The Future of Air Travel?

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This is a guest post by Cameron Leckie, of ASPO Australia.

The organisation that I work for depends upon air travel for the movement of several thousand trainees around the country each year. I have been working on some peak oil risk management/mitigation strategies and the future of air travel is a key requirement that needs to be explored. This is a start on identifying the prospects for air travel in the post peak oil world. Ironically, this essay was planned whilst flying from Brisbane to Melbourne for one of this organisation's courses.

Introduction

Over the last couple of decades, the advent of cheap air travel has provided an unprecedented opportunity for large parts of the population in developed economies to travel. Cheap air travel has allowed both business and leisure travel to become an embedded part of the developed world's culture, something that is currently taken for granted.

In recent years however, the rapid increase in the rise of oil prices, and in particularly jet fuel prices, has resulted in airlines around the world facing a pinch. At least a dozen airlines globally have filed for bankruptcy in the last six months and US airlines faced a collective first quarter 2008 loss of $11 billion according to the International Air Travel Agency (IATA). Since 2000, QANTAS' fuel costs have increased from 10% to 24% of operating expenses, overtaking labour as the airlines greatest expense. Virgin Blue is also facing the same pressure, with its fuel costs rising from 15% to 35% of operating costs. As reported in the same article, "No airline business model was built for oil prices to be sustained well above $US100. If it continues we will certainly see airlines continue to fail."

The main stream media continues to portray recent spikes in oil prices as being a temporary problem and externalising the blame on speculation, a falling US dollar, OPEC or oil companies.

However the underlying fundamentals of stagnant production, increased demand and falling exports lead to the conclusion that higher oil prices are here to stay and will most likely only increase in the future.

Those aware of peak oil have oft claimed that airlines would be the first victim of peak oil, as stated by the late Dr Samsam Bakhtiari. The peak oil e-mail group Running on Empty Australia (or ROEOZ) almost daily has posts titled 'airline deathwatch.' The recent attention paid in the media to higher oil prices and the actions of airlines in raising surcharges and reducing capacity leads to the question of how sustainable is air travel and airlines in a post peak oil future. This will be the first in a series of posts on the future of air travel and will focus on fuel economy.

Fuel Economy

The fuel economy of an aircraft is dependent upon a number of factors. These include the aircrafts aerodynamic efficiency, weight efficiency, the number of passengers carried and the fuel efficiency of the engines. As oil prices have risen, airlines have attempted to increase the fuel economy of their fleets in a number of ways. These include:

- Under fuelling aircraft to reduce the weight carried and hence reduce fuel consumption.
- Charging customers higher rates on baggage to encourage smaller luggage loads.
- Grounding older and less fuel efficient aircraft.
- Reducing route capacity to increase the Revenue Seat Factor (basically a percentage describing how much of the available seat capacity has been used).

Increasing fuel economy will no doubt be an important part of the airlines responses to higher oil prices. The chart included below is an attempt to compare the raw fuel economy of the current fleet of QANTAS Group (including Jetstar and QANTAS Link) and Virgin Blue, against the economy of these aircraft per passenger.
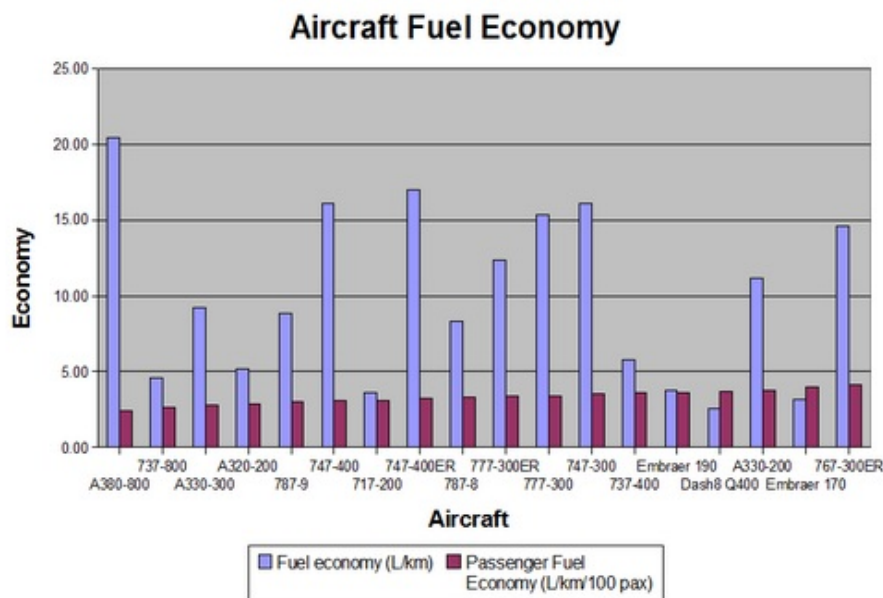

Chart One: Comparison of fuel economy and fuel economy per passenger of the current QANTAS and Virgin Blue aircraft fleets.

The process used to derive this chart used data sourced from Wikipedia and Virgin Blue's website on each of the aircraft used by QANTAS and Virgin Blue. The fuel economy was calculated by dividing maximum fuel payload by the range of the aircraft to give a fuel economy figure in litres per kilometre. Whilst this may not be a technically accurate measurement of an aircrafts fuel economy, it provides an approximation against which to compare aircraft. As you can see and

would expect, the smaller aircraft, such as the Dash 8, Embraer 170 and Boeing 717, use several times less fuel than the larger aircraft, such as the Boeing 747 and Airbus A380 to travel the same distance.

The next step was to calculate the fuel economy per passenger (this figure has been multiplied by 100 passengers to allow the data to be displayed at the same scale) for each of the aircraft. This was calculated by dividing the fuel economy figure by the maximum number of passengers the aircraft can carry. This provides a useful reference point against which to compare the relative efficiency of each aircraft type in moving passengers. What is clear is that the larger aircraft are more economical on a fuel economy per passenger basis than the smaller aircraft. For example the Airbus A380 was 28% more economical on a per passenger basis than the average figure for all of the aircraft sampled. This economy would be even greater on a seat kilometre basis. This is due to the disproportionate quantity of fuel consumed during take off and whilst gaining cruising altitude. Short haul aircraft are exposed to this requirement more regularly than long haul aircraft, thus increasing the fuel consumption of these aircraft. Unfortunately finding useable data on the seat kilometre fuel consumption of the sampled aircraft was difficult.

Comparing the fleet composition of both QANTAS and Virgin Blue, to the fuel economy per passenger of each aircraft type, results in some interesting findings. Whilst exact aircraft number by type for Virgin were unavailable, its Boeing 737-800 aircraft are the second most economical of those examined, whilst the Embraer 190 and 170 aircraft are amongst the least economical on a per passenger basis. QANTAS has both a far larger number of aircraft and a larger number of different aircraft types in service. Of note is that the Dash 8 fleet and Boeing 767 aircraft make up some 67 of QANTAS' 213 aircraft, or 31%. These aircraft also happen to be amongst the least economical on a fuel consumption per passenger basis.

Fuel economy of aircraft is only one factor that needs to be considered in the context of future air travel. The next factor is the revenue seat factor.

Revenue Seat Factor

In many instances, an aircraft is not loaded to 100% of its passenger capacity. In an era of ever increasing fuel prices, this is not a good thing for airlines. Airlines regularly report their capacity statistics. Both QANTAS and Virgin Blue report on their Revenue Passenger Kilometres (RPK) and Available Seat Kilometres (ASK) which are used to determine their Revenue Seat Factor. The RPK is the number of paying passengers carried multiplied by the number of kilometres flown whilst the ASK is the number of seats available for sale multiplied by the number of kilometres flown. When the RPK is divided by the ASK, the result is the Revenue Seat Factor.

The latest data available from QANTAS and Virgin Blue is from March 2008. The Revenue Seat Factor for March 2008 and the current financial year to date are detailed in Table 1.

Table One: Revenue Seat Factors for QANTAS and Virgin Blue

Airline	Mar 08	YTD
QANTAS Group	80.3%	82%
QANTAS Link (regional)	69.7%	72.7%
Virgin Blue	80.8%	82.5%

All airlines will obviously try to maximise their Revenue Seat Factor as close as possible to 100%. QANTAS Link, which provides regional air services throughout Australia, has a significantly lower Revenue Seat Factor than the remainder of the QANTAS Group whilst also using aircraft (Dash 8) that are the least economical on a per passenger basis. We can expect to see further capacity reduction as both airlines attempt to increase their Revenue Seat Factor, if oil prices stay high. It is interesting to note that the Revenue Seat Factor for March is less than the year to date figure.

There could be a number of reasons for this, such as seasonal variations or the recent rounds of fare increases.
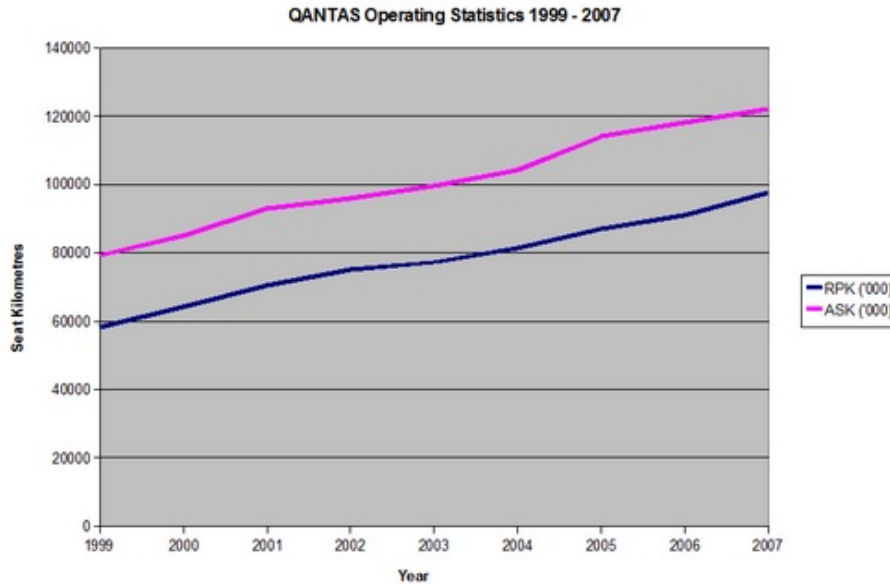

Chart Two: The RPK and ASK for QANTAS Group over the period 1999 – 2007

Chart Two details the ASK and RPK for QANTAS from 1999 -2007. Figures for Virgin Blue were unavailable. As can be seen, the increase in both RPK and ASK has held a close relationship with a slight increase in the Revenue Seat Factor over this time from 73% to 80%. The last data point in this chart was from 30 June 2007 when Singapore Jet fuel was 199c/gal compared to 377c/gal in May 2008. With the recent measures that QANTAS and Virgin Blue have instituted, it will be interesting to see over the coming months whether the Revenue Seat Factor will rise, fall or remain constant.

How this plays out will largely determine the future of these airlines in the post peak oil era. Some indicators could be:

If capacity (ASK) is reduced and the Revenue Seat Factor increases, the airlines maybe OK.
If capacity (ASK) is reduced and the Revenue Seat Factor falls or remains relatively constant, then the airlines are in trouble.

This will be something that I will be watching with some interest over the coming months.

Conclusions

A few key conclusions can be drawn from this analysis. Firstly, the smaller the aircraft, the more economical it is to fly on a fuel economy basis, however the larger (and newer) aircraft are more economical on a per passenger basis.

Secondly, that many of the aircraft in the QANTAS and Virgin Blue fleet are at the lower end of the fuel economy per passenger scale. It is likely that routes using these aircraft would be the first to be reduced, particularly if the Revenue Seat Factor is lower on these routes. No doubt, considerations such as this were key elements in Virgin Blue's recent decision to cut the Sydney – Proserpine and Melbourne Darwin routes.2

Thirdly, the Revenue Seat Factor is highest in the long distance international travel area and lowest for regional travel. Regional services also have a generally lower fuel economy per passenger than the other services. It can be safely assumed that airlines will do whatever it takes to remain profitable. This implies that those routes that are not as economical to operate on either

a fuel economy or capacity basis, will be reduced and if the oil price continues to increase, possibly removed altogether. It is likely that regional Australia, and industries such as tourism that are reliant upon air travel, will be the first to feel the impacts.

Fourthly, as the airlines struggle with the impact of higher fuel prices, we have a couple of indicators, particularly the relationship between Available Seat Kilometres and the Revenue Seat Factor, that will provide some guidance on the future prosperity or otherwise of our airlines.

Admittedly this post has only covered one element of the airlines operating considerations, however it poses an interesting dilemma for the airlines and industries reliant on air travel such as tourism. I would be interested in hearing from airline industry insiders and their comments on this post. One area that I have not explored is the maintenance costs by aircraft type and how this may sway the balance in total operating cost of an aircraft type.

I will follow this post up over the next few weeks with another perspective on the future of air travel. I can be contacted at Cameron.Leckie@aspo-australia.org.au. You can also download this post as a PDF.