

Auckland Airport's Asset Beta: Covid-19 Adjustment Using Flint Study

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Introduction

1.1 Background

Covid-19 has had a major impact on capital markets and asset valuations over the last three years. The Covid-19 period coincides in part with the period the Commerce Commission uses when estimating several of the key parameters in its current Input Methodologies review. The Input Methodologies however, in principle, are forward looking. There is a risk that the estimates which the Commission derives from data over the last three years are unduly influenced by Covid-19 and are not accurate estimates of the appropriate parameters for the forward-looking Input Methodologies to apply to PSE4 for the period FY2023 to FY2027.

The Flint Group (Flint) published a report in June 2021 that detailed the implications of Covid-like events on the asset beta for Heathrow Airport Limited (Heathrow) and how adjustments can be made to the beta to avoid giving undue weight to the impacts of Covid.¹ The Flint study and methodology was used by the United Kingdom Civil Aviation Authority when considering the appropriate asset beta for Heathrow in the post-Covid-19 period.

The method Flint implemented was used to consider the asset beta for Heathrow on a “forward-looking” basis. Flint recognized that using historical data in calculations is not necessarily a good indicator for future expectations of the market or an individual company’s equity performance.

Flint’s approach can be divided into three phases:

1. Consider a baseline beta from a time period that is unaffected by Covid-19;
2. Consider the effect of Covid-like events occurring again in the future at different frequencies (e.g., from once every 5 years to once every 100 years); and
3. Adjust the baseline without-Covid beta estimate for the Covid effect weighted by the probability of Covid-like events occurring in the future.

By determining the difference between asset betas under the baseline and at varying Covid frequencies, a “Covid adjustment” is found to represent the impact of future Covid-like events on the asset beta.

1.2 This report

This report applies the methodology used in the Flint report to estimate an appropriate asset beta for Auckland International Airport Ltd (AIAL). Following this Introduction, Section 2 of this report details the key assumptions and methodology used in this analysis while Section 3 presents our findings and conclusions.

¹ “Support to the Civil Aviation Authority: Estimating Heathrow’s beta post-COVID-19”, Flint Group, August 2021. [https://publicapps.caa.co.uk/docs/33/CAP2266E%20Estimating%20Heathrows%20beta%20post%20covid-19%20\(Flint%20August%202021\).pdf](https://publicapps.caa.co.uk/docs/33/CAP2266E%20Estimating%20Heathrows%20beta%20post%20covid-19%20(Flint%20August%202021).pdf)

2 Framework for analysis

As noted in Section 1 above, this report uses a similar framework to that found in the Flint study with a few minor adjustments to tailor the approach to the New Zealand environment. We discuss these adjustments below in the key assumptions and methodology sections.

2.1 Key assumptions

There are three high-level assumptions made in conducting this asset beta analysis for AIAL:

2.1.1 Historical data

We use a 5-year dataset, giving us sufficient pre-Covid data while avoiding problems associated with relying on a longer dataset (such as a different set of risks influencing the observations). For this analysis we use daily historical AIAL share price and NZX50 Index data between August 2017 and August 2022. We have expanded on the Flint study by converting daily data into weekly and monthly data values using the Commerce Commission methodology to determine daily, weekly and monthly asset betas.

2.1.2 Covid-19 window

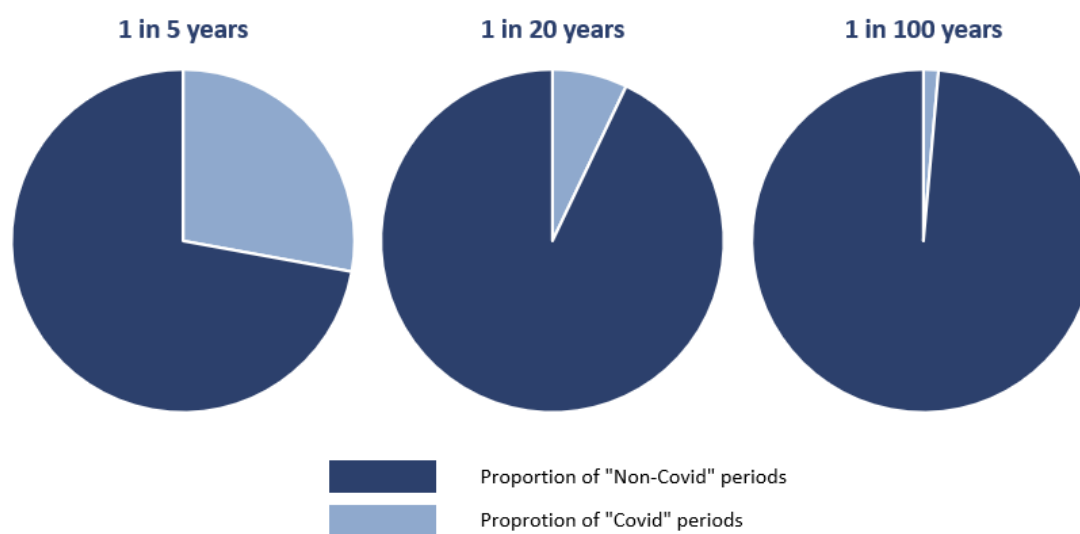
Similar to the Flint study, we assume firstly a single 'Covid window' from February 2020 to June 2021. We use this window, which is approximately 17 months, as a lower-bound estimate for the assumed duration of future COVID-like events. For sensitivity analysis, we estimate an upper bound for the duration of a Covid-like event of 30 months (akin to the period from February 2020 to July 2022), again as in the Flint study.

The Flint study discusses how its previously conducted analysis of the "baseline" asset beta in April 2020 produced a range between 0.50 and 0.60. This result was compared against their more recent work (August 2021) which produced comparable results, so they saw no need to change the lower and upper ranges of the baseline asset beta. The August 2021 paper determined baseline asset betas using the 43-month "pre-Covid" period and we have replicated that method in this paper.

2.1.3 Covid frequency

We present results for a range of frequencies of a Covid event occurring. The frequencies range from one in five years to one in 100 years. Similar to the Flint study, we focus on the baseline Covid result relative to results within the range of once in 20 and once in 50 years.

Figure 1: Proportion of Covid to non-Covid periods for different frequencies



2.2 Methodology

Calculating daily returns is simple and can be expressed in the formula:

$$R_x = \frac{P_x}{P_{x-1}} - 1$$

where x refers to the current reference day and x-1 refers to the previous day. This formula is applied to both the AIAL stock price and NZX50 values.

Weekly returns are slightly more complicated to calculate as there can be variation in the returns calculated depending on which trading day is selected as the reference day. The Commerce Commission has addressed this issue in its Input Methodologies and has adjusted its methodology to take an average across the 5 potential "week-end" reference points (Mon-Mon, Tue-Tue, ..., Fri-Fri).

4-weekly returns are calculated using a similar method to the weekly approach, except instead of 5 possible reference days there are approximately 21 trading days in any given month that need to be averaged.²

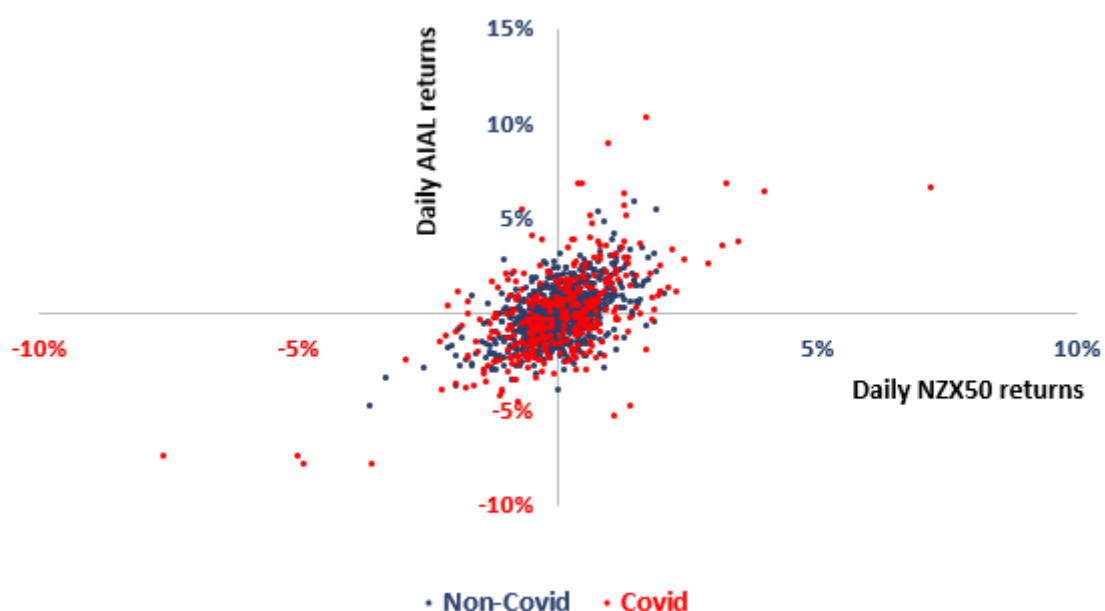
The equity beta is essentially the regression coefficient of a simple linear regression of historical share price returns for the stock in question compared to those of an index that represents the market. In this report we use AIAL's historical share price and to represent the market we use the NZX50 Index. The resulting equity beta is then de-levered using historical debt and equity values for AIAL to derive an asset beta.

As discussed above, we are interested in varying the weights of data points within the Covid window relative to those outside this window in order to reflect the assumed likelihood of future Covid-like events. Hence, rather than estimating the equity betas using a simple linear regression, we consider a weighted least squares regression model. This method allows for certain observations to be given more weight or influence in the regression model.

² Commerce Commission, "2016 input methodologies review decision: Topic 4: Cost of capital issues", p 291.

To estimate the Covid adjustment, we have 're-weighted' equity beta estimates based on the daily share price and index data between 2017 and 2022. Some of this data is directly affected by Covid-19 (those datapoints within the Covid window) while some of the data pre-dates Covid-19 entirely.

Figure 2: Comparison of daily returns for AIAL and NZX50, August 2017 to August 2022



The weight on the Covid-affected observations in our dataset is then changed relative to the non-Covid observations. This allows for betas to be simulated over longer time horizons while also reflecting different frequencies with which Covid is assumed to occur. The re-weightings are shown in the table below for each of the different frequencies.

Table 1: Reweightings for dataset over different frequencies of Covid occurring

Lower Bound	Covid	Non-Covid
Raw beta	1.0	1.0
1 in 10 year	1.0	2.4
1 in 15 year	1.0	3.7
1 in 20 year	1.0	5.1
1 in 50 year	1.0	13.3
1 in 100 year	1.0	27.0

Note: The baseline asset beta gives “non-Covid” returns a weight of 1 and zero for “Covid” returns

By using the re-weightings shown above we are able to use historical data to form a forward-looking beta that reflects the different assumed probabilities of Covid-like events occurring in the future.

We classify each data point as either Covid-affected or non-Covid affected depending on when it occurred. We then calculate an equity beta using a linear regression, with different weights assigned to Covid and non-Covid observations. The weights are treated as an equivalent ‘frequency’ at which a ‘Covid-like’ event occurs.

We then repeat this regression for a series of different weightings of ‘Covid-like’ events to represent different frequencies. Finally, we convert the equity betas into asset betas using historical leverage data over the five-year period.

3 Findings and conclusions

The table below sets out the results of our analysis of the asset beta for AIAL for a set of scenarios. Each scenario corresponds to an assumed frequency of future Covid-like events.

The first column of data shows the estimated pre-Covid beta for AIAL. Each subsequent column shows our constructed betas, placing progressively lower weight on the Covid window data (from February 2020 to June 2021) relative to non-Covid daily data, simulating Covid-like events happening less frequently. The rows reflect asset betas on a daily, weekly or monthly time series basis over the five-year period analysed. The average column at the end of the table references the average of a 1-in-20 year and 1-in-50 year frequency event occurring.

Table 2: Lower bound Covid window (17 months) asset betas for AIAL, August 2017 to August 2022

	Non-Covid Beta	1 in 5 years	1 in 10 years	1 in 15 years	1 in 20 years	1 in 50 years	1 in 100 years	20 - 50 yr Avg.
Daily	0.90	1.00	0.94	0.92	0.91	0.90	0.90	0.91
Weekly	0.83	1.06	0.91	0.87	0.85	0.83	0.83	0.84
Monthly	0.55	0.99	0.72	0.63	0.60	0.56	0.55	0.58

As the table shows, the re-weighted beta falls as the frequency of Covid-like events declines.

The data in Table 2 above is based on our lower-bound assumption of a Covid window of 17 months. For the upper-bound results, we simulate Covid-like events which last 30 months. In order to simulate a 30-month Covid-like event, we rely on the same 5-years of daily data as in our lower-bound estimates, but increase the relative weight on Covid-affected data for any given frequency of Covid-like event.

Table 3: Upper bound Covid window (30 months) asset betas for AIAL, August 2017 to August 2022

	Non-Covid Beta	1 in 5 years	1 in 10 years	1 in 15 years	1 in 20 years	1 in 50 years	1 in 100 years	20 - 50 yr Avg.
Daily	0.90	1.05	0.98	0.94	0.93	0.91	0.90	0.92
Weekly	0.83	1.18	1.03	0.94	0.89	0.84	0.83	0.87
Monthly	0.55	1.22	0.94	0.77	0.68	0.57	0.56	0.63

As would be expected, the table above shows the asset beta estimates increase with the assumption of a longer Covid window, but the estimates are not particularly sensitive to the assumption – for example, the average figure in the last column increases by 0.02 for the daily data.

Table 4 below presents a lower-bound ‘Covid adjustment’ factor that represents the difference between the average value shown in the last column of Table 3 above and the baseline beta (i.e. the asset beta value from outside the Covid window).

Table 4: Lower bound Covid adjustments, August 2017 to August 2022

	20 - 50 yr Avg.	Non-Covid Beta	Covid Adj.
Daily	0.91	0.90	0.00
Weekly	0.84	0.83	0.01
Monthly	0.58	0.55	0.03

As Table 4 shows, we find a lower-bound increase relative to the pre-Covid asset beta of between 0 and 3 basis points (i.e. an increase of 0.00 to 0.03), on the assumption that the frequency of Covid-like events is between one in 20 and one in 50 years. The upper-bound adjustment factors assuming a Covid period of 30 months are expressed in Table 5 below.

Table 5: Upper-bound Covid adjustments, August 2017 to August 2022

	20 - 50 yr Avg.	Non-Covid Beta	Covid Adj.
Daily	0.92	0.90	0.01
Weekly	0.87	0.83	0.04
Monthly	0.63	0.55	0.08

For a Covid frequency between 20 and 50 years, the upper bound estimate of the beta adjustment factor is between 1 and 8 basis points (i.e. an increase of 0.01 to 0.08 over the baseline, and 0.01 to 0.05 above the lower-bound estimates.)

Overall we find that an event similar in nature and impact to COVID-19, occurring between once every 20 and once every 50 years, would increase the beta estimate for AIAL by between zero and 8 basis points, compared to recent pre-COVID observed values.

In practice, this means that, using CEPA's estimate of the pre-Covid asset beta for AIAL of 0.69, an appropriate forward-looking estimate for the asset beta for AIAL that gives an appropriate (but not undue) weighting to the likelihood of a Covid-type event occurring in the future is likely to be in the range of 0.69 to 0.77, assuming a Covid-type event occurs in the future between every twenty and every fifty years.³

³ To find CEPA's estimate for a pre-Covid asset beta we take an average of the weekly and 4-weekly 2 year (2018 to 2020) asset beta values for AIAL. Refer CEPA, "Review of Cost of Capital 2022/2023" a report prepared for the NZ Commerce Commission, Nov 2022 https://comcom.govt.nz/_data/assets/pdf_file/0014/301082/CEPA-report-on-Commerce-Commission-IM-Review-Cost-of-Capital-29-November-2022.pdf