

Further Comments on Incenta's WACC Analysis for ChCh Airport

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1. Christchurch International Airport Ltd (CIAL) is consulting with airlines over future pricing. As part of this process, CIAL has commissioned Incenta Economic Consulting to undertake work on three issues: depreciation for PSE3, RAB adjustments from PSE2, and the asset beta component of the weighted average cost of capital (WACC).
2. In response to comments I provided on 23 March 2017, Incenta has supplied a further memorandum, dated 8 April 2017. My comments on the three issues discussed in this Incenta memorandum follow.

Estimating a Proxy Beta

3. My last report re-iterated a concern I had previously stated: that *"the rationale for modelling the growth rates in passenger traffic and GDP was not apparent and it was not clear why Incenta had rejected the use of levels (or logarithms) of these variables"*. Incenta respond by (correctly) noting that *"standard (financial) betas are obtained by estimating the relationship between the growth in the value of a financial asset against the growth rate in the value of the market portfolio of assets"*. The implication seems to be that this is the reason Incenta estimated a proxy beta by regressing growth rates in passenger numbers against growth rates in domestic GDP.
4. If this is Incenta's justification for using passenger growth rates, then I disagree with Incenta and consider that the *proxy* nature of the beta being estimated has not been properly considered. The Incenta approach ignores an important economic difference between asset values and passenger numbers:
 - a. passenger numbers are a flow, measured in numbers of people per unit of time;
 - b. asset values are a stock, representing the market's estimation of the net effect of the future flows of several variables (including, for airports, passengers).
5. This distinction has important implications for the way each type of variable is used in any estimation of the contribution a given firm's equity has to systematic risk. Changes (e.g. growth rates) in asset values (i.e. share prices) for an airport are a good indicator of financial returns to holders of the company's stock over any given year. However, if we instead observe the flow of passengers, the growth rate over a year is much less informative about the returns to share-holders. There are two reasons for this.
 - a. First, passenger numbers are just one of several flows that investors consider when pricing the stock. Other flow variables of relevance include aircraft movements, non-aeronautical revenue, and cost measures.
 - b. Second, and more fundamentally, changes in asset value (the stock variable used in estimating financial betas) depend on a lot more than the per-period change in *any* of

the relevant flow variables. In particular, the *historical level* of flow variables and their expected *future levels*, are relevant to the market valuation of the firm's equity.

6. The latter point warrants further elaboration. It is the expected future value of all relevant flow variables that determines the market's valuation of an airport's equity. When investors are considering the value of the airport's equity they look at the current *levels* of the relevant flow variables and the recent trends in those *levels*, and they form expectations about their future *levels*. Discounted cash flow analysis is often used in valuation models: the inputs to these models are past and expected future levels of the relevant flow variables.
7. The Incenta analysis ignores these relationships between flow variables and stock variables. It implicitly assumes that short-term (i.e. annual) variation in one (of many) relevant flow variables is a reliable indicator of the long-term expectations that affect market prices and (through those prices) returns to equity holders.
8. For these reasons, I remain concerned about the definition of the variables used by Incenta, which are very fundamental inputs into analysis that seeks to justify a higher asset beta for CIAL than the comparator sample average.

Period of Analysis

9. Incenta argue that it was forced to use different sample sizes to estimate a proxy beta for CIAL and for the benchmark sample: these were "*not in fact choices*". I disagree. Incenta clearly did choose to place more weight on its desire to "*use the maximum extent of data available for each respective purpose*" than on a desire for standardising the comparison of proxy beta estimates, or testing whether CIAL's beta is different.
10. Moreover, it is well known that there is a trade-off between using older information and obtaining the most accurate estimates of the relevant economic parameters. The economic environment for CIAL and New Zealand was very different in the late 1980s and early 1990s than it is today, so it is far from clear that one should prioritise including these old data at the expense of properly testing the proposition that CIAL is advancing. Put simply, it is not always better to use old data.¹
11. In my view, the very large difference in sample periods between Incenta's estimates of CIAL's proxy beta create an obligation on Incenta to justify its reliance on these large differences. Where Incenta cannot justify its reliance on the different sample sizes, it should use consistent sample sizes for both the proxy beta and the benchmark sample.

Statistical Significance

12. In the modelling section of my previous report, I began by showing the results of adding CIAL to the benchmark sample "*while allowing for the slope parameter to differ*". The slope parameter is the proxy beta value of central interest here. My modelling estimated three parameters:

¹ See for example, P.C.B. Phillips, 1996, Econometric Model Determination, *Econometrica*, 64, pp. 763 – 812, which considers among other things how to decide whether to "discard data that may be irrelevant".

- a. An intercept parameter common to all firms; and
 - b. Two slope parameters (proxy betas), one for the common sample and another for CIAL.
13. In response, Incenta has estimated a four-parameter model (equation 3 of Table 1) that allows (in addition to the model I estimated) for CIAL's intercept to be different to the benchmark sample. It turns out that this extra intercept is not statistically significantly different from zero (p value of 39%), so Incenta's four-parameter model does not explain the data better than my three-parameter model.
14. I therefore do not consider that my previous analysis and inference are undermined by the results Incenta presents. Perhaps this is why Incenta goes on to argue about standards of statistical significance, to which arguments I now turn. Incenta says there are three reasons why its opinion on CIAL's proxy beta should be accepted without having to meet "*conventional levels of statistical significance*". I address these separately below.

Practically Impossible

15. Incenta says (I think) that it is "*practically impossible*" to estimate "*asset betas*" with "*conventional levels of statistical significance*". This is a very strong claim, unsupported by any citations, that could potentially lead to a long discussion about empirical testing of asset pricing models. I would be happy to engage in such debate. However, as things stand it is Incenta that is seeking to use statistical evidence to support a claim that CIAL deserves a higher WACC than would be consistent with the Commerce Commission's analysis. I therefore consider that, if Incenta wishes to pursue the "*practically impossible*" claim it should provide some evidence.

Commission's Approach

16. Incenta suggest that it should not be held to the standard of "*conventional levels of significance*" because the Commerce Commission exercised some judgement about non-aeronautical activities. There are two difficulties with this argument.
- a. First, the example cited led to a *reduction* in the estimated WACC. If there is actually statistical evidence that CIAL has a *higher* asset beta than the benchmark sample then this exercise of judgement by the Commission should have made that *easier* to demonstrate.
 - b. Second, Incenta is actively seeking to differentiate its client's risk from the benchmark sample *by using statistical analysis*. In this context, it is not clear why normal statistical standards should not apply. If Incenta had chosen to use a different evidential approach to try to identify CIAL's level of systematic risk, this matter would not have arisen. CIAL cannot both rely on statistical analysis to produce its results and then defend its findings by arguing that statistical analysis cannot be relied on.

Type I and II Errors

Incenta's final argument is that "*a less extreme trade-off between Type I and Type II error is justified*". While it is true that significance levels involve such a trade-off, it would be

difficult to argue that “*conventional levels of significance*” are “*extreme*”. It is relevant but not surprising that Incenta do not attempt any substantive argument on this point.

Conclusion

17. For the reasons outlined above, I consider that Incenta has not established that it:

- is “practically impossible”, or
- is unnecessary because the Commission exercised some judgement, or
- creates an extreme trade-off between Type I and Type II errors

to apply conventional standards of statistical significance in seeking to establish whether CIAL’s proxy beta should be accepted.