Assignment 2: Risks for Domestic Airlines
ECO423A

The core criteria used to assess this Assignment are:

Criteria	
Knowledge and understanding:	Understanding of key ideas in Financial Modelling
Application:	Ability to apply theoretical ideas, frameworks and quantitative risk models in practice and in a critically reflective way.
Reasoning and analysis:	Ability to analyse, use critical reasoning and principles to formulate a position, balancing theory and personal reflection.
Professional literacy:	Understanding of the risk management profession including recent issues, trends, cases and special terminology.
Communication and presentation:	Ability to communicate complex technical concepts clearly and effectively in writing.
Research:	Ability to explore a complex issue by finding and absorbing relevant documents suitable.

Suggested Information Sources

You should make use of academic sources such as:

Berghofer and Lucey (2014) 'Fuel hedging, operational hedging and risk exposure – Evidence from the global airline industry' International Review of Financial Analysis along with some of the papers cited by Berghofer and Lucey.

De Mello, L., Sheedy, E. and Storck, S. (2015), A Practical Guide for Non-Financial Companies When Modeling Longer-Term Currency and Commodity Exposures. Journal of Applied Corporate Finance, 27: 89–100.

Annual reports of domestic airlines may be a good source of information.

Risks for Domestic Airlines

You operate an Australian domestic airline called Jetsafe.

- In August 2015, Jetsafe generated revenues of $20 million i.e. 500 flights producing (on average) $40,000 each. Revenues are partly determined by demand from international visitors to Australia who are sensitive to currency movements. Assume that percent change in flights in the current month has a delta of -0.8 with respect to returns in the AUD exchange rate (expressed in US dollars) in the previous month. For example, the AUD depreciated by 5.60 in August so flights in September will be 4.44% higher at 522 (after rounding). We assume that there is currently plenty of capacity to meet any increase in demand for flights.
- Every month Jetsafe has fixed costs of $11 million (this includes debt servicing with interest costs fixed).
- The most significant variable cost is jet kerosene. Each flight requires (on average) 13 metric tonnes of jet kerosene. We assume that the USD price of jet kerosene at the start of the month will apply to all usage of jet kerosene during the month (USD500.9 per metric tonne as at 4 September 2015 will apply for the entire month of September). To convert to AUD, we convert at the spot exchange rate applying at the start of the month (0.6972 USD per AUD 4 September rate will apply for September).
- Other variable costs are $7000 per flight.

	USD price of jet kerosene per metric tonne	USD per AUD
4 Sep 2015	500.9	0.6972

1. Calculate earnings before tax for Jetsafe for the month of September 2015 expressed in AUD. *4 marks*

2. Complete the following table:

	Jet Kerosene returns in USD	AUD/USD returns
Volatility per month (using all available data)		
Volatility per annum (using all available data)		
Mean per month (using all available data)		
Mean per annum (using all available data)		

4 marks

3. Assuming normality of returns and using the data from question 2, what is the probability that in any given month jet kerosene returns in USD will be lower than -23%?

4 *marks*

4. Based on the empirical data, what is the actual probability that in any given month jet kerosene returns in USD will be lower than -23%? Compare with your answer in question 3 and discuss the implications. *4 marks*

5. Calculate the correlation between jet kerosene returns and AUD/USD returns using all the available data and discuss the implications for Jetsafe. *4 marks*

6. Simulate 1000 paths of monthly prices for the next 12 months (i.e. October 2015 to Sep 2016) for jet fuel and the AUD/USD assuming that:

- the mean of log returns for both series is zero,
- the two series have a bivariate normal distribution,
- the volatility of jet fuel (in USD) is 10.0% per month
- the volatility of AUD in USD is 3.5% per month
- the correlation between these two prices is 0.30

For each path, calculate the earnings each month. For the first path you should show all your workings (no other calculations to be presented). Provide sufficient workings so the marker can follow your calculations.

For each path, calculate the total earnings for the twelve months ending September 2016 (no need to adjust for time value).

Each time you hit the F9 button, Excel will recalculate everything with a new set of random numbers. Try doing this at least ten times and see how the EaR changes for different samples. To reduce sampling error, take an average across the ten different samples i.e. you now have a total of 10,000 Monte Carlo Simulations.

Complete the following table using the **average** across the ten samples. **Discuss** the effect of sampling error on the distribution of outcomes:

	Earnings over next 12 months
a. Maximum (of total earnings)	
b. 95th percentile	
c. Median or 50th percentile	
d. 5th percentile	
e. Minimum	
f. Earnings at Risk (with 95% confidence) i.e. c. – d.	

10 marks

7. You consider hedging the fuel price risk and/or the currency risk. To analyse this issue copy the simulated earnings, jet kerosene price and AUD for October 2015 to a new sheet i.e. you will have 1000 simulated values for each of earnings, jet kerosene and AUD.

a) Calculate the correlation between earnings and jet kerosene from these simulated values.
b) Calculate the correlation between earnings and AUD/USD from these simulated values.
c) Calculate the minimum variance hedge for jet kerosene (assuming no currency hedge).
d) Calculate the minimum variance hedge for currency (assuming no fuel hedge).
e) Now perform a regression analysis where your dependent variable is simulated earnings; your independent variables are simulated jet kerosene and simulated AUD/USD.

If Jetsafe was motivated to hedge market risk, what would be the most efficient way of achieving this based on the analysis in a) to e)? Justify your answer.

10 marks

Total 40 marks