AN EXPERT'S REPORT ON

THE USE OF A 75TH PERCENTILE FROM THE WACC RANGE FOR INFORMATION DISCLOSURE REQUIREMENTS OF AIRPORTS IN NEW ZEALAND FOR THE PURPOSE OF PROFITABILITY ASSESSMENT BY THE COMMERCE COMMISSION

REPORT OF

PROFESSOR PULIYUR (SUDI) SUDARSANAM

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On Behalf Of:	**Air New Zealand**
Prepared For:	**New Zealand Commerce Commission**
On Instructions Of:	**Bell Gully**

Professor S Sudarsanam

PSSquared Consultants Limited

1 Duchess Grove, Buckhurst Hill

Essex IG9 5HA, United Kingdom

p.s.sudarsanam@cranfield.ac.uk

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1 Introduction

1.1 Experience and Credentials

1.1.1 I am Emeritus Professor of Finance & Corporate Control at the Cranfield University School of Management, Honorary Senior Visiting Fellow at the Cass Business School, London and visiting professor in Mergers & Acquisitions at Imperial College Business School, London, three of the most prestigious business schools in the UK and the world. I was also Professor of Finance & Accounting at the Cass Business School earlier. I have taught on Master's and MBA programmes corporate restructuring/ turnaround, bankruptcy modelling, mergers and acquisitions, corporate valuation, cost of capital and private equity at these schools in addition to publishing in top refereed journals in these areas (see Appendix 1 for a list). Most of my research has involved modelling cost of capital using CAPM, three/ four factor models etc.

1.1.2 I was appointed as a Reporting Panel Member of the UK Competition Commission ("CC") in 2005 and was a member of the CC's expert panel on cost of capital and regulatory finance (the Finance & Regulation Group or FRG) from 2006 to 2013. I was involved in the preparation of eight determinations in relation to cost of capital issues including two appeals in 2010-11 by Carphone Warehouse under section 193 of the Communications Act, the economic regulation of Heathrow and Gatwick in 2007, the economic regulation of Stansted in 2008 and Bristol Water price determination in 2010.[1] I was a member of several inquiry teams, a member of the expert FRG panel advising other inquiry groups on cost of capital and financeability issues and in some inquiries both. I stepped down from the CC in March 2013. As member of the CC, which is among the top two/three antitrust regulators in the world, I gained experience in merger investigations and price control regulatory proceedings. I have much experience of evaluating the adversarial arguments submitted by parties to disputes in these areas.

1.1.3 I provided expert opinions on the choice of a high percentile point estimate from a range of WACC estimated by Civil Aviation Authority (CAA) in the UK on behalf of British Airways in 2013 and an expert opinion on the instructions of Baker and McKenzie for British Airways and Virgin Atlantic on the cost of capital determination for the 6th Quinquennium (Q6) regulatory period in 2014 on errors made by the Civil Aviation Authority in its conclusions on the cost of capital in the formulation of a price control for Heathrow airport limited for the 6th Quinquennium (q6) between 1 April 2014 and 31 December 2018.

1.1.4 I am the author of *Market and Industry Structure and Corporate Cost of Capital*, Journal of Industrial Economics, June 1992 and *Cost of Equity for Regulated Companies: An international Comparison of Regulatory Practices*, Competition Commission UK, Discussion paper, November 2011.

1.1.5 I am the author of the text book on mergers and acquisitions, "The Essence of Mergers and Acquisitions" (Prentice Hall, 1995), which was translated into five European and Asian languages. My second book, "Creating Value from Mergers and Acquisitions: The Challenges" (FT Prentice Hall) was released in October 2003. The second edition of this

[1] *The Carphone Warehouse Group plc v Office of Communications*, Case 1111/3/3/09; BAA Ltd: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd, presented to the Civil Aviation Authority, September 2007; Stansted Airport Limited: Q5 price control review, presented to the Civil Aviation Authority, October 2008.

book was published in 2010 both editions being translated into Chinese. I am a co-editor of "Corporate Governance and Corporate Finance in Europe" (2007).

1.1.6 I have published extensively in leading academic journals like Financial Management, Journal of Banking & Finance, European Finance Review, European Financial Management and Journal of Industrial Economics. I have presented numerous research papers at leading conferences in Europe and the USA. I have been an associate editor of the Journal of Business Finance & Accounting and am an associate editor of Review of Behavioral Finance.

1.1.7 My full curriculum vitae is attached as Appendix 1.

1.2 Instructions

1.2.1 I have been instructed by Bell Gully acting for Air New Zealand to prepare this report for submission to the New Zealand Commerce Commission ("the Commission") in response to the Commission's paper, "Further work on cost of capital input methodologies - Process update paper - 31 March 2014".

1.2.2 I have been asked to provide an expert opinion addressing the appropriate WACC percentile(s) to be used in the cost of capital input methodologies in the New Zealand regulatory regime, with a principal focus on the aviation sector.

1.2.3 I have adhered to the standards of an independent expert appearing before a court or tribunal.

1.2.4 I set out, in References, a list of the materials that I have considered in the preparation of this report.

1.3 Disclosure of Interests

1.3.1 I can confirm that I do not have any actual or potential conflict of interest with any of the parties involved in this matter whose identities have been advised to me by Bell Gully.

1.4 Synopsis

1.4.1 I have examined the rationale for the Commission's use of the 75th percentile from a range of perspectives and examined the empirical evidence for the returns to airports being skewed as a result of any potential asymmetric risk. I consider that the Commission's reasoning and methodologies behind the use of the 75th percentile of the WACC range are not well supported by strong analytical rationale, conceptual rigour and empirical evidence. Therefore, a consideration of the relative costs of under- and over-estimation of the cost of capital in terms of over- or under-investment and in terms of dynamic efficiency does not justify the use of the 75th percentile.

1.4.2 My analysis is structured as follows:

a. The regulatory background to the case;
b. The New Zealand High Court's judgment in the recent appeals against the Commission's IMs in particular reference to the use of a high percentile estimate from its WACC range;

c. My Opinion;
d. Conclusions.

2 Background to my opinion

2.1 Regulatory system for airports in New Zealand - the form of price regulation

2.1.1 The regulation of designated airports in New Zealand is not price control but information disclosure and price monitoring by the NZ Commerce Commission (the Commission hereafter). The three main international airports (hereafter the Airports) (along with three electricity distribution businesses (EDBs)) in New Zealand are subject to information disclosure (ID) regulation for the purpose of such monitoring to enable the Commission to assess whether they are making excessive profits. The Commission develops the requisite input methodologies (IMs) to determine the cost of capital for the regulated Airports[2].

2.1.2 The IMs rely on complex analytical techniques to estimate the uncertainty associated with the estimation of WACC. These techniques either estimate, or make assumptions about, the standard errors in the estimates of the individual parameters that together add up to the WACC. The primary model employed by the Commission for the estimation is the CAPM, modified to take into account the imputation of tax credits to investors and the general absence of tax on capital gains in New Zealand, whose components are either individually estimated or assumed as shown in Table 1.

CAPM parameter	Point estimate	Standard error
Leverage	17%	
Debt issuance costs	0.35%	
Asset beta	0.60	0.16
Equity beta	0.72	
Tax-adjusted market risk premium (TAMRP)	7.1%*	0.015
Average corporate tax rate	28.4%	
Average investor tax rate	28.1%	
Debt premium (as at 1 July 2010)	1.75%	0.0015
Risk-free rate (as at 1 July 2010)	4.96%	

Table 1: CAPM parameter values and associated standard errors estimated by the Commission

Source: The Commerce Commission, Input Methodologies (Airports) Reasons Paper, December, 2010, Table E22, p346. * Only for the initial year and reduced to 7% thereafter.

2.1.3 The Commission estimates the standard error of its post-tax WACC estimate using a formula that combines the standard errors of the three components for which standard errors have been estimated[3]. It acknowledges that "the main disadvantages of this approach are that, although greater use is made of statistical information, the use of such information might create a sense of precision that is not warranted. Also some degree of judgment is still involved when applying this approach. Finally, the assumption of the overall cost of capital estimate being normally distributed is unlikely to be satisfied in reality"[4].

[2] Commerce Act (Specified Airport Services Input Methodologies) Determination 2010, NZCC 709, 22 December 2010.
[3] The Commission, Input Methodologies (Airports) Reasons Paper, December, 2010, Table E11.18-E11.21, p328-329.
[4] *Ibid*, E11.22.

2.1.4 Specifically in relation to the Airports, the Commission stated in concluding that the midpoint is the appropriate starting point in that it "… recognises that returns in competitive markets often fall below or exceed the mid-point of the cost of capital". The use of a range "recognises uncertainty in the estimation of the cost of capital" and "also recognises that profitability measures (such as the ROI) can fluctuate on a yearly basis"[5].

2.1.5 The IMs require the Commission to publish 75th percentile WACC estimates, mid-point WACC estimates and 25th percentile WACC estimates for all suppliers that are subject to ID regulation. In its recent reports on how effectively information disclosure regulation was promoting the Part 4 purpose in respect of specified airport services (under s 56G of the Commerce Act 1986, 'the Act' hereafter), the Commission assessed the Airports' profitability against a WACC range from the mid-point to the 75th percentile[6].

2.1.6 In developing its IMs for cost of capital and in choosing the range for WACC, the Commission's position is that:

- the cost of capital cannot be directly observed, but must be estimated and these estimates are subject to error; the Commission needs to apply judgement to dealing with such error;
- it cannot be known whether an estimate is in error or not but, using statistical methods, a confidence level can be assigned to how likely it is that the true value of the WACC is above or below a particular value[7]; and
- the social costs of underestimating the WACC outweigh the social costs of overestimating it[8].

2.1.7 In exercising its judgement as regards the 75th percentile, the Commission had regard to the elements of the s 52A purpose set out in paragraphs (a) and (d) of the Act. Incentives to invest and innovate were given greater weight than limiting suppliers' ability to extract excessive profits. The Commission also noted some model misspecification errors as motivation for its using the 75th percentile, as discussed in section 3.2 below.

2.2 Appeal against the Commission's IMs and the High Court's judgment

2.2.1 A number of parties appealed the Commission's cost of capital IMs set out in 2010 (as well as a number of other IMs) to the High Court (the Court hereafter). On 11 December

[5] See *ibid*, E11.58.
[6] The Commission also stated in its Airports Reasons Paper that, in assessing profitability, an appropriate starting point is the 50th percentile (mid-point) of that range. That statement is not part of the Airports cost of capital IMs.
[7] For example, as per the Commission, if standard errors are correctly calculated, there is a three-in-four chance that the 75th percentile estimate exceeds the true value of the WACC, and a one-in-four chance that the 75th percentile estimate is below the true value of the WACC.
[8] In more detail, in the EDBs-GPBs Reasons Paper, the Commission stated: *"The reason for the Commission adopting a cost of capital estimate that is above the mid-point for default/customised price-quality regulation, is that it considers the social costs associated with underestimation of the cost of capital in a regulatory setting involving constraining price to end users (as opposed to information disclosure applications and situations involving competition among suppliers), are likely to outweigh the short-term costs of overestimation (i.e. if the cost of capital is set too low, the incentives for suppliers to undertake efficient investments will be reduced, which would be inconsistent with the long-term benefit of consumers). That is, the Commission is acknowledging that where there is potentially a trade-off between dynamic efficiency (i.e. incentives to invest) and static allocative efficiency (i.e. higher short-term pricing), the Commission will always favour outcomes that promote dynamic efficiency. The reason is that dynamic efficiency promotes investment over time and ensures the longer term supply of the service, which thereby promotes the long-term benefit of consumers (consistent with outcomes in workably competitive markets)*". See EDBs-GPBs Reasons paper at [H1.31], 3/7/001378.

2013, the Court delivered its judgment on all the merits appeals against the IMs. The Court dismissed all the appeals against the cost of capital IMs. However, it raised a number of concerns about those IMs in its judgment. Among these are issues concerning the validity of the use of the 75th percentile from the WACC range.

Observations of the Court

2.2.2 In its judgment the Court made a number of sceptical observations concerning the Commission's use of the 75th percentile from its WACC range. In summary,

- the Commission used what it called standard errors and a percentile range in a way so as to arrive at a WACC estimate that it considered was likely to comfortably overestimate the WACC (paragraph or para 1451 of the judgment).
- the Commission's estimate was explicitly chosen so as to likely be higher than the unobservable true WACC (para 1452).
- The question to be addressed is the adequacy of the basis for the Commission's approach, which MEUG had challenged (para 1459).
- The Commission's approach of using the 75th percentile in the manner set out in the cost of capital IMs involves the likelihood that suppliers will earn excess returns[9].
- This is clearly at odds with the s 52A(1)(d) purpose of limiting the ability of regulated suppliers to extract excessive profits (para 1461).
- No supporting analysis was provided by the Commission. *Indeed, the propositions advanced for choosing a point higher than the mid-point seemed to be considered almost axiomatic (emphasis mine)*. This extended to a strongly expressed, but unsupported, view of the benefits of dynamic efficiencies deriving from investment, without apparent regard to the nature of the investment. (para 1462).

2.2.3 The Court found a similar sentiment and lack of reference to any research literature in the various citations provided by suppliers to submissions made on their behalf. While some rationale in terms of the loss function was offered by the Commission and other parties, no supporting empirical evidence was presented. There was some acknowledgment of the difficulties in estimating the loss function (paras 1463 to 1469).

2.2.4 The Court cited approvingly the observations of the Australian Competition Tribunal (ACT) in the *Telstra* case where it refused an adjustment to cost of capital to recognise asymmetric error costs in the absence of supporting material for the 75th percentile approach and more fundamentally beliefs about the asymmetric social costs (para 1468)[10]. The Tribunal did not accept the view that "overestimation of the WACC leads to

[9] The Court further observes: "This is true even having regard to the fact that the calculation of the 75th percentile involves some generally acknowledged imprecision, and false precision. There is no suggestion in the Commission's reasoning that its choice of the 75th percentile is a decision made out of caution, and to be reviewed in the light of further evidence regarding the WACC. Rather, all the Commission's reasoning points to the choice following from, in its view, unavoidable uncertainties and asymmetric costs being permanent features of the regulatory framework" (para 1460).

[10] The Court cited the following passage from the Australian Competition Tribunal:

We accept that it is possible that there may be asymmetric consequences associated with setting a WACC too high or too low. However, it is not clear to us that the asymmetry would always imply that overestimation of the WACC led to a lesser social cost than underestimation of the WACC. The nature of the asymmetric consequences of incorrectly setting a WACC is likely to depend on the circumstances of a given

a lesser social cost than underestimation of the WACC in regulated businesses and the Tribunal would only have been convinced by evidence, as opposed to assertion" (para 1469).

2.2.5 The Court countered the Commission's reasoning with some in-principle arguments. In sum:

- Even a normal return on new investment ought to be an attractive proposition for a regulated supplier... Why then, should higher likely returns be provided? (para 1472).

- Higher than normal expected returns may not stimulate greater efficiency of any kind (para 1473).

- How exactly are higher expected returns supposed to stimulate them [suppliers]? Dynamic efficiency implies finding better ways to meet customer needs and adapting to changes in market circumstances… Utility industries are unlikely to be leaders in dynamic efficiency, precisely because they do not need to be (para 1474).

2.2.6 The Court made important observations on the inter-sectoral impact of higher than normal returns to regulated suppliers and called for evidence of such impact:

- If the prices paid by user industries are higher than the resource cost of producing the outputs (viz, electricity and gas transmission and distribution), then inefficiency is promulgated throughout the economy (para 1475).

- At the least, the inter-sectoral effects ought to be considered, and if possible estimated. This has not been done in the present regulatory processes. If evidence from studies in other times and places exists, it was not placed before us, and seems to have played no part in the Commission's thinking (para 1476).

2.2.7 In the Court's view, applying the 75th percentile estimate to the initial RAB is unlikely to be necessary to promote incentives to invest and innovate (para 1479). In conclusion, the Court again cited the following passage from the Telstra case (*Telstra Corporation Ltd (No 3)* [2007] ACompT 3 at [457]):

> *… there exists as a matter of theory the potential for asymmetrical consequences should the WACC be set too low or too high. Which of these consequences will carry with it the greatest social damage is not a matter solely for theory, however, but for robust empirical examination, well-guided by theory, of the actual facts of any particular case* (para 1486).

2.2.8 My expert opinion focuses on these issues.

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matter that may be before the Tribunal. Telstra and Professor Bowman submitted that the long-term social costs of underestimating the WACC would be greater than the long term social costs of overestimating it in this particular instance, largely because in circumstances where the WACC was set too low, there was a risk that this would lead to the cessation of services, or a failure to develop services at a socially desirable rate. In order to convince us of this submission, however, it was incumbent upon Telstra to provide evidence that these circumstances actually existed or would exist in relation to the ULLS. Professor Bowman assumed that they did, but he did not provide any evidence or support for the proposition that this was, or would be, the case.

3 The Commission's response to the Court judgment

3.1.1 In its invitation to stakeholders to express their views on whether it should review or amend the cost of capital IM, the Commission has presented a number of issues on which it seeks such views. My expert opinion focuses on the following two among those issues:

- What evidence is there in support of either the 75th percentile or credible alternatives?

- In selecting an appropriate WACC percentile, how significant is it that regulated outputs are inputs to other sectors of the economy?

3.1.2 Before commenting on these issues I set out the rationale of the Commission for its choice of the WACC range and for the use of the 75th percentile in the ID for Airports.

3.2 The Commission's rationale for its choice of WACC range and the 75th percentile

3.2.1 The Commission's rationale for selecting the cost of capital range and for using the 75th percentile in setting the price-quality paths for regulated utilities in general and in assessing whether airport returns were appropriate as part of the s56G reviews is set out in its Input Methodologies (Airports) Reasons Paper of December 2010 (hereafter the Reasons Paper or RP). I summarise the main reasons advanced by the Commission in paragraphs E11.51 to E12.36 here.

3.2.2 In balancing the risk between setting the cost of capital too high and setting it too low, the Commission has to make an assessment as to the consequences of either error and takes into account a number of factors which may be divided into two categories:

1. Model (mis-specification) errors leading to the true cost of capital being above or below the estimated mid-point of the selected range;
2. Balancing the incentives and disincentives to suppliers.

3.2.3 Among the factors under the first category are the risks that:

- the true (but unobservable) cost of capital is above the estimated mid-point WACC;

- CAPM and the SB-L CAPM may underestimate the returns on low beta stocks;

- the use of a domestic CAPM may lead to higher estimates of the cost of capital than the international CAPM;

- individual parameters of the SB-L CAPM including beta and the TAMRP may be estimated with error e.g. the values for some parameters may be above their true (but unobservable) level including, for example, the estimated asset beta or debt issuance costs.

3.2.4 Among the factors under the second category are:

- ensuring suppliers of regulated services have incentives to invest and innovate, which will benefit consumers over time but are not able to extract excessive profits;

- that in workably competitive markets the risks are borne by the party that is best equipped to manage these risks;

- the impact on potential subsequent investment by service users and the potential impact on dynamic efficiency.

3.3 Information disclosure regulation - the cost of capital range for Airports

3.3.1 Airports are subject to information disclosure regulation. The Commission considers that it needs to use its judgment and balance all of the considerations above and recognises that returns in competitive markets often fall below or exceed the mid-point of the cost of capital. In assessing profitability of the Airports an appropriate starting point for any assessment is the 50th percentile (mid-point) on the range.

3.3.2 Given the uncertainty associated with some of the parameters, as well as the measurement of suppliers' actual level of profitability, the Commission considers it appropriate to take a range between the 25th to 75th percentiles. The use of this range recognises uncertainty in the estimation of the cost of capital. It also recognises that profitability measures (such as ROI) can fluctuate on a yearly basis.

3.3.3 The Commission then considered the possible adjustments to the estimated cost of capital for a range of factors.

3.4 Possible adjustments to the cost of capital for asymmetric risk

3.4.1 The IMs do not make any adjustments to the cost of capital for asymmetric risk. However, the Commission does consider that it may be appropriate to deal with asymmetric risks through some other forms of adjustment or mechanisms, such as adjustments to regulatory cash flows with the use of flexible depreciation (e.g. a front-loaded depreciation profile in the event that asset stranding becomes apparent).

3.4.2 A firm faces asymmetric risk when its distribution of returns is truncated at one extreme without an offsetting truncation at the other. In other words, the firm's payoffs are 'asymmetric'. For example, in competitive markets with sunk costs existing firms may be exposed to the risk of new entry that would erode upside returns when the market is profitable. However, when the market is unprofitable entrants are unlikely to arrive so incumbent firms are left to entirely bear any losses. This type of cost is specific to the individual supplier and is not compensated for in the standard cost of capital estimations. Similarly, in monopolised markets regulation can cap potential profits without providing commensurate insulation from downside risk. All firms may also be exposed to stranding risk (e.g. through technical obsolescence, unfavourable demand shocks), and large catastrophic events such as natural disasters.

3.4.3 The Commission distinguishes between two categories of asymmetric risk:

- Type I risks are risks that are generally unrelated to the day-to-day operations of the firm, and arise through infrequent events that could produce large losses e.g.

natural disasters; pandemics; terrorist threats. These may be regarded as truly exogenous events outside the firm's control.

- Type II risks are risks that derive from such events as the threat of competitive entry or expansion. A firm may experience a cap on any significant upside to their profits, but typically no limit on the significant downside risk that it faces. On the downside, assets can become stranded through technical innovations that unexpectedly lower operational costs or through negative demand shocks.

3.4.4 The Commission's decision is not to make any adjustments to the cost of capital for Type I asymmetric risk. However, the Commission may in some circumstances make an allowance for such risk in the cash flows.

3.5 Type II asymmetric risk and real options

3.5.1 Type II asymmetric risks are potentially large in industries that are: (i) characterised by long-lived, irreversible (large sunk cost) investments; and (ii) subject to substantial uncertainty over such things as future demand and costs. The Commission has used the real options framework to analyse the implications of Type II asymmetric risks for the returns firms in such industries expect while making their investment decisions.

3.5.2 Real options theory suggests that in industries with such features, firms will not enter or invest unless the (conventionally calculated) expected rate of return is above normal. Instead, firms will wait until expected profits are large enough to cover both the cost of capital and the Type II asymmetric risks associated with entry. Such delay can occur in workably competitive markets that are characterised by significant uncertainty and a high degree of sunk costs, and can be efficient. Hence, the presence of Type II asymmetric risk creates a timing decision and suggests that there potentially should be either a mark up on the standard cost of capital estimate or some upward adjustment to allowed revenues.

3.5.3 Although many submitters argued for higher allowed rate of return to compensate suppliers, the Commission notes that it was not clear from arguments presented by submitters that their request for an increased allowed rate of return was because of the existence of an asymmetric risk. At the same time, the Commission acknowledges that suppliers might set hurdle-rates for new investments above the normal rate of return on a project-by-project basis. However, as some of these projects are likely to perform better than others, the Commission considers that, on average, suppliers will achieve a normal rate of return in the long-term and this will be reflected in their long-term expectations. Further, such policies used by firms may not be a reflection of asymmetric risk faced by firms, but the need of the business to discipline overly optimistic forecasts by project managers.

3.5.4 NZIER (for BARNZ) argued against the adoption of a real options approach. It highlighted that advocates did not provide the Commission with any practical guidance as to how it could identify or value real options among the firms it was required to regulate, and did not identify any other regulators that have allowed for real options to be taken into account. Further, NZIER submitted that for Airports subject to information disclosure real options had no relevance, and was sceptical that real options were even relevant for price-path regulation.

3.5.5 As part of the Expert Panel's advice, Professor Myers recommended that timing options in the face of symmetric risk are a manifestation of market power, and regulators should not provide compensation for these. However, timing options extinguished in the face of Type II risk (asymmetric options) should be compensated for by the regulator. Dr Lally agreed that options exercised in the face of symmetric risk were a manifestation of market power that should not be compensated for and agreed that Type II asymmetric risk potentially warranted compensation. However, he considered that a crucial feature of the Type II risk was asymmetry of the cash flows, rather than the presence of a timing option. Professor Franks recommended that any allowance for extinguished timing options be made through the regulatory cash flows.

3.6 The Commission's conclusion on compensating suppliers for Type II asymmetric risk and real options

3.6.1 The Commission considers that regulated suppliers have not provided evidence to demonstrate that a Type II asymmetric risk exists and needs to be compensated using a real options approach. On this basis, the Commission considers a real options approach that provides for a mark up in the cost of capital (or regulatory asset base) is not appropriate for dealing with Type II asymmetric risks.

3.6.2 The Commission has more general concerns about the applicability of real options to all services regulated under Part 4. In particular:

- regulated firms are unlikely to be subject to the requisite degree of uncertainty for a real options approach to apply due to the long-term nature of regulation;
- (comparable in many ways to a long-term contract) where an asset value is fixed at the moment it enters the RAB, and suppliers are allowed to earn a return on and of that investment. In workably competitive markets with sunk costs and uncertainty, the existence of long-term contracts mitigates the need for a real options approach;
- assigning a positive value to real options could reward a regulated supplier for its position of market power, which would be inconsistent with the Part 4 Purpose;
- there is no regulatory precedent for taking into account real options in the cost of capital (or asset base) even though other regulators have previously considered such arguments; and
- to the extent that any Type II asymmetric risk does exist, the Commission considers this is better dealt with through front loading of the depreciation profile or cash flows, or allowing stranded assets to remain in the RAB, as has been done by other regulators.

3.6.3 The Commission also noted that airports had not demonstrated that Type II risks existed in the case of Airports and that real options were a particular concern for them[11].

3.6.4 Overall, having considered the two categories of risks that might justify the choice of a higher percentile than the mean and the potential impact of the incentive to delay investments and the need to compensate suppliers of regulated services to undertake

[11] The Commission, Input Methodologies (Airports) Reasons Paper, para E12.36.

investment in a timely manner using the real options framework, the Commission decided to base its decision on the 75th percentile on:

- model estimation errors; and
- the relative incentive effects of high and low cost of capital for investment, innovation and dynamic efficiency.

It decided against making a cost of capital allowance for any asymmetric risk in the form of real options.

4 My opinion

In the following sections, I consider whether or not there is evidence in support of the Commission's rationale for its use of the 75th percentile. I examine this rationale using the two categories of risks that motivate the Commission's rationale:

1. model-related errors; and
2. the relative incentive effects and high and low cost of capital relative to the mean of the WACC range.

4.1 Model-related errors

4.1.1 The Commission considers three possible errors resulting from the use of SB-L CAPM to estimate the cost of equity: low beta stocks, domestic rather than international investor perspective and possible errors in the estimation of beta and TAMRP.

4.1.2 While it is possible that such errors may exist, it is not clear that all of them unequivocally result in under-estimation of the Airports' cost of capital. The Commission does not offer evidence to this effect and does not provide a measure of the underestimation or how the choice of the 75th percentile would offset the degree of under-estimation.

4.1.3 The Commission also does not consider other potential sources of under-estimation. Although it acknowledges that the assumption that WACC may be normally distributed may not hold, it does not investigate the possible sources of non-normality. The equity stock returns may not be normally distributed but skewed. Such skewness may also be a source of under-estimation of investor expected returns estimated with the traditional CAPM.

4.1.4 One such source of under-estimation is the asymmetric returns to firms which are not captured by the traditional mean-variance CAPM. Several US studies have argued, and some US studies have provided empirical evidence, that stock returns are skewed and the stock returns include a premium for co-skewness. Coskewness is a measure of the correlation between an individual stock's skewness of returns and the skewness of market returns, analogous to the beta which is a measure of the correlation between the variance of an individual stock's returns and the variance of market returns. Investors expect to be rewarded for bearing the co-skewness risk (the co-skewness risk premium or CRP) in the same way as they are rewarded with MRP.

4.1.5 It has been argued that under a price cap regulation of an airport that suffers from capacity constraints such as London Heathrow, the airport is unable to take advantage

of the upside potential of traffic volume surges whereas they are exposed to the downside risk when the volume collapses. This scenario may plausibly account for the skewness of returns to airport equity investors (Europe Economics, 2013; NERA, 2013 and Cooper, 2011). If skewness and coskewness were significant and caused a downward bias in the CAPM estimated cost of equity, then a plausible case can be made for estimating a model that incorporates coskewness[12] or alternatively for adjusting the CAPM-estimated cost of equity upwards to offset its downward bias.

4.1.6 The case was made to the UK's Civil Aviation Authority (CAA) in its Q6 price control determination process by Heathrow Airport and its advisers. The CAA commissioned its adviser, PwC, to investigate the presence and impact of skewness and co-skewness. PwC (2013) reported that pre-2006 stock returns to BAA, the erstwhile holding company of Heathrow and Gatwick prior to its delisting, did not manifest significant negative skewness during 1987-2006 and did not find any significant or reliable coskewness between the BAA stock returns and UK stock market returns during this period.[13]

4.1.7 PwC (2013) also estimated small negative coskewness coefficients for some other European airports. Vienna airport has a coskewness coefficient -0.24 over 15 years to March 2013, and Paris airport has a negative coskewness coefficient -0.23 over the past 6 years to March 2013 (since it was listed).

4.1.8 Europe Economics (2013) advising Heathrow estimated the TMCAPM for a number of European airports ranging from large to small airports and also for Heathrow prior to its de-listing in 2006. EE estimated coskewness for comparator airports using the same approach and found that different European airports exhibited different, but small or negligible, degrees of negative skewness.

4.1.9 EE also estimated the TMCAPM that included the traditional covariance or beta factor and the coskewness factor for a range of European airport operators; this provides estimates of the beta and gamma coefficients respectively (Table 6.13); the TMCAPM was estimated for two subperiods – 2003 to 2005 preceding Q5 and 2006-08 during Q5 (Table 6.15).

4.1.10 EE found that the gamma coefficient for BAA was statistically insignificant i.e. BAA's equity returns in the period 2003-05 prior to its delisting in 2006 were insensitive to market skewness. This is consistent with PwC's analysis that BAA's returns were not coskewed with the market and that its returns were insensitive to its coskewness. Post-2008 the UK market exhibited zero skewness and over the entire period 2003-2012, skewness was quite modest, probably statistically insignificant. Thus coskewness of Heathrow with the market returns was likely negligible.

4.1.11 This evidence, for a range of small as well as large European airports, suggests that asymmetric returns are probably unlikely to be the source of any non-normality in airports' cost of capital and that adjustment of cost of capital for such asymmetry of returns is not necessary.

[12] Such a model is called a Third Moment CAPM (TMCAPM) in contrast to the conventional two factor CAPM.

[13] PwC concluded: "We estimate a positive coskewness coefficient of 0.16 for BAA between 1987 and 2006, suggesting low positive coskewness for the entire time period; however, there is evidence of negative coskewness in the more recent past, with a coskewness coefficient of -0.46 in the five years to 2006. So, there is some evidence of negative coskewness for BAA's returns in the latest years for which data are available, but the coskewness coefficient is particularly unstable, so it is difficult to be confident what the coskewness coefficient is moving forward" (2013, p38).

4.2 Real options, timing and commitment impact on Airport investments

4.2.1 Another source of potential asymmetry of returns i.e. the real options was discussed at length by the Commission as indicated above (see sections 3.5 and 3.6 above). Although the Commission did not give credence to the real options perspective in the context of regulated businesses making long term investments under regulatory regimes that have the characteristics of long term contracts, there are certain aspects of real options that need further examination. Moreover, the Commission did not examine any empirical evidence concerning the impact of real options held by a firm on its stock return, volatility and the relation between return and volatility.

4.2.2 The real option perspective discussed by the Commission and the various parties suggests that firms in competitive markets with valuable investment opportunities enjoy a timing option i.e. they can wait until they have better information about market or technology evolution before investing. Regulated firms may forfeit such an option by being forced to make investments at inopportune times i.e. they make suboptimal investment decisions resulting in lower returns. Airports and their advisers argued that the Commission should take this opportunity cost into account and choose a point estimate above the mean of the range.

4.2.3 In competitive markets, firms faced with real options have to choose between delaying investment until more and better information is available and exercising their option early to pre-empt their rivals. Smit (2003) and Smit and Trigeorgis (2009) discuss the relative value implications of flexibility (ability to delay investment) and commitment (early option exercise). Firms in making their investment decisions and their timing decisions trade off these value consequences. Smit and Trigeorgis (2009) develop option-game theoretic models to evaluate the value implications of the trade-off. In their model:

> Value of Enterprise = Value of assets in place + Growth option value
> = PV of cash flows from assets in place + Flexibility (option) value + Commitment (games) value

The growth option value consists of the value of timing flexibility and the value of commitment. The discussion by the Commission and the various parties has largely ignored this trade off.

4.2.4 In the case of regulated firms such as airport operators which by definition are sheltered from competition in most of their aeronautical services, early exercise may still have commitment value if they face competitive markets for some of their services e.g. as a transfer hub for regional or international passengers[14]. Even otherwise, airports with significant market power can still gain from early exercise to deter potential entry or to augment ('gold-plate') their RAB in order to enhance their revenue (IATA, 2007).

4.2.5 A dual till system such as in New Zealand may provide the Airports with an additional incentive to commit to terminal and other investment early. Any analysis of the incentives to the Airports to undertake long term investments to provide aeronautical

[14] To illustrate, Smit and Trigeorgis (2009) cite BAA's rationale for its Terminal 5 investment: "Without a fifth terminal at Heathrow, the world's busiest international airport, many travellers will be forced to use rival continental airports to connect between flights. Transfers account for a third of Heathrow's business, and losing this could have a damaging effect not only on BAA [British Airports Authority], but also on the national and local economies. If airlines are denied the opportunity to grow at Heathrow many of them will choose Paris, Frankfurt, or Amsterdam to expand their business." (p5, citing BAA 1999).

services cannot be divorced from an analysis of the incentives that the Airports receive from commercial revenues that will be generated together with the aeronautical revenues. The dual till regulatory structure implies that the case for incentives in the form of a high percentile WACC is much weaker than appears from the extant analysis presented by the Commission focused only on aeronautical services. A more careful analysis of the impact of commercial revenues on the Airports' investment incentives is required.

4.2.6 Similarly, any real options analysis of the Airports' investment opportunities needs to examine how the various factors influencing the option values and the timing of the option exercise will be affected by a single till perspective. Commercial revenues are likely to impact on the value of the assets in place as well as the value of options to make new investments - the volatility of the cash flows, the cost of new investment (the exercise price), the timing flexibility and the relative advantages of delay versus commitment in undertaking investments.

4.2.7 Thus the view that airports forfeit the value of the timing flexibility and gain little in return is an incomplete picture and distorts the valuation and cost of capital analysis of regulated airports[15].

4.3 Sunk and irreversible costs, real options and the case for high percentile WACC

4.3.1 In the presence of irreversible fixed costs i.e. sunk costs, Hausman and Myers (2002) show, through Monte Carlo simulation, that the optimal rate of return allowed by the regulator to the regulated supplier is well above the mean of the range of WACC. They derive this result in the context of the railroad regulation in the US. The infrastructure assets built by railroad operators may be plausibly regarded as 'sunk costs' satisfying the 'irreversibility' criterion. Hausman and Myers (2002) argue that such assets give rise to an asymmetric risk which justifies the choice of a high percentile above the mean by the regulator.

4.3.2 Many submitters to the Commission argued that it should, following the same logic, use a high percentile so that the Airports receive adequate incentives for long-lived investments (see The Commission, 2010, paras E12.16 and E12.17).

4.3.3 If the allowed rate of return does not compensate the regulated service provider for this asymmetric risk, the provider loses the incentive to invest in new long term assets which may become sunk investments once made.

4.3.4 There are several reasons why the irreversibility argument is unlikely to hold in the case of the Airports' assets:

- Given the expected strong growth in volume of air traffic through these Airports, their viability as airports and the continued deployment of their assets in their current use seem a strong prospect; and

[15] According to Smit and Trigeorgis (2009), "when Schiphol's management was contemplating a complement airport in the North Sea as an expansion option, London's BAA expressed its concerns that the large scale of this project would affect its own growth opportunities in London. The huge up-front investment of this growth strategy for Schiphol would generate significant strategic commitment value, pre-empting future growth in the industry, while at the same time it would sacrifice flexibility value. Once made it would be hard to recover. Schiphol management's strategy has been to follow a more flexible expansion plan that allows staging and adjusting sequential investments according to the level of growth, industry developments, and competitive responses".

- The assumptions behind the Commission's valuation of these assets for the purpose of valuing their RAB are consistent with their continued use to provide aeronautical services.

4.3.5 In real options theory, the option to put the airport assets to alternative uses would constitute a put option which will be exercised in the event the airport assets' value-in-current-use falls below their value in alternative use. The higher the latter the more valuable is the put option. The higher the put option value, the lower is the sunk cost and smaller the losses from any potential bankruptcy.

4.3.6 Any consideration of sunk costs should therefore take account of the put options that the Airports hold and their value[16]. The presence of such put options means that the asymmetric risks which the Airports are said to suffer from are likely to be mitigated by the put options[17]. This reduces the need for a high percentile from the WACC to be chosen by the regulator.

4.4 How do real options impact on CAPM-based estimate of cost of capital?

4.4.1 Grullon, Lyandres, and Zhdanov (GLZ) (2012) test the hypothesis that the positive relation between firm-level returns and firm-level volatility may be due to real options that firms possess. One of the main implications of real options theory is that a real option's value is increasing in the volatility of an underlying process (i.e., demand volatility, cost volatility, or overall volatility of profits). Therefore, if real options constitute a substantial component of firm value, then it is possible that the positive return-volatility relation documented in Duffee (1995) is driven by the presence of these options. Using a battery of proxies for investment opportunities, GLZ find that the positive contemporaneous relation between returns and changes in volatility is very strong among firms that are likely to have abundant investment opportunities, while it is substantially weaker among assets in place–based firms.

4.4.2 The authors also examine the effect of the return-volatility relation on the performance of asset pricing models. Based on the insights of McDonald and Siegel (1985), Berk, Green, and Naik (1999) and Da, Guo, and Jagannathan (2012), they argue that, in the presence of real options, the CAPM may explain the expected returns on a firm's underlying assets but not necessarily the expected returns on its equity. This is because when firms possess real options, equity risk becomes a nonlinear function of the risk of the underlying assets. Consistent with this argument, Da, Guo, and Jagannathan (2012) show that the presence of real options seems to explain the poor performance of the CAPM. If real options are an important determinant of the positive relation between volatility and stock returns, then the CAPM, or any asset pricing model that does not account for real options, should perform better for firms with a weak return-volatility relation (firms with relatively few real options) than for firms with a strong return volatility relation (firms with abundant real options). GLZ find that, while the CAPM is

[16] The redeployment of airport assets to non-aeronautical uses is another possibility in the rare event of a regulated airport falling into bankruptcy. Interestingly, the Mayor of London, Mr Boris Johnson, a strong opponent of the third runway at Heathrow, suggested the following alternative uses for the Heathrow assets in the event that it was shut down and a new London hub was created in the Thames Estuary as advocated by him: new technology and education hub; new residential quarter or new town (see report in http://www.cityam.com/blog/1396266237/three-things-boris-wants-build-in-heathrow-instead-new-runway). Airport assets are likely to be some of the best developed real estate assets with excellent communication and transport connectivity to high population catchment areas and commercial hubs. Their value in alternative uses is therefore likely to be quite high.

[17] The put option value will differ from one regulated utility to another. It is likely to have very low value in the case of railroad, as suggested by Hausman and Myers (2002), and high value in the case of airport assets.

comfortably rejected in the case of firms with abundant real options, it performs much better with firms rich in assets in place, consistent with the prior studies cited above[18].

4.4.3 As noted in paragraph 3.6.2 above, the Commission has expressed reservation about the applicability of the real options framework to regulated services such as airports and is not persuaded that the investment opportunities of these businesses can be adequately characterised as real options. Given this characterisation that such businesses are relatively real options-poor, the empirical results from GLZ study lend support to the view that the CAPM provides a reasonably adequate model of the returns to such businesses. While this conclusion applies to the validity of the CAPM and equity returns, I believe that a similar conclusion as regards WACC for such businesses is not inappropriate[19]. This suggests that any uplift to the WACC estimated using the CAPM or SB-L CAPM to compensate for real options is not warranted.

4.5 Relative incentive effects of high and low WACC

4.5.1 The other major reason for the Commission to use the 75th percentile rather than the mid-point of its WACC range is that the social welfare costs of a low percentile estimate far outweigh those of a high percentile estimate. Welfare gains are measured in terms of long term investments and innovation and welfare losses are the opportunity costs to users and consumers of these investments and innovation foregone or delayed because the low percentile offers inadequate incentives for the regulated business.

4.5.2 It is this reason that has drawn much of the criticism in the HC's judgment as noted above. A relevant question is whether there are countervailing factors that will prevent under-investment even in the event that the Commission chooses, for example, the midpoint of the estimated range. The Commission has not considered this issue and identified such countervailing forces that would mitigate any investment-avoidance.

4.5.3 Among the relevant factors are the competitive threats faced by the airports from other airports in New Zealand and from other transportation media. To the extent the Airports face some measure of competition, their incentive to avoid or delay investment is diluted and there is no need for a high percentile WACC incentive;

4.5.4 Moreover, non-price mechanisms available to the Commission may encourage the airports to make timely investment of sufficient scale;

4.5.5 Since Airports stand to gain from adding new investments to their RAB on which the WACC is calculated for the purpose of assessing their profitability, they have an incentive to advance, rather than delay, their investment programmes even in the absence of the high percentile incentive;

4.5.6 For the same reason, Airports have an incentive to undertake more costly investments than necessary for the provision of adequate aeronautical services to users i.e. the incentive for 'gold-plating'. While the monitoring of such investments by the regulator and the airlines may restrain gold-plating, the information asymmetry between Airports on the one hand and the regulator/ airlines on the other may work to the advantage of

[18] The authors find similar results for the Fama and French (1993) three-factor model.

[19] Since Airports' WACC, as estimated by the Commission, is dominated by equity in their capital structure i.e. 83% whereas debt only accounts for 17%.

the Airports and encourage them towards gold-plating. This again suggests that additional incentives in the form of high WACC may be unwarranted.

4.5.7 Airports gain from the commercial, non-aeronautical services and the franchises to retailers, restaurants etc at the airports. Airports depend on the airlines to deliver the passengers before they spend on the commercial services offered at the airports. Airports enjoy scale economies in generating commercial revenues once they have made the investment in the necessary infrastructure (Francis et al, 2003).

4.5.8 As noted above, New Zealand regulation is a multi-till system that excludes commercial revenues. Such revenues are likely to be important drivers of the growth opportunities available to airports even when consolidated under a single-till regulatory system but are considerably more attractive under multi-till systems such as in New Zealand. Given the incentives that the commercial revenue generating opportunities already present to the Airports, incentive in the form of a high percentile in the WACC applied to just aeronautical services seems excessively generous and may be redundant.

4.5.9 Whether investment incentives are needed depends also on the size of investments already made by the Airports. If they are stable businesses that have reached stable investment levels, the underinvestment risk is low and the Commission does not need to provide offsetting incentives to encourage investment.

4.5.10 Thus while the social cost of underinvestment may be significant, its probability is overestimated. So the case for additional investment incentives in the form of a higher percentile is not compelling.

4.5.11 It is not clear from the IM (Airports) Reasons Paper that the Commission has considered the above issues in sufficient detail.

4.6 Impact of high percentile WACC for Airports on airlines' costs and investment incentives

4.6.1 A high percentile, while encouraging investment by the Airports, may discourage airlines from making their investments such as in additional fleet, new green and environmentally friendly technology, new routes etc. The disincentive effects of a high percentile selection on airlines' investment is not considered explicitly by the Commission.

4.6.2 In its submission to the UK's CAA during the Q6 price control determination process, CEPA, on behalf of British Airways, showed that the cost to the airlines of each additional percentile by which the allowed WACC to the regulated airport, Heathrow, was raised was about £9m and the additional cost of the 80th percentile relative to the midpoint of the range is £58m at Heathrow and £8m at Gatwick each year. The cumulative cost would be £341m over the Q6 period[20].

4.6.3 A similar analysis of the cost impact of each additional percentile to WACC relative to the midpoint on airlines operating out of the Airports would be necessary to give a balanced perspective of the true costs and benefits of the incentives to Airports.

[20] These would be additional revenues to Heathrow and Gatwick, hence cost to the airlines.

4.6.4 If the cost imposed on the airlines is significant, it has to be explicitly balanced against any putative benefit of avoiding underinvestment by the Airports.

4.6.5 Since investments by airlines have social benefits, these have to be balanced against the social cost of underinvestment by the regulated airports.

4.6.6 Such an analysis is in the spirit of the Court's call for an inter-sectoral cost-benefit analysis[21].

4.6.7 As noted above, airports' investment incentives depend on the commercial revenues they are likely to earn when they make infrastructure investments e.g. addition or modernisation of terminals. Airlines play a critical role in delivering passengers whose spend will drive these revenues and the underlying investment to generate them. An exclusive focus on aeronautical revenues for the purpose of price –quality path development or price monitoring of the Airports is likely to ignore the investment incentives offered by the commercial services and overstate the need for investment incentives for aeronautical-service related investments.

4.6.8 Delivering increasing passenger volumes would require airlines to make investments as noted above. Taking account of the commercial revenues is likely to reduce the excessive incentives offered to the Airports and lead to lower airport charges thereby providing incentives to airlines to undertake their own investment programmes to the common benefit of both themselves and the airports they operate from.

4.6.9 In assessing whether the Airports require investment incentives, the Commission should therefore take into account the incentives that the opportunities for commercial revenue growth offer the Airports.

4.6.10 Airports can improve operational and investment efficiencies so that their bottom line and their investment programmes are protected. This should mitigate any potential underinvestment by them when the midpoint is selected.

4.7 Real options of airports and real options of airlines

4.7.1 Higher charges reduce the NPV of any investment that airlines make. This reduces the real option value of the airlines' investment opportunities. They may delay the timing of exercise of their options to a time when growth in air traffic reaches a level when exercising their options becomes more valuable. Thus a there is a tradeoff between the early exercise of their options by airports stimulated by high airport charges and the delay in the airlines' exercising their options.

4.7.2 On the other hand if high airport charges lead to early exercise of the airport's option to expand, airlines may also have to consider whether to exercise their option to expand say routes or fleet or invest in fleet upgrade. By exercising the option early the airlines lose timing flexibility and have to bear the cost of early exercise.

4.7.3 Thus while considering the real options available to the Airports, one needs to consider how their exercise is likely to impact adversely on the real options available to the

[21] The Court's call for analysis of the inter-sectoral impact of high versus low WACC goes beyond an analysis limited to just the airlines although they may be among the largest and most immediately affected stakeholders.

airlines. An exclusive focus on the former is unlikely to reveal the true value of the real options that Airports hold and the impact of their timing.

4.8 Loss function analysis

4.8.1 The Court in its judgment has called for a loss function analysis to inform the choice of a high percentile from the WACC range. Hausman (1997) examines how society can establish the value of new services and increased choices to the consumers offered by telecommunications and provides a cost-benefit analysis of such services. His approach is to estimate the cost of regulatory delays by valuing the economic gains that consumers would have had if the service had been available during the period of regulatory delay. Since choice of a low percentile WACC is said to discourage the Airports from making investments, there may be a similar delay in services being available to airport users. However, Hausman's analysis is not directly concerned with the loss or gain to consumers of an inappropriately high or low cost of capital or its impact on the investment incentives of a regulated business in the form of a higher than normal WACC.

Dobb's welfare loss analysis

4.8.2 Dobb (2011) is concerned with the welfare consequences of high or low cost of capital selected by the regulator. He develops a loss function that balances the gains and losses.

4.8.3 He carries out a Monte Carlo simulation and derives a number of results concerning the welfare-maximising level of allowed WACC relative to the mean of the calculated range. These differ according to three investment categories[22]:

1. Sunk costs i.e assets in place;
2. Deferrable investments; and
3. Non-deferrable investments

4.8.4 Dobbs shows that the allowed return should be at or just below the midpoint in respect of sunk investments but needs to be above the mid-point to encourage deferrable and non-deferrable investments. Between the last two types of investment, deferrable investments need a stronger incentive (a higher percentile) than in the case of non-deferrable investments. Further, where the price elasticity of demand for the relevant product/ service offered by the regulated entity is low, the allowed return and the price can be higher than if the elasticity were high.

4.8.5 However, Dobbs has only considered the loss function from the regulated supplier's perspective e.g. airports. Dobb's analysis does not deal with:

- overinvestment by the regulated entity;
- inter-sectoral welfare losses and gains;
- the impact of regulated charges on user investments and consequent welfare losses;
- any empirical analysis and relies on Monte Carlo simulation; he does not offer empirical evidence;

[22] In practice differentiating among the different categories of investments may be a complicated process. Moreover the concept of split cost of capital has not been favoured by many regulators.

- Airport services that may be more elastic than electricity. So Dobb's conclusions may overstate the percentile needed to minimise welfare losses relative to the regulated electricity supplier[23].

4.8.6 Any loss function analysis of high airport charges should also take account of the fact that both airports' and airlines investments serve consumer need and overall welfare losses and gains depend on both categories of investments. This means that investment incentives in the form of a higher WACC cannot be determined only on the basis of the investments that airports make. It is imperative that when the investments of airports and airlines are jointly considered, the percentile WACC must be chosen by the regulator to incentivise both categories of investments. It is probable that the optimal allowed WACC will be much lower than the level chosen to incentivise only the airports' investment.

4.9 The estimated range is actually already generous due to assumed low gearing level

4.9.1 The assumed gearing of just 17% may be quite conservative and in practice the Airports may raise it to a higher level and still maintain a high investment grade rating. This suggests that even if WACC is pitched at the mid-point, the Airports may have some head-room for meeting their investment commitments through borrowing. In this event, the case for a high percentile choice of WACC is much weaker.

4.9.2 This low gearing level, assumed by the Commission in estimating the WACC range for the Airports, seems to be the result of the need to avoid an anomaly in the SB-L model i.e. the WACC seems to increase, rather than decrease, with increasing gearing (Reasons Paper, 2010, Section E3).

4.9.3 Whatever the reason for the Commission's assumption of low gearing for the purpose of WACC estimation, in practice the Airports are likely to have a significant head room for gearing up to a much higher level and thereby benefit from the tax advantage of high gearing. In the UK, the actual gearing levels of the regulated airports like Heathrow during the Q5 price control period (2008-2013) were much higher than the level assumed by the regulator, Civil Aviation Authority of the UK (CAA) (as high as 82% compared to the assumed 60%)[24].

4.9.4 The ability of airports to gear up is not surprising given their attractiveness to debt investors based on their asset and earnings quality[25].

4.9.5 The Commission's assumption of low gearing may therefore represent a source of value to the Airports which negates the need for an additional incentive in the form of high percentile.

5 Conclusions

5.1.1 I have reviewed the basis of selection of the high percentile from the estimated WACC range for the regulated Airports and the arguments in favour of, and against, high

[23] Whether price elasticity of demand for airport services is high or low is a matter of empirical determination and requires a careful analysis.
[24] See CAA (2013), section 9.
[25] See Low (2013).

percentiles. One justification for a high percentile is that the traditional CAPM may neglect additional risk premium equity investors may expect as compensation for bearing asymmetric or skewness risk. I have examined this justification from both conceptual and empirical points of view. I do not believe either point of view supports the case for a high percentile.

5.1.2 I have also examined the investment incentives arguments for favouring a high percentile. In my evaluation the disincentive for investment stemming from the choice of the midpoint rather than a high percentile is very much overstated. I note that a high percentile is likely to have disincentive effects on the investment programmes of the airline users of the Airports. I consider that the choice of a high percentile to encourage investment by the Airports lacks a strong rationale when balanced against the disincentive for investment that a high percentile will impose on the airlines.

5.1.3 In its recent determination of the cost of capital for Heathrow and Gatwick, the CAA in its initial proposals chose a high percentile from its WACC range for price cap purposes (75th for Gatwick and 80th percentile for Heathrow)[26]. However, in its final determination, it did not explicitly show any preference for such a high percentile and the final WACC selected was considerably below the levels initially proposed e.g. only 61st percentile in the case of Heathrow and 59th percentile in the case of Gatwick[27]. This suggests that the case for a high percentile choice was not very persuasive to the UK regulator.

[26] CAA (2014).
[27] CAA (2014).

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Appendix 1

CURRICULUM VITAE OF

Professor Puliyur (Sudi) Sudarsanam

- Currently, Senior Consultant to Cambridge Economic Policy Associates, London
- Member of the Competition Commission, the UK's independent antitrust authority (April 2005 to March 2013)
- Member of the merger panel and utilities panel
- Member of the CC's Finance & Regulatory Group (FRG) an expert group advising on cost of capital and other financing issues and on regulated industries (2006-2013)
- See Appendix 1.1 for list of cases I was involved in

Academic positions

- Emeritus Professor of Finance & Corporate Control, Cranfield School of Management (2010)
- Professor of Finance & Corporate Control, Cranfield School of Management (2000-09)
- Director, Centre for Research in Economics & Finance (CENREF), Cranfield School of Management (2005-09)
- Professor of Finance & Accounting, Cass (previously, City University) Business School, London (1997-1999)
- Senior Lecturer in Financial Management and Accounting at Cass (1994-96)
- Lecturer in Financial Management and Accounting at Cass (1986-1994)
- Lecturer in Business Finance, University of Leeds (1980-1985)
- Officer, State Bank of India, India and London (1970-78)

Academic qualifications

- PhD (Accounting & Business Finance) (Cass Business School, City University, London) (1977-81)
- MSc (Finance) (Cass Business School, City University, London) (1976-77)
- MSc (Physics) (Madras, India) (1966-68)
- BSc (Physics) (Madras, India) (1963-66)

Professional qualifications

- Associate of the Chartered Institute of Bankers, London (ACIB) (since 1976)
- Graduate Member of the Institute of Export, London, 1976; winner of three prizes in the Final Part 1 and of Certificate of Exceptional Merit in Final Part 2 Examinations of the Institute

Visiting Academic positions

- Visiting Professor in Mergers & Acquisitions, Imperial College Business School, London (2010 -)
- Senior Visiting Fellow at Mergers & Acquisitions Research Centre, Cass Business School, London (2008-2015)
- Visiting professor in finance and in M & A, Santa Clara University, California, (January and March 2008 and 2009)
- Management Centre Institute, Innsbruck, Austria (2005-7)

- ALBA Graduate Business School, Athens, in M & A (2004-5, 2007-08)
- M & A the University of Szczecin, Poland (2004-5)
- Donau University at Krems, Austria, (2002, 2004)
- Athens University of Economics and Business (2000, 2001)
- University of Vienna (1999)
- Donau University at Krems, Austria (1998)
- Kenan-Flagler Business School, University of North Carolina, Chapel Hill (1998)
- Visiting Professor in International Finance: University of Notre Dame, Indiana, USA on their London MBA programme (1986-98)

Teaching experience

Taught the following courses on MSc, full-time MBA, Exec MBA, modular MBA programmes and undergraduate programmes:

- Management Accounting; Financial Accounting; Accounting & Financial Analysis; Corporate Valuation;
- Corporate Finance; International Corporate Finance;
- Mergers, Acquisitions and Divestments (MAD); Corporate Restructuring (CRS); and
- Private Equity, Corporate Governance, and Investment Banking.

Europe Journal-related positions

- Formerly Associate Editor, Journal of Business Finance & Accounting
- Associate Editor, Review of Behavioural Finance (John Wiley)
- Research Editor for the Special Interest Group of the British Accounting Association on Corporate Governance until 2004

Annexure 1: Professor Sudi Sudarsanam

My participation in Competition Commission inquiries since 2005

Year	**Regulatory case**	**My role as**
2012	Phoenix Natural Gas price determination	FRG member
2011	BT v Ofcom; EE v Ofcom; Hutchison 3G v Ofcom; Vodafone v Ofcom: wholesale mobile voice call Termination	FRG member
2010	Bristol Water plc: Price Determination	FRG member
2010	The Carphone Warehouse Group plc v Ofcom appeal: wholesale line rental price control	Inquiry group member
2009	Cable & Wireless UK v Ofcom appeal: leased lines price control	FRG member
2009	The Carphone Warehouse Group plc v Ofcom appeal: local loop unbundling price control	Inquiry group member
2008	Stansted Airport: A regulatory price control review (Q5)	Inquiry group member
2007	A report on the economic regulation of the London Airport Companies (Heathrow and Gatwick) (Q5)	Inquiry group member
Year	**Merger case**	**My role as**
2012	Epwin-Latium	Inquiry group member
2012	VPS-Sitex Orbis	Inquiry group member
2007	Kemira Growhow and Terra Industries	Inquiry group member
2005	Vue Cinema	Inquiry group member

Personal Research and Scholarship

1. *Publications*

1.1 *Refereed Journal Articles*

On corporate governance, finance and related topics:

"Determinants of earnout as acquisition payment currency and bidder's value gains" (with Leonidas Barbopoulos), *Journal of Banking & Finance,* 36, 678-694, 2012

"Corporate governance convergence in Germany through shareholder activism: Impact of the Deutsche Boerse bid for London Stock Exchange" (with Tim Broadhurst), *Journal of Management and Governance*, 16, 235-268, 2012

"Target bankruptcy risk and its impact of going-private buyout performance and exit", *Corporate Governance: International Review*, 19 (3), 240-258, 2011

"Determinants of takeover premium in cash offers: An option pricing approach, *Journal of Business Finance & Accounting*, 37 (5) and ((6), 687-714, 2010

"Management's going concern disclosures: Impact of corporate governance and auditor reputation", *European Financial Management* Special Issue on Corporate Governance (with J-Y Uang, R Taffler and D Citron) (2006)

"Are friendly acquisitions too bad for shareholders and managers? Long term value creation and top management turnover in hostile and friendly acquirers", *British Journal of Management*, 17, S7-S30, 2006 (with A Mahate) (2006)

Ranked among top twenty papers from *BJM* in the previous three years on the basis of frequency of citations and 9th in the previous year in terms of download

"The role of internal auditors in mergers, acquisitions and divestitures: An international study", *International Journal of Auditing*, 7, 3, November 2003

"Corporate Governance: Overview and Research Agenda", *British Accounting Review*, 32, 341-354, December 2000 (with Mike Wright and Istemi Demirag)

"Corporate restructuring in response to performance decline: impact of ownership, governance and lenders" (with J Lai), *European Finance Review*, 1, 2, 1997

"Financial Distress, Asset Sales and Lender Monitoring", *Financial Management*, Vol 25, No 3, 68-85, Autumn 1996 (with M A Lasfer and R J Taffler)

"Shareholder Wealth Gains in Mergers: Effect of Synergy and Ownership Structure", *Journal of Business Finance and Accounting*, July 1996 (with Holl and Salami)

"Large Shareholders, Takeovers and Target Valuation", *Journal of Business Finance and Accounting*, March 1996

"The Role of Defensive Strategies and Ownership Structure of Target Firms: Evidence from UK Hostile Takeover Bids", *European Financial Management*, Vol. 1, No. 3, November 1995

On other finance topics

"Determinants of financial ratio covenants and pricing of debt in private debt contracts: The UK evidence", *Accounting & Business Research* (with Lance Moir) 37, 2, 2007

"Real Options and the Impact of Intellectual Capital on Corporate Value", *Journal of Intellectual Capital*, 7, 3, 291-308 (with B Marr and Ghulam Sorwar) (2006)

"Discussion of 'Increasing market share as rationale for corporate acquisitions' " in *Journal of Business Finance & Accounting*, 31, 1&2, Jan/March 2004

"Glamour acquirers, method of payment and post-acquisition performance: The UK evidence" (with Ash Mahate), *Journal of Business Finance & Accounting*, 30 (1) & (2), Jan/March 2003

"Rational expectations, analysts' forecasts of earnings and sources of value gains for takeover targets" (with A Salami and G Alexandrou), *Journal of Banking and Finance*, 26, 2002, 153-177

"Corporate financial distress and turnaround strategies: An empirical analysis", *British Journal of Management*, 12,183-199, 2001 (with J Lai)

"Mergers, acquisitions and joint ventures" in *International Encyclopaedia of Business and Management*, Thomson International, 2 edition, 2001

"Shareholder wealth effects of corporate sell-offs: Impact of growth opportunities, economic cycle and bargaining power", *European Financial Management*, 7, 2, June 2001 (with G Alexandrou)

"Mergers, Acquisitions and Joint Ventures" in The *Concise International Encyclopaedia of Business and Management* (ed) M Warner, Thomson Publishing (1997)

"Effectiveness of corporate turnaround strategies: An empirical analysis", *Proceedings of the Annual Conference of British Academy of Management*, 1997

"Mergers, acquisitions and joint ventures" in *International Encyclopaedia of Business and Management*, Thomson International, 1st edition, 1996

"Financial Ratio Proportionality and Inter-temporal Stability: An Empirical Test", *Journal of Banking and Finance*, 1995 (with R J Taffler)

"The Effect of Corporate Divestments on Shareholder Wealth: The UK Experience", *Journal of Banking and Finance*, 1992 (with Afshar and Taffler)

"Market and Industry Structure and Corporate Cost of Capital", *Journal of Industrial Economics*, June 1992

"Defensive Strategies of Target Companies in UK Contested Takeovers", *Managerial Finance*, vol 17, no 6, 1991

"Industry Classification in UK Capital Markets: A Test of Economic Homogeneity", *Applied Economics*, April, 1985 (with R J Taffler)

"Auditing the Board: A New Approach to Measuring Company Performance, *Managerial Finance*, 1980 (with R J Taffler)

1.2 *Books and research reports*

Cost of Equity for Regulated Companies: An international Comparison of Regulatory Practices, Competition Commission UK, Discussion paper, November 2011

Creating value from mergers & acquisitions: The challenges, Integrated and International Perspective, 2nd edition (FT Prentice Hall, 2010)

Corporate Governance and Corporate Finance: A European Perspective (Editors: Ruud van Frederikslust , University of Amsterdam; James Ang, Florida State University, and Sudi Sudarsanam) (Routledge, London, 2007)

Financial Reputation Drivers and their Impact on Shareholder Value, research report prepared for Ernst & Young, London, 2007

Creating value from mergers & acquisitions: The challenges, Integrated and International Perspective, October 2003 (FT Prentice Hall) (see Annexure 2 for a selection of post- and pre-

publication reviews from journals and academics) (Chinese edition published in 2007) (among the best-selling MBA books on Amazon.co.uk) (See Annexure 3 for reviews of this edition)

Mergers, Acquisitions and Divestitures: Control and Audit Best Practices, The Institute of Internal Auditors Research Foundation, Florida, USA, 2002. (Based on field interviews of 22 of the largest US and European corporations)

The Essence of Mergers and Acquisitions, 1995, published by Prentice Hall International (translated into Spanish, Polish, Chinese, Indonesian and Thai) (on the best-seller list of *Financial World*, magazine of the Institute of Financial Services, UK and a main text book on M & A in many leading universities. Polish edition a leading textbook on M & A at many leading Polish universities)

1.3 *Professional Journals, Articles, Contributions to Book etc.*

"Value creation and value appropriation in M & A deals" in R Joseph, D. Faulkner and S. Teerikangas,(eds) *The Handbook of Mergers & Acquisitions* (Oxford University Press, 2012)

"Executive Compensation and Managerial Overconfidence: Impact on Risk Taking and Shareholder Value", in Greg N. Gregoriou and Luc Renneboog (eds): *International Mergers and Acquisitions Activity Since 1990: Quantitative Analysis of Recent Research*, a volume in the QUANTITATIVE FINANCE series (Elsevier Inc., 2007)

"Hostile or friendly takeover: Does it matter?" in Handbuch Integriertes Mergers & Acquisitions Management, (2006), (Ed: Prof. Bernd Wirtz, University of Witten, Germany) (publisher: Gabler Company, Germany's best known publisher of business titles)

"Valuation of intellectual capital and real option models" (with G Sorwar and B Marr) in "Perspectives on Intellectual Capital: Multidisciplinary Insights Into Management, Measurement, and Reporting (ed: B Marr), El Sevier (2005)

"Creating value through demergers" in Managing Mergers and Acquisitions, *CBI Business Guide*, May, 2000

"Corporate Governance, Corporate Control and Takeovers", in *Advances in Mergers and Acquisitions* (eds: Alan Gregory and Cary Cooper), JAI Press, 2000

"Mergers, Size and Value", *Oxford Energy Forum*, contribution to forum on mergers in the oil & gas industry, May 2000

"Short termism: myth or reality?" *INFORMED*, Journal of the Investor Relations Society, July 1997

"The importance of bid dynamics", *Acquisitions Monthly*, June 1997

"Less than lethal: Defensive Strategies in UK Contested Takeovers", *Acquisitions Monthly*, January 1994

"How Homogeneous are London Stock Exchange Industry Groupings?", *Investment Analyst*, April 1984

2. *Conference papers*

I have presented numerous papers at refereed conferences in Europe and the US over the last thirty years