Aviation Strategy

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Aviation 2022 and beyond: Survey Results

WITH THE end of the Covid-19 pandemic, and for a bit of fun we decided to poll our readers on their (*your*) views of the short- and medium-term prospects for the airline industry. That was before the grim reality of Russia's invasion became apparent. Nevertheless, the survey provided some very interesting insights from a good 30% response rate.

As in all good surveys the first question was an easy one, and kept deliberately vague: *"When do you expect global passenger traffic to recover to pre-pandemic (ie 2019) levels?"*. The results (see chart below) were not totally suprising: the majority (57%) plumped for 2024 as the recovery year; 20% a bit more optimistically suggesting 2023; and 24% more pessimistically thinking 2025 or later.

But with the diversity of individual countries' reactions to the health crisis in different parts of the world, and continuing restrictions on travel, it is apparent that potential recovery in airline fortunes varies by region.

So, for the second we asked the same question but focusing on 12 key regional markets: Intra-European (including domestic), Europe-Asia, North Atlantic, South Atlantic, Intra North America, USA-Latin America (inc Mexico), Trans Pacific, Intra-SE Asia (inc Indian sub continent), China Domestic, China International, Intra NE Asia (Japan, South Korea), and NE Asia International.

The results, shown in the charts on the next page, are mixed as expected but follow the general theme that short-haul will recover faster than long-haul; and that the more mature American and European markets will recover faster than those of Asia.

Over half (57%) of the respondents reckoned that the intra-North American markets would show full recovery in the current year with only a few die-hard pessimists delaying recovery to 2024 or beyond. 75% believe that short haul intra-European (which is a quasi domestic market) and Chinese domestic would show recovery in either 2022 or 2023. Intriguingly the majority also think the the transatlantic market will return to pre-pandemic levels by 2023, with another optimistic 11% hoping for 2022.

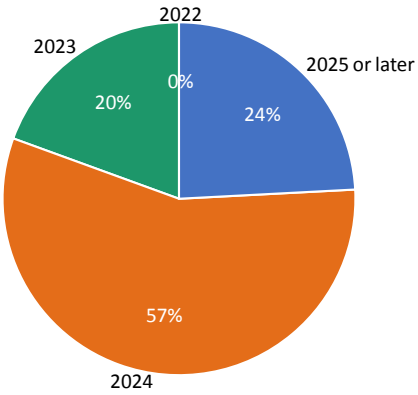
We invited comments, some of which were:

"All these answers depend on one's assumptions about the emergence of new strains of COVID. I assume that we will still have to deal with the pandemic/epidemic, but there will be no new major shocks causing major economies to close down again. I appreciate that this might be optimistic."

"Whilst travel restrictions are slowly being reduced governments

This issue includes

1) When do you expect global passenger traffic to recover to pre-pandemic (ie 2019) levels?



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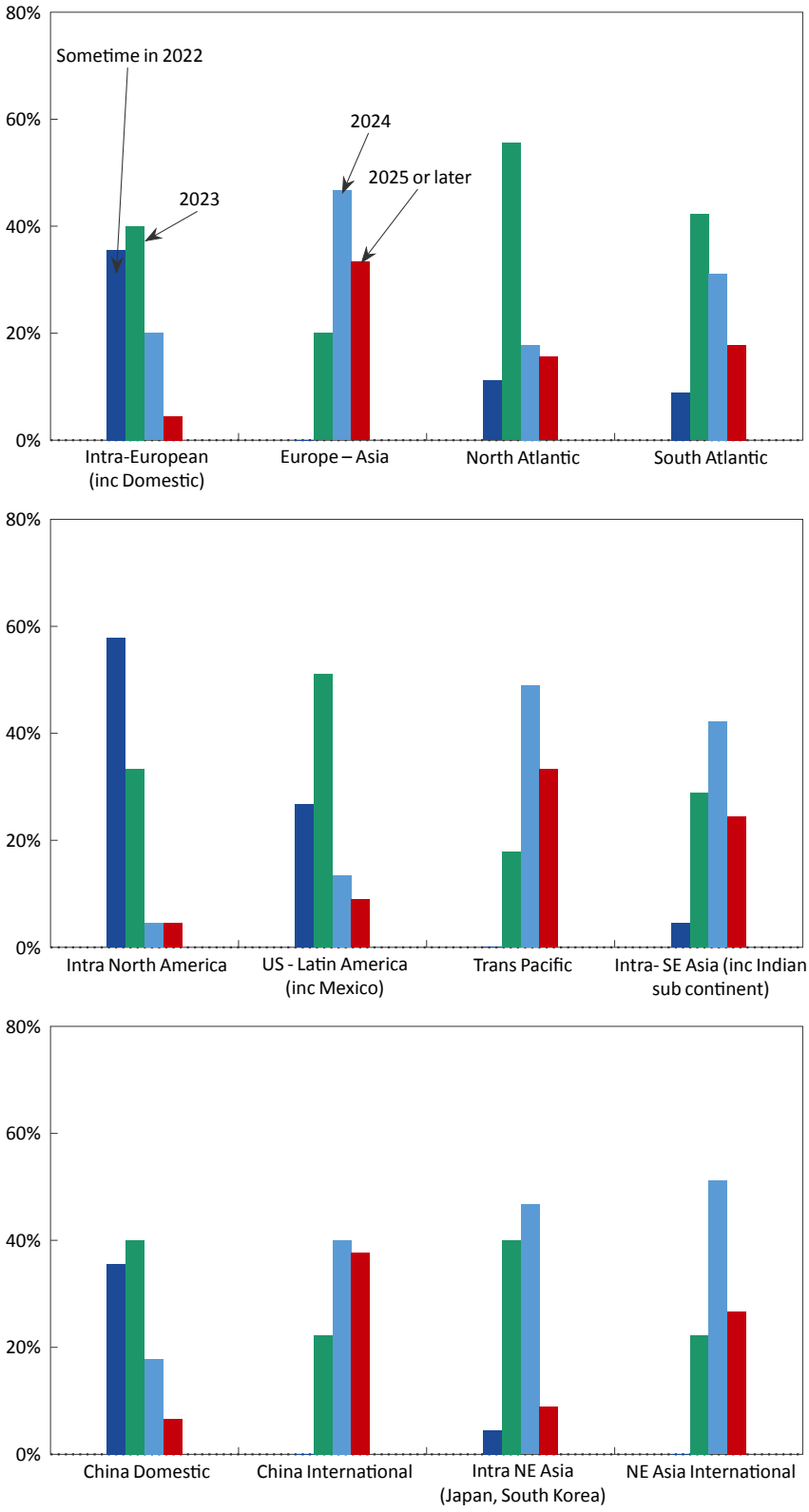
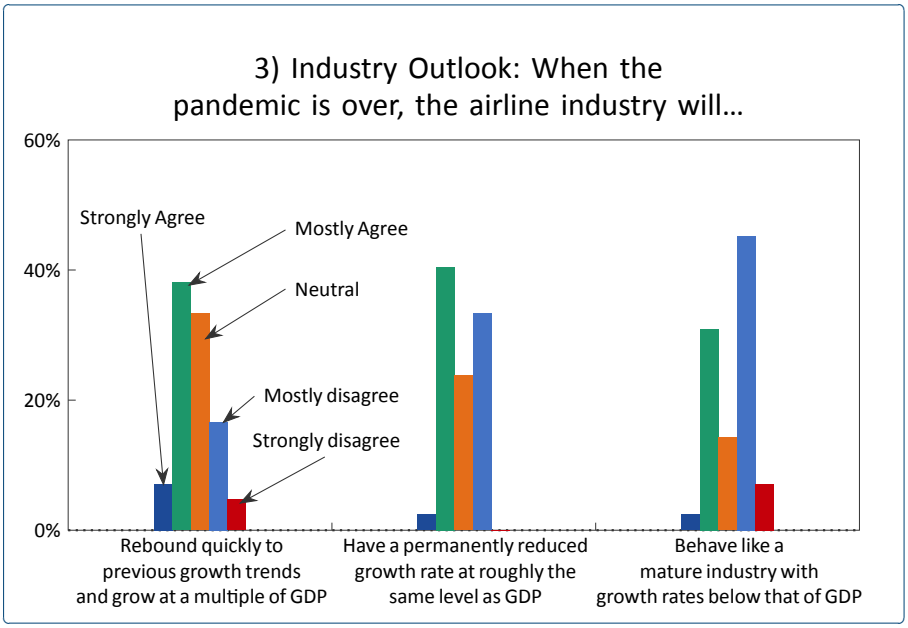
2) Focusing on some key regional markets, what is your view on recovery to pre-pandemic traffic levels?





are not making it easy for passengers to have confidence on the clarity of what restrictions remain in place and therefore the ability to travel freely across borders, this will significantly impact the return of travel."

"UK to EU leisure travel bookings for 2023 for my company are showing higher than 2019 at the moment."

"China opening up timescale is the really big unknown. Look at what is happening in HK!", and *"China is the biggest outlier in recovery, until it decides to live with COVID".*

And, the depressingly logical:

"Internal flights are flying to and from the same COVID restrictions and therefore subject to less stringent rules and therefore should return first but some governments have sought to promote rail connectivity forcing nations to reduce these routes. Due to the ongoing pandemic until every nation is vaccinated and the virus under control the number of nations where restrictions are lifted on international flights will continue to be limited. The Pandemic has opened business eyes up to the savings and potential of virtual meetings so business flights will be slower to return. Consumer confidence will take time to recover through fear that the passenger will become stuck down route. Hence the delay till possibly 2030 or even later before we return to 2019 levels."

Post-pandemic

For the third question we considered the possibility that in the post-pandemic environment the airline industry may exhibit changed economic drivers, and asked people to rate three propositions: that *When the pandemic is over, the airline industry will…*:

- Rebound quickly to previous growth trends and grow at a multiple of GDP;
- Have a permanently reduced growth rate at roughly the same level as GDP;
- Behave like a mature industry with growth rates below that of GDP.

To be fair, there is a lot more behind this question than just whether there will be a return to the *status quo.* The imposition of tight security controls following 9/11 may have had a dampening effect on propensity to travel — but the industry continued to grow at around twice the level of GDP for the following 20 years. After the pandemic, health controls and border restrictions may stay. The question of climate change is rising up the agenda in (western) public consciences and ESG controls are being imposed on the corporate world. Airlines themselves may be constrained by excessive levels of debt. Responses would depend on underlying assumptions of these among other influences.

The results are shown in the graph above. Just under half indicate that either the former GDP to traffic multipliers will return or the new relationship will be more like one-to-one. A third tend to suggest that air traffic growth will be curtailed.

Our fourth question looked at the outlook for the various airline business models — the ULCCs, LCCs, network carriers and niche airlines — asking which would gain or lose market share (see graph on the next page for the results).

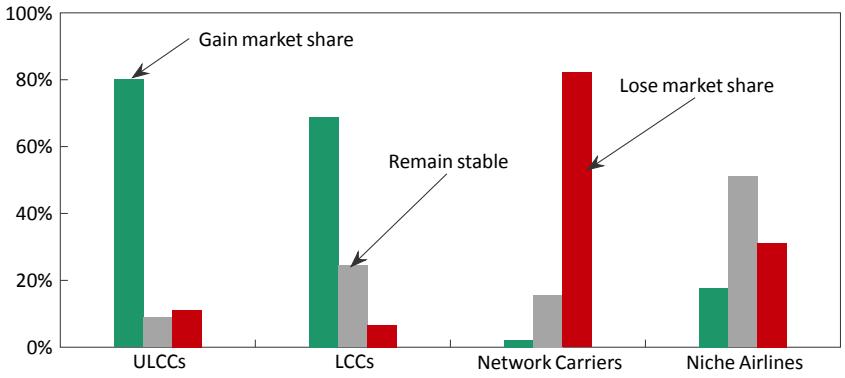
Unsurprisingly, 80% of the respondents thought that the ULCC operators would gain and the network carriers would lose. There was slightly less enthusiasm — at 69% — for the traditional low cost carriers winning. The thoughts on the prospects of niche carriers appeared neutral — possibly showing that no-one really knows what a niche carrier is.

Segments

A recurring topic in the past two years has concerned business traffic: will it ever come back? (But then this has been posed after each cyclical downturn in the past forty years). For the fifth question in the survey we asked the respondents to rate various contentious statements on the subject:

- It will return to pre-pandemic levels after a couple of years;

4) In the short/medium haul markets (up to 6 hours) do you expect the following airline models to gain market share, lose market share or remain stable over the next five years



✈ The market has changed fundamentally because of technical changes (Zoom etc);
✈ Corporations will significantly curtail business travel because of ESG considerations;
✈ If revenue from Business travel does significantly reduce, airlines will have to push up Economy class yields substantially.

On the first point views were fairly evenly matched (see graph below for the results) with 31% mostly agreeing, 12% neutral, and 35% mostly disagreeing with the idea that the market would return to normal after a couple of years, although 17% strongly disagreed with the assertion.

However, a majority (71%) agreed that the market had fundamentally changed because of technical changes in the pandemic and 60% agreed that corporations would cut back business air travel for ESG reasons.

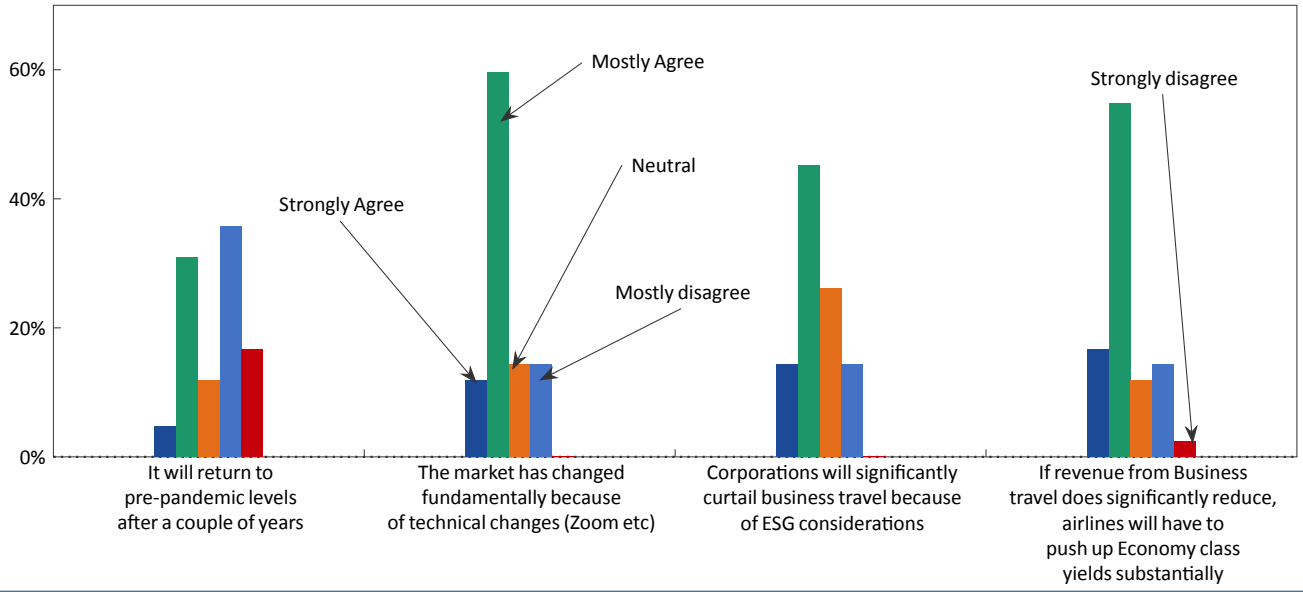
The fourth point possibly caused some head-scratching — after all airline finances are a fine balance between revenues and costs — but 71% strongly or mostly agreed that economy yields would have to rise.

Again we offered the opportunity to comment:

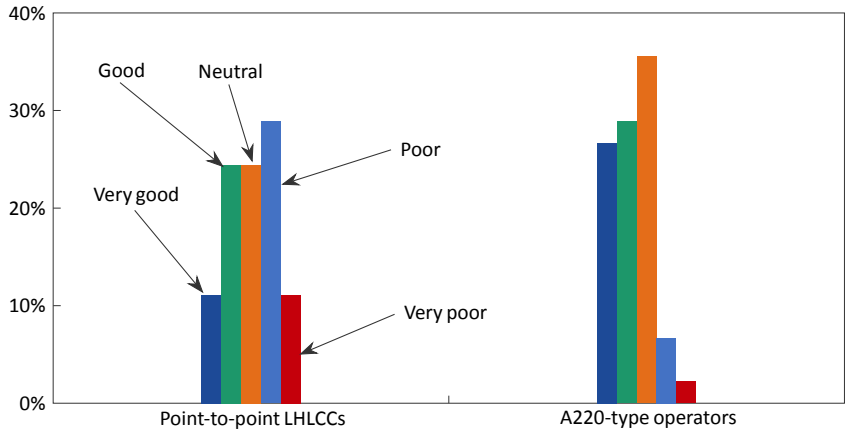
"Corporates have become used to the cost control they have with reduced Business Class travel and also gives them some 'greenwashing' credibility in their ESG statements."

"Technical innovations like Zoom have improved worker productivity allowing the individual to make two or more international meetings a day and hence reducing transport and accommodation costs. As a result it is only where there are conference style arrangements where the majority of business is done outside the meeting room where it may still pay to fly

5) Business Travel: Long-haul Business travel has been particularly hit hard in the pandemic, and there is uncertainty as to when and how it will resume. Please rate the following statements



6) New entrants. How do you rate the prospects for the following new entrant types?



a representative to a meeting. With the additional pressure to be more sustainable too, companies will also fly people in economy or use trains where they can to reduce the carbon footprint. Therefore, the business and even 1st class passenger sector numbers will take longer than most sectors to recover."

"Can't push yields without cutting supply and operating deleverage. Cost will need to take the slack."

"Business travel as a share of total travel has been declining since before covid. Covid has accelerated this trend. The legacy model will be under tremendous pressure over the next decade as legacy airlines struggle to adapt to a new demand landscape."

"All else being equal, leisure travellers will be likely to have to pay more. However, with single-aisle airplanes breaking into the lower-end of long-haul markets that are dominated by widebodies, the fare increase probably is not that much."

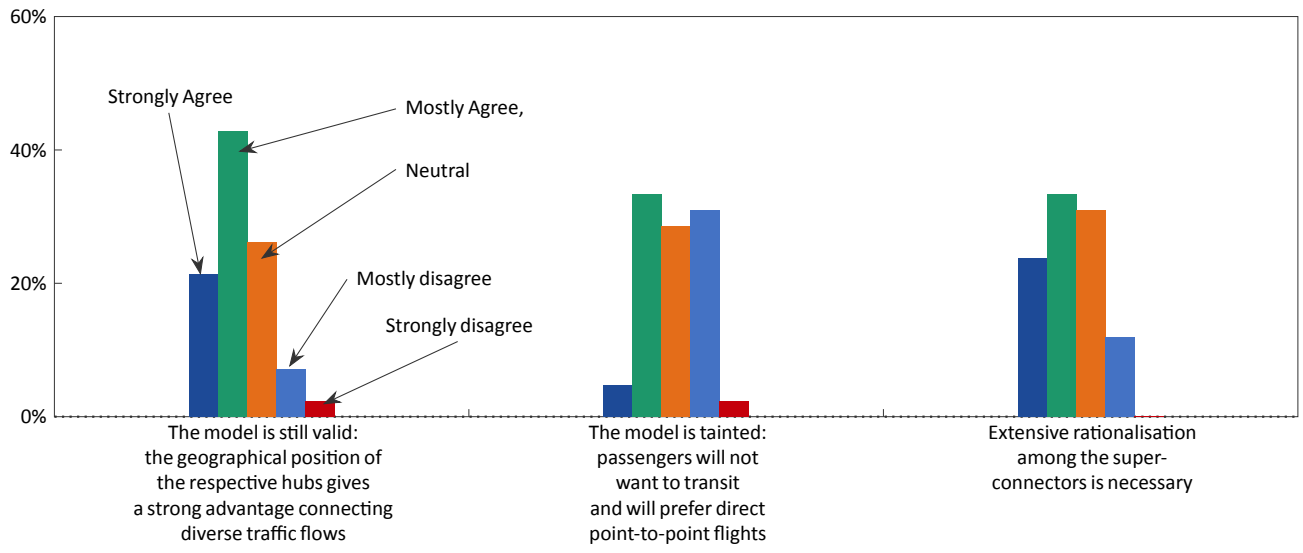
The sixth question was on the prospects for new entrants. Perhaps surprisingly, over a third of responses were optimistic about long-haul LCCs. Over half were optimistic about A220-type operators.

For our seventh topic we turned to the superconnector model — Emirates, Etihad, Qatar and Turkish — which had been a major innovative force in the last cycle. We asked for a rating on the following statements:

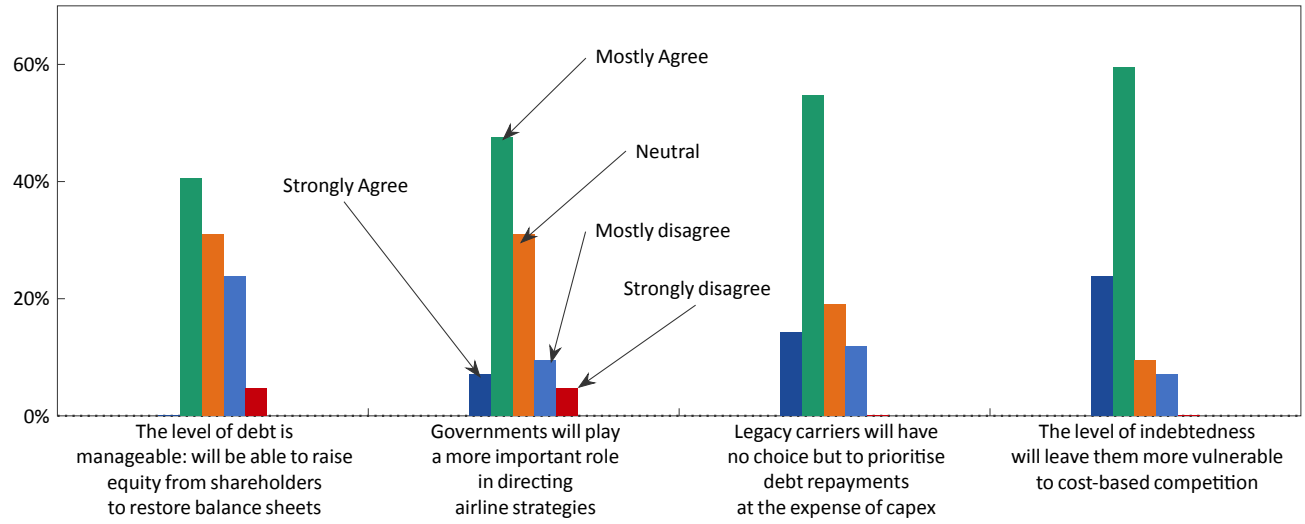
- ✈ The model is still valid: the geographical position of the respective hubs gives a strong advantage connecting diverse traffic flows;
- ✈ The model is tainted: passengers will not want to transit and will prefer direct point-to-point flights;
- ✈ Extensive rationalisation among the super- connectors is necessary.

For the first assertion the respondents overwhelmingly seemed to believe (64% agreeing and 26% unde-

7) The super connector model (Emirates, Qatar, Etihad, THY) was a major innovative force in the past cycle. What is your opinion on the following statements?



8) Legacies and Government support: Legacy airlines have received huge cash injections in the form of equity and debt during the pandemic. What is your opinion on the following statements?



cided) that the model continues to be valid — and that Emirates will regain its position as "the world's favourite airline" (defined by British Airways in the 1980s as the airline flying the most international RPKs).

However, the second point obviously caused some consternation — a third each sort-of agreeing, neutral, and sort-of disagreeing that passengers would shun transfers through mega-hubs. The jury is presumably still out.

A majority (57%) agreed that rationalisation is necessary. Etihad already scaled back ambitions before the onset of Covid, so that leads to thoughts of which of Qatar or Emirates will break first — a combination would be geo-politically unthinkable.

Governments and Legacy Carriers

The eighth question tried to garner views on the way forward for the traditional legacy network carriers. Again we asked for a ranking of a series of statements in the light of the assertion that legacy airlines had received huge cash injections in the form of equity and debt during the pandemic:

- The level of debt is manageable: will be able to raise equity from shareholders to restore balance sheets;
- Governments will play a more important role in directing airline strategies;
- Legacy carriers will have no choice but to prioritise debt repayments at the expense of capex;
- The level of indebtedness will leave them more vulnerable to cost-based competition.

All these statements are unashamedly pointing in the same direction. The answers (see graph above for results) to the first statement was inconclusive but veering on the "agree" (with a highly sceptical 5% strongly disagreeing). It was interesting to find that a majority (55%) believed that governments would play an increased role in strategy with only 13% disagreeing. However 69% agreed that the legacies will be forced to concentrate on restoring balance sheet health at the expense of expansion and 83% that this makes them more vulnerable to (new-entrant, point-to-point) lower cost competition.

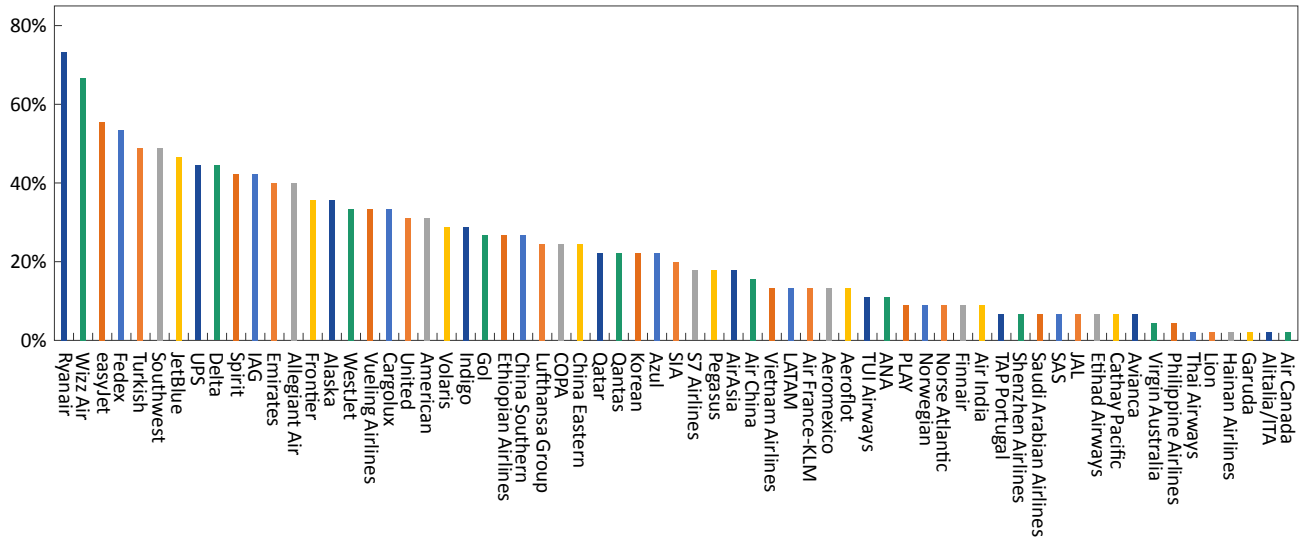
Winners and Losers

The next two items in the questionnaire asked respondents to mark any of 65 airlines who were deemed to be winners (likely to come strongly out of the pandemic) and losers (those most seriously impacted by the crisis).

The list of carriers was generated from the top airlines by numbers of seats operated pre-pandemic, bolstered cheekily by a few few post-pandemic entrants.

It was a multiple choice question so the percentages (in the winners chart on the facing page and losers chart on the next page) reflect the proportion that voted for a particular airline out of the total responses.

9) Winners: Which of the following airlines are likely to recover strongly from the pandemic?



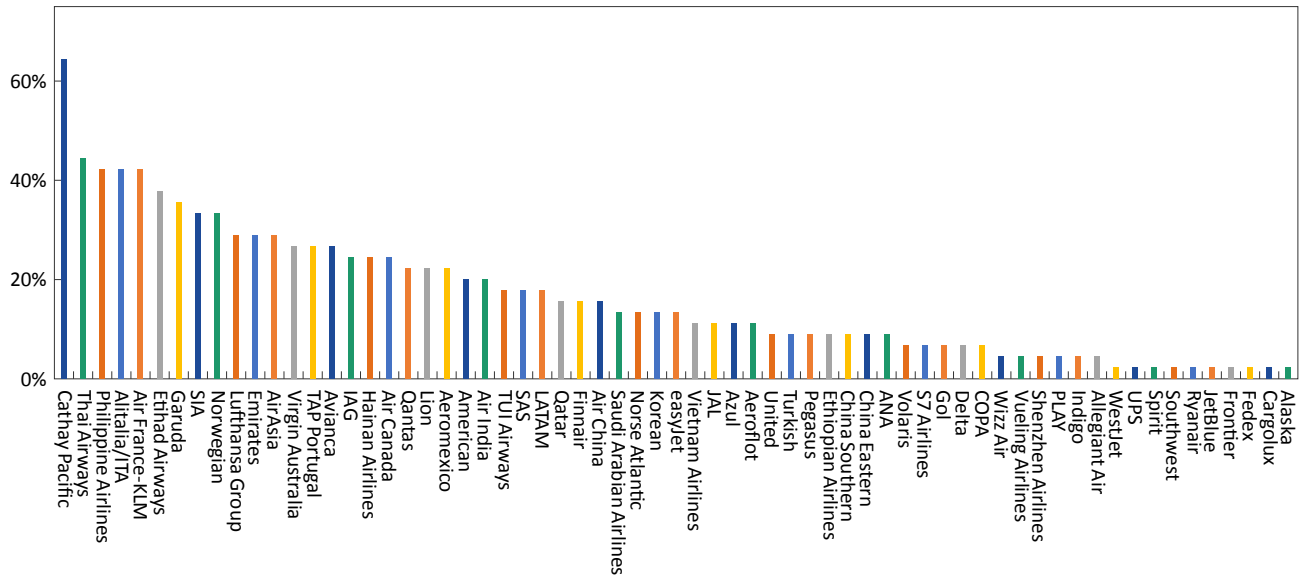
Perhaps reflecting a European focus of the respondents, the top of the winners' ranking features ULCCs Ryanair and Wizz with LCC easyJet a close third. Interestingly Fedex, benefiting from the home shopping boom, and Turkish each are ranked above Southwest and JetBlue; and Delta and IAG are ranked at 9th and 11th position respectively, sandwiching Spirit.

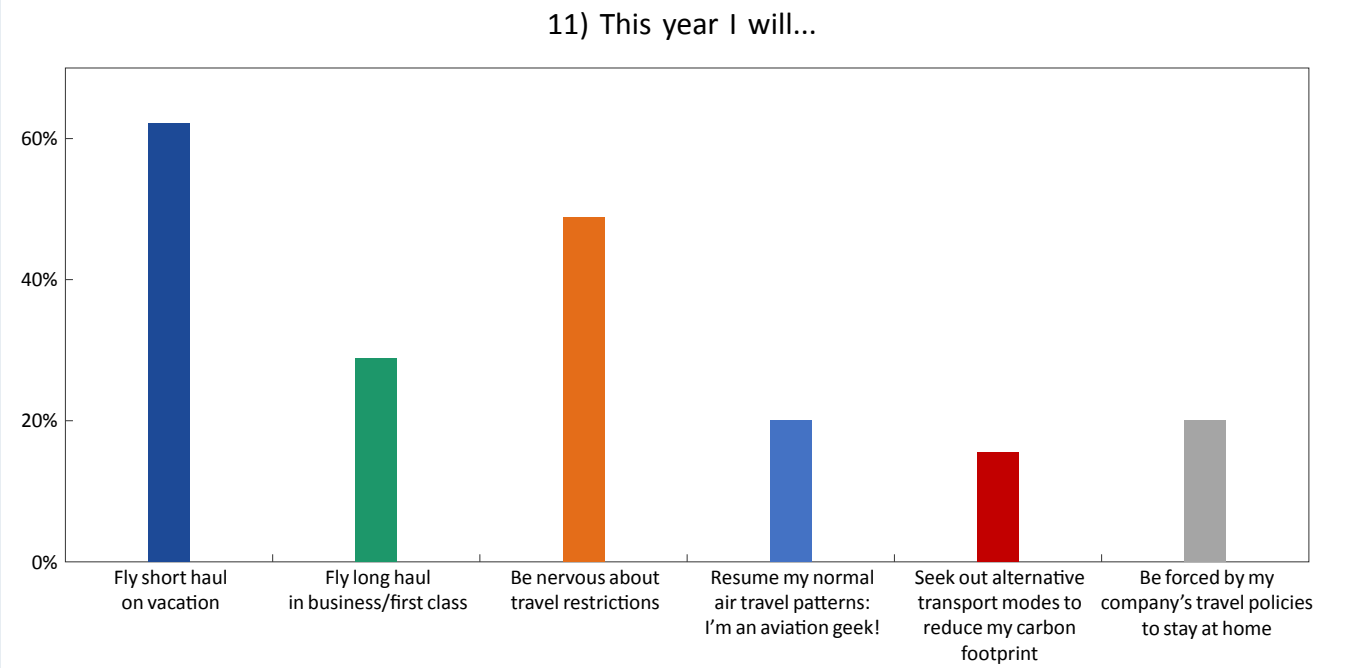
In contrast the losers' board is spearheaded by Cathay Pacific, beleaguered by Hong Kong's attempt to kowtow to China's zero-covid policy, followed by Thai, Philippines, Alitalia, Air France-KLM and Etihad. Lufthansa appears in tenth position.

There were many interesting comments:

"There are a significant number of 'marginal' carriers out there and are very vulnerable to attack by the key Super Connectors and the well established LCCs. There is likely to be signif-

10) Losers: Which of the following airlines have been most seriously impacted by the pandemic?





icant airline failures"

"Successful airlines need either great demographics (Latin America, Vietnam), low costs (Frontier, Spirit, Wizz) or unique situations (Turkish — much better demographics and better geography than EK etc)."

"The winners will be low cost and those with the backing to swallow or drive out competition (eg Wizz/Indigo partners)... the losers, legacies with big debt, and those whose business model was maybe going the wrong way (eg easyJet targeting business travel from hubs)."

"Basically Asian carriers worst hit because so many markets cut off by governments for so long."

Personal plans

The final question we posed was a light-hearted look at personal travel plans, with the respondents asked to choose as many statements proposed (out of six) that they thought applied to them, each preceded by the phrase "This year I will... ".

✈ A healthy 62% said that this year they would fly short-haul on vacation;

✈ Just over a quarter (29%) stated that they would fly long haul in business or first class. (We are not quite sure how to interpret this response, but given the general background of our readers, this may be a bit lower than normal.)

✈ Nearly half (49%) are still nervous about travel restrictions: the idea of travelling for 12 hours wearing a face-mask to find when you reach your destination that the rules have changed and you have to go into quarantine is not exactly encouraging.

✈ However, 20% responded positively to the statement "I will resume my normal travel patterns. I'm an aviation geek!". One commented: *"Where good deals are available in the coming recovery phase post pandemic I am likely to take advantage of competitive pricing and travel more than I might have historically*".

✈ In contrast 16% agreed they would seek out alternative transport modes to reduce their carbon footprint (and this from aviation-focused professionals!);

✈ and, 20% would be "forced by my company's travel policies to stay at home". (This may explain why the long haul response was low.)

Final comments from participants ranged from the positive (as above) to the pragmatic — *"risk exposure to covid exists everywhere... need to manage the risk and live with it*" — to the sad — *"personal finances have been hit by the pandemic and government taxation plans reducing my vacation possibilities as well*".

The most plaintive was *"I would fly short haul on vacation if I didn't have a young child*".

A big "thank you" to all who particpated.

Mexico and the success of the globalised ULCC model

THE PANDEMIC has rationalised the Mexican airline industry, leaving it with two dynamic ULCCs — Volaris and Viva Aerobus — and one full-service carrier about to emerge from Chapter 11 bankruptcy — Aeroméxico.

Mexico shut down most of its domestic capacity in April 2020 in response to the first Covid-19 wave, the US imposed severe restrictions on travel between the two countries, and other important trading partners like Argentina, Brazil, Colombia, Chile, and Canada completely closed their borders to international travel. Overall, 2020 domestic traffic was 50% down on 2019, international traffic by almost 60%. But markets have been reopening since the spring of 2021, and last year traffic rebounded by 60% domestically and 76% internationally, By the end of the year traffic volumes were strongly up not just on 2020 but also 2019.

The Mexican government provided no direct state support to the airline industry during the pandemic. As a result the structure of the Mexican industry has been radically changed. The two ULCCs have increased their share of the domestic market from 51% in 2019 to 71% by the end of 2021. Aeroméxico marginally increased its share to 26% but only because of the exit of smaller airlines from the market. Internationally, the two ULCCs now have 15% of the market (Mexican and foreign carriers) against 8% in 2019, surpassing Aeroméxico whose share has fallen from 16% to 11%.

Interjet, which was almost as large as Volaris in 2017, went out of business in early 2021. The pandemic was the immediate cause of its bankruptcy, but the airline had been in difficulties for some time, its LCC-model being squeezed by the ULCCs. Moreover, Interjet's investment in Sukhoi SuperJets proved to be a false economy. The unit prices were apparently very low but by mid-2019 15 of Interjet's 22 SSJs were out of service, with Sukhoi unwilling or unable to pay for repairs to the PowerJet engines and provide a regular supply of parts — a Soviet-era characteristic.

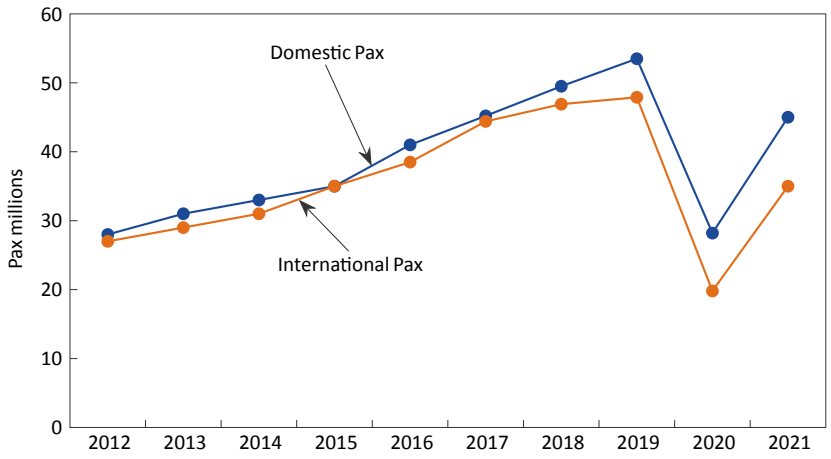
The three remaining Mexican carriers are emerging from the crisis with various expansionist strategies but in an uncertain economic climate; 2020 was dire, with real GDP plummeting by 8.3% but there was a rebound of around 6% in 2021 and the OECD forecasts continuing growth of over 3% pa in 2022 and 2023. The president since 2018, Andrés Manuel López Obrador (known by his initials AMLO), continues to pursue a strong anti-corruption stance, but has come under increased criticism for his handling of the economy. One of his policies is to always fly in Economy class.

His major intervention in the aviation sphere was to cancel the new six-runway Mexico City airport initiated by his predecessor, which was about one third constructed and was going to cost $13bn. Instead, a former military airport at Santa Lucia has been converted to commercial use specifically for low-cost operations and is due to open this spring, complementing the congested Benito Juárez International Airport.

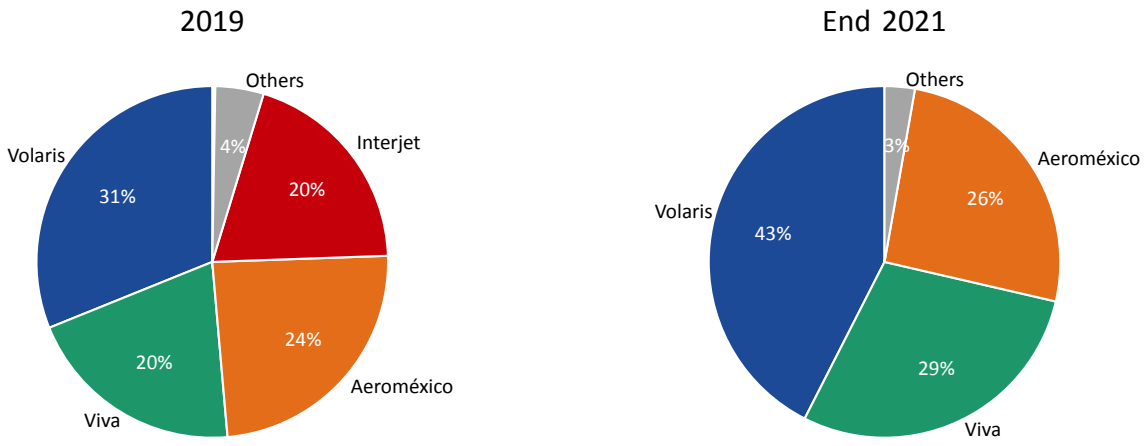
Aeroméxico's transformation hopes

Aeroméxico entered 2020 in a weak state, just about breaking even at EBIT level. After two months of Covid-19 the airline had burnt through almost all its cash reserves and its net as-

MEXICAN TRAFFIC: RECOVERY FROM PANDEMIC



DOMESTIC PASSENGER MARKET SHARES

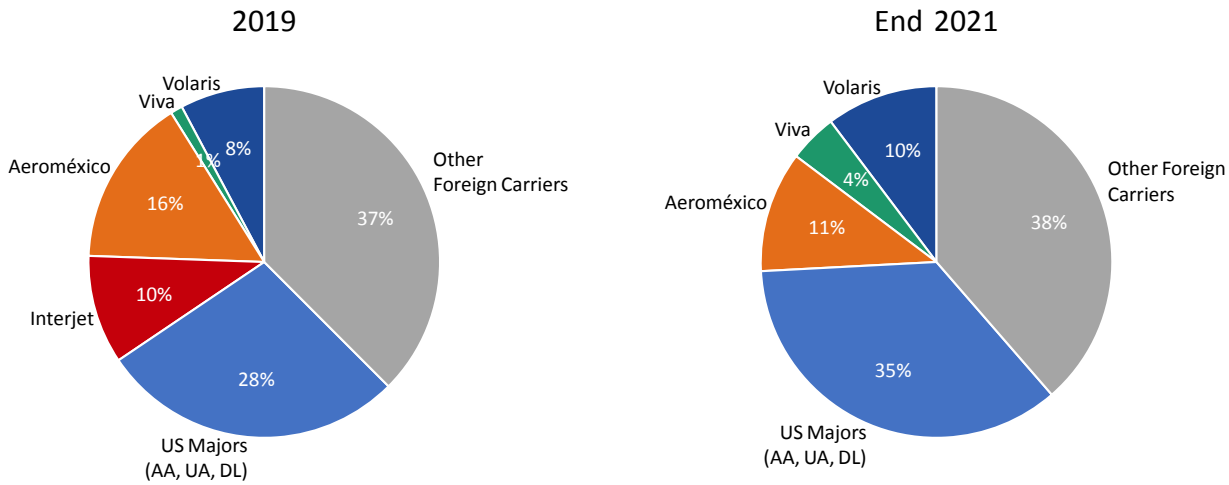


set value was negative to the tune of -$1bn. Delta, which owned 49% of the carrier, was unable to support its Mexican partner, having itself received sate aid under the CARES Act. Aeroméxico declared Chapter 11 in June 2020, with CEO Andrés Conesa claiming that the Chapter 11 process would be used to re-invent the airline, cutting its cost base, terminating leases and switching to Power by the Hour contracts, and rationalising its fleet from 122 aircraft to 86 units.

Aeroméxico attracted a Debtor-in-Possession (DIP) investor — the New York-based private equity giant, Apollo Global Management, which has agreed a loan of $1.1bn to be delivered in tranches of $100m. Then in November 2020 Delta purchased from Apollo part of the DIP debt in a deal whereby Delta and Apollo and acquired the right for the two entities to convert debt into equity in the reorganised Aeroméxico.

In 2021 Aeroméxico reported a net loss equivalent to US$940m (over half of which was accounted for by "restructuring costs") on revenues of $2.3bn, leaving the balance sheet with negative equity of $(2.7)bn. The Chapter 11 reorganisation plan, approved by US and Mexican courts at the end of January, envisages Aeroméxico emerging from Chapter 11 with a cleaned-up balance sheet due to conversion of the DIP debt to equity, renegotiated lease obligations and a new equity raise. The

INTERNATIONAL PASSENGER MARKET SHARES



end-2022 balance sheet is projected to show positive equity of $156m. Delta is expected to have about 20% of Aeroméxico's equity, down from 49% pre-Chapter 11, and Apollo would hold about 22%.

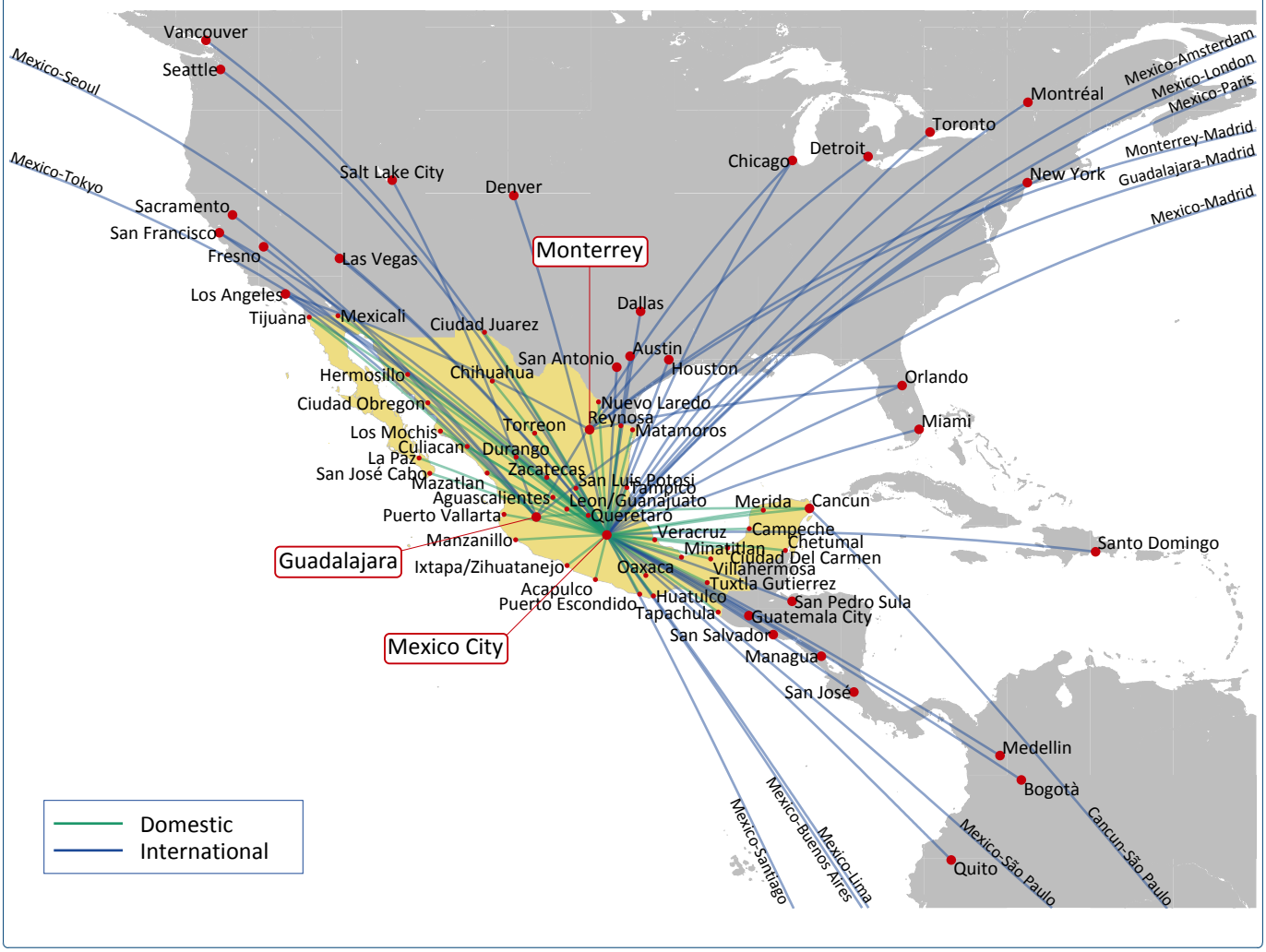
Details on the airline's post-Chapter 11 strategy are skimpy, apart from differentiating itself from the lower-cost competitors. The reorganisation plan stated, somewhat unimaginatively: "Aeroméxico expects to be the airline of choice for business and leisure customers by offering a best-in-class customer experience on the ground and in the air".

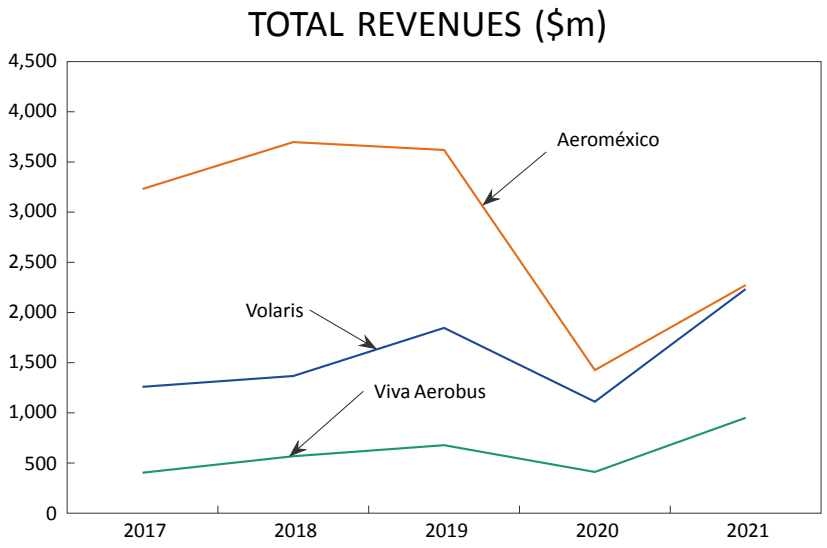
The outline operating plan and financial projections were published in November last year and show Aeroméxico nearly doubling his passenger volume from 17m in 2021 to 32m in 2025 alongside growth in the fleet (including Aeroméxico Connect) to 154 units from 133 today. Break-even at EBIT level is forecast for this year, with margins rising to around 14% in 2024/25. All this depends on an increase in average yield while unit costs are held more or less steady.

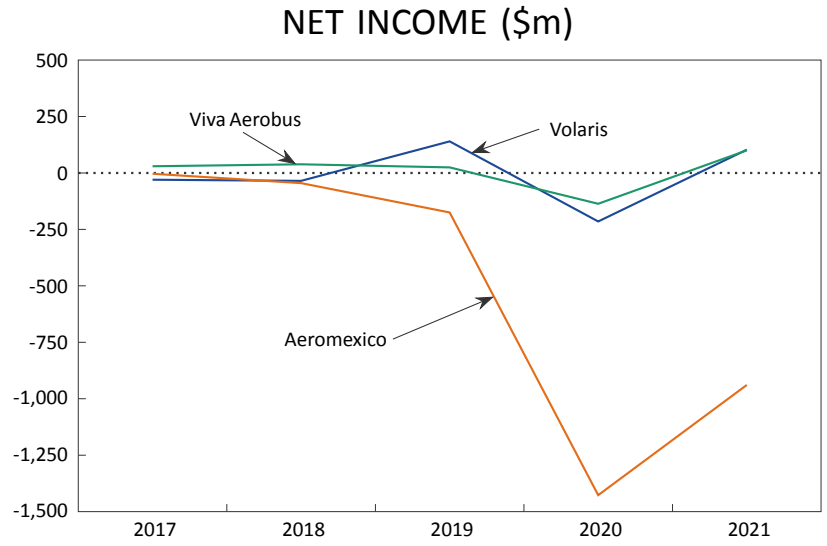
The achievements of Volaris and Viva Aerobus

Volaris has been listed on the Mexican Stock Exchange and the NYSE since its IPO in 2013, with Indigo Partners, the founding entity, retaining a minority stake. It is perhaps surprising that it is probably the highest rated airline stock in North America. Of the 11 US analysts that follow Volaris, eight have "buy" recommendations and three "hold". Veteran US airline analyst Michael Derchin, in his independent newsletter, puts Volaris at the top of the list of his ten worldwide stockmarket-listed airlines.

AEROMEXICO ROUTE MAP







BALANCE SHEETS

At end Dec 2021 ($m)	Aeroméxico	Viva Aerobus	Volaris
Fleet (inc Right of Use) Assets	3,025	1,022	2,372
Current Assets	315	531	875
Cash	*1,000*	*452*	*741*
Total Assets	**4,340**	**2,005**	**3,988**
Long term debt and lease liabilities	2,100	1,215	2,128
Current liabilities	4,970	659	1,543
Total Liabilities	**7,070**	**1,874**	**3,671**
Shareholders' Equity	**(2,730)**	**131**	**317**

Volaris' 2021 financial performance was impressive compared to pre-pandemic 2019. Total revenues were up 29% to the equivalent of US$2.2bn while adjusted net profit rose to $194m (the adjustment refers to the exclusion of a $88m non-cash loss related to the winding down of a derivatives position; Volaris has announced that in future it will account in US dollars rather than Pesos, partly to avoid such adjustments.) The adjusted net profit margin of 8.7% for the year is claimed by the company to be one of the highest in the global airline industry, and was achieved through a combination of 13% increase in unit revenue (TRASM) and a zero change in unit costs (CASM).

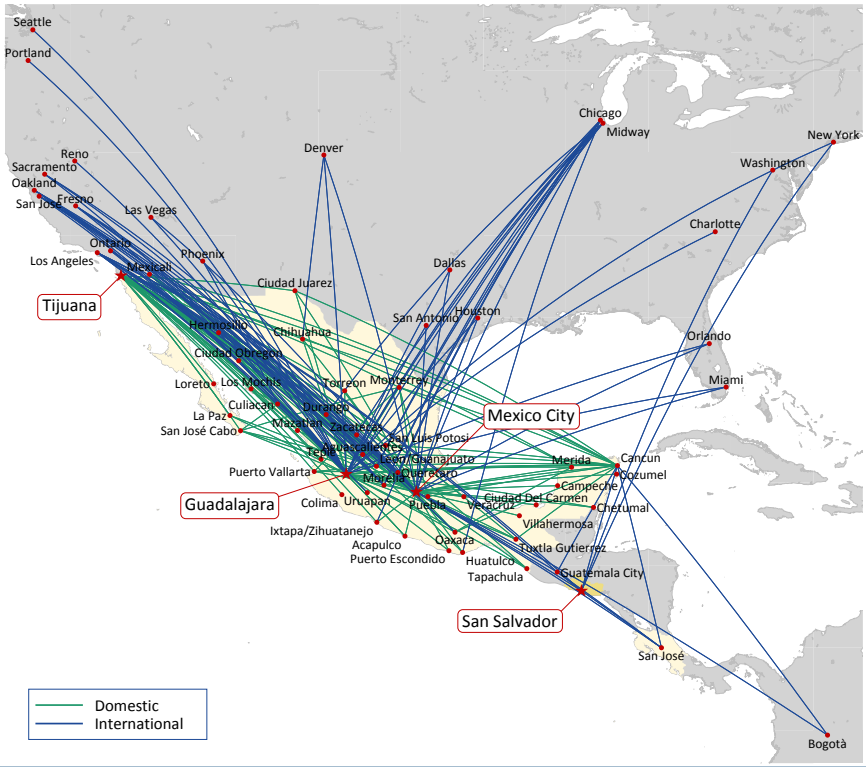
Viva Aerobus's results for 2021 look even better (both airlines' financials are unaudited at this stage). It achieved a 10.0% net margin. Total revenues at US$985m were 56% up on 2019 while net profit at $99m was 320% better than 2019's results. Revenue and cost trends, comparing 2021 with 2019, were very similar to Volaris': a 11% increase in unit revenue (TRASM) and a -2% change in unit costs (CASM).

Grupo Viva Aerobus is privately owned by IAMSA, Mexico's largest bus company, with the joint founder Irelandia, the ULCC investment fund, having sold its 49% stake in 2016. Last year it was reported that Viva Aerobus was planning an IPO on the Mexican and New York exchanges, probably in 2022, but market conditions may now have moved against this offering.

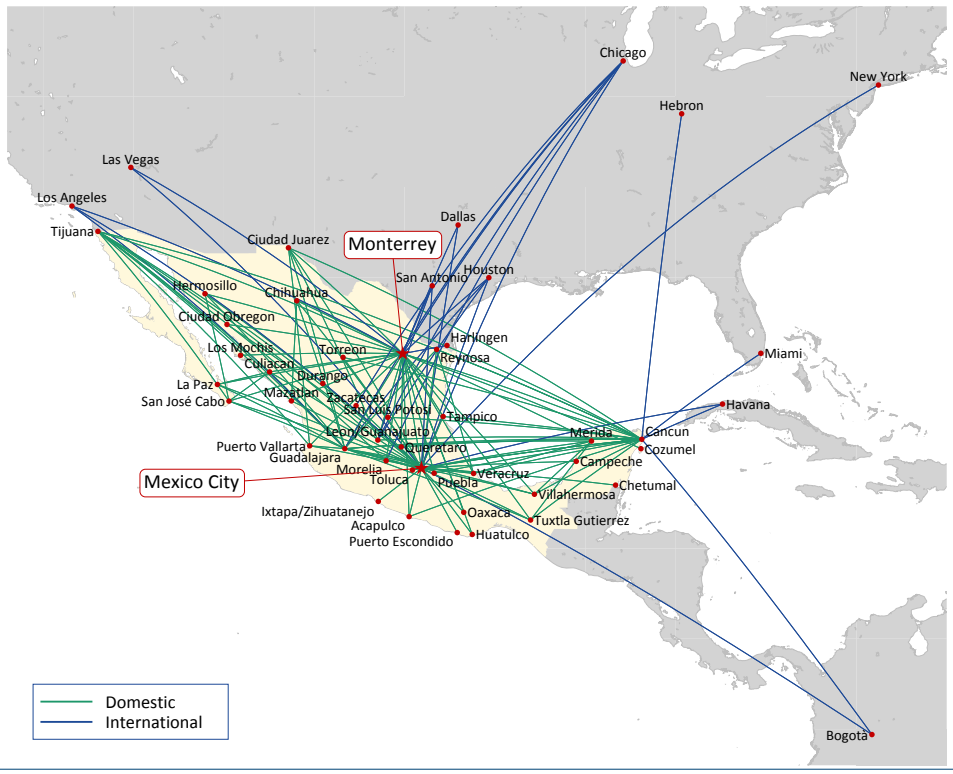
The reasons behind Volaris' and Viva Aerobus' recent financial achievements and their bright prospects are:

✈ Both airlines have embraced all the key elements of Ryanair's ULCC

VOLARIS ROUTE MAP



VIVA AEROBUS ROUTE MAP



AEROMEXICO FLEET

	End 2021 Fleet	Firm Orders
737-700/800	41	
737 MAX 8/9	27	56
Narrowbodies	68	56
787	18	4
Widebodies	18	4
Total Fleet*	**86**	**60**

*Notes: * plus 47 E-190s operated by Aeroméxico Connect. Plannned increase to 133 narrobodies and 21 widebodies by 2026.*

VOLARIS FLEET

	End 2021 Fleet	Firm Orders
A319	4	
A320ceo	40	
A320neo	40	33
A321ceo	10	
A321neo	8	91
Total	**102**	**124**

Note: Contractual fleet of 121 by 2026, all neos. Flexible growth plan

VIVA AEROBUS FLEET

	End 2021 Fleet	Firm Orders
A320ceo	21	
A320neo	20	15
A321ceo	7	
A321neo	7	38
Total	**55**	**53**

Note: Net addition of at least 60 units by 2026.

model — yield-driven demand, flexible asset location, high productivity, rigorous cost control, clear decision-making processes, concentration on VFR and Leisure segments, etc. Perhaps more importantly, there are stable, long-established management teams — under CEO Enrique Beltranena at Volaris and Juan Carlos Zuazua at Viva Aerobus — who know how to implement ULCC strategies.

✈ Volaris' CASM ex-fuel is US¢4.0, while Viva Aerobus' is a little lower at US¢3.8. These compare to US¢5.6 for the US ULCC Frontier, US¢7.5 for the US LCCs as a group, US¢7.5 for Latin American network carriers and US¢10.2 for US Legacies — so an operating cost advantage of 30-60% against the main rivals

✈ Low base fares are sustainable in rapid growth mode because ancillary revenue is strong. Ancillaries account for 42% of total revenue at Volaris and 45% at Viva Aerobus.

✈ The two fleets are exclusively A320 Family, so Volaris and Viva Aerobus have avoided the 737 MAX crisis. Average aircraft age is 5.1 years at Viva, 5.6 at Volaris, and average daily utilisation is over 13 hours at both airlines. Expansion plans are increasingly focused on the A321neos, configured with 230 seats and very probably the most efficient type for low-cost operations. Volaris, in particular, has built in a cost advantage due to the unit pricing achieved by Indigo Partners when it placed its A320 mega-order (see below).

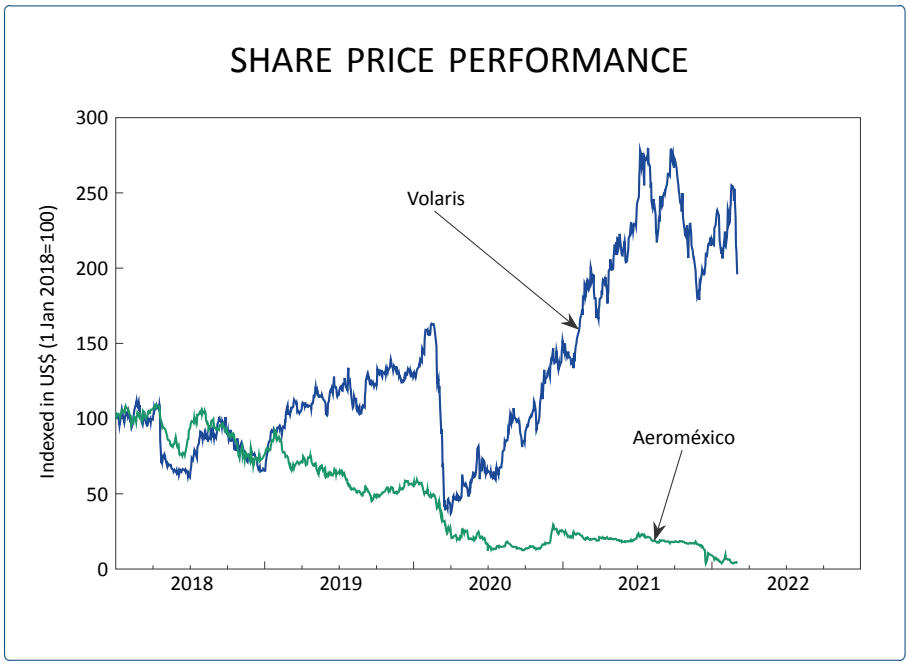
✈ The airline supply/demand balance is in an unusually favourable alignment because of the exit of InterJet and the downsizing of Aeroméxico. Volaris reckons that the equivalent of 60 narrowbodies have been taken out of the market.

✈ Domestically, the two ULCCs are growing by diverting passengers from the buses. Mexico's extensive bus network expanded rapidly in the 2000s, boosted, ironically, by the duopoly that Aeroméxico and Mexicana then held over domestic air travel. Mexican buses are not the boneshakers that foreign tourists might imagine; Executive Class buses, for instance, offer roomy reclining seats, air conditioning, on-board drinks and snacks and entertainment systems. On Volaris' network, 41% of routes compete only with buses. The marketing message is that the airline's cheapest fares, for example, on Cancun-Mexico City are half those of the bus and the travel time saving is 26 hours. Viva Aerobus's strategy involves selling more bus/airline connections, reflecting its ownership by IAMSA.

✈ Internationally, the US-Mexico open skies agreement completed in 2016 should provide growth opportunities for both ULCCs now that slot constraints at Mexico City should be alleviated by the new Santa Lucia airport and cross border alliances are developed (see below). Firstly however, the FAA has to restore Mexico's Category 1 status which was suspended last year over concerns about regulatory oversight. This means that schedule expansion is limited for all Mexican carriers. Viva Aerobus has stated that it is confident that Category 1 will be restored in the first quarter of 2022. Expansion of Mexico-South America routes is also a prospect — Volaris notes that ULCC penetration in its "reachable markets" in this sector is only about 10%.

ULCC evolution

Mexican ULCCs are playing an important role in a global evolution of ULCC networks, driven in particular by Indigo Partners airlines (see Avia-



tion Strategy, February 2018, "Airline Incubation"). Volaris has benefitted from Indigo's purchasing power taking about 80 of the investment fund's mega-order for 430 A320-family aircraft placed in 2017; the other Indigo-backed airlines were Wizz Air, Frontier and JetSMART (Chile).

Volaris has a strong link into Frontier through a codeshare agreement, claimed to be the first between ULCCs. That agreement has assumed greater significance following the proposed takeover of Spirit by Frontier, a $6.6bn deal announced in February. This will create the fifth largest airline in the US, one with adjusted CASM about 25% below that of Southwest and over 40% below that of the three Legacies. Bill Franke, chairman of Frontier and managing partner of Indigo Partners, Frontier's majority shareholder, will be Chairman of the Board of the combined company.

There is also speculation about Wizz's transatlantic intentions. Wizz has only applied for a cargo licence to operate its sole A330F, but US airlines and unions are concerned and objecting strongly, perhaps fearing future incursions into the transatlantic passenger market by a ULCC deploying some of the 47 A321XLRs it has scheduled for delivery from 2023. Wizz has previously stated that they will be deployed on eastern routes, but following the Ukraine war that now seems improbable.

Viva Aerobus' origins were with the other ULCC incubator, Irelandia, established by ex-Ryanair directors, Although Irelandia disposed of its stake in Viva Aerobus, the airline has developed an extensive codeshare alliance with another Irelandia-owned airline, Viva Air of Columbia

In December last year Viva Aerobus announced what it describes as being "a first-of-its-kind, fully integrated" alliance with Allegiant. The two ULCCs have submitted a joint application to the US DoT, requesting anti-trust immunity for the joint operation.

ATI legalises full commercial cooperation between airlines, removing the risk of collusion charges; it is something that is well established for network carriers on intercontinental services but which has never been remotely associated with short/medium haul ULCCs.

Allegiant will also make a small investment of $50m in Viva Aerobus, and its CEO, Maurice Gallagher, whose ULCC investing activity goes back to ValuJet, will be a Viva board director. Start-up date for the joint operation is the first quarter of 2023.

As Allegiant does not currently serve Mexico, the networks would appear to be complementary, potentially offering new non-stop service on US-Mexico routes, capturing traffic from US hub networks. Allegiant will be able to expand its leisure-based network to destinations such as Cancun, Los Cabos and Puerto Vallarta, while Viva Aerobus will have full access to Allegiant's Las Vegas-based network in the west and centre of the US and its Tampa Bay/Orlando-based network in the east. The aim is to achieve full coordination across all areas of airline operations — codesharing, scheduling, marketing, information systems and loyalty programs. The one peculiarity is fleet — last year Allegiant ordered 50 737 MAXes, having previously been a sole A320 operator.

These ULCC network developments may be the big innovation that comes out of the aviation recession. The alliances have yet to be tested in practice, but the starting point is probably easier than for network carriers because the operating models and corporate cultures are compatible.

eVTOLs: Upwardly Urban Mobility

According to UN estimates, 2007 was the first year when the world's urban population exceeded the rural population. Urbanisation has increased strongly as the world as whole has got richer: 16% in 1900 (when London was the largest city in the world with a population of a mere 5m), 30% in 1950; 50% in 2007. Forecasts suggest the proportion will reach 68% by 2050 (see chart). Currently, the largest city in the world (depending on how you measure it) is Tokyo, with a metropolitan population of 37m.

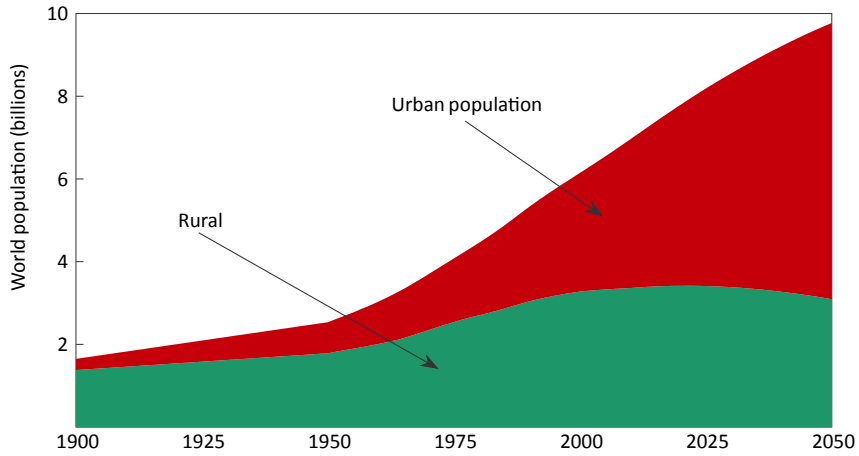
The are obvious attractions for living in cities — but as their populations grow, congestion and travel times increase. The cities themselves introduce measures to limit or curtail private ground transport through taxation, parking and access charges — exacerbated by the increasing need to cut fossil-fuel usage.

The concept of Urban Air Mobility (UAM) is not new, and has featured in many science fiction films from Metropolis of 1927 to the iconic 1982 Blade Runner. But the technology we've had since the 1950s (the helicopter) is noisy, expensive and pollutive. A realistic replacement would not only (probably) have to have vertical take-off and landing capability, but be quiet and environmentally sustainable.

The technological changes in battery design since the late 2010s have been dramatic — in part fuelled by the automotive industry's pursuit of the development of electric cars. The prospect of electricity powered personal regional aircraft — spurred on by NASA's Advanced Air Mobility (AAM) program and EASA's embracing of the concept — is becoming an increasing reality.

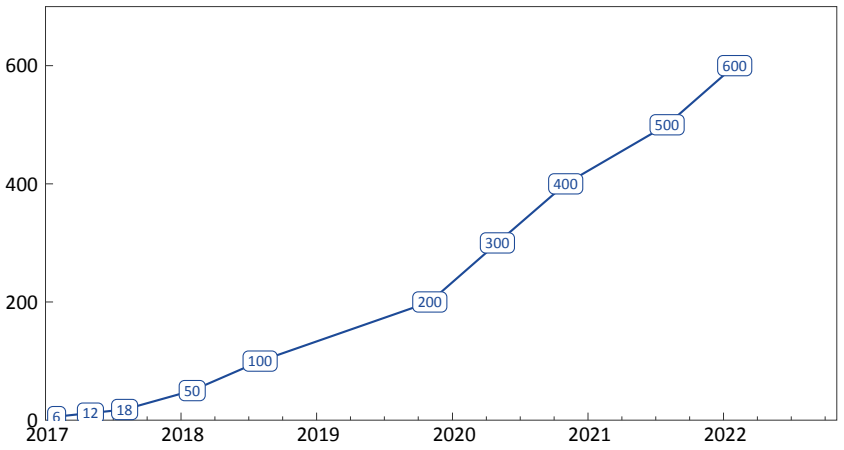
What is coming to the fore is a race to find a first-mover advantage in creating a winning electric vertical take-off and landing passenger aircraft (eVTOL). The Vertical Flight Society (originally founded as the American Helicopter Society in 1943) has been tracking eVTOL programmes in

INEXORABLE RISE OF URBANISATION



Source: OWID, UN

WORLD eVTOL AIRCRAFT DIRECTORY ENTRIES



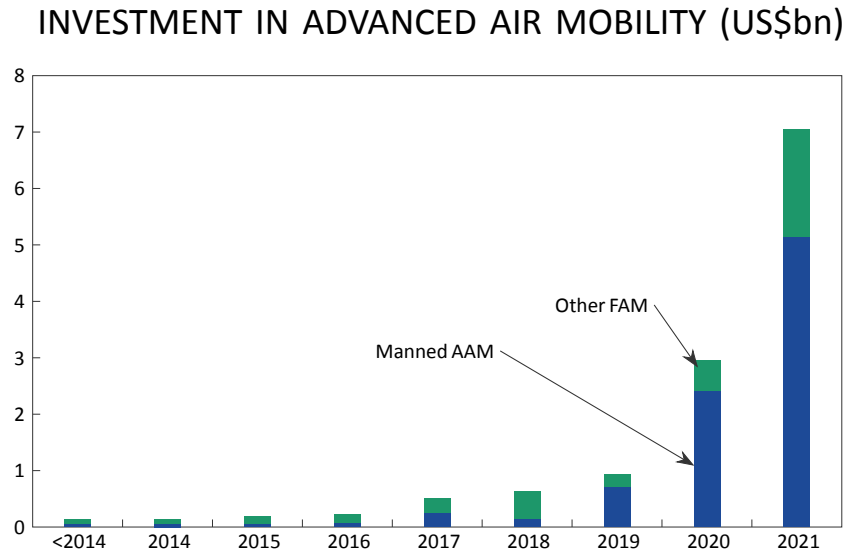
Source: VFS.
Note: number of eVTOL design programmes – "from the silly to the serious"

its World eVTOL Directory. The number of designs has rocketed from six in 2017 to 600 from nearly 350 companies worldwide at the beginning of 2022 (see chart on the facing page). Director Mike Hirschberg states that "since some innovative designs that seemed implausible at the time continued maturing into plausible approaches, we decided to catalogue every known design — from the silly to the serious".

(Presumably not included in the directory, as being neither vertical takeoff nor electric despite being silly, is the AirCar — a two-seater road car with foldaway wings powered by a 1.6-litre BMW engine — which received its Certificate of Airworthiness from the Slovak Transport Authority in January.)

VFS estimates that $4.5bn had been pumped into the sector between 2010 and 2020; and then last year there was an explosion of interest, partly reflecting the stock market flotations of a handful budding developers as well sizeable private investments, bringing the total to over $10bn.

The chart above (using data from the *Financial Times* referencing a McKinsey report) exemplifies the wall of investment money attracted to this burgeoning sector over the last decade. And the figures suggest that in 2021 piloted eVTOLs received an additional $5bn, and the more futuristic and autonomous programmes $2bn in funding.



Sources: Financial Times, Mckinsey.
Notes: AAM=Advanced Air Mobility; FAM=Future Air Mobility

Plethora of designs;

Multiple business models

The designs vary. Many are "multicopters" — multiple open rotors to provide the lift (and allow for redundancy). Some have wings. One involves an electric ducted fan jet engine (actually 32 of them). Most are fully electric. All are perforce small (batteries are heavy), providing a seating capacity of 2-6 passengers and very short range (100-300km). There may be room for a pilot, at least initially, while some are aiming for fully autonomous operations from launch.

The business models also vary from**the traditional OEM selling manufactured product**, to **building equipment to provide in-house managed ride-sharing operation**s, or anything in-between. They all face the hurdles of equipment certification and lack of appropriate infrastructure: existing heliports are not equipped to deal with the power requirements for battery recharging, and there has been a parallel explosion in interest to develop networks of "vertiports" in appropriate urban settings.

The sector is extremely fashionable, with the major aircraft manufacturers are in on the scene, but it is hard to identify a winning business model.

✈Boeing

Boeing is developing Wisk in a joint venture with US eVTOL developer Kitty Hawk. It is an autonomous winged aircraft with 12 independent rotors for lift and one propeller for flight, a range of 40 km, maximum speed of 160kph, and a capacity of 2 passengers (no pilot). "Autonomy has to be done from the very beginning," said Marc Allen, Boeing's chief strategy officer. "The extra time that will take to certify is the trade-off."

Wisk plans to operate its own aircraft. In May last year the company announced an agreement with Blade Urban Air Mobility to operate 30 aircraft on short-distance routes on Blade's network at hourly chartered rates.

✈Blade Urban Air Mobility

Blade is not an eVTOL developer, but is rather seeking first mover status as an UAM provider. It is currently focused on providing time efficient transportation (ie helicopters) on congested routes primarily in Northeast US. It also has an associate business in Western India.

The company operates an asset-light model, and does not own any aircraft. Blade partners with third-party operators to arrange flights for its customers.

Blade expects transition to eVTOL by 2025 — it has partnerships nominally in place with both Wisk and Eve — initially to operate on existing routes and targeting to add 5-10 new markets per year from 2027.

Blade has identified JFK-Manhattan, the Northeast and West Coast markets as short-to-medium-term opportunities, and is targeting 1m passengers by 2024.

✈Airbus

Airbus has been exploring new technology including battery capacity, autonomous flying and electric propulsion since 2014. The company has developed two demonstrator aircraft "Vahana" and "CityAirbus" and completed more than 100 test flights on both demonstrator aircraft. In September 2021, the company revealed another eVTOL "CityAirbus NextGen". This concept has a fixed wing, V-shaped tail, eight electric-powered powered propellers as part of what it calls its "uniquely designed distributed propulsion system". It will have four seats, and initially designed to be piloted. Currently the aircraft is in detailed design phase, and Airbus is targeting the first test flight in 2023 and certification by 2025.

✈Embraer

Embraer set up a separate company "Eve" to accelerate the development of eVTOLs. It is currently working on a piloted winged aircraft with capacity for four passengers and a 100km range. Certification and commercial launch is targeted for 2025/26. (It expects to have a six-passenger autonomous aircaft ready by 2030).

The aircraft will be powered by eight counter-rotating electric propellers for vertical lift and two ducted propellers for forward thrust. Eve states that it has signed MOUs and LOIs with six airlines (including 100 pre-orders for SkyWest and 200 for Republic) and eight helicopter operators (including 100 each from Avantto and Bristow). It claims a total (non-binding) order pipeline of $5.2bn covering 1,735 vehicles. It says it will not own aircraft, but will instead "establish joint operations and grow partner-by-partner". Whatever that means, it too has a partnership with Blade. Eve is currently in the process of getting a NYSE quote through a deal with special purpose acquisition company Zanite Acquisition Corp providing $500m in cash and an enterprise value of $2.4bn.

✈EHang

Guangzhou-based **EHang** was the first publicly traded UAM company, having listed on Nasdaq in December 2019. Its two-seater autonomous aircraft, the EHang 216, has a nominal range of 35km, powered by eight open rotors, and a cruise speed of 100kph. Early in 2020 the 216 was granted a commercial pilot operation approval for logistics flights (effective payload 100kg).

At the 2021 Zhuhai Air Show the company unveiled the concept of a new aircraft targeting a 300km range. The winged VT-30 features eight lifting propellers distributed across two booms for vertical take-offs and landings, and a pusher propeller at the rear of the fuselage for cruise flight.It still only has two seats.

EHang in its presentation material features some pretty futuristic concepts of dedicated vertiports — fully automated landing pads, automated battery recharging and/or replacement and parking, 30m above ground level in a baobab shaped structure. Its business model is not clear.

✈Archer

Archer started trading on NYSE in September 2021 following the reverse takeover of SPAC Atlas Crest Investment. The company executives include former employees of Wisk, Airbus, Mazda and Tesla. Its two-seater winged aircraft features a design range of 60km and a top speed of 150kph. It is powered by twelve rotors: six statinary twin-bladed propellers to provide lift and six tilting five-bladed propellers for cruise.

Early in 2021 Wisk took legal action against Archer, claiming Archer had stolen its aircraft design and other trade secrets after hiring former Wisk employees. Wisk's motion for a preliminary injunction against Archer was dismissed; Archer countersued for $1bn damages for defamatation. The trial is scheduled for January 2023.

Archer's business model is to operate aerial ride sharing along with aircraft OEM business. The company received a USD1bn order from United for 200 aircraft and has an agreement with Stellantis for large volume production from 2026. It is planning to work with REEF for urban takeoff and landing sites, by using REEF's network of 4,800 parking locations covering a large portion of US urban population.

Archer is working on a piloted winged aircraft with a capacity for four passengers, a 96 km range and top speed of 240kph. It is expecting commercial launch in 2024.

✈Joby Aviation

Joby Aviation went public in August 2021 following a business combination with SPAC Reinvent Technology Partners. Joby's staff includes former employees of Tesla, JetBlue, Uber and Ford. The company business model is to operate aerial ride sharing, with a

focus on congested metros with the help of an in-house mobile app or partner app. For landing/take-off, it also is working with REEF to use its parking lots, and also with Signature aviation, Related and Macquarie. In December 2020, Joby bought Uber Elevate, which was Uber's planned eVTOL business. In February it announced a partnership with ANA to bring UAM to Japan.

Joby is working also working on piloted winged aircraft with capacity for four passengers. Powered by six tilting rotors it is targeting a 240 km range and top speed of 320 kmh, and is also expecting commercial launch in 2024.

Its modest mission is to "save a billion people an hour a day".

✈Lilium

Lilium went public in September 2021 following a business combination with SPAC Qell Acquisition. Lilium management has Airbus, Rolls Royce, and Goldman Sachs experience. It is working on two business lines, aerial ride sharing and turnkey enterprise sales to corporates and governments. The company plans to operate a vertiport network with Ferrovial in Florida, and partnered with multiple German airports including Dûsseldorf, Munich and Kôln to establish a network in Germany.

The company is targeting 400 units in house per year from 2023 and global production from 2026 with the help of a 3rd party manufacturer.

Lilium's business model is based on larger aircraft flying longer distances than the other eVTOL operators. Lilium's aircraft is also powered by 32 individual small jet engines, in contrast to the peers' propeller aircraft. It is working on a 7 seater (6+1) winged aircraft with 250 km range and top speed of 280 kmh, and expecting commercial launch in 2024. Lilium has an aircraft order for 220 aircraft from Brazil's Azul.

✈Vertical Aerospace

Vertical Aerospace went public through a SPAC reverse takeover by Broadstone Acquisition in December 2021. Key management includes former employees of Airbus, Rolls Royce, Dyson and Lilium. The company will operate as an OEM, and has no commitment towards aerial ridesharing, a divergence from other companies. American Airlines, Virgin Atlantic and aircraft lessor Avolon are among the customers who have placed indicative orders for 1,350 aircraft. According to the company, Avolon has agreements to place its aircraft with Gol and Japan Airlines.

Vertical Aerospace is working on a piloted winged aircraft with capacity for four passengers, a 160 km range and top speed of 325 kph, and is expecting commercial launch in 2024.

✈Volocopter

Volocopter is based in Germany and, as yet, unlisted. Its management team has experience from Airbus, Daimler and Siemens. Volocopter expects to launch revenue service with its short range two-seat multicoptor VoloCity air taxi in 2023, one year ahead of peers, focusing on urban single passenger services. It targets Singapore and Paris as its first two cities. It does not plan to sell its aircraft to third parties, but will operate its own rideshare business.

In addition to the VoloCity, it plans to develop a longer range VoloConnect winged aircraft with room for up to four passengers (powered by eight rotors for lift and two to push for cruise).

The company is targeting to produce around 100 units in house per year from 2023 and global production of 1,000 aircraft from 2025.

High Tech meets Aviation

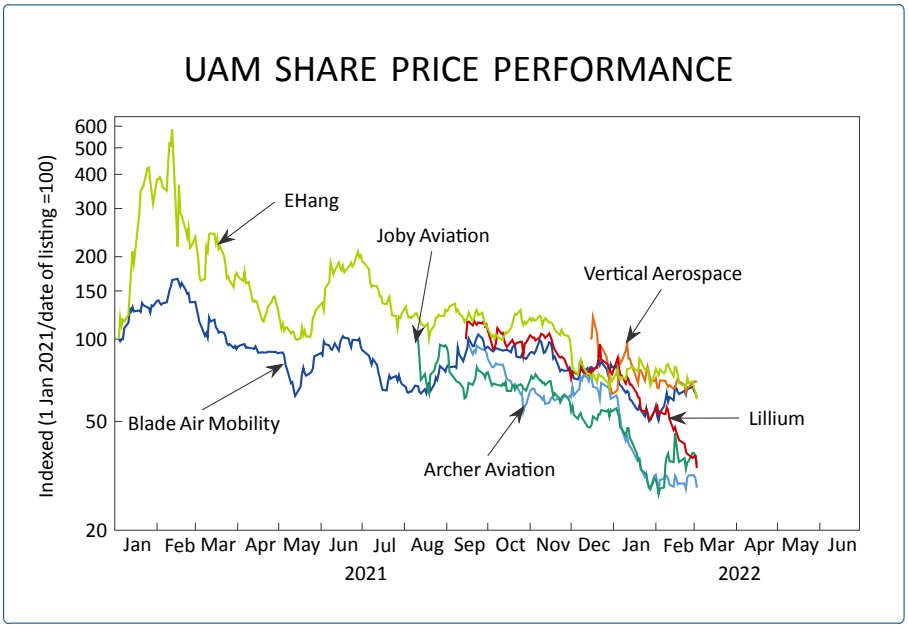
Electric vertical takeoff and landing air taxis could offer a green solution to congested ground transport in densely populated areas: emission free, quiet, (hopefully) safe and fast air transport. As HSBC's Andrew Lobbenburg has put it in a recent report on the eVTOL sector: eVTOL might deliver the electrification revolution that Tesla brought to the automobile, combined with the ride sharing transformation from Uber while escaping the congestion of two dimensions — Tesla meets Uber in 3D.

The eVTOL participants that have come to the markets have made very similar investor presentations. They each show that their design is the best. They each compare their market rating favourably with their competitors. They each try to show that their aircraft will be able to operate ridesharing trips at costs comparable, or better than existing premium ground transportation (and especially Uber). In traditional Silicon Valley fashion, they don't expect to make money for years to come.

But aviation presents its own specific barriers, and dissenters to the enthusiasm in eVTOL development have raised serious concerns of viability.

✈ Air-worthiness certification is an expensive and lengthy process. All bar Wisk are aiming to achieve this initially with piloted models — meaning that their designs could almost go through the process at the FAA and EASA as (sort-of) "traditional" aircraft. Autonomous certification, with requirements for unassailable cyber security may be more difficult. But the models only show competitive costs once the pilot is removed.

✈ Continued battery design development will be necessary. This will not be a mass-market, and eVTOL



producers will come well down the line of demand behind motor manufacturers.

✈ Design range will be limited by requirements for fuel reserves (30-45 minutes for traditional fixed wing and 20-30 minutes for helicopters depending on flight rules). Batteries degrade over time. (So does engine performance in traditional aircraft, but traditional engines last longer).

✈ Unlike ground transport ride-sharing, UAM will not be point-to-point, but will require vertiports (with some method to get the passengers to and from the aircraft). Notably, none of the eVTOL manufacturer plans mention landing charges: Blade, already operating helicopters, points out that landing charges currently account for 50% of trip costs.

✈ A comparison of the UAM business models (with the exception of Blade's) for ridesharing with that of Uber is dubious. Uber is generally asset-light — a booking platform for its corpus of independent drivers with their own cars. Owning a $1-$2m aircraft, which needs power to fight gravity, and operating a taxi service at a cost competitive with a road car is as sensible as buying an electric Rolls-Royce Spectre (due 2023) for $500,000 and accepting rides for the same price as an Uber.

The enthusiasm for the newly quoted sector was extraordinary. EHang's share price at one point had risen six fold from its initiation price. Since mid 2021, some reality entered the market and share pirces have tanked: Archer, Joby, and Lillium are down by 65-70% from their initial prices, Blade and Vertical down by 39-40%; and EHang down 90% from its peak.

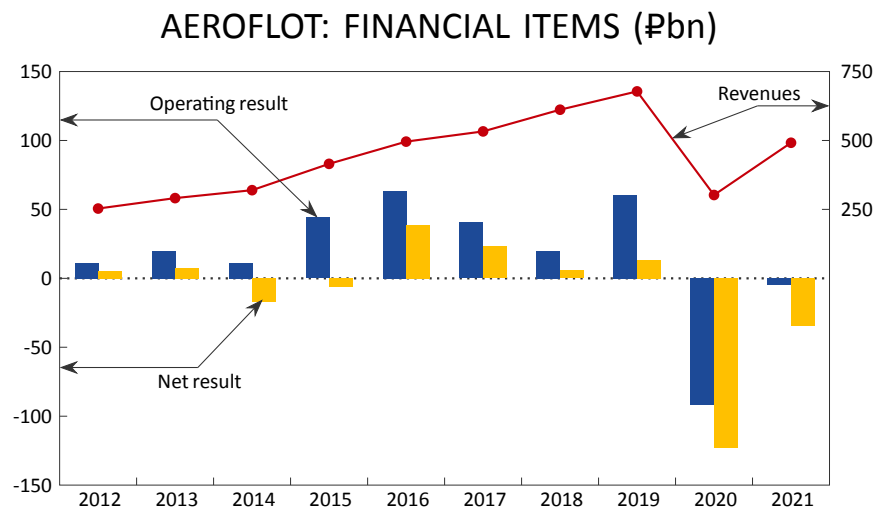
Flying Magazine quotes one (anonomous) sceptical venture capitalist: "we're a little surprised to see a space that has so much regulatory risk, go-to-market risk, and consumer behaviour risk get as much attention and capital as it has". That's a lot of risk even for disruptive technology, and enthusiastic investors may be chasing a bubble.

Aeroflot Sanctioned

BEFORE the collapse of the Soviet Union Aeroflot was, or claimed to be, the world's largest airline in terms of passengers carried. Following Putin's invasion of Ukraine Aeroflot is likely to cease to exist, at least in its current form.

The state agency Rosimushchestvo owns 51.2% of Aeroflot and Rostec, a state conglomerate, has a further 3.3%. There is a free float of about 41% of the shareholding, but the reality is that strategic decisions are centrally planned, notably the state-ordered takeover of Russia's second largest carrier, Transaero, in 2017. The Aeroflot Group also contains Saint Petersburg-based Russiya and the lower-cost subsidiary Pobeda, which in total carried about 42% of total Russian airline traffic in 2021, down from 46% in 2019.

The EU, the UK, the US and Canada have all closed their airspace to Russian registered or owned aircraft, closing off the company's main source of foreign exchange.

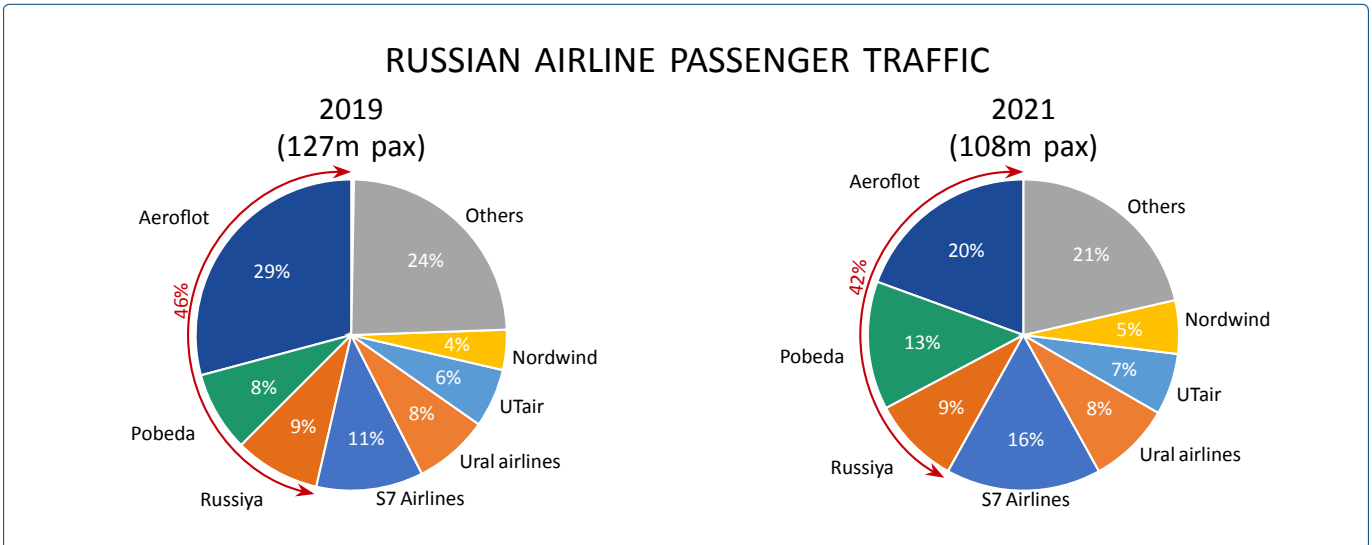


Note: IFRS16 from 2019

The international market has been critical for Aeroflot, accounting for about 40% of its traffic and 60% of total scheduled passenger revenue.

Russia has retaliated by closing off its airspace to Western airlines, a move which mainly impacts Finnair's Europe-NE Asia hub system, but it will have only a minor direct impact on IAG, Air France and Lufthansa, which can take more southernly routings, adding on average two hours on a flight to Beijing, according to Eurocontrol.

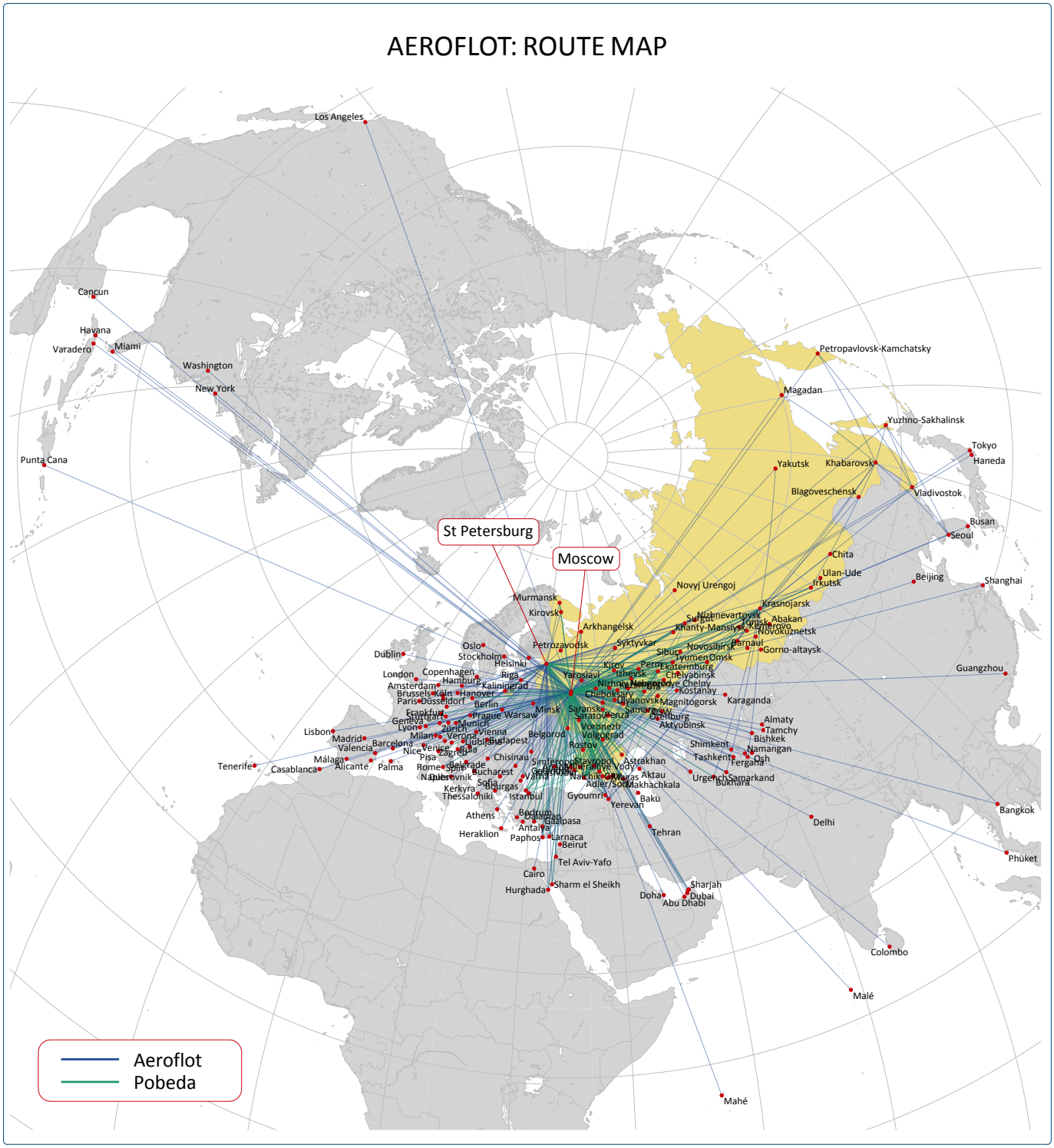
It also kills off Aeroflot's international-international transfer operation at Moscow Sheremetyevo. Selling that routeing was always



challenging and was only made marginally viable through Aeroflot's membership of SkyTeam. Delta has cancelled its codeshare agreement with Aeroflot as has KLM and Air France. It is only a matter of time before Aeroflot is ejected from the BGA. In addition, Sabre and Amadeus have removed Aeroflot from their distribution systems.

As with any state-controlled flag-carrier, the route map offers some insights into where the country's politico-economic interests lie. (The map below was the constructed from Aeroflot's schedules just prior to the Ukrainian invasion).

✈ Geographically, the domestic market is huge, with a dense network linking provincial cities to two of Moscow's three civilian airports;



AEROFLOT GROUP FLEET

	In Service	On order
Dash 8	9	
SSJ100	76	
MC-21		27
A319	28	
A320	69	
A321	36	
737-800	93	
A330-200	12	
A350	7	15
777	32	
747-400	9	
Total	**371**	**42**

there are also extensive connections to former USSR states in the east like Kazakhstan and Uzbekistan.

✈ All the major Western European cities are covered but only four points in the USA.

✈ Chinese links are, perhaps surprisingly, limited to three routes to Beijing, Shanghai and Guangzhou.

✈ Cuba remains because of its historic relationship but there are no scheduled routes to Africa (apart from Cairo).

✈ Most of the holiday destinations favoured by newly affluent Russians — London, Miami, Palma, Nice, Cyprus, Sharm el Sheik and (probably) Turkey — are now blocked. But that still leaves places like the Maldives and the Seychelles for the oligarchs.

Aeroflot has suffered financially during the pandemic. In 2020 it reported, under IFRS, a net loss of ₽123.2bn (US$ 1.7bn at then year exchange rates) equivalent to 41% of total revenues of ₽302.2bn. In 2021 there had been a recovery — the net loss was reported as ₽34.5bn, or 8% of revenues of ₽491.8bn.

The balance sheet as at the end of last year showed assets of just over ₽1.1tn ($14.8bn at year end exchange rates) including ₽94bn of cash ($1.26bn) but ₽1.3tn of total liabilities giving a negative equity value of ₽146bn ($2.0bn). These numbers seem irrelevant now; the key metric is Aeroflot's share price, quoted on the Moscow stock exchange, which plummeted by 40% in rouble terms and by 57% in dollar terms before the market was closed. Its last quoted equity market capitalisation was US$840m but that presumably has now dropped to about zero. Ten years ago, Aeroflot was planning a secondary listing on the London stock exchange.

AEROFLOT GROUP BALANCE SHEET

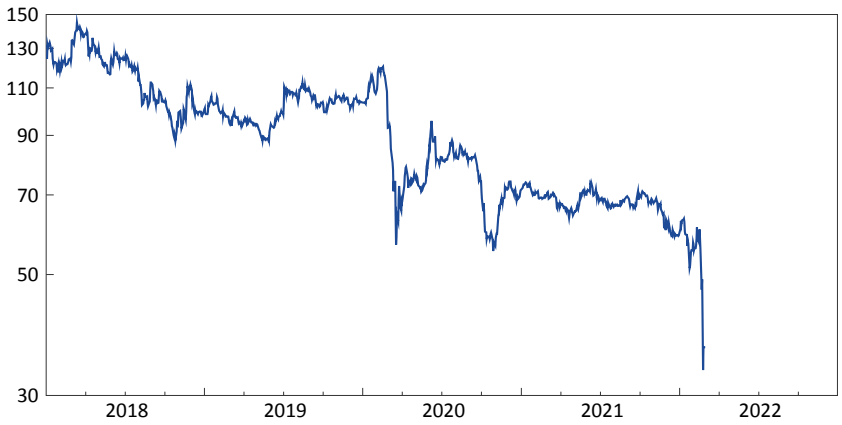
₽bn	Dec 2021
Fleet including right of use assets	719.4
Other long term assets	199.7
Current Assets	190.3
of which Cash	*93.8*
Total Assets	1,109.5
Long term debt and lease liabilities	672.4
Other long term liabilities	301.9
Current liabilities	272.6
Total liabilities	1,258.9
Shareholders' equity	(146.4)

The Aeroflot Group fleet consisted of 371 aircraft at the end of last year of which 47% were Airbus (or Bombardier) equipment, 43% Boeing and 20% Sukhoi. Both the Western OEMs have announced that they have halted to supply of all parts and maintenance support services to all Russian airlines, which will mean that Aeroflot and the other carriers may be unable to operate even domestically after a couple of months, depending on the levels of parts inventories. Increased utilisation of the Sukhoi SuperJets may not be feasible because of the reliability problems encountered by users of this type (like Interjet, see article on page 9).

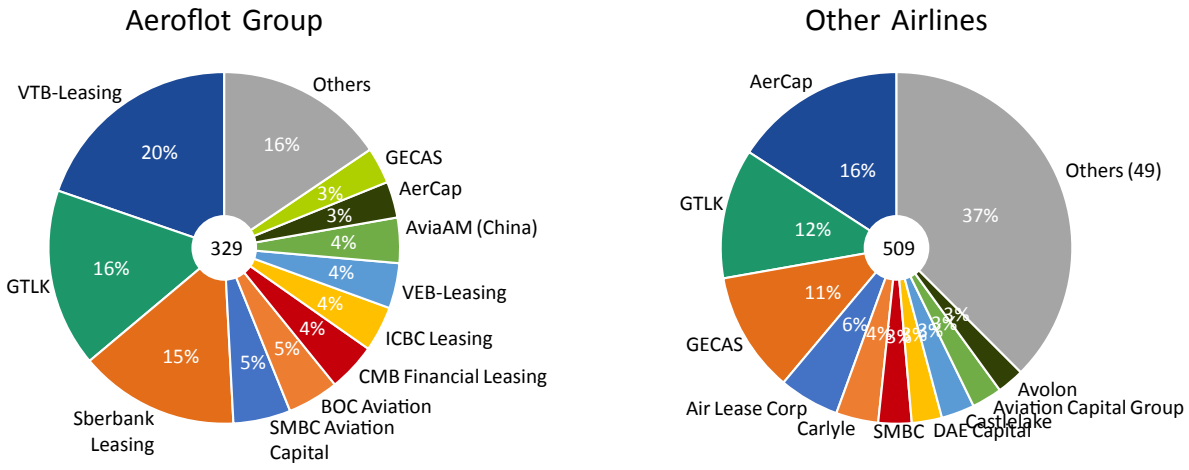
Airbus will probably cancel Aeroflot's order for 15 A350s. Boeing has no aircraft on order from Aeroflot, but it does have firm orders for 43 737MAXs from two Siberian airlines, Utair and S7.

Further, the UK government is preparing legislation that will close

AEROFLOT SHARE PRICE PERFORMANCE (₽)



LESSOR EXPOSURE TO RUSSIAN AIRCRAFT



off insurance services to Russia. The large majority of the Russian fleet is insured through the Lloyd's of London market.

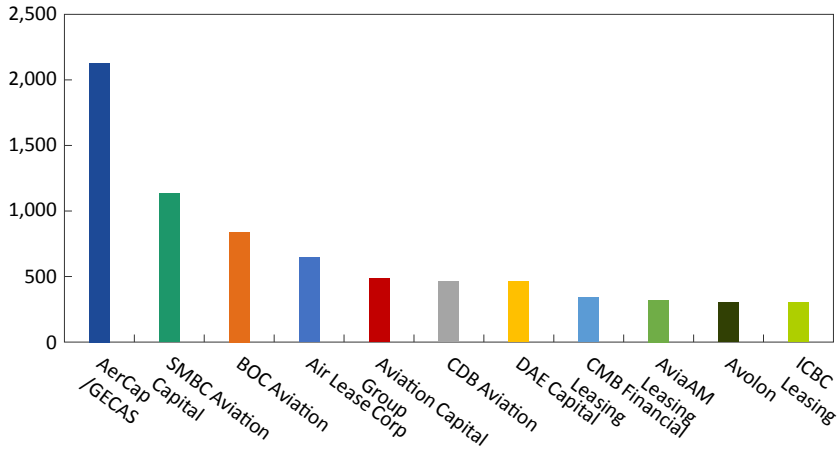
Looking at the ownership structure about 90% of Aeroflot Group's fleet by number is on operating lease. Over half the leasing companies are Russia-based — VTB, GTLK, Sberbank and VEB — with Western and Chinese lessors making up the other half. The other Russian airlines have more aircraft, over 500, on operating lease, with a higher proportion from non-Russina leasing companies- For the Russian financial institutions, continuing to finance Russian aircraft, given the targeted sanctions on Russian banks and the severe constraints on the supply of dollars, is going to prove extremely difficult.

The European Union has issued a directive to the effect that leasing companies have to terminate their contracts with Russian airlines by the end of March. This presumably will directly affect all European, mostly Dublin head-quartered, lessors, regardless of ultimate ownership. Moreover, all lessors worldwide must already be facing defaults on their rentals as aircraft are being grounded by sanctions, and international bank settlement systems like SWIFT have been frozen. AerCap, including GECAS, has the greatest exposure of the non-Russia lessors, followed by SMBC and BOC.

How or if aircraft will be repossessed from Russia is just not clear. One suggestion from the Russian side is that the aircraft could be nationalised, which is a semi-polite way of saying expropriated without compensation.

There will be collateral damage to Western leasing companies and to airlines. But what is happening to Aeroflot is a microcosm of what is happening to the Russian economy — destruction through sanctions.

LESSOR EXPOSURE TO ALL RUSSIAN AIRLINES: ESTIMATED VALUE OF AIRCRAFT ($m)



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