients who were left out of pocket (Frost, 2020). Given some airlines were already flouting the refund rules, this was seen as an attempt by airlines to secure "interest-free loans" by keeping customers' cash (Frost, 2020). Although the European Commission rejected the call to loosen the requirements, some airline lobby groups such as Airlines for Europe (A4E) with airline members including EasyJet, Air France–KLM, Lufthansa and Ryanair, argued that they simply were not in a position to comply given their cashflow problems (Janzen, 2020). It is worth noting here that these "rules" are limited in scope in a sense that they can only be adopted and enforced when the respective governments mandate airlines to do so.	

Quadrant II: Externally imposed short-term responses	To further elucidate this quadrant, governments have proposed as means of helping airlines to overcome such challenges associated with forced cancellations of international flights (Harper, 2020). For instance, the Brazilian Civil Aviation Authority (ANAC) also temporarily waived the minimum 80% slot usage rule for firms, which helped to improve airlines' survival chances and help such emerging economies maintain a higher degree of air flight connectivity which is essential for development and recovery in the post-crisis period (IATA, 2020a). These were important steps given that aviation accounts for US$18.8 billion of its GDP, supports around 839,000 jobs and offers numerous city-pair connections (IATA, 2019). For instance, the Brazilian government adopted measures such as deferring payment of air navigation and airport concession fees by airlines and offered special credit lines to buttress airlines' financial positions (IATA, 2020a). In Australia, the government launched a $430 million relief package for the industry including fee waivers on aviation fuel excise and regional aviation security charges (Chua, 2020a). When the World Health Organization declaration emerged, the Allied Pilots Association (APA), acting on behalf of American Airlines' pilots, filed a lawsuit seeking cessation of flights to mainland China (Wolfsteller, 2020a, p. nd). In late January 2020, American Airlines suspended flights to China in light of the outbreak as the airlines' pilots also sued to halt services to China (Wolfsteller, 2020a, p. nd). Some airlines have adopted emergency measures to halt operations to reduce costs. ***Exit*** Another visible manifestation of the effects was that the crisis not only pushed vulnerable airlines towards bankruptcy but also airlines which were in a financially stable and healthy position before the crisis (Harper, 2020). In order to protect themselves in the wake of COVID-19, some airlines consciously opted to focus on averting bankruptcy in the short-term, but it was inevitable for some. One of the unintended outcomes was that coronavirus spread at such a rapid rate that it shifted a largely profitable industry from profitability into a negative territory (Walsh, 2020). No international airline was immune from the devastating effects of coronavirus's effect. Given that many airlines have borrowed heavily to acquire or lease planes which were grounded by COVID-19, the global industry needed around $200bn in state aid for many airlines to maintain operation (The Economist, 2020d). By January 2020, the standard airline had cash to cover just "between 50% and 80% of short-term liabilities and about two months of revenues … and three-quarters could not cover costs beyond three months" (The Economist, 2020d, p. nd). These situations left many airlines in a precarious situation of having to embrace cutting flights to many domestic and international destinations, and offloading workers. As industries such as tourism see a decline in the number of tourists (The Economist, 2020c), airlines have also witnessed a dramatic decline in the number of bookings and a surge in cancellations. This has further amplified by the good number of financially weak firms prior to the crisis. Subsequently, the outbreak brought some airlines to the brink of bankruptcy and even closure including Compass Airlines, US (Walsh, 2020). The flight restrictions and collapse in demand following the coronavirus outbreak further amplified the problems of UK-based struggling carrier Flybe, culminating in its collapse and	Government-mandated air travel restrictions. Imposed restrictions on group gatherings. Temporary closure of borders for non-essential travel.

	closure in March 2020 (Salaudeen, 2020). The decimation of the industry by the COVID-19 pandemic was further exemplified when Trans States Airlines collapsed (Wolfsteller, 2020b). The airline which serviced around 200 daily flights to 80 cities in North America was also affected by pilot shortage and consolidation in the industry (Wolfsteller, 2020b). Besides these, the pandemic also affected surviving firms' ability to maintain operations and secure bank loans (Hsu, & Flitter, 2020).	
Quadrant III: Internally generated long-term responses	To further explicate this quadrant, amid the global coronavirus outbreak and cancellations of passenger flights, some airlines such as Emirates maintained some important international cargo flight service with a focus on the future (Klar, 2020).Take the case of Qantas which cancelled many international flights and sent home most of its 30,000 employees to be able to recover quickly in the long term (Harper, 2020). In a similar vein, by late March 2020, Ryanair had reduced its capacity by 80%, Air France-KLM between 70% and 90%, Lufthansa Group was operating at just 5% of its total capacity and parking around 700 of its 763 aircraft (Dunn, 2020d). In a similar vein, Turkish Airlines also suspended all its international flights with the notable exception of five route services to New York, Moscow, Hong Kong, Washington and Addis Ababa (Dunn, 2020d). Most of the firms sought to maintain their expertise and resources with a focus on the future.	Firms halting new investments in aeroplanes, seeking funding and cancellation of orders. Airlines suspend and eliminate unprofitable routes. Non-market strategies (e.g. lobbying government for relief, subsidies, government-backed loans). Seeking short-term funding.
Quadrant IV: Externally imposed long-term responses	To further illuminate this quadrant, government-mandated social distancing measures are likely to impact airlines' seating arrangements and route connections in the long term. It is safe to say that the WHO *Guide to Hygiene and Sanitation in Aviation* should be further strengthened as pandemics are becoming a common occurrence. Given that many short-term responses were induced through government actions, directives and mandates, long-term survival chances would be rooted in organisations that are able to quickly mobilise and deliver quality services in the immediate post-crisis phase. The lifeblood of successful organisations in the post-crisis environment is likely to be innovation that delivers customers an assurance of safety and quality services, and addresses their social distancing concerns. The initial crisis response centred on minor operations measures whilst late responses were more strategic in their focus. Given that ticketed passengers unable to board their designated flights could pay a penalty and get on different flight, the revenue from the original booking become difficult to account for as having been obtained. This pandemic has triggered waves of governments across the globe issuing different guidance to their citizens against all non-essential travels forcing many ticketed passengers to cancel their flights leading to depleting of financial resources of airlines.	Wider adoption of in-flight social distancing policies by governments. All international airlines – industry-wide triggered responses and actions. IATA and WHO directives. Government-mandated air travel restrictions.

NB: sources used here are on the reference list

Online Supplementary Appendix 3: Summary of Airlines' Responses and Examples

Code	Responses	Examples of airlines
Internally generated	Seeking state-aid/government emergency loans and support.	• Major American airlines, Virgin Australia and Air New Zealand all sought government financial support.
	Corporate level- scaling back.	• Qantas Group deferred previously declared $112 million dividend pay-out and terminate its share repurchase initiative (Cirium, 2020d).
	Initial suspension of flights to routes to China.	• Some European and other airlines that announced flight suspensions in response to Covid-19 include LOT Polish, Poland; Czech Airlines, Czech Republic; SAS, Sweden; Air Baltic, Latvia; Lauda, Austria; TUI Airlines UK; Air Moldova, Moldova; La Compagnie, France; Air Dolomiti, Italy; Austrian Airlines, Austria; Volotea, Spain; Air Malta, Malta; Brussels Airlines, Belgium; Transavia France, France; Transavia Airlines, Netherlands; Jet2, UK, Luxair Luxembourg; Ryanair, Ireland. From Africa, airlines such as Rwanda Air and Air Mauritius also suspended services to China (Salaudeen, 2020) • Iberia, Air Canada; British Airways, Lufthansa, Qantas, Aer Lingus, Singapore Airlines; SilkAir; Scootetc. • In March 2020, South African Airways also cancel international services but maintained services on its domestic and regional route network (Cirium, 2020b).
Externally imposed	Bankruptcy/verge of bankruptcy as demand for services collapse.	• South Africa Airways (SAA) sought bankruptcy protection (Salaudeen, 2020). • Collapsed of Trans States Airlines (Wolfsteller, 2020b), Flybe in March 2020 (Salaudeen, 2020) and Compass Airlines, US (Walsh, 2020) all attributed to the pandemic.
	Initially reduced services attributed to government-mandated travel restrictions and decreased consumer demand.	• Airlines citing these factors included British Airways, Delta Air Lines, KLM, Qantas, American Airlines, South African Airways, Ryanair, EasyJet, Cathay Pacific, Singapore Airlines and United Airlines
Internal and external	Cancellation and temporary layoff including cabin crew, pilots, administrators, maintenance employees.	• In March 2020, British Airways proposed to suspend 80% of ground handling staff, cabin crew, engineers and employees at its head office. • Norwegian Air (around lay off 7,000 staff); Scandinavian airline SAS (lay off around 90% of workforce); American Airlines offered employees option for voluntary leave and early retirement.

Data sources: synthesised by the authors from: Puhak, 2020; Harper, 2020; BBC, 2020a, 2020b, c; Puhak, 2020; Dunn, 2020a; Kaminski-Morrow, 2020b; Cirium, 2020a-d; Salaudeen, 2020.