**The effects of Covid-19 on air transportation**

**ebay-espresso**

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Our expectation was that air travel by passengers would be substantially reduced by restrictions on travel, and that airlines would find alternate ways to maintain maximum usage of planes.

The questions we asked were:

* Which countries were planes coming into Australia from?
* What were the numbers of passengers arriving to and departing from Australia?
* What was the amount of freight and mail in and out of Australia?
* What were the ratios of passengers to freight per flight?
* Did any airlines stop servicing Australia in 2020?

**Which country were planes coming into Australia from?**

From period 2009 to 2020, the total number of countries with flights to and from Australia was 51.   
The flight operation was changed due to the Covid scenario and operation from some countries dropped or changed.   
In the year 2019 flight operation included 35 countries in or out of Australia.   
In the year 2020 flight operation increased to 37 countries.   
Hong Kong and Korea are the countries whose flight operation increased instead of dropping in year 2020.

**What were the numbers of passengers arriving to and departing from Australia?**

For passenger data, there is a general positive trend. More people are coming into and leaving Australia every year. We do not know the reason for the passenger movements e.g.  Citizenship increase, travellers or students but this would be an interesting topic to investigate). In 2020 however, due to Covid-19 and the resulting travel ban, the passenger movement in Australia plummets down to almost nothing.

**What was the amount of freight in and out of Australia?**

For freight data, there is a significant difference in the incoming and outgoing freight before 2016. Investigating the reason incoming and outgoing freight was very closely correlated in the following years would be useful in understanding the industry and clearing the ambiguity of freight vs mail.

Freight in and out of Australia slowly increased throughout 2020, although it did not nearly come close to the forecasted values. Our overall analysis showed how airlines put plans into action to keep revenue up by substituting passenger flights with freight.

**What was the amount of mail in and out of Australia?**

The monthly trend of each year from the 2009-2019 data shows a pattern over the years that:  
1. there is more incoming than outgoing mail, and  
2. it dips in February and peaks in December.  
In comparison, the 2020 data revealed a quite different pattern and that mail logistics activity within that year started deteriorating in March and started recovering after April. From the 2009-2019 data we utilised linear regression plots to be able to forecast the figures for 2020, essentially visualising what mail activity could have been if the disruption did not occur. From those values, we were able to visualise the forecast of 2020 on top of the actual mail in and out activity plot. By doing so across all the months of all the years, we were able to display an overview of the total mail activity that we forecasted for 2020 vs. the actual data where we were able to display the distinct and significant disruption in the general pattern. The mail activity across all the countries in our dataset shows that the incoming and outgoing mail among countries from 2009-2019 follow a general pattern of more incoming mail than outgoing; the USA, Singapore, and New Zealand being in the top 3 in volume. In comparison, the data revealed that Australia had more outgoing mail to some countries in 2020, with the UAE, New Zealand, and the UK topping the list.

**What were the ratios of passengers to freight per flight?**

Once COVID hit, the flights reduced dramatically but was there normal passenger levels for airlines/flights still operating? To work this out, we needed to compare all the data against the total amount of flights operating. Doing so we could see a dramatic shift in what was being hauled on each flight. By Jan 2020, passengers carried, and cargo hauled, inverted, showing that freight haulage was increasing by proportion the number of total flights while passengers dramatically decreased. To show this in a more succinct way we strove to normalise all data to a single unit (Kilograms). Data for conversion of passengers to kilograms was taken from a survey conducted by the European Aviation Safety Agency in 2008, combining the average weight of passengers, their carry-on and stowed luggage. Doing so showed just how dramatic the shift was, but also allowed us to see that after COVID hit flights, on average, were able to carry more total weight hauled than previous years.

**Did any airlines stop servicing Australia in 2020?**

1. Since 2009, there have been at least 90 different airlines in operations.

 Explored the data to establish which airlines have the largest market share OR volume of passengers and cargo (freight & mail) and found the following:

1. For cargo - Singaporean Airlines tops the chart marginally ahead of Qantas Airways
2. For Passengers - Qantas is in the lead having double that of any other airline in market share

1. Now taking both passengers and cargo volume - Jetstar reduced both cargo and passengers by about ~70%.

This insight led us to investigate Jetstar further. From other data sources, we believe this could be because of two reasons:  
a. Jetstar is a subsidiary and owned by Qantas, so reducing Jetstar operations to focus on Qantas could have been a lean operation / cost cutting strategy.

b. We believe, the reduction in overall flights means more empty seats in one airline. Therefore, it makes economic sense to amalgamate passengers & freight travelling the same route into one profitable airline.