Airline Insolvency Review

Aviation Data and Economics

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Submitted by:
ICF

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1. Executive Summary

1.1. The purpose of this report is to provide an estimate of the number of passengers flying to and from UK airports potentially affected in the event of an airline insolvency. This report has been prepared by ICF for the Department for Transport's Airline Insolvency Review.

1.2. ICF's analysis has been based on 350,000 data points, covering:

- 778m passengers (264m[1] passengers in 2017) flown by;
- 7.0m flights over;
- 6,000 routes operated by;
- 516 Airlines in;
- 162 countries to;
- 53 UK Airports across;
- 38 months from November 2014 to December 2017

1.3. Highlight figures:

- **Of the 264m passengers flying through UK airports, approximately 160m passengers were UK-originating, and therefore within scope for repatriation**
- **On a monthly basis, this represents between 4.5m and 8.8m UK originating departures per month**
- **At any one time there are between 1.2m and 2.4m UK originating passengers overseas**
- **The potential cost incurred for a repatriation varies significantly depending on the number of overseas passengers and the method of repatriation**
- **ICF has estimated insolvency probabilities for all major airlines serving the UK market, as well as analysing historical rates of insolvency. The latter analysis suggests an annual average of c. 20,000 stranded overseas passengers resulting from airline insolvencies**
- **Analysis of potential repatriation funding schemes suggests cost implications to airlines of between £0.01 and £0.50 per passenger. These costs represent a very small proportion of typical airline costs and profit per passenger. If passed through to consumers, the demand response would be marginal**

[1] We have halved domestic passenger volumes to prevent double counting these passengers at both ends of the route

2. Scope of Work

2.1. The independent Airline Insolvency Review (AIR) is looking at how to ensure airlines can wind down in an orderly fashion with the minimum impact on passengers and the taxpayer. The purpose of this report is to provide AIR with an estimate of the number of passengers flying to and from UK airports potentially affected in the event of an airline insolvency.

2.2. ICF's engagement with AIR has been segmented into three key phases:

- **Phase I:** The provision of data to inform policy design and to input into financial modelling of the resulting policy options.
- **Phase II:** Estimation of the duration of a repatriation operation, the number of affected passengers and the costs of the repatriation exercise
- **Phase III:** Modelling the competition impacts of different options to reform consumer protection.

2.3. In addition to the above tasks, this report sets out the calculated data point's methodology as used by ICF.

3. Data Sources

3.1. Exhibit 1 lists our approach to each of the required data variables listed in the Statement of Requirements.

Exhibit 1. Key Data Sources

Data	Description	Source
Passengers Volumes	Monthly, directional (arrivals and departures) passengers and flights by airline and route	UK CAA
International Passenger Survey	A large survey based on 700,000-800,000 interviews conducted by the ONS that are used to produce estimates of overseas travel & tourism	Office for National Statistics (ONS)
Departing Passenger Survey	The CAA conducts annual surveys of around 200,000 passengers departing from UK airports, providing detailed information on travel purpose, ultimate destination and demographics	UK CAA
Airline Financial Statistics	Financial statements covering airlines' profit and loss, balance sheet, and cash flow statements.	Airline Annual and Quarterly Reports
Airline Credit Ratings	Public credit ratings from major rating agencies for airlines representing the top 95% of the UK market. Airlines not rated have been assessed by ICF based on Moody's approach for airlines.	Moody's, S&P, Fitch Ratings, and ICF
Transition probabilities	One-year transition probabilities for moving between credit ratings, based on actual movements for all sectors from 1983 to 2017	Moody's

Onboard CAA Passenger Statistics

3.2. The UK CAA collects statistics from more than 60 UK airports, which can be used to assess the levels of flight activity, onboard demand and capacity for the total UK market. The data utilised for this study was made available at a monthly level with splits provided for airline, arriving/departing as well as the route served.

Exhibit 2. CAA Passenger Statistics Example

Date	Reporting Airport	Next Airport	Direction	Airline	# of Flights	Seats	Demand
201411	ABERDEEN	AMSTERDAM	Arrv	KLM	89	11,481	8,646
201411	ABERDEEN	AMSTERDAM	Dep	KLM	89	11,481	8,963

Source: DfT (CAA data)

3.3. This data set provides the foundation upon which much of the modelling is prepared and was available for 2015-2017.

3.4. In order to simplify the analysis, ICF segmented the main airlines and markets into sub categories considering the significance of each segment, namely:

- **Airlines**: The UK market is served by approximately 150[2] airlines operating a wide range of business models with a vast range of scale, from small regional carries to global airlines, the supply side characteristics of the UK aviation market is incredibly diverse. This demand was considered at an airline level taking into account 93% of total demand, beyond this, groupings such as “other long haul” were applied in order to group the smaller airlines into similar buckets of demand. This segmentation resulted in 42 airline categories to consider.
- **Markets**: The UK aviation market involves many types of destinations operated over a wide range of distances in many different geographies serving a range of customer segments. For this modelling the demand was segmented into the following categories:
    - **Domestic**: This segment captures all intra UK flows. It was necessary to adjust the input of aviation activity for all UK airports to eliminate any double counting[3] of demand resulting in 22m passengers in 2017.
    - **Short Haul**: This category includes all UK-European markets as well as North African markets which are within range of narrow body aircraft. This is by far the largest category accounting for 186m passengers and approx. 70% of demand. This category was further segmented owing to several distinct categories emerging from our demand and supply side

[2] 2017 – number of airlines with at least 10k annual passengers
[3] Since CAA data is gathered by all UK airports all domestic traffic is effectively counted at the departing and arriving airport (i.e. A LHR-EDI passenger is counted by LHR and EDI). Effectively the domestic airport activity needs to be halved to account for passenger demand.

characteristic analysis. For example, many routes are dominated by leisure demand and these routes are typically found further from the UK than average. As a result, a different carrier mix is found and resulting costs of repatriation would be higher owing to the longer stage lengths involved. Therefore, short haul demand was further segmented by typical leisure and business orientated markets

- **Long Haul**: The final category accounts for 55m passengers and captures inter-continent flows across the Globe. Within this segment routes to North America account for the largest share, equivalent to 42% of demand or 25m passengers
- A breakdown of the main countries within each market is provided in the appendix for reference

3.5. Other adjustments to the market analysis ensured that cargo movements and helicopter movements (mainly oil rigs) were removed from the analysis.

3.6. Exhibit 3 summarises the main market segments (x5) whilst the airline categories (x42) are discussed later in this document.

Exhibit 3. Market Segments, 2017

Market	Typical Sector Distance (km)	Business Share (2017)	Passengers, M (2017)	Share of Demand
Domestic	435	42%	22	9%
Short Haul Business	750	37%	34	13%
Short Haul Mixed	1,175	19%	65	25%
Short Haul Leisure	1,930	3%	87	33%
Long Haul	7,190	13%	55	21%
Total	**2,565**	**16%**	**264**	**100%**

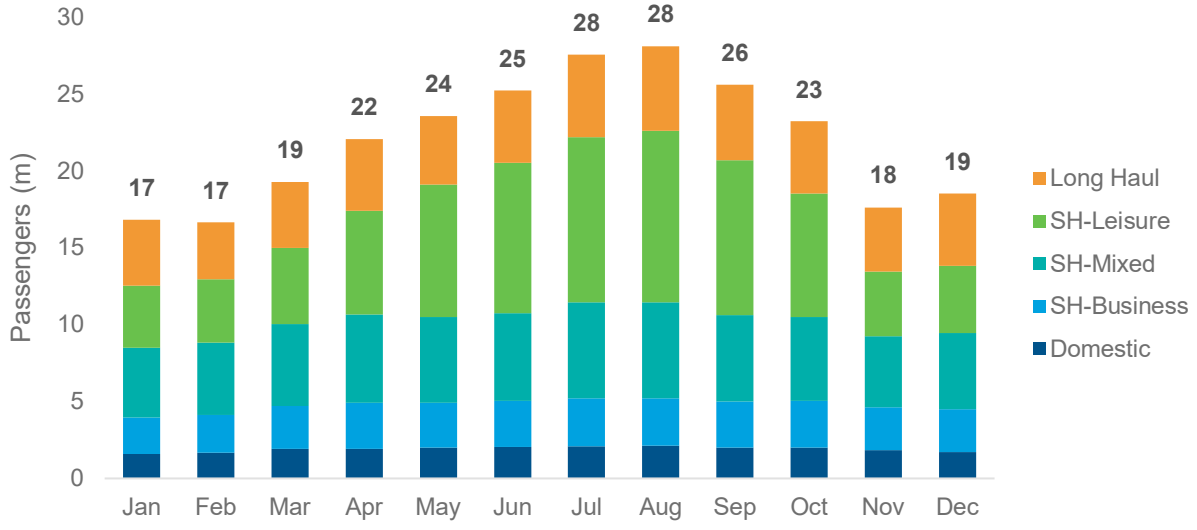
Source: ICF

3.7. The dataset for the analysis of 2017 demand accounted for 264m arriving and departing passengers at UK airports with 22m in the domestic category, 186m in short haul and the remaining 55m in long haul. Within these segments there is a wide variation within the short haul categories, business heavy markets (e.g. Frankfurt, Zurich) operate with around 37% of demand travelling for business and these routes are relatively short sectors averaging just 750km compared to the rest of the short haul market which has much lower business shares and on much longer flights (e.g. Alicante, Tenerife).

3.8. Exhibit 4 highlights the monthly variation of demand across the UK aviation market in 2017. Demand is seasonal with the peak seen in August when over 28m passengers travelled compared to under 17m passengers in February, the peak months are typically 30% busier than average. This ratio varies significantly by market segment, for example the short haul leisure segment is 55% busier than average in the peak summer months with demand ranging between 40m and 72m throughout the year. In

contrast the short haul business segment is just 9% busier in the peak compared to average.

Exhibit 4. Total Passengers by Month, 2017



Source: CAA

Passenger Profile

3.9. The following steps all relate to the passenger profiles of the individual market and carrier segments. The characteristics considered (e.g. UK resident share, length of stay) are all important drivers in relation to understanding the potential scale of a repatriation exercise.

3.10. Much of this analysis makes use of the CAA Departing Passenger Survey. This is a series of surveys which has been undertaken to obtain information about air travellers and the determinants of the travel market. The survey comprises many questions including, but not limited to, a passenger's journey purpose, final and intermediate surface origins/destinations, means of transport to and from airports, route flown, country of residence and income.

3.11. The CAA Survey was supplemented by the UK International Passenger Survey (IPS), this survey collects information about passengers entering and leaving the UK across various airports and ports. These statistics are used to produce estimates of overseas travel and tourism and provide insight on the passenger profile.

3.12. This more detailed level of segmentation was applied at an annual level owing to the limited sample sizes and observed variations throughout the year. For example, the share of transfer passengers was kept constant for a given airline grouping rather than vary on a monthly basis.

3.13. It is this data and the resulting steps that enables the onboard passengers presented in the previous section to be converted into the number of UK residents overseas at any one time.

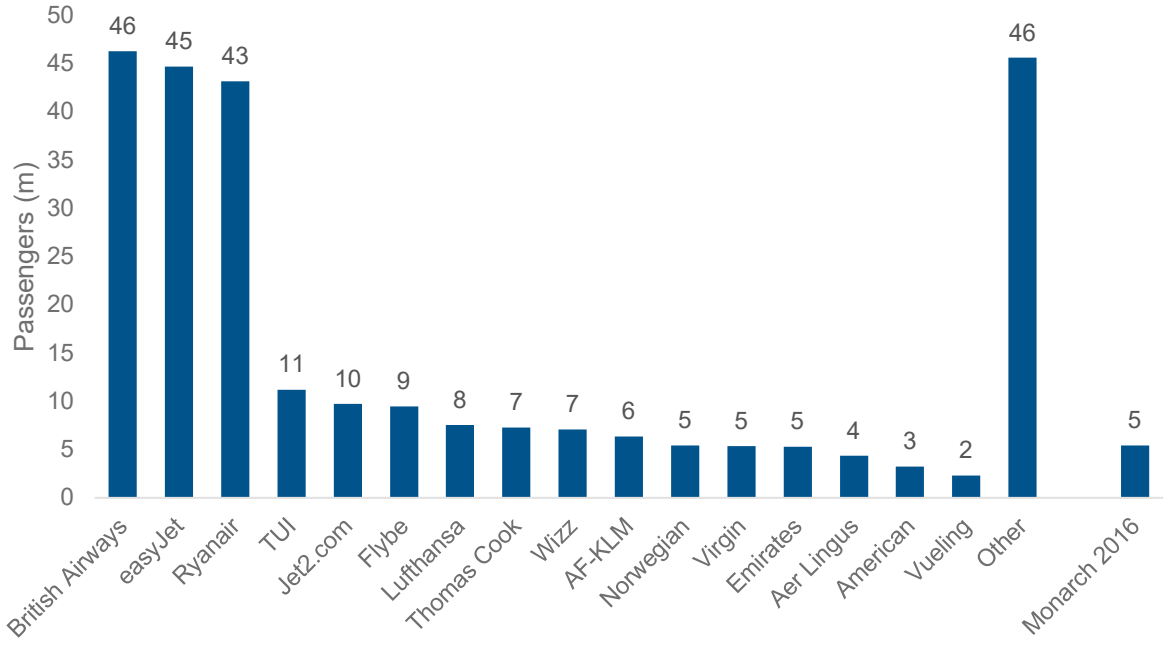
Share of Flown Pax UK Originating

3.14. The outputs from the segmentation of onboard passengers provides a starting point to which the passenger profile of each market segment is applied. The breakdown by airlines is shown in Exhibit 5, BA, easyJet, and Ryanair are by far the largest carriers each carrying approx. 45m passengers to/from/within the UK. After Ryanair there is a steep drop off to the next largest carrier TUI which handled 11m passengers in 2017.

3.15. After this there are 9 airlines in the category of 5-10m passengers per year. This grouping consists of a mixture of UK based leisure carriers (Jet2, Thomas Cook), several other LCCs (Wizz Air, Norwegian) and several flag carriers with a large UK presence (e.g. Lufthansa, American)

3.16. The top 16 are presented here, whilst the remaining airlines are grouped as 'other' for the purposes of simplifying the outputs in this presentation. For comparison, Monarch accounted for 5m passengers in 2016 comparable to Norwegian, Virgin and Emirates today.

Exhibit 5. Total Passengers by Airline, 2017



Source: CAA

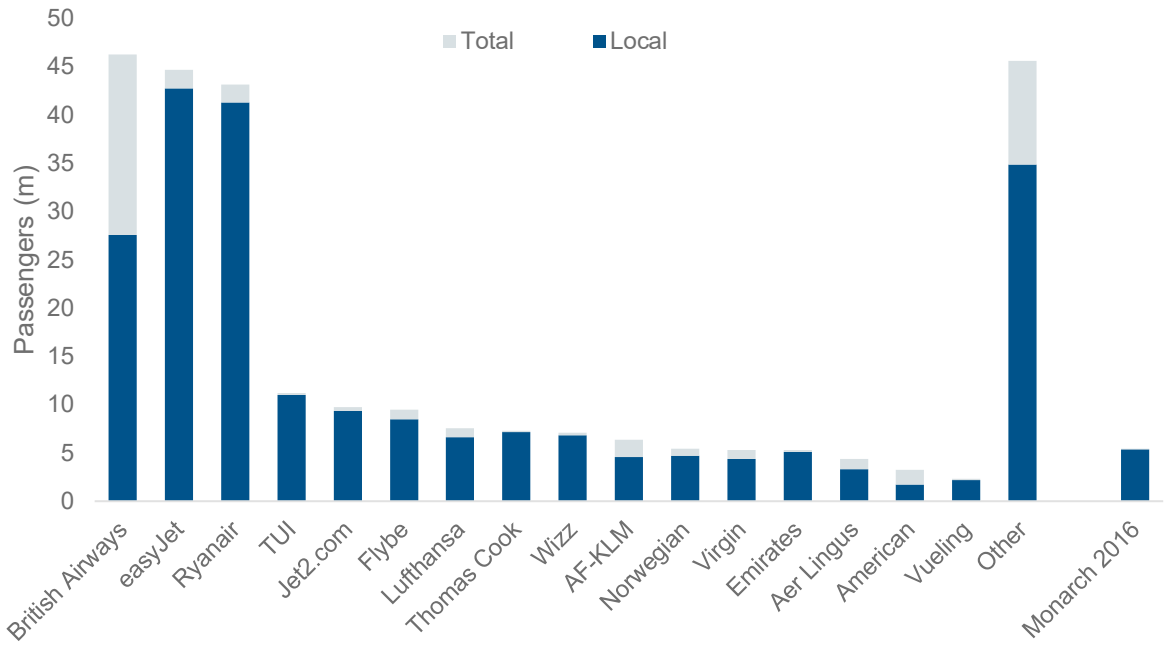
3.17. From the monthly onboard data set, the first step towards sizing the number of overseas UK originating passengers is to exclude transfer passengers, i.e. those passengers who are on connecting itineraries flying via a UK airport (e.g. a passenger flying NYC-LHR-DEL). It should be noted that those transfer passengers who are UK

residents are still captured in the resulting overseas demand. For example, an Edinburgh resident flying EDI-LHR-NYC will still be captured for potential repatriation.

3.18. Given the variety of airline business models and the importance of transfers, the share of demand that is out of scope for repatriation varies widely. For example, transfers account for 40% of BA's and many of their partner airlines' demand whilst this share is much lower at under 5% for many UK based carriers (e.g. easyJet, TUI, Jet2, Flybe etc.)

3.19. At a total level the CAA survey provides a transfer share around 15% which reduces the total onboard demand from 264m to 222m. The reduction by carrier is shown in Exhibit 6 highlighting which airlines are impacted most significantly.

Exhibit 6. Total Point-to-Point Passengers by Airline, 2017



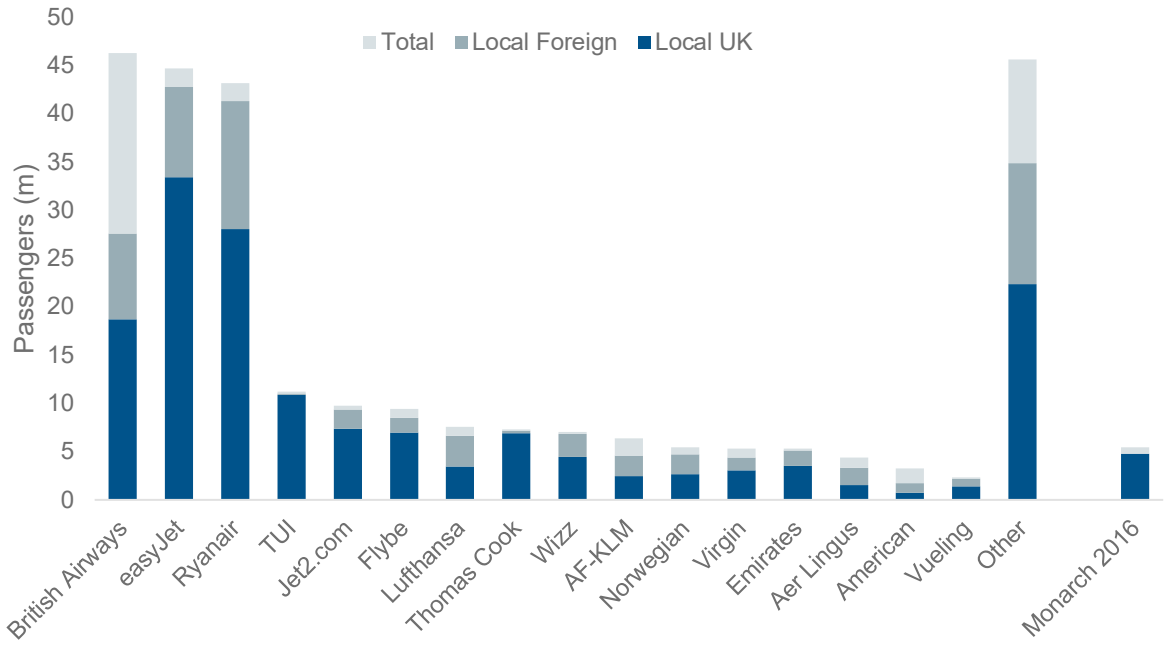
Source: CAA

3.20. In addition to excluding the transfer passengers it is necessary to exclude those passengers who started their return journey from overseas, i.e. those also considered out of scope of any potential repatriation exercise. For this calculation, we have used the country of residence recorded in the CAA Survey as a proxy for the point of origin for the passenger's trip.

3.21. At a high level the UK aviation market is dominated by outbound demand with approx. 70% of the point-to-point demand being driven by UK residents. Like transfers, the share of UK residents by carrier varies significantly. Of point to point demand BA is relatively 'balanced' with approx. 50% of demand arising from UK residents. For the largest LCCs this share rises to around 70% whilst for the leisure focused carriers it is over 95%.

3.22. Exhibit 7 highlights the resulting addressable UK market. From the 222m point to point passengers this reduces to 158m when excluding the non-UK segment.

Exhibit 7. Total UK originating Point-to-Point Passengers by Airline, 2017



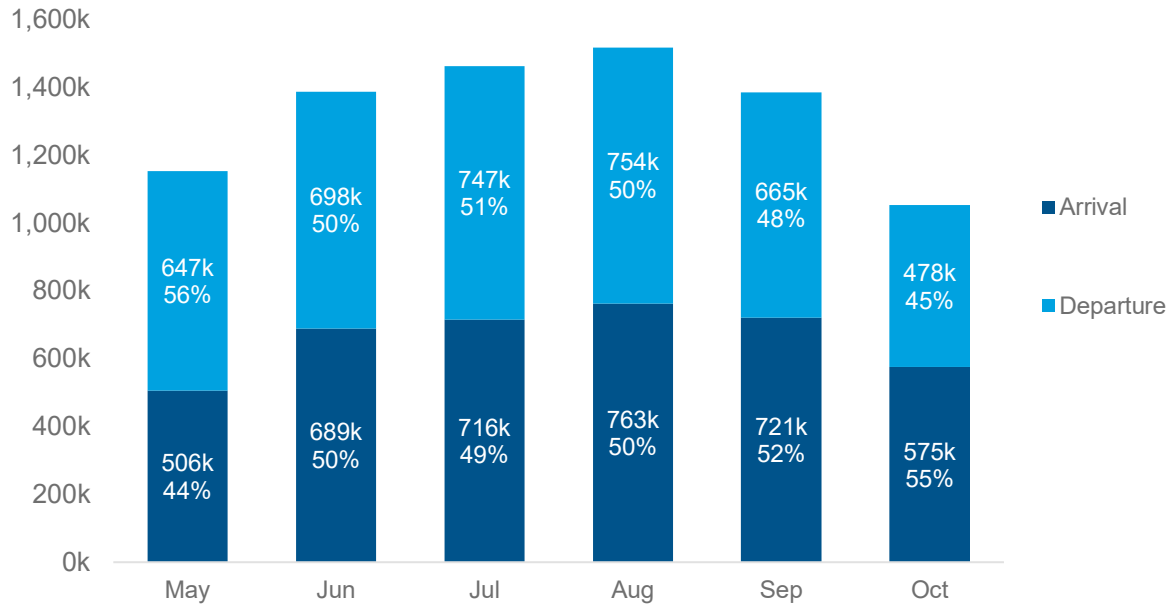
Source: CAA

3.23. The resulting 158m needs to be halved to account for departing UK residents only. The arrival & departure profile whilst flat at an annual level does have some notable variances by month for several significant airlines.

3.24. For the leisure segment with highly seasonal profiles, in the months leading up to the peak (e.g. June) the arrival/departure profile is weighted towards departures, whilst following the summer peak the airlines are much fuller on their inbound flights reflecting a period of maximum exposure when their peak of overseas passengers occurs.

3.25. This is shown in Exhibit 8 for TUI; in May as much as 56% of demand relates to outbound demand returning towards a balanced split during the Jun-Aug period. This then reverses as by October 55% of demand relates to passengers returning from their holidays whilst they airline reduces their overall capacity.

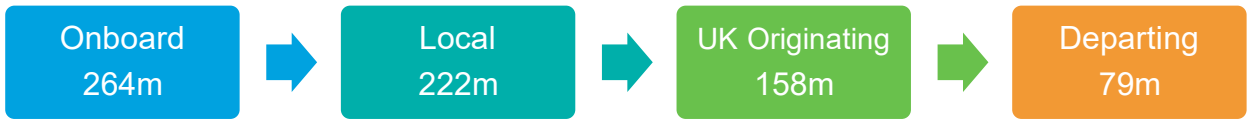
Exhibit 8. Arrival/Departure Ratios (Example = TUI, 2017)



Source: CAA

3.26. Exhibit 9 provides a summary of the steps between the initial input of 264m annual passengers resulting in the figure of 79m departing UK passengers in 2017. It is estimated that this figure has grown 18% from 67m in 2015 highlighting the strong growth trends in the UK's aviation market during the last couple of years.

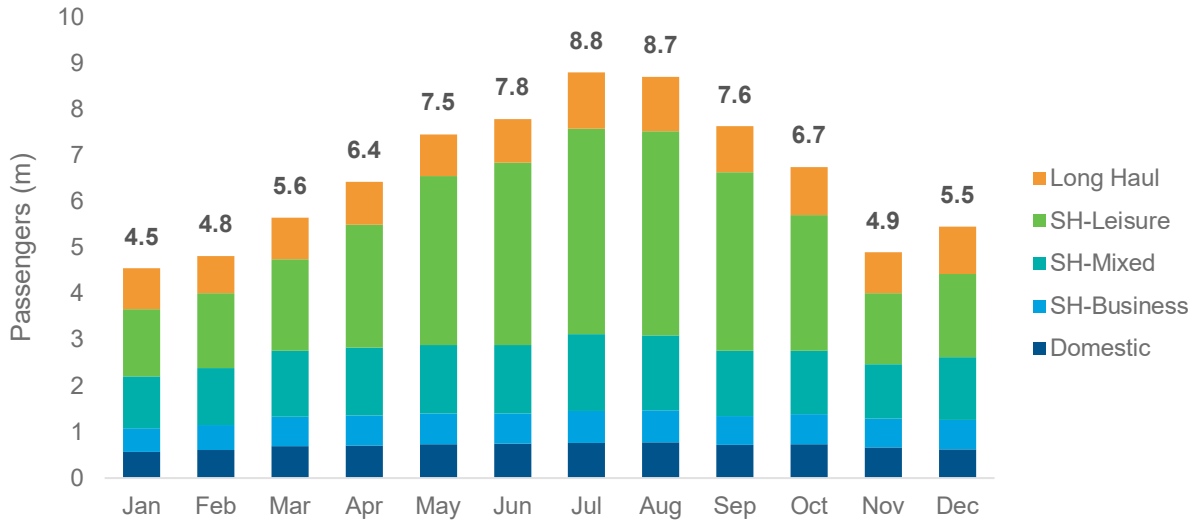
Exhibit 9. Summary of Results, 2017



Note: Starting figure has already been filtered for demand out of scope (e.g. Oil Rig traffic)

3.27. The monthly breakdown for the 79m departures is presented in Exhibit 10. As can be seen the peak month now shifts to July driven by a slightly higher share of departures compared to August. During the peak month, 8.8m departing UK residents are forecast to fly which is equivalent to 284k per day. This peak rapidly falls off and reaches 4.9m by November which is 44% below the peak.

Exhibit 10. Departing UK residents by Month, 2017



Source: CAA

Overseas Demand – Exposure

3.28. To calculate the exposure or the number of UK residents overseas at any given time for an airline it is necessary to incorporate further analysis. This combines the rate that passengers are being flown out of the UK with the typical trip duration. Naturally the carriers with the longest trip stays will be proportionally more exposed and require longer periods for any repatriation operation.

3.29. Exhibit 11 provides a summary of the calculation applied at an individual airline & market segment level (e.g. British Airways short haul leisure market).

Exhibit 11. Overseas Demand Calculation

$$Length\ of\ Stay * \frac{Monthly\ Passengers}{Days\ in\ Month} = Overseas\ UK\ Originating$$

3.30. The resulting exposure varies proportionally according to the length of stay, highlighting the importance of this assumption. For this analysis, again CAA Survey statistics supplemented by the UK International Passenger Survey were used to cross check the results.

Exhibit 12. Market Segments, 2017

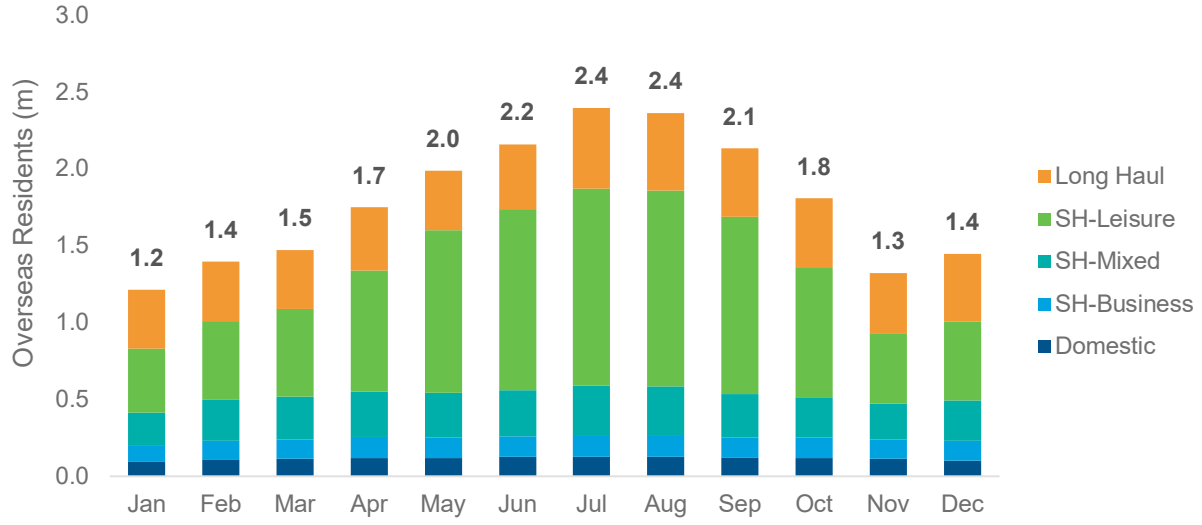
Airline (examples)	Market Segment	Length of Stay Assumed
EasyJet	Short haul – Biz	4.0 days
	Short haul – Mixed	5.9 days
	Short haul – Leisure	8.6 days
All	Domestic	5.2 days
All	Short haul	7.9 days
All	Long haul	13.3 days
All	**Total**	**8.2 days**

Source: ICF

3.31. Long haul travel has a significantly higher length of stay of 13 days compared to the domestic or total short haul market which average 5 and 8 days respectively. Within the short haul category there is significant variation, for example for easyJet the business orientated markets average 4 days whilst the leisure markets average more than double at nearly 9 days.

3.32. Combining the rate at which people fly and the average length of stay assumptions in Exhibit 12 provides the average number of overseas residents by month which is used to underpin much of our subsequent analysis. At an annual level the average number of overseas residents is around 1.8m however this peaks at 2.4m in the summer high season.

Exhibit 13. Overseas UK residents by Month (on any given day within month), 2017



Note: Domestic included to capture total market profile

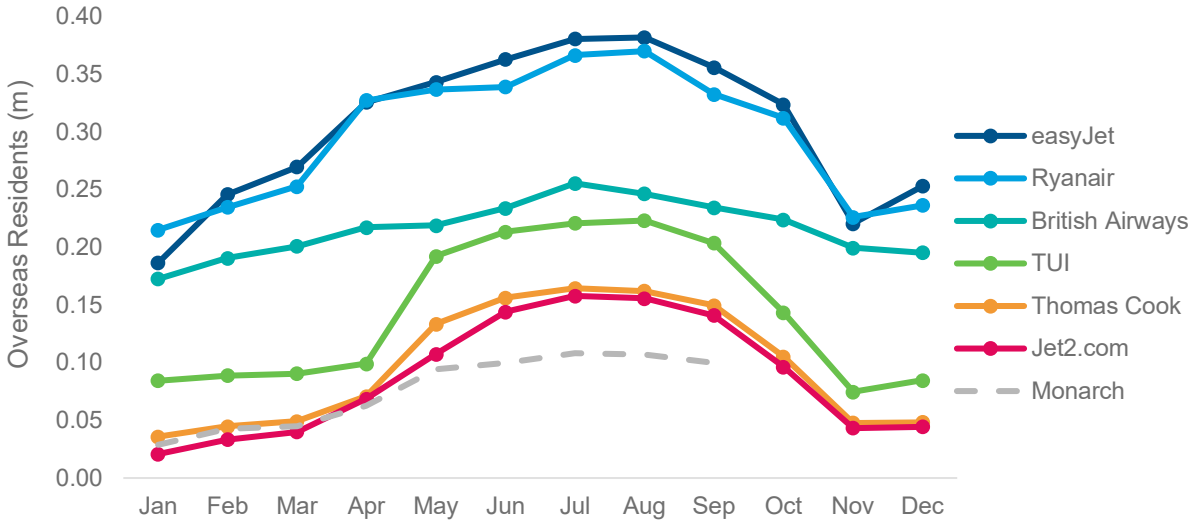
Source: CAA

3.33. Throughout the year the exposure by market segment varies significantly. Within the peak summer exposure of 2.4m overseas people over 50% (1.3m) of this is attributable to the short haul leisure segment. In the off peak this segment accounts

for just one third of demand equivalent to 415k people which is nearly 70% below the peak summer months. Other market segments are clearly less seasonal with long haul exhibiting the smoothest year-round profile.

3.34. At an airline level the profile of exposure varies significantly by month and the output for the top airlines in the UK market is shown in Exhibit 14.

Exhibit 14. Overseas UK residents by Month (Top Carriers), 2017



Source: CAA

3.35. Ryanair and easyJet have a very comparable seasonal and absolute profile with nearly 400k passengers exposed in the peak summer months and under 200k in the winter. BA, whilst the largest carrier of all passengers is only ranked 3rd when considering the volume of overseas demand and exhibits a much flatter profile of 200k compared to the LCCs just mentioned.

3.36. The main leisure carriers (TUI, Jet2, Thomas Cook) operate with highly seasonal profiles and in the case of TUI, when combined with typical longer trip durations results in peak overseas demand being only slightly below BA.

3.37. Monarch, which is shown for comparison purposes, also had a seasonal profile. While passenger volumes in peak months may not be as high as some other leisure carriers, their collapse affected around 100k passengers in early October when the airline ceased trading.

3.38. This complete data set for passenger re-patriation exposure split by airline, market and month is used to calculate the potential repatriation cost arising through the different approaches. These options are discussed in Section 5.

Exhibit 15. Breakdown of Market Haul

Short Haul	Long Haul	Long Haul (continued)
Albania	Afghanistan	Namibia
Algeria	Angola	Nepal
Armenia	Antigua And Barbuda	New Zealand
Austria	Argentina	Nigeria
Belarus	Australia	Oman
Belgium	Azerbaijan	Pakistan
Bosnia-Herzegovina	Bahamas	Peru
Bulgaria	Bahrain	Philippines
Croatia	Bangladesh	Puerto Rico
Cyprus	Barbados	Qatar
Czech Republic	Bermuda	Rwanda
Denmark	Botswana	Saint Kitts And Nevis
Egypt	Brazil	Saudi Arabia
Estonia	Brunei	Senegal
Faroe Islands	Burkino Faso	Seychelles
Finland	Burma	Sierra Leone
France	Cameroon	Singapore
Georgia	Canada	South Africa
Germany	Cape Verde Islands	Sri Lanka
Gibraltar	Cayman Islands	St Lucia
Greece	Chile	Sudan
Greenland	China	Syria
Hungary	Colombia	Tahiti
Iceland	Costa Rica	Taiwan
Irish Republic	Cuba	Tajikistan
Israel	Djibouti Republic	Tanzania
Italy	Dominican Republic	Thailand
Jordan	Ecuador	Trinidad And Tobago
Kosovo	Equatorial Guinea	Turkmenistan
Latvia	Ethiopia	Turks And Caicos Islands
Lebanon	Falkland Islands	UAE
Libya	Gabon	Uganda
Lithuania	Gambia	USA
Luxembourg	Ghana	Uzbekistan
Macedonia	Grenada	Venezuela
Malta	Hong Kong	Vietnam
Mauritania	India	Virgin Islands
Morocco	Indonesia	Yemen
Netherlands	Iran	Zambia
Norway	Iraq	Zimbabwe
Poland	Ivory Coast	
Portugal	Jamaica	
Republic of Moldova	Japan	
Republic of Montenegro	Kazakhstan	
Republic of Serbia	Kenya	
Romania	Korea	
Russia	Kuwait	
Slovak Republic	Kyrgyzstan	
Slovenia	Liberia	
Spain	Malawi	
Sweden	Malaysia	
Switzerland	Maldives	
Tunisia	Martinique	
Turkey	Mauritius	
Ukraine	Mexico	

Source: ICF

4. Airline Insolvency Probabilities

4.1. The probability of airline insolvency is an important input to understanding the repatriation costs that are likely to be incurred over a period of time

4.2. ICF's approach is to base our estimations on credit ratings, from which insolvency probabilities can be calculated using transition probability rates published by credit rating agencies. Wherever possible we utilised published credit ratings, but where airlines did not have a credit rating, we estimated their ratings based on the same quantitative and qualitative factors that Moody's use in their rating of airlines

4.3. The airline specific insolvency probabilities can then be used, in conjunction with the number of overseas passengers to calculate the level of repatriation efforts required and the risk factor.

Airline Credit Ratings

4.4. A credit rating is an opinion on the creditworthiness of an entity, in this case, airlines. Ratings are based on several key factors which influence the outlook on a carrier's future performance, its exposure to risk and its ability to mitigate risks.

4.5. As part of ICF's analysis, the top 35 airlines, as measured by the number of passengers arriving and departing the UK, were assigned credit ratings. The sample size of 35 airlines equates to 93% of total UK aviation demand in 2017. For the remaining 7% of passengers, ICF grouped these smaller airlines into twelve other categories based on the dominant market (domestic, short haul, long haul) and four key criteria which influence the risk of insolvency:

- Significance of the UK market – Is the UK a significant part of the carrier's network? E.g. Loganair (Large) or Air Europa (Small)
- Scale of airline – How big is the airline globally? E.g. Avianca (Large) or Wideroe (Small)
- Market position – how dominant Is the carrier in its local market? E.g. Aeroflot (Dominant) or Malaysian (Not Dominant)
- Ownership - Is the carrier owned by the state or privately? E.g. Saudia or IAG

4.6. For each of the 12 categories we assigned credit ratings based on the characteristics of the largest airline within the category

4.7. For the 35 named carriers, 18 were publicly rated and we simply adopted the official ratings for this study. Where the airline had a rating from another agency we translated that into the equivalent Moody's rating. For the remaining 17, we used publicly available data to calculate the financial metrics that make up the quantitative metrics in Moody's methodology for the passenger airline industry. This was further supported by two additional approaches before assigning estimated credit ratings:

- Credit Rated Enhanced Equipment Trust Certificates (EETCs)
- Comparison to publicly rated carriers. For example; geography, network, business model, fleet type.

4.8. Moody's publishes its credit rating methodology for the Passenger Airline Industry, which is based on the metrics as shown in Exhibit 16.

Exhibit 16. Moody's Rating Methodology for the Passenger Airline Industry

Rating factors	Factor weighting	Sub-factor	Sub-factor weighting
Scale	**10%**	**Revenue**	**10%**
Business Profile	**25%**	**Market Position & Network Strength**	**25%**
Profitability & Efficiency	**12.5%**	**EBIT Margin**	**12.5%**
Leverage & Coverage	**37.5%**	**Debt / EBITDA**	**12.5%**
		RCF / Debt	**12.5%**
		(FFO + Interest Expense) / Interest Expense	**12.5%**
Financial Policy	**15%**	**Financial Policy**	**15%**
Total	**100%**		**100%**

Source: Moody's Passenger airline credit rating methodology

4.9. Based on Moody's published methodology, publicly available financial statements and ICF's access to industry data sources such as IATA's PaxIS and OAG, ICF were able to estimate airlines' credit ratings.

4.10. The two remaining factors (business profile and financial policy) are qualitative measures and as such are more open to interpretation. The Business Profile factor, which is worth 25% of the airline's overall score is based on Exhibit 17's descriptions, as provided by Moody's.

Exhibit 17. Moody's Airline Business Profile Scorecard

Category	Description
Aaa	Unparalleled and sustainable market position supported by an extremely large and well diversified network, with revenue spread across an extremely large number of countries or regions and no concentration in any one country or region; and extremely strong ability to sustain revenue and earnings through the economic cycle.
Aa	Extremely strong and sustainable market position supported by a very large and well-diversified network, with revenue spread across a very large number of countries or regions and a very low degree of concentration in any one country or region; and very strong ability to sustain revenue and earnings during global and regional economic downturns.
A	Very strong and sustainable market position supported by a large and well diversified network, with revenue spread across a large number of countries or regions and a low degree of concentration in any one country or region; strong ability to sustain revenue and earnings during global and regional economic downturns.
Baa	Strong and sustainable market position supported by a well-diversified network, with revenue spread across a moderately large number of countries or regions; moderately strong ability to sustain revenue and earnings during regional economic downturns but somewhat limited ability during global or pan-regional economic downturns.
Ba	Moderately strong and sustainable market position supported by a fairly diversified network, with revenue spread among several countries or regions; or moderate concentration in one country or region that reduces diversification benefits and increases exposure to idiosyncratic shocks; or limited ability to sustain revenue and earnings during global or regional economic downturns, resulting in moderate earnings volatility.
B	Sustainable market position but a fairly concentrated network with revenue spread across a very small number of countries or regions; or a significant reliance on one country or region reduces diversification benefits and increases exposure to idiosyncratic shocks; or the network is exposed to increasing competition from new entrants; or very limited ability to sustain revenue and earnings during global or regional economic downturns, resulting in elevated earnings
Caa	Operates in a small market or has a history of weak network profitability; or a highly significant reliance on one country or region reduces diversification benefits and increases exposure to idiosyncratic shocks; or the network is exposed to increasing competition from new entrants; or severely limited ability to sustain revenue and earnings during economic downturns, resulting in significant earnings volatility.
Ca	Operates in a single country or region, with a very weak market position or has a history of loss-making operations; or an extremely significant reliance on one country or region; or has a limited ability to sustain market share when faced with new entrants, idiosyncratic shocks or increasing competition; or small network constrains ability to sustain revenue and earnings through the economic cycle, resulting in extremely volatile earnings.

Source: Moody's

4.11. Based on the descriptions in Exhibit 17, it can be seen that airlines operating across a wider range of markets and holding stronger market positions are regarded as being in

a position of better credit worthiness than a carrier who holds a weak position in a less diverse range of markets.

4.12. Based on industry data from IATA, ICF have used a set of metrics such as market share, number of routes/countries served and number of competitors, to influence our decision making with regards to the airline's business profile score.

4.13. The final outstanding scoring criteria is the financial policy, worth 15% of the total credit score. Moody's criteria states that airlines which are more conservative with regards to risk and liquidity management and hold stable financial metrics should be less susceptible to event risk and as such able to maintain a higher credit rating.

Exhibit 18. Moody's Airline Financial Policy Scorecard

Category	Description
Aaa	Expected to have extremely conservative financial policies (including risk and liquidity management); very stable metrics; essentially no event risk that would cause a rating transition; and public commitment to a very strong credit profile over the long term.
Aa	Expected to have very conservative financial policies (including risk and liquidity management); stable metrics; minimal event risk that would cause a rating transition; and public commitment to a strong credit profile over the long term.
A	Expected to have predictable financial policies (including risk and liquidity management) that preserve creditor interests; although modest event risk exists, the effect on leverage is likely to be small and temporary; strong commitment to a solid credit profile.
Baa	Expected to have financial policies (including risk and liquidity management) that balance the interests of creditors and shareholders; some risk that debt funded acquisitions or shareholder distributions could lead to a weaker credit profile.
Ba	Expected to have financial policies (including risk and liquidity management) that tend to favor shareholders over creditors; above-average financial risk resulting from shareholder distributions, acquisitions, or other significant capital structure changes.
B	Expected to have financial policies (including risk and liquidity management) that favor shareholders over creditors; high financial risk resulting from shareholder distributions, acquisitions, or other significant capital structure changes.
Caa	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring in varied economic environments.
Ca	Expected to have financial policies (including risk and liquidity management) that create elevated risk of debt restructuring even in healthy economic environments.

Source: Moody's

4.14. For airlines where no financial information was available, ICF have looked to use EETCs. EETCs are financial securities used in aircraft finance by airlines. The debt

raised by the trust certificate is secured against the aircraft being acquired, and are comparable to properties that are mortgaged.

4.15. EETCs are often rated based on the seniority of the debt, which provides a credit rating range. In addition to the seniority of the debt, the ranges reflect the airline's financial position and the attractiveness of the aircraft asset. Aircraft where there is significant demand from a wide range of operators is typically considered more attractive, as in an insolvency situation, the holders of the EETC is able to recoup losses by selling the aircraft on the secondary market. As such, ICF have adjusted the EETC ratings based on the specific aircraft type.

4.16. ICF have been able to source EETCs for Norwegian and Emirates, which both publish financial data. ICF applied Moody's methodology to the financials in addition to adopting the EETC approach to validate the individual airline credit ratings.

4.17. For airlines without credit ratings, publicly available financial information or EETCs, ICF has assigned credit ratings based on the most comparable publicly rated airline. ICF has based these comparisons on factors such as network size, business model and geography.

Transition Probabilities

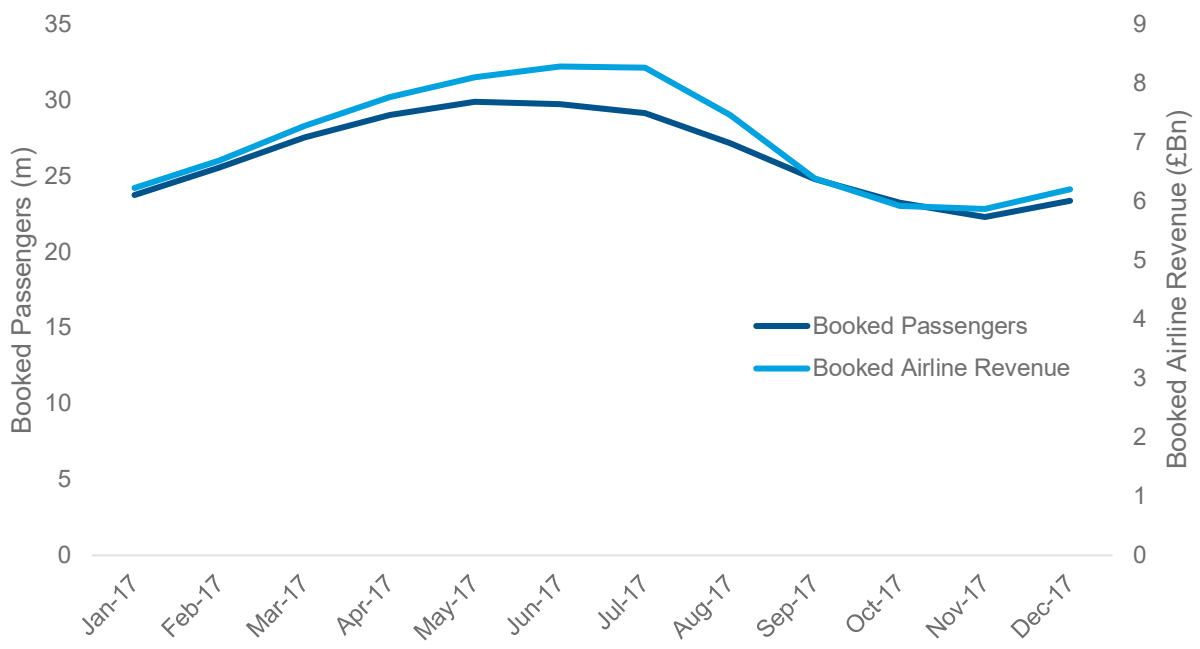
4.18. For both airlines and collective groups, ICF has assigned a probability of insolvency, based on data collected by Moody's for the period 1983 to 2017. Moody's data reflects the probabilities for each credit rating to transition to insolvency within a one-year period, with companies rated towards the lower end of the spectrum more likely to fall into default than those with a higher rating.

4.19. Moody's transition probabilities include the probability of moving to a 'Withdrawn Rating'. Withdrawing a rating is not necessarily linked to a company's credit worthiness, as management's needs to demonstrate credit worthiness may change. As such ICF has removed their weighting in our insolvency probability calculation, and scaled up the insolvency probabilities. For example, for a BAA3 rating, the insolvency probability is 0.25% and the probability of moving to a 'Withdrawn Rating' is 5.97%. In this instance we would recalculate the insolvency probability as 0.25% / (1-5.97%) = 0.27%

Seasonally Adjusted Transition Probability Profile

4.20. Based on the annual insolvency probability and monthly booking curves, ICF has calculated the monthly risk of insolvency for each airline and category, to reflect the seasonal nature of the aviation industry.

Exhibit 19. Booking Curves by Month, 2017



Source: CAA

4.21. As demonstrated in Exhibit 19, aviation demand in the UK peaks in the summer months of June to August. Prior to this, airlines collect future revenue based on forward bookings by passengers. As such, airlines typically hold more cash during and immediately prior to peak travel months. However, after the peak, the airline's cash reserves fall as the airline enters the weaker travel periods and it has fewer booked passengers. At the same time, many of its costs remain relatively fixed throughout the year, and the airline is therefore more vulnerable to default.

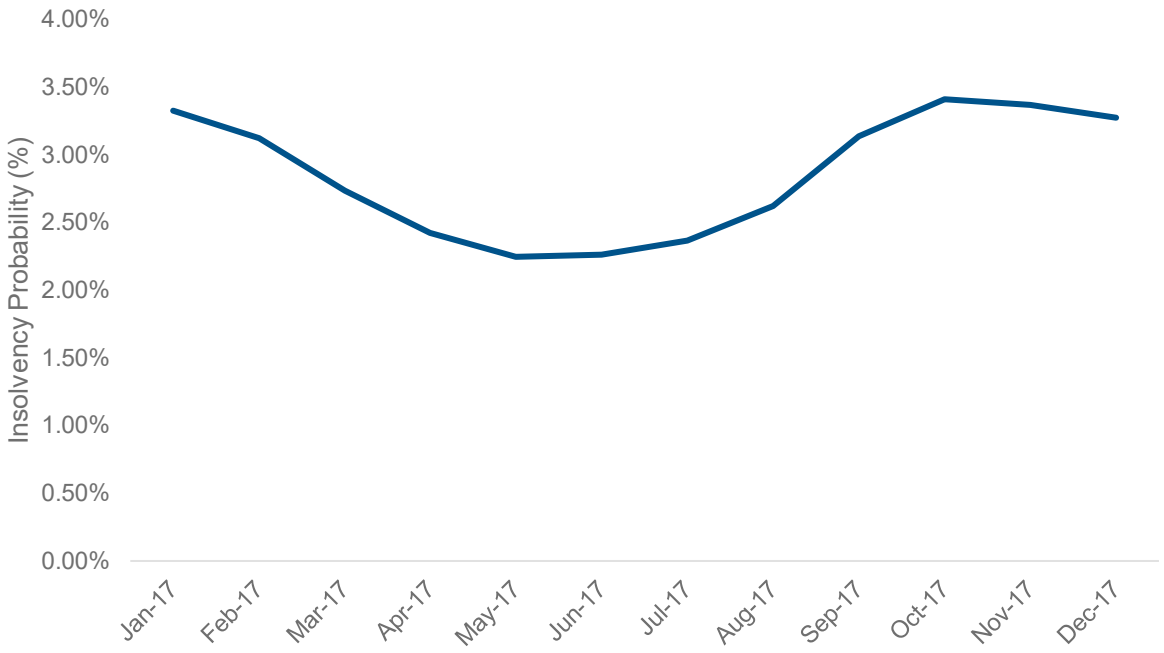
4.22. ICF has utilised forward bookings to reflect the seasonality of insolvency by applying the resulting adjustment factor based on the calculation in Exhibit 20 to the implied annual insolvency.

Exhibit 20. Seasonal Insolvency Factor Calculation

$$\frac{\textit{Average Month Revenue}}{\textit{Monthly Revenue}} = \textit{Seasonal Insolvency Factor x Annual Insovlency Probability}$$

4.23. As shown in Exhibit 21, the probability of an airline entering insolvency in the UK peaks in October, immediately after the summer peak.

Exhibit 21. Airline Insolvency Probabilities by Month, 2017



Source: ICF

5. Repatriation Options and Costings

5.1. The method of repatriation is key to evaluating the costs associated with such an event. ICF has identified three key categories of repatriation:

- **Self-repatriation;** Affected passengers find, book and pay for seats on other airlines on "rescue fare" terms, a discounted price for two weeks. If needed, the Co-ordinating Body would help with a microsite, sign-posting the airlines offering such fares.
- **Assisted repatriation:** An operation in which the Coordinating Body plays a more active role than in Self-Repatriation by providing a central flight availability and booking facility through which passengers can select and pay for their flights.
- **Organised charter;** Operation by a co-ordinator to charter third-party aircraft capacity acquired in advance and post-insolvency operate an organised substitute flying programme.
- **Keep the fleet flying (KFF**); An orderly wind-down, where the airline's (inbound) flying programme is maintained for a short-period (less than 14 days in the vast majority of expected cases) until the market can provide sufficient alternative capacity. This solution is essentially limited to UK registered airlines as it will be reliant on changing airline licensing regulations and insolvency law, which will only apply to the UK.

Estimating the Cost of Repatriation

Self/Assisted-Repatriation

5.2. To calculate the cost of self-repatriation, ICF has reviewed industry data from IATA and airline annual reports to calculate the average fare for a one-way journey by market and carrier type. ICF's assumptions can be found listed in Exhibit 22.

Exhibit 22. Self-Repatriation Fare Assumptions, 2018

Market	Carrier Type	One-way Fare (£)
Domestic	FSC	80
Domestic	LCC	43
Domestic	Other	70
Domestic	Regional	75
SH-Biz	Charter	60
SH-Biz	FSC	85
SH-Biz	LCC	50
SH-Biz	Other	80
SH-Biz	Regional	85
SH-Mixed	Charter	70
SH-Mixed	FSC	105
SH-Mixed	LCC	57
SH-Mixed	Other	83
SH-Mixed	Regional	90
SH-Leisure	Charter	95
SH-Leisure	FSC	111
SH-Leisure	LCC	85
SH-Leisure	Other	98
SH-Leisure	Regional	118
LH	Charter	255
LH	FSC	405
LH	LCC	230
LH	Regional	405
LH	Other	255

Source: ICF analysis

Organised Charter

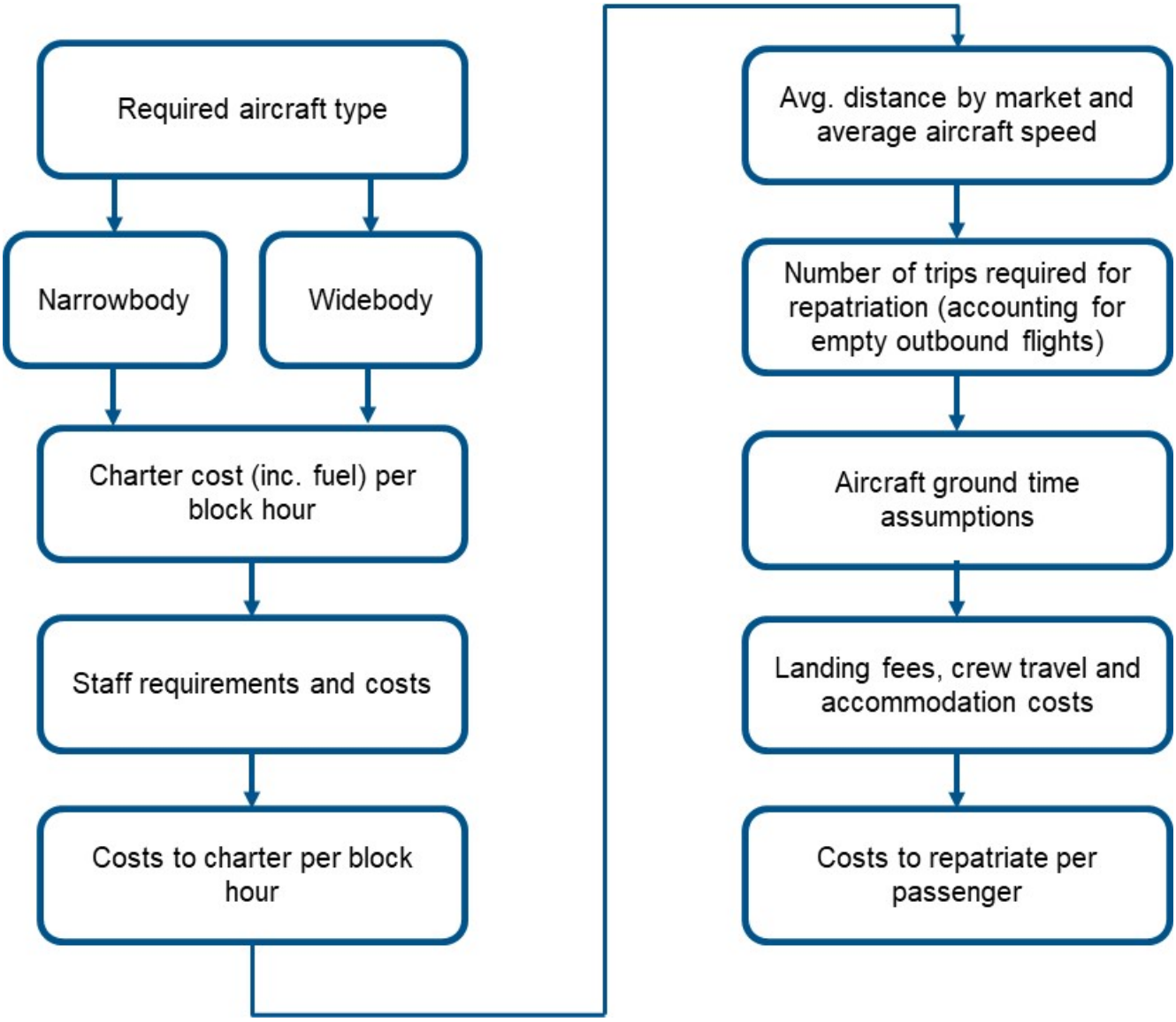
5.3. For passengers who can't get home via existing capacity in the market, alternative means of transport will have to be arranged, such as the leasing of aircraft, crew, maintenance and insurance (ACMI).

5.4. Airlines are often able to charter additional aircraft in anticipation of increased demand, such as during the summer period, where an airline may charter an aircraft for several weeks.

5.5. In addition to medium term leases, airlines are also able to request ad-hoc charters to cover one-off or short-term requirements. As ad-hoc charters are often requested with relatively short-notice and for a short period time, ad-hoc flights typically cost more than wet lease flying.

5.6. Due to the unexpected and urgent nature of a repatriation, ICF has assumed repatriations would be operated as ad-hoc charters rather than wet leases

Exhibit 23. Organised charter methodology



Source: ICF

5.7. ICF has calculated the cost of organised charter on a per passenger basis which has been built with a bottom-up methodology. For the domestic and short-haul markets, ICF has calculated the cost to charter narrowbody aircraft with 150 seats to facilitate the repatriation. Due to the distances involved, ICF has assumed widebody aircraft are used to repatriate passengers stranded in long-haul destinations.

5.8. ICF has produced an average charter cost per block hour covering the cost of chartering the aircraft, fuel, maintenance and insurance based on several quotes by aircraft charter operators. Based on EASA crew regulations we have then calculated the number of staff necessary to operate the aircraft and applied average staff costings to calculate the total charter cost per block hour.

5.9. Based on the chartered aircraft capacity, the average distance by market category average aircraft speed and a repatriation period (days), ICF calculated the number of trips required to repatriate the majority of passengers. In addition to the time spent operating the aircraft, ICF applied additional time assumptions to account for the loading and unloading of the aircraft to calculate the total time the chartered aircraft are required for.

5.10. Finally, ICF included additional operating fees such as airport landing charges, crew travel and accommodation costs to produce total costs, which ICF then converted to cost per passenger. The average organised charter cost per passenger is then applied to all airlines where organised charter is required, and based on the number of stranded passengers results in an airline and market-specific cost of organising charter repatriations.

5.11. ICF's cost per person for organised charter by market are listed in Exhibit 24.

Exhibit 24. Organised Charter Cost Assumptions, 2018

Market	Cost Per Person (£)
Domestic	286
Long-Haul	1,620
SH-Biz	345
SH-Leisure	528
SH-Mixed	402

Source: ICF

Keep the Fleet Flying

5.12. Outside of the UK, several countries have regulatory regimes which allow airlines to continue operations beyond bankruptcy in order to facilitate a winding down of operations. In Italy, this has been applied to Alitalia, while Air Berlin in Germany also recently continued operations as they looked to sell off assets and repatriate passengers.

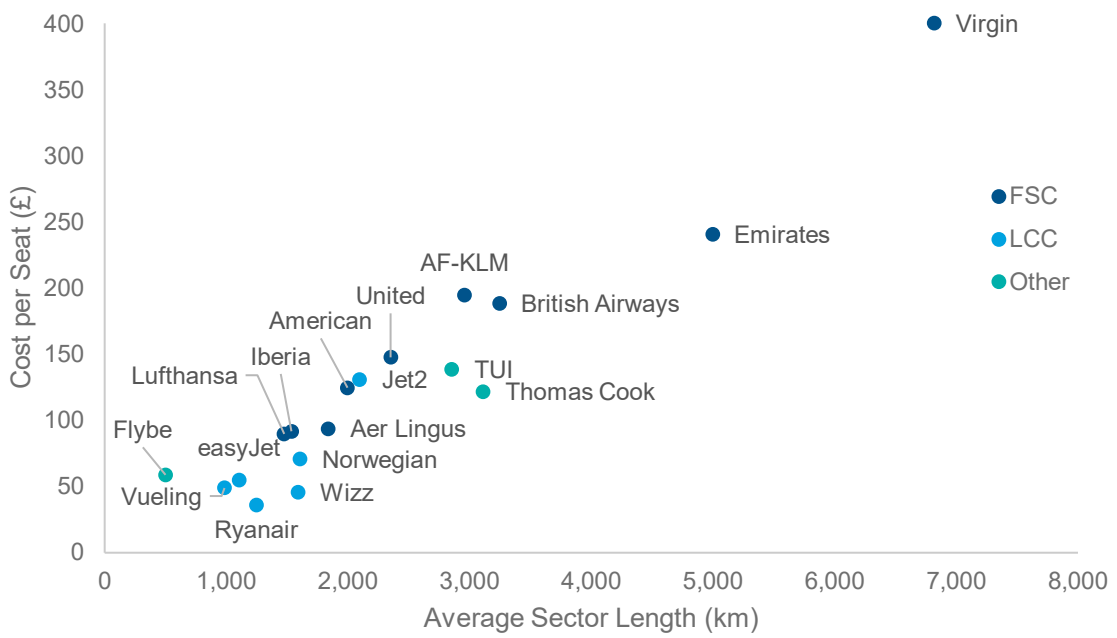
5.13. In the UK – the law is currently more restrictive and does not allow for continued operations.

5.14. However, due to the scale of some of the UK's largest airlines, namely British Airways, easyJet and TUI, and the difficulties associated with leasing vast numbers and different types of aircraft, ICF has modelled the costs associated with keeping the fleet flying, as both self-repatriation and charter agreements would fail to achieve full repatriation.

5.15. ICF reviewed annual operating costs across each airline's network to calculate the average cost per available seat kilometre (CASK) and the cost per seat. As shown in Exhibit 25, Full-service carriers (FSCs) such as British Airways and Virgin typically

operate longer sectors than their Low-cost carrier (LCC) counterparts. LCCs also tend to operate at a lower operating cost per seat than FSCs. Flybe, a regional operator, has the smallest average sector length, reflective of the markets it serves. Virgin, which operates almost exclusively transatlantic services has a significantly longer average longer sector length, and the cost to match.

Exhibit 25. Airline Cost vs Distance Benchmark



Source: Airline Annual Reports

5.16. Based on each airlines' average CASK and CAA data, ICF has been able to adjust the network average costs to create costings per passenger by airline and market category which ICF has used to calculate the cost of operating the fleet for repatriation purposes.

5.17. Prior to declaring insolvency, airlines are expected to have extended their credit to the limit with suppliers and incurred significant debt. As a result, ICF has assumed airlines will be required to pay off a portion of their existing debt in order to start receiving additional consumables (fuel) and services (staff, aircraft, etc) which are essential to keep the fleet flying.

5.18. For each airline where the KFF option is a required, ICF have calculated these 'clearance' costs by multiplying the airline's weekly operating cost by the ratio of operating costs over trade creditors. The ratio of operating costs over trade creditors reflects the outstanding expenditures over the annual total to provide the number of weeks of costs outstanding at any one time.

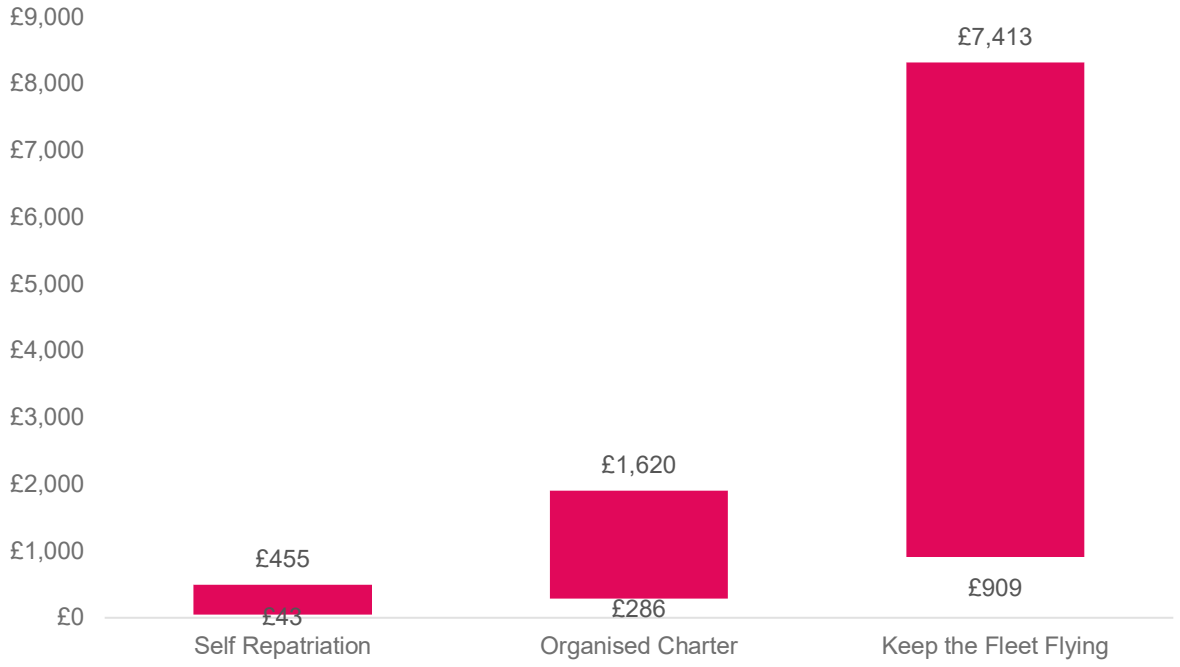
5.19. Total keep the fleet flying costs have therefore been calculated by applying the variable operating cost per passenger by market to the number of stranded local UK passengers overseas and the additional fixed debt clearance costs.

5.20. ICF notes that full debt clearance may not be required under a KFF scenario, as only those that are truly essential to the operating of the fleet are likely to be cleared. ICF therefore considers the assumption that all debt is cleared prior to commencing a repatriation operation to be a 'worst-case' scenario. ICF has assumed payments will have to be made equivalent to two weeks of operating costs, however there is a level of uncertainty about the precise levels of debt which would need to be cleared prior to operations recommencing.

Comparison of Option Costs

5.21. Repatriation costs vary considerably by the method employed as demonstrated in Exhibit 26

Exhibit 26. Repatriation Costs per Passenger (range represents different destinations)



Source: ICF

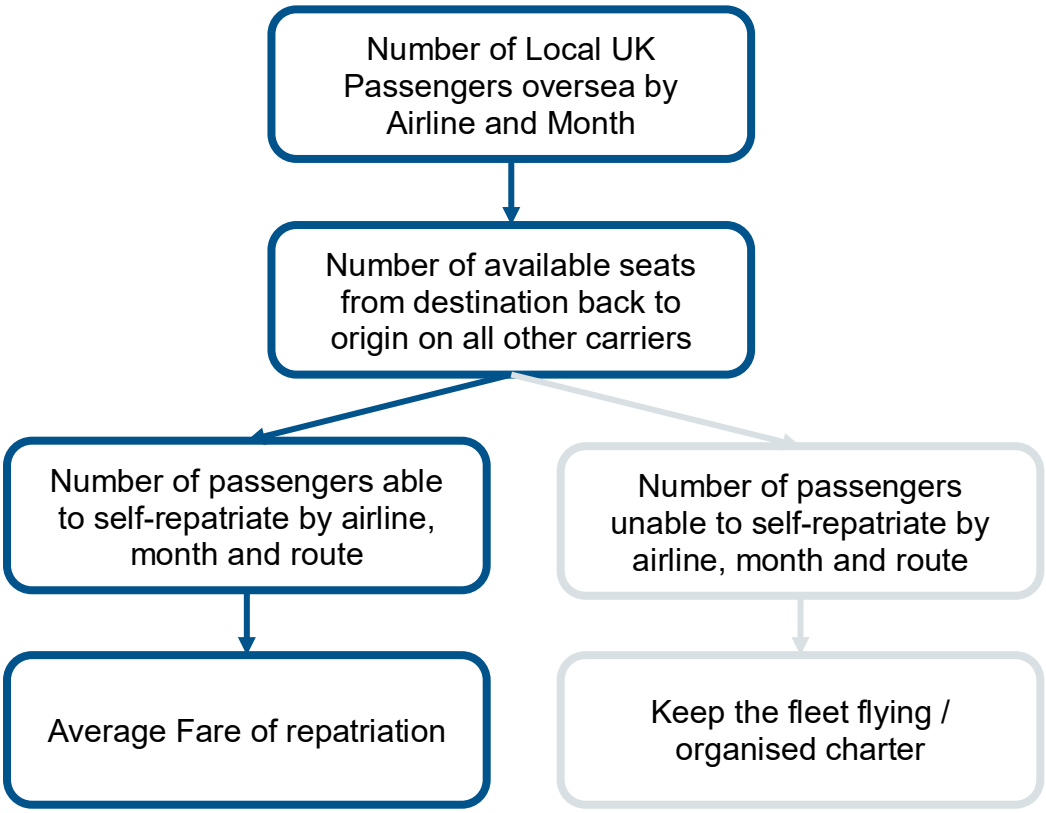
Selecting the Method of Repatriation

5.22. In any insolvency situation there will be passengers who choose to organise their own alternative travel home. This could be on another airline or by other transport modes (e.g. rail, ferry).

5.23. The extent to which this is a viable option is determined in large part by the available capacity on alternative flights, something which will depend on the month of travel and on the destinations served by the airline.

5.24. In order to calculate how many passengers could theoretically be repatriated via other airlines, we have analysed each airline's network to assess how many spare seats there are available on each of the airline's city pairs, and how this varies by month.

Exhibit 27. Self-Repatriations Methodology



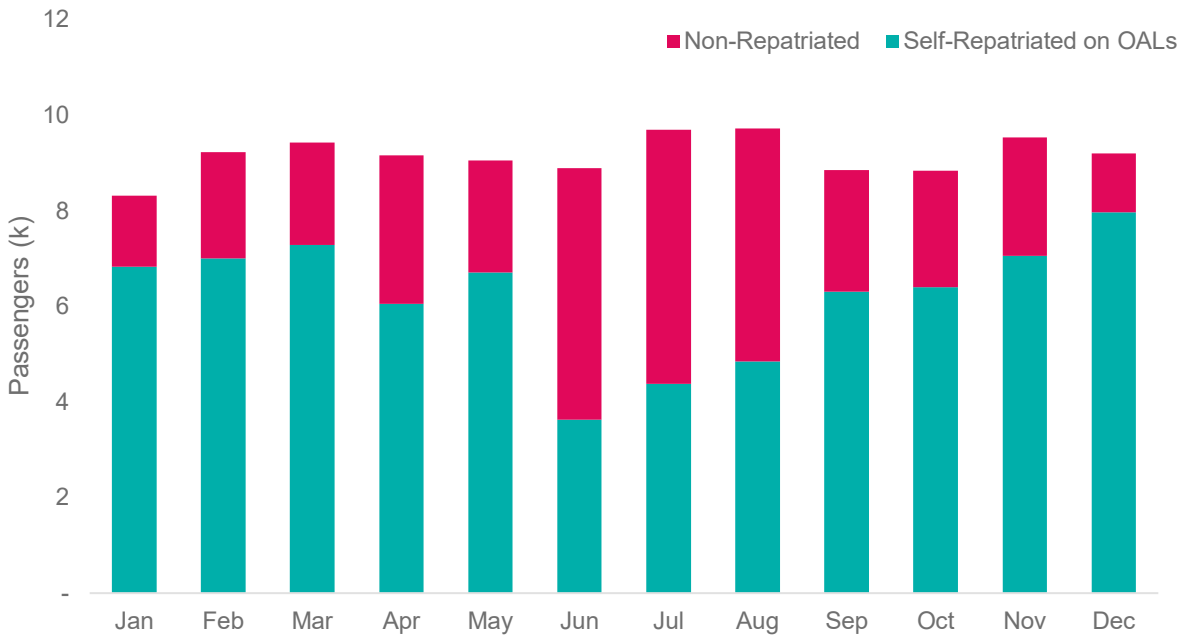
5.25. ICF has assumed that self-repatriation occurs when passengers are able to return to their home airport from where they are at the time of an airline insolvency. For example, we assume passengers from Manchester in New York only self-repatriate to Manchester and do not seek alternative UK destinations such as London or Edinburgh.

5.26. The sum of each individual route pairing is then categorised into the market level (Domestic, Long-Haul, Short-Haul (SH) Business, SH Leisure, and SH Mixed) by airline and month.

5.27. ICF's analysis covered a total combination of 1,996 route level markets.

5.28. As shown in Exhibit 28, were Ryanair to cease operations in a peak, a far smaller proportion of passengers can be repatriated due to the higher volumes and the higher load factors on other carriers.

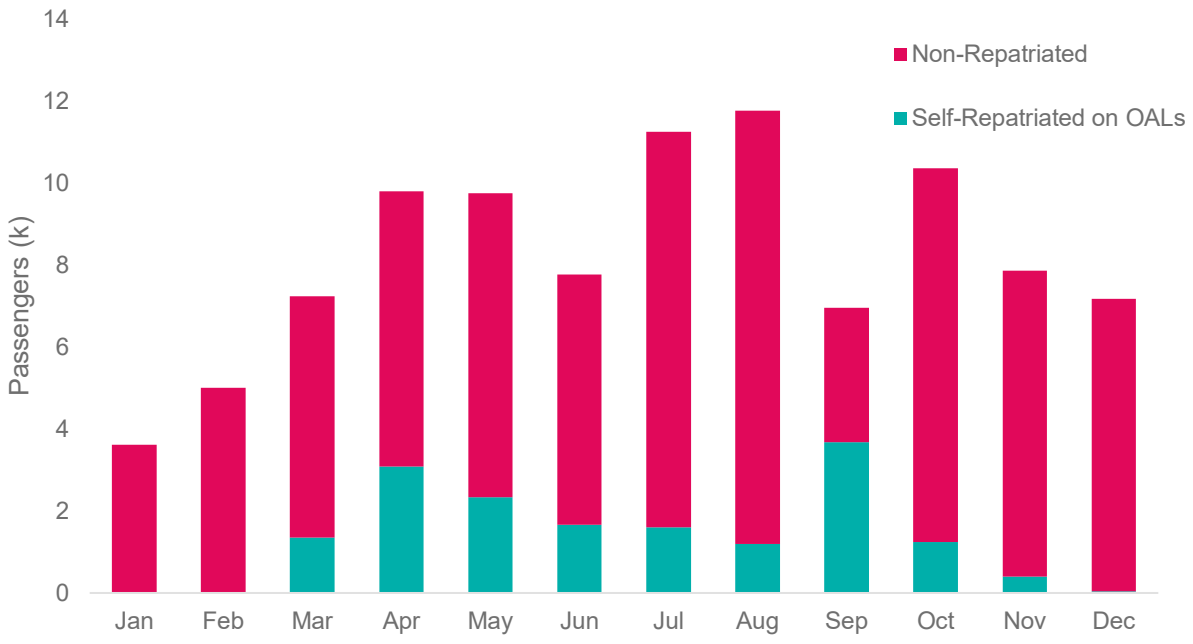
Exhibit 28. Ryanair Self-Repatriations for London – Dublin, 2017



Source: CAA
Note: OALs = Other Airlines

5.29. ICF's analysis also showed that long-haul markets, tend to be operated by fewer carriers which translates to less available seat capacity in the case of an airline becoming insolvent. For example, were Virgin to become insolvent, passengers flying to Orlando from Manchester are unlikely to self-repatriate, with just 12% likely to find tickets on other airlines to return home in October, when insolvencies are most likely.

Exhibit 29. Virgin Self-Repatriations for Manchester - Orlando, 2017



Source: CAA

5.30. Based on the cumulative number of passengers unable to self-repatriate, ICF is then able to conclude whether alternative methods of repatriation are required, such as organised charters.

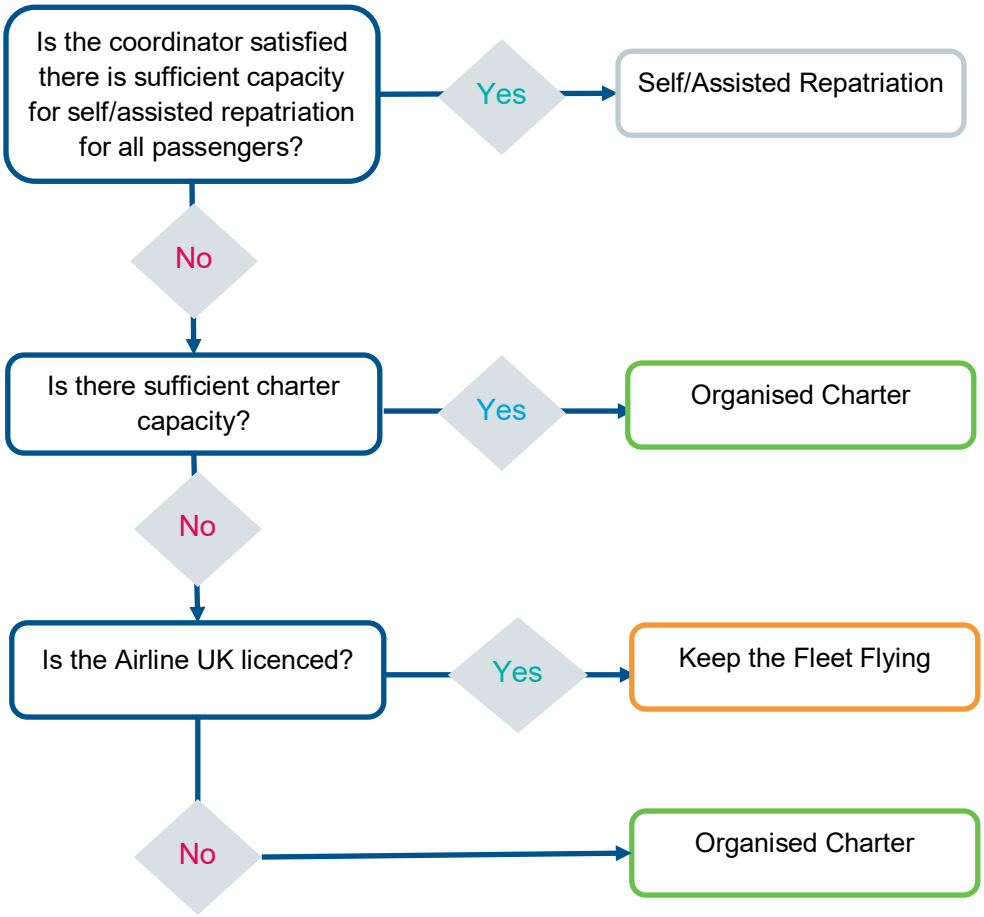
5.31. For passengers who can't get home via existing capacity in the market (i.e. self-repatriate), ICF has assessed the costs related to a repatriation effort involving either organised charters or keeping the airline in operation (so-called Keep the Fleet Flying, 'KFF')

5.32. The underlying philosophy behind the decision process is to aim to repatriate passengers in a timely manner (i.e. providing flights as close as possible to the original scheduled time)

5.33. It is assumed that in most instances where some form of organised repatriation is required (i.e. intervention is required to rescue stranded passengers), the preference will be to arrange organised charter operations. However, in some instances the charter market will not have the capacity to provide sufficient aircraft to repatriate the stranded passengers in a sufficiently timely manner. It is in these situations that keeping the fleet flying could present a more preferable solution.

5.34. The decision tree in Exhibit 30 sets out the criteria used to decide whether an organised charter or keep the fleet flying option is utilised

Exhibit 30. Method of Repatriation Decision-Tree

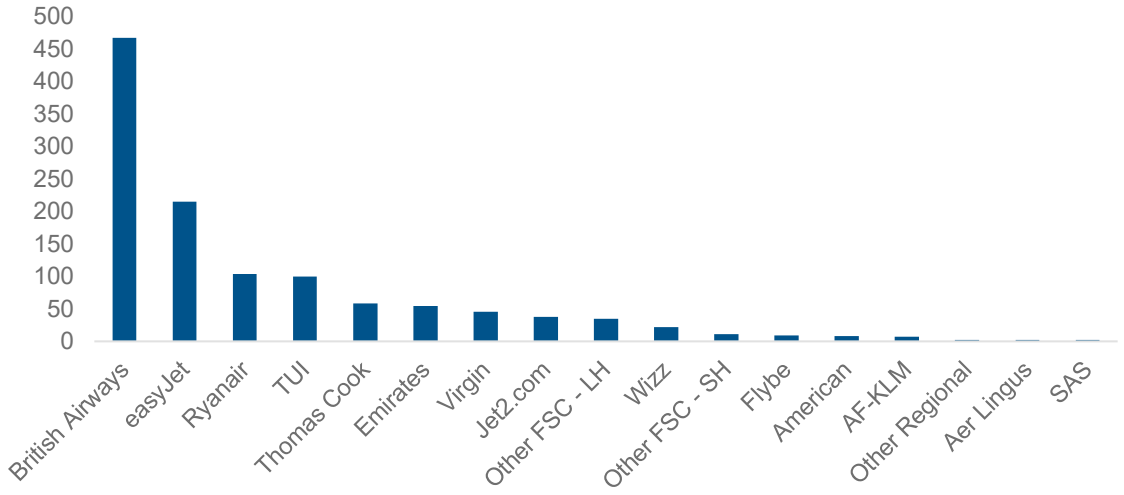


Repatriation Exposure by Airline

5.35. The cost of repatriation for a given airline represents the combined costs of self/assisted-repatriation and either the organised charter or Keep the Fleet Flying option (if required)

5.36. Based on the decision trees outlined above we have determined the optimal combination of options. ICF has determined the optimal combination to be that which returns the passenger to their origin as close as possible to their original date of travel. This is summarised by major airline in Exhibit 31

Exhibit 31. Repatriation Costs by Airline
(£m, based on a hypothetical insolvency in October 2017, airlines in decreasing order of cost)



Source: ICF

6. Booked Passengers Methodology

6.1. In order to estimate the level of exposure of booked itineraries that have yet to travel, ICF has converted the monthly travel patterns to a booked position for passengers and revenues for each airline category. Given the wide range of markets and passenger booking profiles, this results in a materially different seasonal profile to that seen for flown passengers.

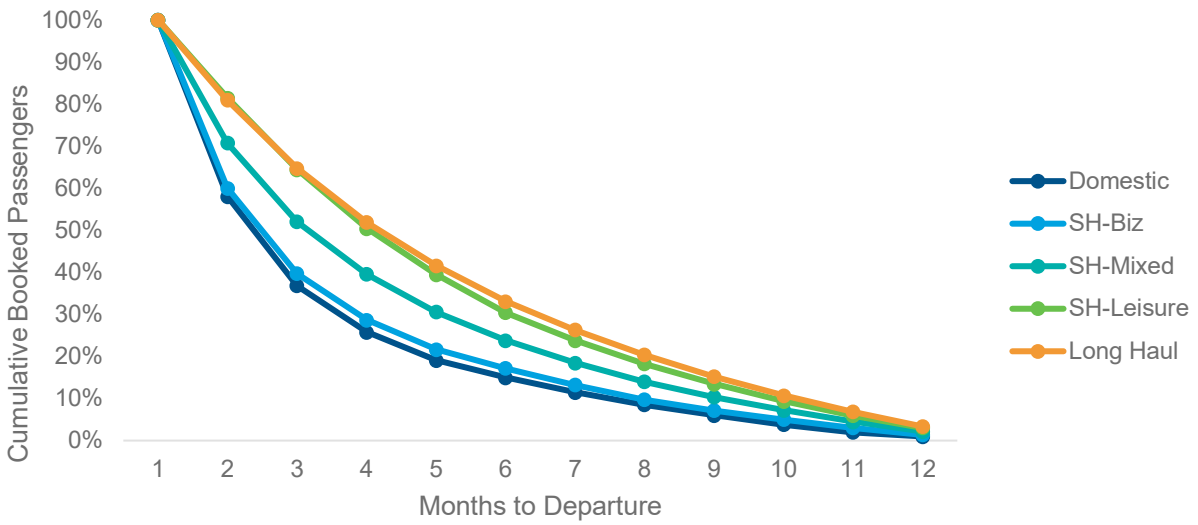
6.2. For each market segment a booking curve was assumed to reflect the typical market behaviour. For example, the average booking window for a business traveller is much shorter than that of the typical leisure passenger. Differences are also seen by market and carrier type – long haul travel is typically booked further in advance whilst charter carriers typically have the longest lead time between booking and travel.

6.3. A range of sources were utilised to inform the booking curve assumptions to apply to each market profile. For example, the CAA Consumer survey alongside various airline reports and other industry references were used to inform the monthly booking curves.

- Whilst we recognise that there will be seasonal differences to booking curves and that differences between a passenger booking and an airline receiving funds exist (i.e. a ticket may only be issued closer to departure), these have not been considered within the booking curve assumptions. To simplify the analysis, a period of up to 12 months was assumed as the limit to the booking curves. This is not considered to materially impact the results.

6.4. Exhibit 32 provides an overview of the selected booking curves assumed. Domestic and short haul business routes have the latest booking profile with around 40% of demand booking their travel within one month of departure. Long haul and short haul leisure categories exhibit the most gradual ramp up, and this also reflects the availability of tickets which are typically available further in advance.

Exhibit 32. Example Booking Curves – Cumulative bookings



Source: CAA

6.5. These booking curves are then applied to the flown passenger total for each individual market as illustrated in the Exhibit 33. Each flown month of data corresponds to a booking intake per month and a cumulative booked position over a 12-month period.

Exhibit 33. Example Conversion of flown demand to booked demand

Flown Month	**Aug17**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Flown Passengers	**1,000**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Booked Month	**Aug17**	**Jul17**	**Jun17**	**May17**	**Apr17**	**Mar17**	**Feb17**	**Jan17**	**Dec16**	**Nov16**	**Oct16**	**Sep16**
Share	100%	58%	37%	26%	19%	15%	11%	8%	6%	4%	2%	1%
Booking Intake	420	212	110	68	41	35	30	25	22	18	10	10
Booked Passengers	1,000	580	368	258	191	150	115	85	60	38	20	10

Source: ICF

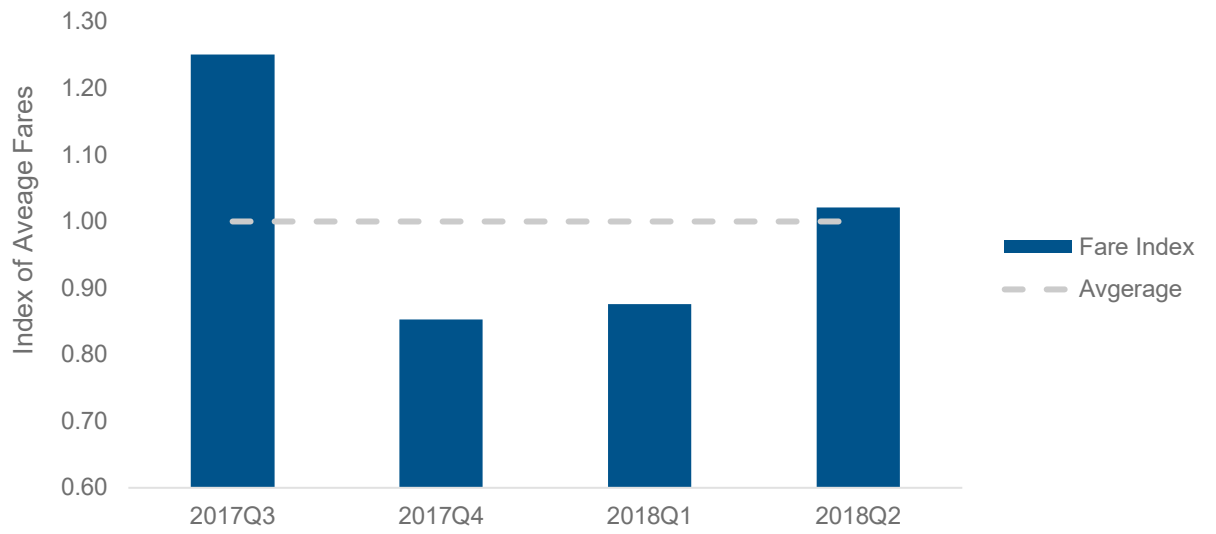
6.6. Aggregating the analysis provides a data set for the UK travel market for total flown/booked volumes and revenues which can be queried at an individual carrier segment and market level.

6.7. In addition to the passenger booking profile ICF has applied seasonal market yields to each segment to reflect the variation of fares throughout the year. On some markets the variability is relatively limited but other more leisure dominated markets these can vary significantly throughout the year.

6.8. Sources including airline annual reports, IATA's PaxIS [4]database were used to provide inputs to these assumptions. It should be noted that these can vary significantly between carrier type, for example FSC vs LCC or even within a group of airlines (e.g. FSC) as average fares are heavily influenced by the cabin mix (i.e. business class seating).

6.9. Exhibit 34 provides a typical quarterly seasonal profile of yields throughout the year. As would be expected in the peak summer months (Q3 Jul-Sep) fares peak over 20% higher than the year-round average. This variance will vary by market, for example business focused routes exhibit a flatter profile whilst highly seasonal tourist markets peak even higher during the summer travel months.

Exhibit 34. Seasonal Fare Profile



Source: Airline Reports

6.10. These seasonal yields are applied to the flown and booked passenger volumes resulting in a revenue dataset capturing forward bookings as well as flown revenue in any month

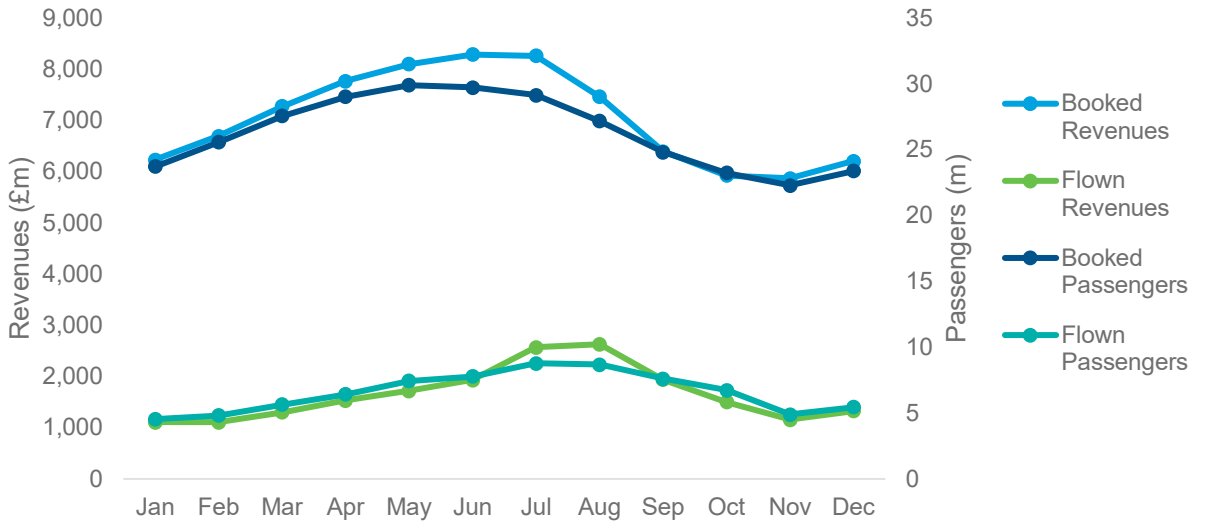
6.11. Exhibit 35 summarises the seasonal variations in demand (passengers & revenues) from a flown and booked perspective.

- **Passengers**: Whilst flown passengers average 6-7m each month the booked position is typically 4 times higher at around 26m reflecting the volume of future bookings held at any one time. Flown passengers peak in August each year whilst booked passengers peak around May-June reflecting the lag between booking and travel month.
- **Revenues**: Flown revenues (revenue accrued from completed flights) are estimated to average around £1.6bn per month peaking at £2.6bn in August

[4] IATA database provides passenger and fare data based on tickets going through IATA's BSP (Billing and Settlement Program)

reflecting the combination of higher fares and peak volumes. Like passengers, booked revenues peak just before the busiest summer months and this rapidly falls off towards a low in Oct/Nov.

Exhibit 35. Monthly Profile of Booked/Flown Passengers & Revenues



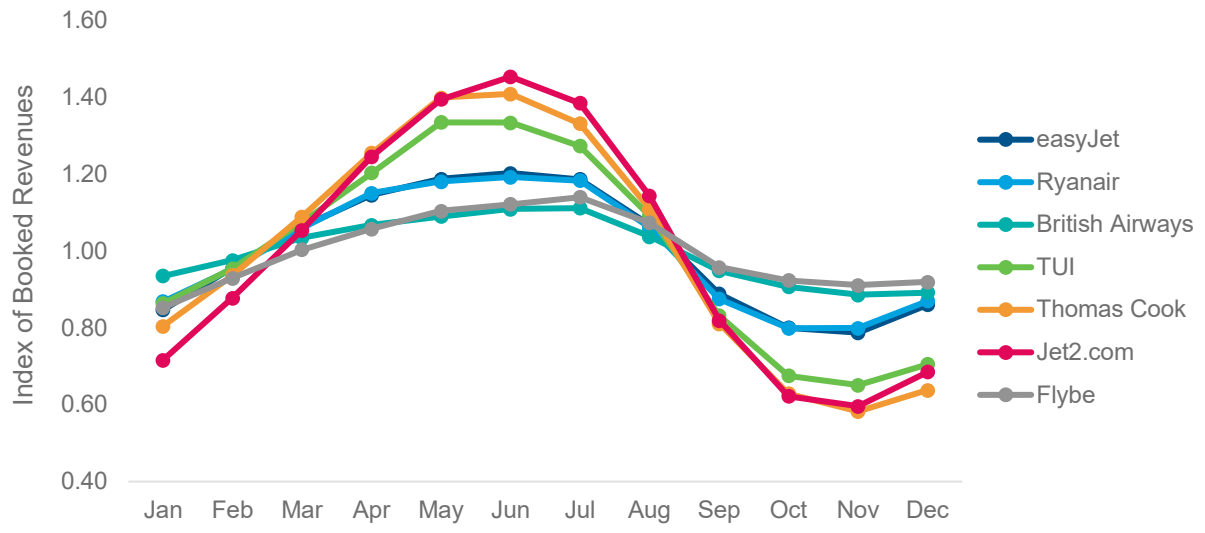
Source: CAA

6.12. Notably the volume of booked passengers is considerably higher than flown passengers – this reflects the fact that at any one point, airlines will have taken forward bookings for up to 11-12 months in advance

6.13. On a carrier level the variability of booked revenues/volumes varies significantly throughout any year. For carriers such as Flybe and BA they have a relatively flat booked position with booked revenues peaking at nearly 15% above average in July. The charter carriers are most exposed to swings in booked revenues with a range of 40% below average in the winter up towards 50% above average in the summer months.

6.14. Exhibit 36 shows this seasonality for the largest carriers in the UK market. These profiles form the basis of the calculation of potential refund in the following section.

Exhibit 36. Index of Booked Revenues



Source: ICF CAA

7. Refund Cost Methodology

7.1. This section focuses on the potential refund cost related to future bookings for those passengers yet to travel on a carrier in an insolvency scenario. To calculate this exposure, it is necessary know the value of future bookings as well as the means of booking.

7.2. The means of booking is important to understand where the exposure of risk lies. For example, if the booking was made through an ATOL registered agency or paid with a credit card, then this provides a high level of protection to the consumer in the event of an insolvency.

7.3. The various methods of protection are considered below

- **ATOL Protected**: ATOL (Air Travel Organiser's Licence) is the UK's financial protection scheme and protects you when you book an air holiday with a registered UK ATOL holder. It ensures that the consumer does not lose money or become stranded abroad if the ATOL holder collapses. It is run by the UK Civil Aviation Authority (CAA) and is funded by contributions from ATOL holders, who must pay £2.50 into the schemes back up fund, the Air Travel Trust, for each person they book on a holiday. Today, ATOL protects approximately 20 million holiday makers each year.
- **Insurance**: Standard travel insurance policies may not automatically cover the risk of an airline's insolvency; this risk is covered by a specific scheduled airline failure insurance (SAFI) policy to protect against this. It is estimated that approximately half of all insurance policies include SAFI protection. It should also be recognised that not everyone travelling overseas will take out an insurance policy. Recent surveys estimate that approx. 25% of UK travellers do not take out any kind of insurance policy.

- **Credit Card**: If a ticket has been purchased by a credit card then the consumer will automatically be protected should an airline goes out of business. This cover is provided by the UK Consumer Credit Act (1974), providing that the cost was between £100 and £30,000. Consequently, tickets paid for by cash, cheque and most debit cards do not provide any protection. UK Finance estimates that in 2017 approx. 60% of airline transactions by value were accounted for by credit card payments.
- **No protection**: The remaining segment reflects those bookings where it is understood that no protection is in place for the consumer.

7.4. Exhibit 37 shows the levels of existing protection for customers, and the sources for the assumptions

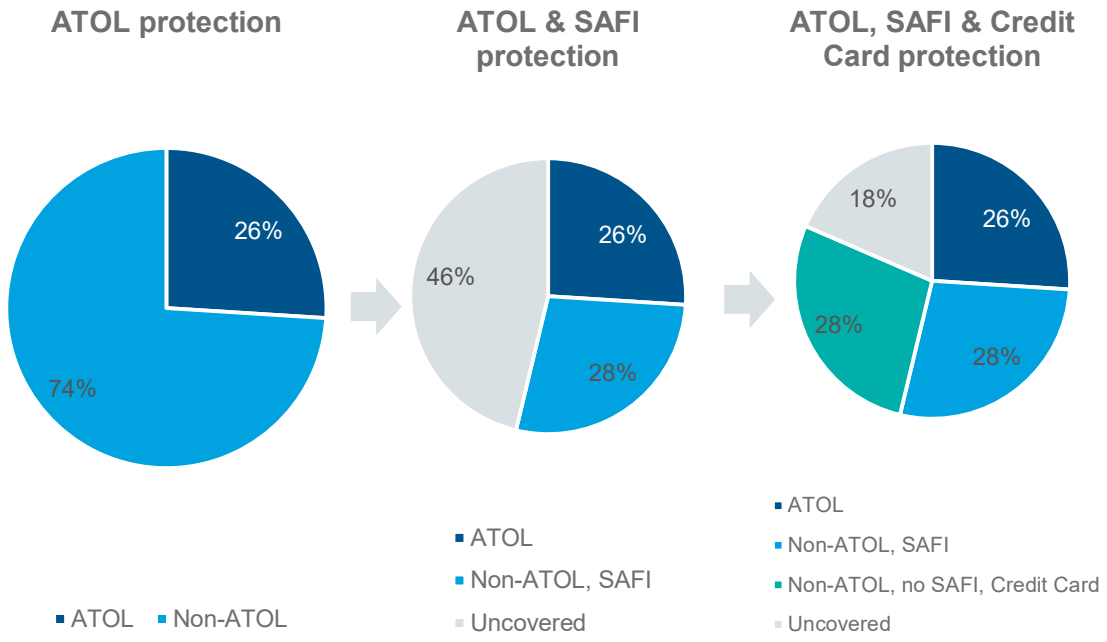
Exhibit 37. Forms of Customer Protection

Type of Protection	Coverage (of UK Originating Pax)	Source
ATOL	20m UK passengers out of c. 70m UK international departing passengers => **26%** coverage	ATOL, CAA
Travel Insurance	75% of UK travelers have travel insurance	ABI
Of which includes SAFI	50% of travel insurance policies in the UK includes SAFI This implies 50% x 75% = **37.5%** of UK travelers are covered under SAFI	Defaqto
Credit Card	Of air tickets purchased with a card, 50% were purchased using a credit card Therefore **50%** of UK travellers have some coverage under the UK Consumer Act	Ukfinance.org.uk

Source: ICF, CAA, ATOL, UK Finance, Surveys

7.5. Many passengers will be covered under multiple types of coverage – e.g. a package holiday booked with a credit card. This provides the high-level breakdown of the estimated covered and uncovered future bookings. The resulting uncovered share of around 20% is obtained reflecting the level of coverage provided by ATOL, SAFI and credit cards.

Exhibit 38. Calculation of Proportion of Passenger without any form of Coverage



Source: ICF, CAA, ATOL, UK Finance, Surveys

7.6. These shares differ throughout the year reflecting the mix of carrier type and booking profile by month. For example, the share protected by ATOL peaks before the summer peak reflecting the high level of ATOL bookings by the charter carriers whose volumes peak in the summer months. The overall share of uncovered demand is relatively stable at around 20% though it should be noted that a range of assumptions and sources of data have been used to provide this estimate.

8. SDG Methodology

8.1. This review has adopted a risk-based methodology that assigns probabilities of insolvencies to airlines based on their current credit ratings. An alternative approach was used by SDG in their review of EU airline insolvencies for the European Commission[5] based on historically observed rates of insolvency

8.2. In this section we have done a similar exercise for the UK market to provide a comparison between the two methodologies.

8.3. ICF has reviewed the impact of every major airline insolvency in the UK over the past decade to establish how many passengers were "affected" (specifically, how many passengers were stranded abroad in need of repatriation).

8.4. ICF have observed 14 major airline collapses over the past ten years affecting the UK market, starting with business class only operator Eos in April 2008 and more recently Primera and Cobalt which both ceased operations in October 2018.

Exhibit 39. Impact of collapsed airlines in the UK

Airline	Date of Collapse	Stranded Passengers
Primera	Oct-18	9,500
Cobalt	Oct-18	2,600
Fly VLM	Aug-18	150
Monarch	Oct-17	113,000
Citywing	Mar-17	550
VLM	Jun-16	710
Cyprus Airways	Jan-15	300
Comtel	Nov-11	660
Globespan	Dec-09	7,600
Sterling Airlines	Oct-08	236
XL Airways	Sep-08	70,000
Zoom Airways	Aug-08	1,500
Silverjet	May-08	7,900
Eos	Apr-08	400
Annual Average (2008-2018)		**19,500**

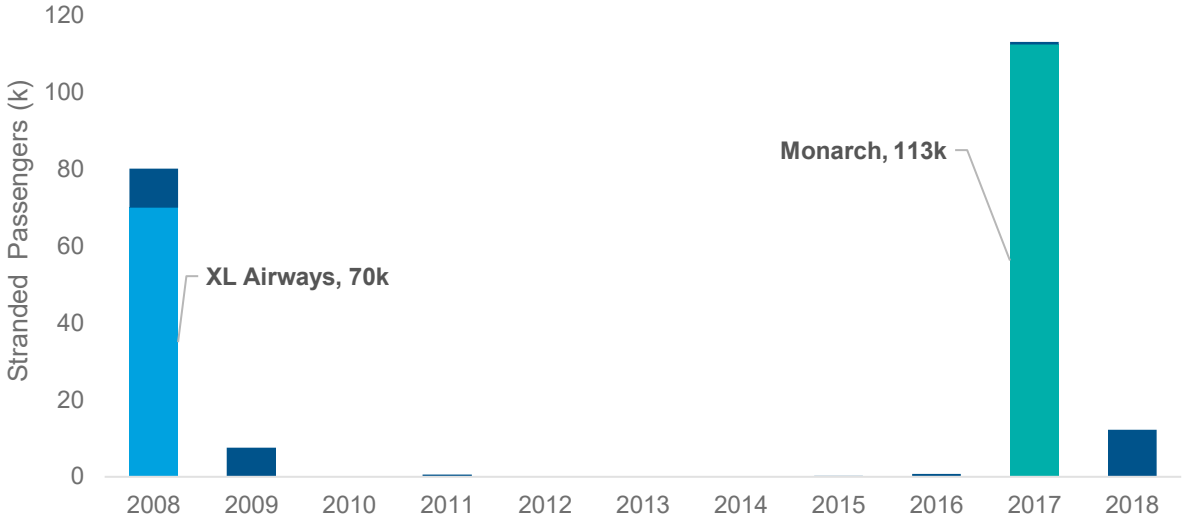
Source: ICF

[5] "Impact assessment of passenger protection in the event of airline insolvency" by SDG, March 2011

8.5. Using CAA data from the last month of full operations, planned schedule capacity for each of the airlines' and survey data, ICF has calculated the number of passengers affected by airline.

8.6. Over the past eleven years, there have been two insolvencies which have affected a significant number of travellers, XL Airways in September 2008 and Monarch in October 2017.

Exhibit 40. Passengers requiring repatriation, 2008-2018



Source: CAA

8.7. As shown in Exhibit 40, ICF calculated that XL Airway's collapse affected 70,000 UK passengers, while Monarch's collapse affected an even greater number. Out of the past eleven years however, four years had no material airline collapses while a further three years had insolvencies which affected fewer than 1,000 passengers, reflecting the uncommon nature of airline collapses.

9. Competitive Impact

9.1. In this section we will be analysing the potential impacts of the short-listed options on aviation demand and airline competition. We consider the impacts from three perspectives:

- The impact of the additional cost burden on airlines' profitability;
- The impact of a cost pass-through on aviation demand; and
- The impact on UK airlines' competitiveness (in the event that not all airlines will fall under the jurisdiction or scope of the scheme).

9.2. These impacts stem from the fact that, regardless of design, the schemes will necessarily entail additional costs for airlines. Unlike a ticket tax (e.g. APD), the additional costs are either based on security or on a levy that will be charged on a subset of passengers (i.e. UK originating passengers). Thus, airlines can either absorb the costs (lowering profit) or pass-through the additional costs to customers (raising prices). We will assess how significant these costs are in these two outcomes, and the potential impacts.

9.3. The third impact we will be considering is whether the scheme is likely to have a distortionary impact on the aviation market by providing one airline a competitive advantage over another airline. Given the risk-based approach to calculating an airlines' cost exposure, inevitably there will be differential costs. We will assess how significant these differences are, and whether they will be sufficient to have a material impact on competitive dynamics. Potentially more distorting is a scenario in which the scheme is only applied to UK-based airlines, thereby conveying some level of cost advantage to foreign-based airlines. We will assess this scenario in terms of its impact on the ability for UK airlines to compete effectively.

9.4. Exhibit 41 below shows the outputs of GAD's modelling of the cost impacts (in terms of cost per UK-originating passenger) of the different Scenarios (summarised briefly below):

9.5. **S1: Security and Government Reinsurance.** In this scenario, airlines are mandated to provide security up to a limit, fitting a set of criteria which would provide repatriation cover on airline insolvency. Claims in excess of this limit would be covered by reinsurance provided by government. The costs incurred by airlines will depend both on the cost exposure and their insolvency risk.

9.6. **S2 & S3: Combination of security, levy and reinsurance.** In these scenarios, airlines also contribute to a levy fund which will cover claims in excess of the security limit up to a second lower overall limit. The remainder will be covered by government reinsurance (S2) or a combination of government and commercial reinsurance (S3).

Exhibit 41. Summary of estimated annual 2018 costs (£) on a per-departing UK Originating passenger basis (assuming no other cover) – grouped by airline type

Airline Group	S1 - Security	S2 & S3 50% coverage	S2 & S3 60% coverage	S2 & S3 70% coverage
Low Cost Carrier	**£0.05**	**£0.09**	**£0.09**	**£0.08**
Full Service	**£0.32**	**£0.23**	**£0.25**	**£0.26**
Charter	**£1.75**	**£0.94**	**£1.09**	**£1.23**

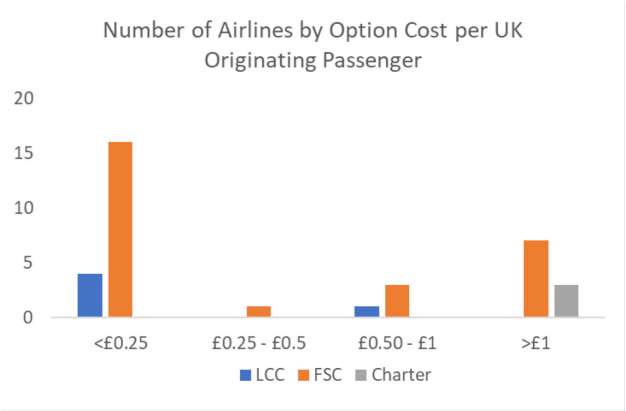
Source: GAD

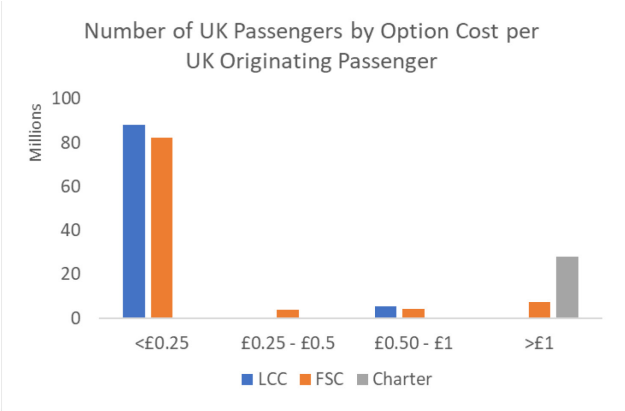
9.7. At an aggregate level, costs under Structuring Option S1 are the highest. However, for airlines with a very strong credit rating, this option can actually be cheaper than Option S2 and S3, though for these airlines the cost differential is typically around £0.03 - £0.06 per UK originating passenger in all Options.

9.8. To assess the worst-case impact at an aggregate level, we will be focussing on the S1 scenario for the remainder of this section.

9.9. Across the top 25 airlines serving the UK, the costs vary from £0.01 to £3.47 per UK originating passenger, but with the vast majority of airlines under £0.50 per UK originating passenger as illustrated in the Exhibit 42.

Exhibit 42. Histograms of Airline Option Costs per UK Originating Passenger, unweighted and weighted by Total UK Passengers





Source: GAD

9.10. To understand the significance of these costs to each airline, we have calculated the annual cost exposure (cost per passenger multiplied by the number of UK originating passengers) and compared this to both the airlines' total annual expenses (across all its geographies) and on a per passenger basis against the airlines' profit per passengers. The results of this can be seen in Exhibit 43:

Exhibit 43. Significance of Option costs (S1) in the context of airlines' total operating costs
(top 30 airlines for which data is available)

Airline Group	Option Cost (per dep UK orig pax)	Option	UK Originating Passengers	Option Costs (total)	% of Annual Costs
Low Cost Carrier	**£0.05**	**S1**	**35.0m**	**£1.8 m**	**0.01%**
Full Service	**£0.32**	**S1**	**24.2m**	**£7.8 m**	**0.00%**
Charter	**£1.75**	**S1**	**13.1m**	**£22.9 m**	**0.57%**

Source: GAD, ICF, Airline Annual Reports

9.11. For this analysis we have chosen the option S1 that results in the maximum aggregate costs to airlines. Combined with the UK originating passenger volumes this gives an annual cost exposure of between £15k and £1m at an individual airline level. As a proportion of the airlines' total operating costs this varies between <0.01% to 0.9%. At an airline group level, it is clear that the Charter grouping, with its relatively high exposure to the UK outbound market, would incur significant costs under this scenario, amounting to around 0.5-1% of their total UK cost base. For typical LCC and Full Service airlines, the impact on their cost base is marginal.

9.12. Clearly, these costs will not represent significant cost items for airlines whose operations are predominantly outside of the UK (i.e. with a low exposure to UK originating passengers).

9.13. Charter airlines (and some other UK airlines) sell a significant amount of ATOL-protected package holidays. Assuming that there is a mechanism to prevent these passengers from effectively being insured under both schemes, we adjust the Option Costs by excluding those passengers who are covered under the ATOL scheme.

Exhibit 44. Adjusting the cost exposure for passengers already covered under ATOL
(top 30 airlines for which data is available)

Airline	% of UK Originating Pax covered by ATOL	Option Costs, excluding pax covered by ATOL (annual)	% of Annual Costs
Low Cost Carrier	**11%**	**£1.6 m**	**0.01%**
Full Service	**15%**	**£6.6 m**	**0.00%**
Charter	**64%**	**£6.3 m**	**0.16%**

Source: GAD, ICF, Airline Annual Reports, CAA Survey

9.14. As demonstrated in Exhibit 44, this significantly reduces the cost burden for Charter airlines from £23m to £6m. At an airline level this brings down the range of annual costs for charter airlines from £5-10m to £1-4m, with the costs representing a share of between 0.06% and 0.24% of total costs

9.15. For airlines that are not based in the UK, or UK airlines with pan-EU operations (e.g. easyJet) the additional costs may well be viewed in relation to their UK operations only, rather than being dispersed across their entire operations. In this regard, it is more relevant to consider how the costs will impact their UK operations profitability. To that end, Exhibit 45 shows the impact of the costs in terms of the profit per UK passenger (that is, all passengers on flights to/from the UK).

Exhibit 45. Option costs as a share of typical airline profit per passenger

Airline Group	Cost per Total UK Passenger*	Typical Profit** per Passenger	Cost per Pax as % of Profit per Pax
Low Cost Carrier	**£0.02**	**£8**	**0.2%**
Full Service	**£0.07**	**£22**	**0.3%**
Charter	**£0.22**	**£17**	**1.3%**

Source: GAD, ICF, Airline Annual Reports, CAA Survey
* Adjusted for costs already covered by ATOL, and shown as per **total** pax rather than per **departing** pax as in previous Exhibits
** Profit before tax

9.16. For most airlines, the cost per passenger represents a very small share of their average profit per passenger (<0.5%). Of the top airlines, the most impacted will be losing around £0.40 per passenger in profit, equivalent to 3% of the typical profit per passenger. Whilst not immaterial (as seen in the total cost exposure calculated previously), these are relatively small impacts and do not, *prima facie*, endanger airline profitability.

9.17. The analysis up to now has focussed on the impacts of airlines absorbing the scheme costs into their existing cost base without raising their fares. In reality, this may not necessarily be the case, and airlines could raise their fares in order to cover the additional costs. The extent to which costs are passed on to customers is known as 'pass-through' and is defined as the percentage of the additional costs that are passed on to customers through higher prices. A 100% pass-through therefore implies that all the additional costs are passed on. For the subsequent analysis we assume 100% pass-through in order to judge the maximum impact on prices.

9.18. In the first instance we must convert the incremental costs into a relative change in the price of air travel. To do this, we use the average cost per seat of the airline to derive the relative significance of the scheme costs, and assume this materialises as a relative increase in prices. Specifically:

% Change in Air Fare = (Cost per pax + Scheme cost per pax) / (Cost per pax)

9.19. To understand how this change in cost will impact consumer demand requires an understanding of the price elasticity of demand. In simple terms, the price elasticity of demand (PED) is measured as:

PED = (% Change in Quantity Demanded) / (% Change in Price)

9.20. Between the extremes of perfectly elastic (increase price from equilibrium and demand will disappear completely) and perfectly inelastic demand (can increase price infinitely and demand will remain), there are varying degrees of sensitivity to price. Elastic demand occurs when customers are highly sensitive to price levels, and a given percentage change in price elicits a proportionally greater response in demand. This can work positively and negatively. Inelastic demand occurs when demand is relatively insensitive to changes in price. This occurs in the case of necessities, for example basic food stuffs, and in cases where the consumer is not directly responsible for the cost of the product or service, such as business travel. As described above, even within the scope of aviation demand, the elasticity can vary significantly. For the purposes of this study we use the weighted average price elasticity of demand as calculated by the DFT in their 2017 UK Aviation Forecast (Exhibit 46), which was -0.6.

Exhibit 46. Price Elasticities to Demand used in the DFT Aviation Model

Segment	Price Elasticity
UK Business	-0.2
UK Leisure	-0.7
Foreign Business	-0.2
Foreign Leisure	-0.7
Domestic	-0.5
Total	-0.6

Source: DFT UK Aviation Forecasts 2017

9.21. Exhibit 47 shows the results of the demand impact analysis, given that, on average, S1 will result in costs per UK passenger increasing by £0.08, or 0.05%

Exhibit 47. Potential demand impact of scheme costs (assuming 100% pass-through)

Airline Group	Cost per Total UK Passenger*	Change in Cost per Passenger (assuming 100% pass-through)	Demand Response	Lost Passengers (annual)
TOTAL	**£0.08**	**0.05%**	**-0.03%**	**-86,000**

Source: ICF
* After excluding costs for those passengers covered under ATOL, and assuming that scheme costs are spread only over UK passengers

9.22. Assuming 100% pass-through, this would result in air fares increasing by 0.05%, eliciting a demand response of -0.03%. At a total UK level, the modelled demand response is of the order 86,000 compare to a baseline of 264m UK passengers. These are very small impacts on demand, and it is arguable whether consumers will notice differences in prices of under 1%. In reality it is likely that customers are relatively

inelastic to price changes of this order and as such this demand response may be over-stated. Given the lower overall costs of the S2 & S3 options, the demand responses under these scenarios would be even smaller.

9.23. Given the airline-specific costs, there is also a risk of creating competitive distortions as some airlines will incur higher costs than others. As an extreme example, in a situation where foreign airlines are exempt from the scheme they would not incur these additional costs, and would therefore have a competitive advantage over UK airlines.

Exhibit 48. Option Costs for UK airlines only

Airline Group	Average Option Cost** (per Total UK pax)	Cost Range (min-max)
UK LCC / FSC*	**£0.03**	**£0.01 - £0.13**
UK Charter	**£0.22**	**£0.08 - £0.36**

Source: GAD, ICF, Airline Annual Reports
* Low Cost Carrier and Full Service Groups have been combined to preserve airline anonymity
** After excluding costs for those passengers covered under ATOL, and assuming that scheme costs are spread over all arriving and departing UK passengers (i.e. not just UK originating passengers)

9.24. Exhibit 48 shows the competitive disadvantage that UK airlines would be operating under in a situation where foreign airlines were exempt from scheme costs. For most major airlines in the UK, the cost disadvantage is of the order £0.01 to £0.13 per UK passenger. For UK charter operators this difference rises to between £0.08 and £0.36.

9.25. This level of cost advantage is not considered significant. Particularly when viewed in the context of the myriad factors that go into determining an air fare on any given day:

- Airline operating costs – these can vary significantly between different airline operating models, and are generally reflected in the air fares;
- Airport – for many major markets in Europe there are multiple airports serving the same market. The difference in airport charges between a primary and a secondary airport can vary by up to £10 per passenger;
- Distribution costs – depending on whether the ticket is booked directly with the airline or through an intermediary can mean incurring additional costs;
- Bags / ancillaries – different baggage policies, etc can impact the overall cost to a passenger significantly; and
- Demand – airlines price their products dynamically, and prices for an air fare can vary significantly across the day and year. Ticket prices will also typically increase as the seats available on a given flight reduce.

9.26. To summarise, the disadvantage faced by UK airlines would small in absolute terms, and relative to the other variables that can determine the price of an air fare, are insignificant.