Input Methodologies Review Draft Decisions - Asset Beta and TAMRP for Airports.

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a fully owned subsidiary of the University of Auckland

Report prepared for:
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Executive Summary

1.0 Introduction

Auckland International Airport Limited ("AIAL" or the "Company") has requested Auckland UniServices Ltd ("Auckland UniServices" or "UniServices" or "we") to comment on the:

- Asset beta for Airports; and
- The tax-adjusted market risk premium

proposed by the New Zealand Commerce Commission ("Commerce Commission" or "Commission") in its "Input methodologies review draft decisions: Summary paper" dated 16 June 2016 ("IM Review, 2016").

2.0 Asset Beta for Airports

The Commission considers that an asset beta of 0.63 overstates the asset beta for aeronautical activities because the comparator sample reflects airports' overall (multi-divisional) businesses. The Commission therefore proposes to adjust the asset beta of 0.63 downwards by 0.05 to 0.58.

In this respect the Commission sought advice from Dr Lally, who determined a point estimate 0.03 downwards adjustment to the average asset beta of airports. The Commission notes that Dr Lally considers his estimate is "*extremely imprecise*", due to uncertainty regarding the underlying parameter values (IM Review, para 413, page 476).

The Commission considers, however, a bigger adjustment than the 0.03 determined by Dr Lally is warranted. The reasons advanced by the Commission include:

- Figure 8 of the Commission's IM Review (2016, page 476) indicates that the asset beta for a business with 100% aeronautical revenues would likely be significantly below the sample average of 0.63 (Commission's IM Review, para 417.3, page 477);

- Deutsche Bank[1] estimates that unregulated activities comprise between 78%-82% of AIAL's market value (Commission's IM Review, para 416.1, page 477);

- A 2011 PwC report estimated Queenstown Airport's non-aeronautical activities as comprising 53%-55% of its total enterprise value (Commission's IM Review, para 416.2, page 477); and

- Replicating Dr Lally's analysis, but assuming 67% value weighting for unregulated activities (based on the average of AIAL and Queenstown), suggests an asset beta for regulated airport services of 0.55 (i.e., an adjustment of 0.08) (Commission's IM Review, para 416.3, page 477).

[1] Deutsche Bank, Auckland Int. Airport – Excellent 1H16, regulatory red light, 19 February 2016.

In Auckland UniServices' view and /or analysis:

- We are unable to replicate Figure 8 using the data in the Commission's IM Review (2016, page 476), when plotting the asset beta against the % of revenue from aeronautical activities (see Table 31, page 561 and Table 8 of the Commission's IM Review, 2016, page 475).

  Our analysis, using the Commission's data, suggests a weak (not significant) positive relationship between asset beta and % aeronautical revenue for Airports.

- Deutsche Bank appear to be using the standard (textbook) version of the CAPM and not the Brennan-Lally version of the CAPM advocated by the Commission. This makes comparative beta estimates difficult to compare without more detail on the assumptions used by Deutsche Bank to derive their asset betas. In our view, and in the absence of a more detailed understanding of how the parameters such as the asset beta and leverage were determined, any inferences and conclusions on both AIAL's aeronautical asset beta and any difference between AIAL's overall beta and the asset beta for the aeronautical component of AIAL must be treated with caution.

- Lally (2016), based upon the assumptions adopted in his paper, should have recommended a base case downward adjustment for the aeronautical assets of airports of *less* than 0.03. However, when taking into account the Commission's revised estimate of an asset beta of 0.63 (term $\bar{B}_A$= 0.63) in its IM Review (2016), compared to its prior estimate of 0.65 for Airports, the base case downward adjustment is still only 0.03.

- If Auckland International Airport Limited ("AIAL") has a higher than average weighting to non-aeronautical activities in the comparator sample of airports (then following the Commission's arguments that a downward adjustment for the asset beta of the aeronautical component is warranted), we would expect AIAL overall to have a higher asset beta than the average asset beta of 0.63 ($\bar{B}_A$) of the comparator sample. This suggests:
  - AIAL's overall asset beta to undertake the calculations in paragraph 416.3 of the IM Review (2016) should assume a higher value for $\bar{B}_A$than 0.63; and
  - The Commission's calculation of an 0.08 downward adjustment using the value weighting method is overstated.

- We note that PwC in their report (page 74) for Queenstown Airport ("QAC") recommended an asset beta of 0.60 for QAC's aeronautical business.[2] This is only 0.03 less than the estimated asset beta of 0.63 in the Commission's IM Review (2016).

[2] PriceWaterhouseCoopers, 2011, Queenstown Lakes District Council: Issue of shares in Queenstown Airport Corporation Limited to Auckland International Airport limited, Detailed Report on Fairness Opinion.

In summary, we conclude based upon our analysis of the empirical evidence in the IM Review (2016) that:

- The downward adjustment to the asset beta of 0.05 proposed by the Commission for the aeronautical activities of airports is not warranted.

- If the Commission decides to make a downwards adjustment to its industry-wide asset beta for airports, any such downward adjustment to the asset beta should be no greater than 0.03**.**

3.0 The Tax-Adjusted Market Risk Premium (TAMRP)

Our estimates of the TAMRP follow Lally (2015). However, we adjust Lally's (2015) approach to (i) the Ibbotson estimate - other markets, (ii) Siegel estimate: version 1 - other markets and (iii) survey evidence for both NZ and other markets. Our revised estimates of the TAMRP as at August 2015 are summarised in the table below and we have highlighted the estimates that differ from Lally's approach.

Estimates of the TAMRP with a five-year risk-free rate				
	Lally / Commerce Commission		**Revised Uniservices estimates**	
	New Zealand	**Other markets**	**New Zealand**	**Other markets**
Ibbotson estimate	7.1%	7.0%	7.1%	**7.9%**
Siegel estimate: version 1	5.9%	5.9%	5.9%	**6.7%**
Siegel estimate: version 2	8.0%	7.5%	8.0%	7.5%
DGM estimate	7.4%	9.0%	7.4%	9.0%
Survey evidence	6.8%	6.3%	**6.9%**	**6.5%**
Median	**7.1%**	**7.0%**	**7.1%**	**7.5%**
Average	**-**	**-**	**7.0%**	**7.5%**
TAMRP estimate	**7.00%**		**7.25%**	
Source: Lally (2015), Commission IM Review (2016), Table 9, para 428 and own analysis				

In our view:

- If the Commission were to round the estimate of the TAMRP, this should be to the nearest 0.25%. Rounding to 0.5% will likely produce overly coarse estimates of the TAMRP that may not reflect changes in underlying market conditions. In this respect, we note that the Commission seeks to be relatively precise (with minimal rounding only) in its estimate of the asset beta and leverage for airports and electricity / gas distribution businesses. Consistency would suggest that the Commission adopt the same perspective when determining a point estimate of the TAMRP.

- An appropriate estimate of the TAMRP as at August 2015 would be **7.25%** (close to the median and average estimates for the New Zealand and other markets combined in the table above)**.**

Input Methodologies Review Draft Decisions - Asset Beta and TAMRP for Airports.

1 Introduction

Auckland International Airport Limited ("AIAL" or the "Company") has requested Auckland UniServices Ltd ("Auckland UniServices" or "UniServices" or "we") to comment on the:

- Asset beta for Airports; and
- The tax-adjusted market risk premium

proposed by the New Zealand Commerce Commission ("Commerce Commission" or "Commission") in its "Input methodologies review draft decisions: Summary paper" dated 16 June 2016 ("IM Review, 2016").

1.1 Compliance with Code of Conduct

This report is written by Dr Alastair Marsden on behalf of Auckland UniServices[3] for AIAL. In preparing this report Dr Marsden has confirmed that he has read the Code of Conduct for Expert Witnesses as contained in Schedule 4 of the New Zealand High Court Rules and that his opinion or advice provided in this report to AIAL will abide by that Code.

1.2 Disclaimer

We refer readers to our "Important Notice" at the front of this report.

In accordance with the terms of our engagement letter with AIAL, we have not audited or independently verified any of the information provided to us.

1.3 Structure of this Report

The remainder of our report is structured as follows:

- Section 2 reviews the Commission's proposed downward adjustment for the asset beta for Airports from 0.63 to 0.58. This reflects a downward adjustment proposed by the Commission to account for potential lower systematic risk for Airports' aeronautical assets.

[3] References in this report to "we" or "our" refer to the opinions of Dr Alastair Marsden.

- Section 3 reviews the proposed Commission's estimate of the TAMRP.

2 Asset beta for Airports

2.1 Comparable Company Evidence

2.1.1 Introduction

The table below summarises the results of the Commerce Commission's empirical estimates of the asset beta for airports in its IM Review (2016).[4]

Table: Mean Airport comparator sample asset beta results				
	Daily asset beta	**Weekly asset beta**	**4-Weekly asset beta**	**# of firms in the sample**
2011 - 2016	0.59	0.60	0.66	26
2006 - 2011	0.60	0.57	0.69	25
2001 - 2006	0.66	0.48	0.55	19
1996 - 2001	0.48	0.16	0.24	6
Source: Commerce Commission, IM Review (2016, Table 7, Page 473).				

The Commission's IM Review (2016, para 404, page 473) determines an average asset beta for the airports' sample at 0.63. This is equal to the average of the weekly and 4-weekly empirical estimates over the periods 2006-2011 and 2011-2016.

2.1.2 Adjustment to beta for aeronautical component of total Airport assets

The Commission considers that an asset beta of 0.63 overstates the asset beta for airports' aeronautical activities because the comparator sample reflects airports' overall (multi-divisional) businesses. The Commission therefore proposes to adjust the asset beta of 0.63 downwards by 0.05 to 0.58.

In this respect the Commission sought advice from Dr Lally, who determined a point estimate 0.03 downwards adjustment to the average asset beta of airports. The Commission notes that Dr Lally considers his estimate is "*extremely imprecise*", due to uncertainty regarding the underlying parameter values (IM Review, para 413, page 476).

The Commission considers, however, a bigger adjustment than the 0.03 determined by Dr Lally is warranted. The reasons advanced by the Commission include:

[4] Commerce Commission (2016), Input methodologies review draft decisions: Summary paper, dated 16 June 2016.

- Figure 8 of the Commission's IM Review (2016, page 476) indicates that the asset beta for a business with 100% aeronautical revenues would likely be significantly below the sample average of 0.63 (Commission's IM Review, para 417.3, page 477);

- Deutsche Bank[5] estimates that unregulated activities comprise between 78%-82% of AIAL's market value (Commission's IM Review, para 416.1, page 477);

- A 2011 PwC report estimated Queenstown Airport's non-aeronautical activities as comprising 53%-55% of its total enterprise value (Commission's IM Review, para 416.2, page 477); and

- Replicating Dr Lally's analysis, but assuming 67% value weighting for unregulated activities (based on the average of AIAL and Queenstown), suggests an asset beta for regulated airport services of 0.55 (i.e., an adjustment of 0.08) (Commission's IM Review, para 416.3, page 477).

2.2 Auckland UniServices' Comments

2.2.1 Figure 8 of the Commission's IM Review (2016, page 476)

We are unable to replicate the analysis in Figure 8 of the Commission's paper. For example, Figure 8 shows two data points in this figure with the % of aeronautical revenues close to or greater than 90%.

In Table 8 of the Commission's IM Paper (2016, para 411, page 475), these airports are Aerodrom Nikola AD Beogr and Malaysia Airports Holdings Bhd. In attachment B of the Commission's IM Review the measured asset beta for Aerodrom Nikola AD Beogr and Malaysia Airports Holdings Bhd over the periods 2006-2011 and 2011-2016 are summarised in the table below.

Asset beta for Airports with circa 90% or over revenue from aeronautical activities							
		Asset beta					
Company	% of revenue from aeronautical activities	2006-2011			2011-2016		
		Daily	Weekly	4-Weekly	Daily	Weekly	4-Weekly
Aerodrom Nikola Tesla AD Beogr	92%	-	-	-	1.04	1.21	1.13
Malaysia Airports Holdings Bhd	88%	0.70	0.66	0.79	0.67	0.85	1.07
Source: Commerce Commission, IM Review (2016, Table 31, page 561)							

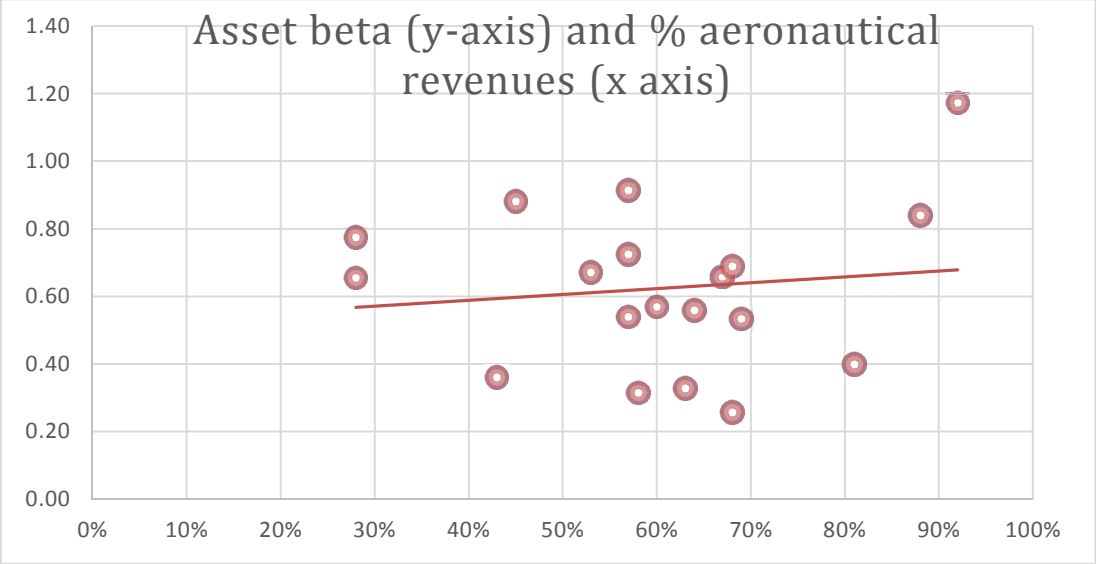
Thus, it is not clear how Figure 8 (two data points at the extreme right hand side of this figure) of the Commission's IM Review (2016) indicates an asset beta for:

- Aerodrom Nikola AD Beogr (with 92% aeronautical revenues) of circa 0.75; and

[5] Deutsche Bank, Auckland Int. Airport – Excellent 1H16, regulatory red light, 19 February 2016.

- Malaysia Airports Holdings Bhd (with 88% aeronautical revenues) of circa 0.20.

We replicate Figure 8 of the Commission's analysis by plotting the % of revenue from aeronautical activities (as per Table 8 of the Commission's IM Review, 2016, page 475) against the average of the weekly and 4-weekly asset betas for the periods 2006-2011 and 2011-16 (as per Attachment B of the Commission's IM Review (2016, Table 31, page 561)). Our revised Figure 8 is provided below:



The trendline suggests there is a weak positive relationship between asset beta and the % of revenue from aeronautical activities.

In undertaking an ordinary least squares regression, the results show:

Regression statistics for Figure above				
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.518	0.209	2.475	0.024
% aeronautical revenues	0.174	0.335	0.518	0.611

The t-stat for the slope of the line is not significant and the adjusted R^2 very low.

Overall, using the data in the IM Review (2016), our analysis suggests there is no strong relationship between the asset beta and the percentage of aeronautical revenues for an airport.

2.2.2 Deutsche Bank Analysis

The Commission's IM Review (2016, para 4.17.1, page 477) states:

"Deutsche Bank reports separate equity beta estimates for AIAL's business segments (0.78 for 'AIA Group', 0.71 for 'Regulated', 0.85 for 'Dual Till', and 0.60 for 'Property'). De-levering assuming gearing of 35% results in an asset beta of 0.46 for AIAL's regulated business, which is 0.05 lower than the asset beta for AIAL group (0.51)."

Part of Figure 11 of the Deutsche Bank report[6] is reproduced in the table below (AIAL Group and Regulated component only).

Deutsche Figure 11		
	AIA Group	**Regulated**
Risk free rate	4.40%	4.40%
Equity beta	0.78	0.71
Equity market risk premium	6.50%	6.50%
Cost of Equity	**9.5%**	**9.0%**
Debt Premium	2.0%	2.0%
Cost of Debt	**6.40%**	**6.40%**
WACC	**7.77%**	**7.47%**
Source: Figure 11. Deutsche Bank Report		

An analysis of the table above reveals a number of points:

- We agree with the Commission that the implied gearing assumed by Deutsche Bank is 35%. To see this, we apply the post-tax definition of WACC as follows to the total Auckland International Airport ("AIAL") Group:

$$WACC = k_e \frac{E}{V} + k_d (1 - t_c) \frac{D}{V}$$

$$7.77\% = 9.5\% \frac{65}{100} + 6.4\%(1 - 0.28) \frac{35}{100}$$

- However, Deutsche Bank appear to be using the standard (textbook) version of the CAPM and not the Brennan-Lally version of the CAPM advocated by the Commission. To see this, the Deutsche Bank cost of equity for the AIA Group is stated to be 9.5% based upon a risk free rate of 4.4%, an equity market risk premium of 6.5% and an equity beta of 0.78. That is:[7]

[6] Deutsche Bank, Auckland Int. Airport – Excellent 1H16, regulatory red light", 19 February 2016.
[7] Application of the Brennan-Lally model would give the following results.
$k_e = R_f(1-T_i) + \beta_L(TAMRP)$ = 4.4% × (1-0.28) + 0.78 × 6.5% = 8.24%.

$$k_e = R_f + \beta_L(MRP)$$

$$k_e = 4.4\% + 0.78 \times 6.5\% = 9.5\%$$

It is not explicitly clear to us what specific beta de-gearing formula Deutsche Bank use to convert from an asset beta to an equity beta and vice versa. However, in using the standard textbook version of the CAPM, the most common beta de-gearing formula is Hamada's formula:[8]

$$\beta_L = \beta_A\,(1 + (1\text{-}T_c)D/E)$$

Where β_L and β_A are the levered and unlevered betas, T_c is the corporate tax rate and D/E is the debt to equity ratio of the firm.

If Deutsche Bank (in using the standard CAPM and not the simplified Brennan-Lally model) had applied the standard textbook de-gearing formula, the implied asset beta estimate for the AIAL Group would equal 0.56. The implied asset beta estimate for the "regulated" component of AIAL would equal 0.51.

Implied Asset beta in Deutsche Figure 11		
	AIAL Group	**Regulated**
Equity beta	0.78	0.71
Other		
Gearing / Leverage	35%	35%
Corporate tax rate	28%	28%
Asset beta using standard textbook formula	**0.56**	**0.51**
Source: Figure 11. Deutsche Bank Report and own analysis		

In our view, however, it is difficult to infer an "equivalent" asset beta under the simplified Brennan-Lally version of the CAPM that Deutsche Bank would have derived for the AIAL Group and the different parts of AIAL without specific details of:

- The analysis undertaken by Deutsche Bank to derived the beta estimate. For example, was this weighted towards fundamental factors or empirical evidence? If the asset beta was based upon empirical evidence, what were the time periods used to estimate beta and

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This also means that the Commission may be incorrect in its suggestion that Craigs Investment Partners (who we understand are associated with Deutsche Bank) use a tax-adjusted market risk premium of 6.5% (see Commission's IM Review, 2016, Table 10, para 435, page 484). In this respect the Deutsche Bank report states (page1) that "*This research has been prepared in conjunction with Craigs Investment Partners Limited*".

[8] See Hamada (1972).

the comparative sample of companies? In this respect, the Commission in its IM Review (2016, para 286, page 439) notes that there may be a small risk of estimation error based on the choice of reference day.

- What was the leverage for the comparator sample of companies? It is not clear if the average leverage of any comparator sample that may have been used by Deutsche Bank to estimate AIAL's asset beta was 35% (the assumed leverage for AIAL by Deutsche Bank).

Moreover, this observation and analysis drawn from the Deutsche Bank report is based upon the asset beta estimate of one broker report only. In our view, and in the absence of a more detailed understanding of how the parameters such as the asset beta and leverage were determined, any inferences and conclusions on both:

- AIAL's aeronautical asset beta; and
- any difference between AIAL's overall beta and the asset beta for the aeronautical component of AIAL,

must be treated with caution.

2.2.3 Replicating Dr Lally's analysis on the asset beta adjustment for aeronautical activities

Dr Lally in his report titled "Review of WACC Issues" dated 25 February 2016[9] states (page 26) that:

> *"In respect of $\overline{w}_R$, Europe Economics (2010, Table 3.1) provides the proportions of revenue from **non-aeronautical** **activities** at six airports (all of which are included in the Commission's set of comparators), and the **average is 39%.** This is a small subset of the 25 comparator airports used by the Commerce Commission (2010b, Table E19). Furthermore, revenue proportions are a very imperfect proxy for value proportions, due to differences in costs relative to revenues and also to differences in the discount rates. So, **I estimate $\overline{w}_R$ at 39%,** but the precision of this estimate is very low" (**emphasis added**).*

Lally (2016, page 25) also states:

> "*Portfolio betas are value-weighted averages of their components. Consequently, the asset beta of an airport (β_A) is a value-weighted average of the asset betas for the regulated (β_R) and unregulated activities (β_U), with value weights of w_R and (1- w_R) respectively.* "

If the average revenues for non-aeronautical activities is 39%, then (1 -$\overline{w}_R$) = 39% and $\overline{w}_R$= 61%. If our interpretation is correct, this means the base case or point estimate downward adjustment to beta for Airport aeronautical activities proposed by Dr Lally in his 2016 report under his assumptions will be *less* than 0.03.

[9] Lally, M., (2016, Feb), Review of WACC Issues, website of the Commerce Commission.

Update of Lally (2016) for the revised asset beta of 0.63 for Airports (comprising aeronautical and non-aeronautical components)

Table 8 of the Commission's IM Review (2016, para 411, page 475) notes that the average % of revenues from aeronautical activities in the sample of companies is 60%. This corresponds closely to the evidence [Europe Economics (2010, Table 3.1)] cited by Dr Lally (2016).

The table below replicates Dr Lally's analysis in his 25 February 2016 report with $\bar{B}_A$= 0.63 and $\bar{B}_U$= 0.67.

Sensitivity analysis to asset beta for aeronautical activities to changes in weight and beta for non-aeronautical activities									
		Weight to aeronautical activities							
		0.29	**0.39**	**0.49**	**0.50**	**0.55**	**0.60**	**0.65**	**0.70**
Asset beta of non-aeronautical activities	**0.57**	0.78	0.72	0.69	0.69	0.68	0.67	0.66	0.66
	0.67	0.53	0.57	0.59	0.59	0.60	**0.60**	0.61	0.61
	0.77	0.29	0.41	0.48	0.49	0.52	0.54	0.55	0.57

Under Dr Lally's base case assumptions where $\bar{B}_U$= 0.67, but $\bar{w}_R$ = 0.60 (i.e. 60% of value weight to aeronautical revenues), the "regulated" beta for aeronautical activities is **0.60**.

That is, any downward adjustment (base case estimate) to the asset beta is still only 0.03 under Lally's (2016) approach. This takes into account the Commission's revised estimate of an asset beta of 0.63 (term $\bar{B}_A$= 0.63) in its IM Review (2016) compared to its prior estimate of 0.65 for Airports.

2.2.4 Commerce Commission references to the PwC report for Queenstown Airport (QAC).

As noted, the Commission states (IM Review, 2016, para 416.3, page 477)

> "*Replicating Dr Lally's analysis, but assuming 67% value weighting for unregulated activities (based on the average of AIAL and Queenstown), suggests an asset beta for regulated airport services of 0.55 (i.e., an adjustment of 0.08)".*

The Commission's calculation is replicated below [see Lally, (2016, equation 2)].

$$\bar{B}_A = \bar{w}_R \times \bar{B}_R + (1 - \bar{w}_R) \times \bar{B}_U$$

$$0.63 = 0.33 \times \bar{B}_R + 0.67 \times 0.67$$

$$\bar{B}_R = 0.55$$

Auckland UniServices' View

In our view, this statement by the Commission and suggestion of a downward adjustment of 0.08 based on inferences from the AIAL and Queenstown Airport value weighting estimates is based upon one observation only. It is not consistent with the broader evidence based upon the comparative sample of companies used to derive the asset beta for airports.

In addition, the average beta estimate of 0.63 from the sample of companies used by the Commission to determine an asset beta for Airports of 0.63 (term $\bar{B}_A$) reflects a mixture of companies with different proportions of aeronautical and non-aeronautical activities.

If Auckland International Airport Limited ("AIAL") has a higher than average weighting to non-aeronautical activities (following the Commission's arguments that a downward adjustment for the asset beta of the aeronautical component is warranted), then we would expect AIAL overall to have a higher asset beta than the average asset beta of 0.63 ($\bar{B}_A$) of the comparator sample.
In this respect:

- Table 8 of the Commission's IM Review (2016, page 475) shows the % of revenues from aeronautical activities (non-aeronautical activities) is 53% (47%) for AIAL, which is below (above) the average 60% (40%) of the comparator sample. This suggests:
    - AIAL's overall asset beta to undertake the calculations in paragraph 416.3 of the IM Review (2016) should assume a higher value for $\bar{B}_A$than 0.63; and
    - The Commission's suggestion of an 0.08 downward adjustment is overstated.

- The table below summarises the Commission's asset beta estimate for AIAL [see IM Review, 2016, Table 31, page 561)].

Table: Estimates of AIAL's asset beta			
Period	**Daily**	**Weekly**	**4-Weekly**
1996-2001	0.58	0.34	0.46
2001 -2006	0.83	0.87	0.82
2006-2011	0.79	0.71	0.68
2011-2016	0.82	0.60	0.69
Overall average	**0.76**	**0.63**	**0.66**
Source: Commerce Commission IM Review (2016)			

The standard errors around any estimate of asset beta in respect of one company only will be high. However, the evidence is consistent with AIAL having a higher asset beta than 0.63, where its proportion of aeronautical activities are below the average of the comparator sample.

For example, if we then take:

- An assumed asset beta for the AIAL equal to between **0.645** (average of the weekly and 4-weekly asset betas over all 4 periods in the table above) and **0.670**

(average of the weekly and 4-weekly asset betas over the last 2 periods 2006-2011 and 2011-2016 in the table above), and

- 67% value weighting for unregulated activities (based on the average for AIAL and Queenstown Airport as per the Commission's IM Review, para 416.3, page 476)

$\bar{B}_A = \bar{w}_R \times \bar{B}_R + (1 - \bar{w}_R) \times \bar{B}_U$

$0.645 = 0.33 \times \bar{B}_R + 0.67 \times 0.67$ to $0.67 = 0.33 \times \bar{B}_R + 0.67 \times 0.67$

$\bar{B}_R = 0.59$ to 0.67

The average value of $\bar{B}_R$ is now 0.63, which suggests no downward adjustment to the asset beta for AIAL is justified.

2.2.5 PwC estimate of the asset beta for Queenstown Airport's aeronautical assets

We note that PwC in their report (page 74) for Queenstown Airport ("QAC") recommended an asset beta of 0.60 for QAC's aeronautical business.[10] This is also only 0.03 less than the estimated asset beta of 0.63 in the Commission's IM Review (2016).

2.3 Conclusion on asset beta

In summary, we conclude based upon our analysis of the empirical evidence in the IM Review (2016) that:

- The downward adjustment to the asset beta of 0.05 proposed by the Commission for the aeronautical activities of airports is not warranted.

- If the Commission decides to make a downwards adjustment to its industry-wide asset beta for airports, any such downward adjustment to the asset beta should be no greater than 0.03**.**

[10] PriceWaterhouseCoopers, 2011, Queenstown Lakes District Council: Issue of shares in Queenstown Airport Corporation Limited to Auckland International Airport limited, Detailed Report on Fairness Opinion.

3 Tax-adjusted market risk premium (TAMRP)

3.1 Commerce Commission's Approach to estimate the TAMRP

In its IM Review (2016, para 428, page 480) the Commission proposes a point estimate of the TAMRP of 7.0%. This estimate is based upon analysis by Lally (2014, 2015) as part of the Commission's determination for Chorus' UCLL and UBA Services.

Lally (2015)[11] concludes a TAMRP based upon the median value of five different approaches applied to NZ and offshore markets. The table below summarises the estimates under each of these five methods.

Estimates of the TAMRP with a five-year risk-free rate		
	New Zealand	**Other markets**
Ibbostson estimate	7.1%	7.0%
Siegel estimate: version 1	5.9%	5.9%
Siegel estimate: version 2	8.0%	7.5%
DGM estimate	7.4%	9.0%
Surveys	6.8%	6.3%
Median	**7.1%**	**7.0%**
Source: Lally (2015) and Commission IM Review, (2016, Table 9, page 480).		

3.2 Auckland UniServices' Review of Dr Lally and the Commerce Commission's Approaches to estimate the TAMRP

Auckland UniServices disagree with the following approaches by Lally (2014, 2015) to determine the TAMRP with a five-year risk-free rate.

Estimates of the TAMRP with a five-year risk-free rate		
	New Zealand	**Other markets**
Ibbostson estimate	Agree	Disagree
Siegel estimate: version 1	Agree	Disagree
Siegel estimate: version 2	Agree	Agree
DGM estimate	Agree	Agree
Survey evidence	Disagree	Disagree

We discuss below the estimates of the TAMRP as at August 2015 [being the relevant date in the latest estimates of the TAMRP by Lally (2015)]:

[11] For details of these approaches see Lally (2014), Review of submissions on the Cost of Debt and the TAMRP for UCLL and UBA Services, 13 June 2014, Website of the Commerce Commission and Lally (2015) Review of submissions on the Cost of Debt and the TAMRP for UCLL and UBA Services, 13 October 2015, Website of the Commerce Commission.

- Using offshore (other markets) in respect of the Ibbotson estimate;
- Using offshore (other markets) in respect of the Siegel estimate: version 1; and
- Survey estimates using NZ and other markets.

3.2.1 Ibbotson Approach

TAMRP estimate using offshore data

To estimate the TAMRP drawn from offshore data, Lally (2015) applies:

- historical estimates of the market risk premium ("MRP" or "$R_m - R_f$") in foreign markets;
- Converts the MRP to a five year estimate by adjusting for the average differential between five and ten-year US rates over the period 1953-2014; and
- Takes the current five-year risk free rate[12] in NZ multiplied by the term T_c to convert the MRP measure to an equivalent TAMRP.

In this estimate of the TAMRP using offshore data, the historical average MRP from the set of offshore markets is 6.19% after adjustment for the interest rate differential between 5 and 10-year rates [see Lally (2015), drawing on work by Dimson et al. (2015)].

The TAMRP then equals:

TAMRP = Historical Ibbotson offshore MRP (5-year estimate) + Current five year NZ Govt. bond yield × T_c

= 0.0619 + (0.0274 × 0.28)

= 0.070 = 7.0%.

The resultant estimate of the TAMRP is 7.0% as illustrated in the table below.

TAMRP Estimate using Offshore Data		Parameter	Source
MRP - average over foreign markets for 10 years		0.059	Lally (2015, Table 3)
Add differential US data 5 - 10 yr rates		0.0029	Lally (2015, page 25)
MRP - average over foreign markets for 5 years		0.062	
August 2015: 5 year risk free rate	0.027		RBNZ website and Lally (2015, page 25)
Tax rate or term T_c	28.00%		
$R_f \times T_c$		0.008	
	TAMRP	**0.070**	
Source: Lally (2015)			

[12] This is the five-year Government bond rate as at August 2015 – see Lally (2015).

Auckland UniServices' view

We disagree with the use of the current five year NZ Govt bond yield to adjust the historical offshore MRP to an equivalent TAMRP.

This approach means that the historical estimate of the TAMRP can vary widely depending upon the current NZ risk free rate.

To illustrate, Lally (2014, page 39) estimates the TAMRP using offshore data (other markets) at 0.076 (see table below).[13]

TAMRP Estimate using Offshore Data		Parameter	Source
MRP - average over foreign markets for 10 years		0.061	Lally (2014, Table 3)
Add differential US data 5 - 10 yr rates		0.0029	Lally (2014, page 38)
MRP - average over foreign markets for 5 years		0.064	
Average April 2014: 5 year risk free rat	0.0423		RBNZ website
Tax rate or term T_c	28.00%		
$R_f \times T_c$		0.012	
	TAMRP	**0.076**	
Source Lally (2014), adjusted for differential 5-10 year data			

In summary adopting the approach in Lally (2014, 2015) we have:

Ibbotson MRP and TAMRP using offhshore markets and approach in Lally (2014, 2015)			
	Year		
	2014	**2015**	**Difference**
MRP - after differential between US 5-10 yr rates	0.064	0.062	**-0.002**
TAMRP - after differential between US 5-10 yr rat	0.076	0.070	**-0.006**
Source: Lally (2014, 2015)			

This results in a change in the historical Ibbotson estimate (other markets) of:

- The MRP of 0.2% between the measurement periods of 1900-2014 (0.064) and 1900-2015 (0.062); and
- The TAMRP of 0.6% between the measurement periods of 1900-2014 (0.076) and 1900-2015 (0.070).

In Auckland UniServices' view, we would expect a much smaller adjustment or change to the TAMRP than a change of 0.006 or 0.6% due to adding one additional data point or one year (i.e. 2015) to a long-term average historical TAMRP measured over the period 1900-2014 or 114 years.

[13] Lally (2014) takes the mean of the point estimates in his Table 3 equal to 0.061 and then uses the April 2014 average for the risk free rate.

Accordingly, in our view, a more appropriate adjustment to derive an offshore (other markets) Ibbotson estimate of the TAMRP (as per Lally (2015)), and consistent with the Commission seeking to estimate the market risk premium for New Zealand that would be a "*stable and predictable estimate of the TAMRP*" (see IM Review, 2016, para 436.3, page 484), would be to:[14]

- Use historical estimates of the MRP in foreign markets;
- Convert the MRP to a five year estimate by adjusting for the average differential between five and ten-year US rates over the period 1953-2014; and
- Take the average of the long-term historical risk free rate in NZ multiplied by the term T_c to convert the MRP measure to an equivalent TAMRP.

Under this approach the long-term Ibbotson estimate of the TAMRP (other markets) will be more stable and fluctuate far less according to changes in the underlying risk free rate. The tables below seek to calculate the long-term historical average for the term $R_f \times T_c$ (in effect, assumed equal to $R_f \times T_I$)[15] for the periods 1932-2014.

Calculation of average $R_f \times T_c$ for Period 2003-2014			
Year	T_c	R_f	$R_f \times T_c$
2003	0.330	0.059	0.019
2004	0.330	0.061	0.020
2005	0.330	0.059	0.019
2006	0.330	0.058	0.019
2007	0.330	0.063	0.021
2008	0.300	0.061	0.018
2009	0.300	0.055	0.017
2010	0.300	0.056	0.017
2011	0.280	0.050	0.014
2012	0.280	0.037	0.010
2013	0.280	0.041	0.011
2014	0.280	0.043	0.012
Average			**0.017**
Source: Lally (2015, Table 1) and own analysis			

For the period 2003- 2014 the average term $R_f \times T_c$ is 0.017.

For the period 1932 – 2002, we take a proxy for the long-term average $R_f \times T_c$ equal to 0.017. This is taken from Lally and Marsden (2004a, Table 2) as the difference between the nominal tax-

[14] Also see Lally (2015, page 28) where Dr Lally, in determining the Siegel estimate for foreign markets, states "*Consistent with seeking to estimate the market risk premium for New Zealand, the estimate of the expected long-term real risk free rate for New Zealand should be invoked,…..*"

[15] In our view, the assumption that $R_f \times T_c \approx R_f \times T_I$ is implicit in Lally (2015), when updating the Lally and Marsden (2004a) Ibbotson estimate of the TAMRP for NZ using New Zealand historical data under the simplified version of the Brennan-Lally tax-adjusted CAPM. The term T_I is an aggregate investor tax rate on debt income.

adjusted market risk premium (bond yields) (0.072) and the nominal market risk premium (bond yields) (0.055).[16]

For the period 1932-2014 the long-term average $R_f \times T_c$ is 0.017 (see Table below).

Ibbotson Approach - Foreign Data -Calculation of average $R_f \times T_c$ for Period 1932-2014				
	Average $R_f \times T_c$	No of years	Weight	Weight × Average $R_f \times T_c$
Lally and Marsden (2004a). 1931-2002	0.017	72	85.7%	0.015
Estimate period 2003-2014	0.017	12	14.3%	0.002
		84	100.0%	**0.017**
Source: Lally and Marsden (2004a), Lally (2015) and own analysis				

Under this approach our revised estimate of the Ibbotson offshore (other markets) TAMRP is 7.9%.

TAMRP Estimate using Offshore Data	Parameter	Source
MRP - average over foreign markets for 10 years	0.059	Lally (2015, Table 3)
Add differential US data 5 - 10 yr rates	0.0029	Lally (2015, page 25)
MRP - average over foreign markets for 5 years	0.062	
Average $R_f \times T_c$ for NZ	0.017	
TAMRP	**0.079**	

In summary, the use of a long-term NZ average for the term $R_f \times T_c$ will produce more stable estimates of the TAMRP using foreign data (other markets), compared to the approach adopted by the Commission in its IM Review (2016) and Lally (2014, 2015).

3.2.2 Siegel Estimate: Version 1

TAMRP estimate using offshore data (other markets)

Under this estimate of the TAMRP, the Siegel[17] version 1 estimate of the MRP is first estimated using offshore data (after also adjusting for the difference between five and ten-year risk free rates). Lally (2015, page 29) estimates this equals 0.051.

The TAMRP (Siegel version 1) estimate is then:

TAMRP(S) = Siegel offshore MRP (5-year estimate) + Current five year NZ Govt. bond yield × T_c

$$= 0.051 + 0.0274 \times 0.28$$
$$= 0.051 + (0.0274 \times 0.28)$$
$$= 0.059 = 5.9\%.$$

The details of Lally's (2015) estimate is also provided in the table below.

[16] Using the arithmetic mean annual return measure.
[17] See Siegel (1992).

Siegel Version One			
Foreign Siegel Estimate		**Parameter**	**Source**
Foreign Siegel Estimate		0.048	Lally (2015, Table 3)
Add differential US data 5 - 10 yr rates		0.0029	Lally (2015, page 25)
Foreign Siegel Estimate - 5 yrs MRP		**0.051**	
Current 5 Yr Govt Stock Rate (August 2015	0.027		RBNZ website and Lally (2015, page 25)
Tax rate	28.00%		
$R_f \times T_c$		0.0077	
Foreign Siegel Estimate - 5 yrs TAMRP		**0.059**	
Source: Lally (2015)			

Auckland UniServices' view

In our view, a more appropriate adjustment to derive an offshore Siegel version 1 estimate of the TAMRP for New Zealand would be to:

- Start with the Ibbotson (foreign) measure of the TAMRP (as per our adjusted estimate);
- Add back the historical average real yield on NZ bonds (net of the tax effect); and
- Deduct a proxy for the historical average of the market's expected real yield on NZ bonds (net of the tax effect).

That is:

$$\hat{TAMRP}(S) = \hat{TAMRP}(I) + AV[R_f^r(1-T_C)] - \hat{AV}[E(R_f^r)(1-T_C)]$$

Where:

$\hat{TAMRP}(S)$ = Siegel version 1 measure of the TAMRP (offshore data or other markets);

$\hat{TAMRP}(I)$ = Ibbotson measure of the TAMRP (offshore data)

$AV[R_f^r(1-T_C)]$ = historical average real yield on NZ bonds (net of the tax effect).

$\hat{AV}[E(R_f^r)(1-T_C)]$ = historical average of the market's expected real yield on NZ bonds (net of the tax effect).

Our calculations of $\hat{TAMRP}(S)$

The tables below seek to calculate the long-term historical average for the terms $AV[R_f^r(1-T_C)]$ and $\hat{AV}[E(R_f^r)(1-T_C)]$ over the periods 2003 – 2014. We adopt Lally's (2015) assumption that $E(R_f^r) = 0.035$.

Table: Siegel-Type Estimates of the TAMRP 2003-2014						
Expected long-run real risk free rate				**0.035**		
Year	R_f	*Inf*	T_c	R^r_f	$R^r_f \times (1\text{-}Tc)$	$E[R^r_f] \times (1\text{-}Tc)$
2003	0.059	0.016	0.330	0.042	0.028	0.023
2004	0.061	0.027	0.330	0.033	0.022	0.023
2005	0.059	0.032	0.330	0.026	0.018	0.023
2006	0.058	0.026	0.330	0.031	0.021	0.023
2007	0.063	0.032	0.330	0.030	0.020	0.023
2008	0.061	0.034	0.300	0.026	0.018	0.025
2009	0.055	0.020	0.300	0.034	0.024	0.025
2010	0.056	0.040	0.300	0.015	0.011	0.025
2011	0.050	0.018	0.280	0.031	0.023	0.025
2012	0.037	0.009	0.280	0.028	0.020	0.025
2013	0.041	0.016	0.280	0.025	0.018	0.025
2014	0.043	0.008	0.280	0.035	0.025	0.025
Average	**0.054**	**0.023**	**0.306**	**0.030**	**0.021**	**0.024**
Source: Lally (2015, Tables 1 & 2). Last 2 columns - our calculations						

For the period 2003- 2014 the long-term average:

$$AV[R^r_f(1-T_C)] = 0.021$$

$$\hat{AV}[E(R^r_f)(1-T_C)] = 0.024$$

For the period 1932 – 2002, we take:

- A proxy for the long-term average $AV[R^r_f(1-T_C)]$ equal to 0.012. This is taken from Lally and Marsden (2004b, Table 2).
- A proxy for the long-term average $\hat{AV}[E(R^r_f)(1-T_C)]$ equal to 0.026 [see Lally and Marsden (2004b, Footnote 13)].

For the period 1932-2014 the long-term average terms $AV[R^r_f(1-T_C)]$ and $\hat{AV}[E(R^r_f)(1-T_C)]$ are 0.013 and 0.026 respectively (see Tables below).

Long term historical AV [$R^r_f \times (1\text{-}T_c)$]				
	AV [$R^r_f \times (1\text{-}T_c)$]	**No of years**	**Weight**	**Weight ×AV [$R^r_f \times (1\text{-}T_c)$]**
Lally and Marsden (2004b), 1931-2002	0.012	72	85.7%	0.010
Period 2003-2014	0.021	12	14.3%	0.003
		84	100.0%	**0.013**

Long term historical expected average					
	$\widehat{AV}$	[E[R^r_f]× (1-T_c)]	No of years	Weight	Weight × $\widehat{AV}$ [E[R^r_f]× (1-T_c)]
Lally and Marsden (2004b) 1931-2002		0.026	72	85.7%	0.022
Period 2003-2014		0.024	12	14.3%	0.003
			84	100.0%	**0.026**

The resulting value for the Siegel version 1 offshore estimate of the TAMRP is 0.067 (see table below).

Siegel Version One			
Foreign Siegel Estimate		**Parameter**	**Source**
Ibbotson TAMRP (foreign estimate)		0.079	Our estimate of the Ibbotson (Offshore) TAMRP
Add	AV [R^r_f× (1-T_c)]	0.013	
Less	$A\hat{V}[E(R_f^r)(1-T_c)]$	-0.026	
Foreign Siegel Estimate - 5 yrs TAMRP		**0.067**	

3.2.3 Survey estimates

TAMRP estimate using New Zealand data

Lally (2015) uses survey data drawn from Fernandez et al. (2015) to derive a forward looking estimate of the MRP (median estimate is 0.06 from 31 responses). The TAMRP is then calculated as:

TAMRP(Survey) = Median NZ survey estimate of the MRP + Current five year NZ Govt. bond yield (as at August 2015) × T_c
= 0.060 + 0.0274 × 0.28
= 0.068 = 6.8%

TAMRP estimate using offshore data (other markets)

Lally (2015) calculates the TAMRP using survey data drawn from offshore markets as follows:

TAMRP (Survey) = Median survey estimate of the MRP for 21 advanced countries + Current five year NZ Govt. bond yield (as at August 2015) × T_c
= 0.055 + 0.0274 × 0.28
= 0.063 = 6.3%

Our view

Auckland UniServices disagrees with the approach adopted by Lally (2014, 2015) and the Commission to derive survey estimates of the TAMRP using NZ and offshore data.

In our view:

- The adjustment for the term risk free rate × T_c should be estimated based on a risk free rate at the time the survey was undertaken. In the Fernandez et al. (2015) paper, most survey responses appear to be received during the month of April 2015.
- Arguably an adjustment still needs to be made on account of the differential between 5 and 10 year rates. In this respect Fernandez et al. (2015, page 1) note that "*Most of the respondents use for US, Europe and UK a Risk-Free rate (R_F) higher than the yield of the 10-year Government bonds*". This suggests that the MRP is referenced to a term of the risk free rate greater than 10 years and hence an adjustment for the interest rate differential between five-year bonds and bonds longer than five years is warranted.

Our adjusted survey estimates of the TAMRP would therefore be **0.069** (NZ data) and **0.065** (Offshore data or other markets). This uses the average of the TAMRP calculated with and without an adjustment for the differential in 5 and 10-year risk free rates.

Application of Survey Method to calculate TAMRP					
	NZ		Offshore (other markets)		Source
Market Risk Premium - median estimate	0.060	0.060	0.055	0.055	Fernandez et al (2015)
Add differential NZ or US data 5 - 10 yr rates		0.0008		0.0029	Lally (2015)
Current 5 year risk free rate	0.031	0.031	0.031	0.031	Source: RBNZ - Month April 2015
Tax rate	28%	28%	28%	28%	
TAMRP	0.069	0.070	0.064	0.067	
Average TAMRP	**0.069**		**0.065**		
Source: Lally (2015), Commission IM Review (2016) and own analysis					

3.3 Deutsche Bank comparative estimates of TAMRP and WACC

The IM Review (2016, Table 10, para 435, page 484) claims that Craig Investment Partners use a TAMRP estimate of 6.5% in the NZ market.

As already noted, however, in our view Deutsche Bank (who have a relationship with Craig Investment Partners) appear to use a MRP of 6.5%, which is not equivalent to the TAMRP. In this respect we refer to our analysis in Section 2.2.2 and Footnote 6 of this report.

Lastly, we note that the Commission in its IM Review (2016, para 575.2, page 516) states that after normalising for differences in risk-free rates:

> "*For example, our estimate is the same as Deutsche Bank's estimate for the regulated segment of Auckland International Airport's (AIAL) business (6.17%)*".

However, Deutsche Bank[18] in a report dated 1 July 2016 (Figure 26) still estimate the WACC for the regulated component of AIAL to equal 7.31%. This assumes a risk free rate of 4.3%, presumably reflecting some long-term expected mean reversion in interest rates.

[18] Deutsche Bank, Auckland Int. Airport – Airport growth dampened, not stalled, 1 July 2016.

In our view the Commission is unable to conclude their estimate of the WACC of 6.17% would equal the WACC that Deutsche Bank would determine after "normalisation" for differences in the risk free rate.

3.4 Conclusion

Our estimates of the TAMRP as at August 2015 following Lally (2015), but adjusted for changes in the approach to (i) the Ibbotson estimate – other markets, (ii) Siegel estimate: version 1 - other markets and (iii) survey evidence for both NZ and other markets are summarised in the table below.

Estimates of the TAMRP with a five-year risk-free rate		
	New Zealand	**Other markets**
Ibbostson estimate	7.1%	7.9%
Siegel estimate: version 1	5.9%	6.7%
Siegel estimate: version 2	8.0%	7.5%
DGM estimate	7.4%	9.0%
Survey evidence	6.9%	6.5%
Median	**7.1%**	**7.5%**
Average	**7.0%**	**7.5%**
Source: Lally (2015), Commission IM Review (2016), Table 9, para 428 and own analysis		

In our view:

- If the Commission were to round the estimate of the TAMRP, this should be to the nearest 0.25%. Rounding to 0.5% will likely produce overly coarse estimates of the TAMRP that may not reflect changes in underlying market conditions. In this respect, we note that the Commission seeks to be relatively precise (with minimal rounding only) in its estimate of the asset beta and leverage for airports and electricity / gas distribution businesses. Consistency would suggest that the Commission adopt the same perspective when determining a point estimate of the TAMRP.

- An appropriate estimate of the TAMRP as at August 2015 would be **7.25%** (close to the median and average estimates for the New Zealand and other markets combined in the table above)**.**

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