EVIDENCE RELATING TO THE ASSESSMENT OF THE WACC PERCENTILE FOR AIRPORTS

Prepared for the New Zealand Airports Association

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INTRODUCTION

Approach and key findings

This paper, commissioned by New Zealand Airports, is intended to be a contribution to the Commerce Commission's upcoming review of its Input Methodologies for Auckland, Christchurch and Wellington airports. It focuses primarily on the Commission's proposals as regards the key percentile(s) within its estimated WACC range.

The paper seeks first and foremost to bring to bear a number of perspectives relevant to the issue that are informed by the experience of the authors.

Dr Harry Bush CB was for eight years to 2011 the UK Civil Aviation Authority (CAA) Board member responsible for setting price caps for the UK's designated airports (then Heathrow, Gatwick and Stansted) and for NERL, the UK's privately operated air traffic service provider.[1] He lived through the results of under-investment in the London airports and some of the strains that imposed on both the aviation sector and the regulatory system. He was also responsible for initiating in regulation of London airports (and NERL) the process of 'Constructive Engagement', which sought to attach greater regulatory weight to airport-airline engagement in regulatory decision-making.

John Earwaker, Director First Economics, has been an advisor on regulation for some twenty years both within aviation in the UK and overseas, and more widely.

Our approach in this report has been, so far as possible, to avoid going over established ground. We recognise that the Commission has recently given the issue of WACC determination a great deal of thought in the context of electricity and gas network regulation. It concluded that there are good reasons to select a point estimate substantially above the mid-point of a calculated WACC range. These reasons related first and foremost to the costs that consumers can suffer:

- if a regulator inadvertently under-estimates the 'true' WACC;
- if this under-estimation causes a price-regulated firm to slow down or withdraw investment; and
- if this under-investment results in asset failures and other service quality failures.

In light of these potentially detrimental consequences, the Commission judged that customers are better off paying a little more for electricity and gas so as to reduce the risk that returns will come out below the WACC, thus reducing the likelihood that adverse outcomes of this type will materialise.

These are arguments which we recognise from regulatory decisions that we have participated in and our work in the UK and elsewhere. The Commission, however, has questioned whether and to what extent the concerns about possible under-investment and its effects that were identified for electricity and gas businesses also apply to airports. In particular, the Commission has raised questions about the nature of the service impacts that might arise at airports relative to the 'major

[1] NERL is the price regulated entity which provides en route air traffic control services within a wider air traffic business known as NATS.

supply outage' that it was concerned about in gas and electricity. The Commission has also questioned whether, even if there are likely to be asymmetric impacts from over- or under-investment, there is a justification for departure from the mid-point estimate of the WACC. It has identified a number of possible reasons why the WACC estimate might have a more limited impact on airport investment decisions than it would for gas and electricity businesses:

- airports are not subject to price-quality regulation but to information disclosure regulation and can therefore set their own prices;
- consultation with a small number of engaged customers is likely to help ensure that appropriate levels of investment are taking place; and
- the existence of unregulated revenues from complementary activities should reduce the risk of under-investment in the regulated business.

The material in this report does not seek to address all of the Commission's questions but in particular focuses on:

- the nature and extent of the costs that could arise from under-investment at airports, drawing on current and recent examples in the London airport system and seeking to infer from them general lessons;
- the degree of reliance that might be placed on airport-airline consultation to ensure that appropriate levels of investment take place even where WACC underestimation means that the airport is itself insufficiently incentivised to undertake such investment; and
- whether the existence of the dual till reduces the risk of under-investment.

It also examines the likely greater uncertainty surrounding asset beta estimation for airports relative to gas and electricity businesses, as it applies to derivation of both a service-wide asset beta and the application of such a beta to individual airports

The report finds that:

- while the costs of under-investment at airports will take a different form than the major outage events examined for gas and electricity businesses, they are potentially very significant, in particular for passengers, and have significant and wider economic ramifications;

- accurate estimation of an airport WACC is subject to greater uncertainty than estimation of utility WACCs. The Commission's samples contain airports with a more diverse range of risks than in the case of utilities. This means that there is greater likelihood of mis-estimating an airport WACC range and the percentiles within it, which argues for a greater degree of caution when considering appropriate WACC percentiles;

- placing reliance on airport-airline consultation to counter the adverse effects of WACC mis-estimation is unlikely to work, given that airport operators (not airlines) are the experts in airport operations, that consultation therefore traditionally involves airline reaction to airport proposals, and that airlines will be guided by their own commercial interests, which may vary as between different airlines and over time, and may not in all respects embrace the interests of passengers. In particular, passengers are likely to benefit from the development of facilities

that enable greater competition between airlines which may be at odds with the commercial interests of resident airlines. Moreover, there must be question marks over how investments which airlines might want, but for which airports are under-rewarded by the WACC, can be delivered in practice. To the extent that the Commission might be relying upon airports setting prices above those implied by its WACC range, that would entail the Commission proceeding on the basis that its WACC judgement would not impact investment. A safer regulatory assumption might be that it would; and

- the incentive effects of dual till are more complex than identified so far by the Commission, and commercial revenues may not in any case be relevant to many of the varied investments that airports undertake.

Our report therefore considers that the asymmetric effects of WACC mis-estimation on investment, which the Commission identified for gas and electricity businesses, will also be present for airports. Airport-airline consultation and the existence of the dual till cannot be relied upon to counter any tendency to under-investment from mis-estimation.

We confirm that this report contains our objective, unbiased assessment of the matters set out above. We also confirm that we have been referred to the Code of Conduct for Expert Witnesses (Code), as contained in the High Court Rules for New Zealand, and that this report has been prepared in accordance with that Code.

Building on the Commission's work

The Commission's recent determination of the appropriate WACC percentile for electricity and gas networks was not anchored to any specific model or calculation. However, the Commission did rely significantly on a framework of analysis provided to it by the consultancy firm Oxera.

The Oxera framework sought to link:

1. a threshold at which under-estimation of the true WACC will cause a regulated firm to under-invest (assumed by Oxera to be 50 to 100 basis points)

2. the probability at any given WACC percentile that an under-estimation of this scale will have occurred, calculated using the Commission's estimate of the standard error in its WACC estimate and the properties of the normal distribution;

3. an assessment of the likely nature and scale of the under-investment that could be expected to emerge;

4. the expected economic and social costs of this under-investment; and

5. the amount that customers should be prepared to pay in advance to avoid these costs, in particular, by selecting a point estimate from above the mid-point of the WACC range.

This framework provides a useful guide for the material in this report; albeit that does not prejudge whether it should be translated wholesale to the airport sector.

The material in the first section of this paper is relevant primarily to the third and fourth of the links in Oxera's chain of an argument in an airport context (i.e. the possible nature of under-investment at airports and its economic and social costs). It does not seek to quantify these issues in relation to New Zealand airports but, rather, through case studies drawn from London to indicate:

(i) the nature and potential scale of the costs involved in under-investment;

(ii) the general lessons to be drawn, including about the impact on passengers; and

(iii) the way therefore they might be considered by the Commission.

The second section is relevant to the first and the second elements of the Oxera framework (i.e. the threshold beyond which under-estimation of the WACC will likely lead to under-investment at airports and the probability of making a large enough error in the WACC). It seeks to identify:

(i) differences between the energy network and airport industries;

(ii) how these might affect the uncertainty involved in estimating airport WACCs (both service-wide and for individual airports); and

(iii) the consequences for the judgement that the Commission will need to make in relation to the likelihood of underestimation arising.

Section 3 considers whether, in the event of mis-estimation of the WACC, reliance can be placed on consultation with airlines to help ensure that appropriate investment is undertaken.

Finally, section 4 considers whether the existence of the dual till might also mitigate against underestimation of the WACC for aeronautical investments.

In considering application of the Oxera framework to the issues currently before the Commission we have been mindful of the question the Commission has raised, as to how far the focus for electricity and gas businesses on service quality generally, and on major supply outages in particular, applies to airports. Service failures do occur at airports, for instance due to poor weather or floods, and the UK CAA has recently put more emphasis on the need for resilience in face of such events. However, while specific forms of under-investment – for instance on flood defences or bad weather equipment – might contribute towards such service failures, the more likely results of under-investment relate, as the Commission's summary of submissions suggests, to factors other than service reliability alone.

Service reliability is likely to be one aspect of a more general service shortfall across a range of dimensions, including delay, reduced choice of destinations, reduced frequency of service, higher airfares and poorer airport ambience and service quality. The manifestation of such shortcomings will be less in particular events (though they may occur) than in incremental degradation as capacity development fails to keep up with demand. While these shortcomings may be less apparently catastrophic than a major outage, their impacts are likely to be more pervasive and longer lasting. They will also have knock on effects to the wider regional or national economy, which will find itself both less well connected and at higher cost. These costs will be related to both the degree of under-investment and its strategic importance to the interconnected logistics of an airports operation. However, as the London examples show, there is the possibility for under-investment to have very

significant costs, for passengers in particular. That these are less obviously demonstrable than a major outage in other sectors should not detract from their potential importance.

1. COSTS OF DELAYED INVESTMENT: CASE STUDIES FROM LONDON

1.1 Introduction

The Commission has identified the potential usefulness of international experience in understanding the issues raised by consideration of the WACC percentile for airports. It identifies a number of studies directly relevant to regulation and setting of the WACC in other jurisdictions. However, international experience may also have something to offer in terms of identifying the risks and costs involved in under-investment. This section sets out evidence from the London airport system, in particular from Heathrow, about the significant effects that are likely to flow from under-investment at airports.

The under-investment examined here, in terms of delay to runway and terminal investment, has actually occurred and its past, present and future costs can be observed or estimated. The reasons for under-investment lay not in a shortfall in the returns allowed to the airports but in shortcomings in planning and policy processes and from environmental and other constraints. However, what is important for the purposes of assessing the impacts of under-investment is not its cause but its effects, and therefore the potential lessons for assessment of risks around the setting of a WACC which insufficiently incentivises investment.

Airports tend to be heterogeneous (a point also relevant to determination of the asset beta, as explained in section 2). The position at one airport cannot be read across unthinkingly to another. The London airports are different in scale, function and geographic positioning to those in New Zealand. This means, on the one hand, that the scale and nature of the impacts will be different from those that would arise in New Zealand. On the other hand, the multiplicity of airports in the London system and the UK's connections to alternative hubs has meant that the effects of under-investment have been mitigated as passengers have found other ways of getting to their destinations. Nevertheless, there are some general lessons about the effects of under-investment, which relate in particular to:

- the nature of the impacts of airport under-investment. Service reliability takes a different form than in other utilities, with a greater likelihood of cumulative, incremental degradation, particularly congestion, delays and poor service. Resulting costs arise in terms of length and unpredictability of passenger journey times, and in passenger dissatisfaction with airport facilities;

- the potential for significant costs to arise which are both multi-dimensional and additive. Under-invested airports will tend to give rise to combinations of high fares, delays, poor service and poor ambience – often the result of capacity failing to keep up with demand. While in London these impacts have arisen where infrastructure has been pretty fully utilised, in principle they could arise at lower levels of capacity utilisation where shortfalls in investment create pinch-points or bottlenecks that effectively prevent full utilisation of capacity;

- the interrelatedness of airport investments. Airports are complex systems for moving planes and people, which require all parts to be working together at a similar tempo to deliver the required service. Under-investment in specific areas can therefore lead to more general service shortfalls as bottlenecks in particular areas prevent other areas working to their maximum or, as in the London case, more general modernisation of the airport, as congestion prevents the necessary decanting of passengers and planes around the airport;

- the costs of under-investment tend to fall disproportionately on passengers. Indeed, airlines can benefit from scarcity rents created by capacity shortfalls where airport charges are held at or close to cost. However, all parties involved - airport, airlines and regulator - are likely to be damaged economically or reputationally by service failings; and

- airport under-investment has potential knock-ons to the wider economy. These can be long lasting and pervasive given that service failings are ongoing rather than one-off interruptions. The UK evidence suggests they can also be sizeable.

1.2 The evidence base

The two case studies examined below relate to delays in investment in runway and terminal capacity in London over the last 20 years. They draw on evidence available from airports, regulatory processes and, in particular, the current process for determining where an additional London runway should be built. This has generated a good deal of evidence from the Airports Commission charged with making a recommendation to Government and from the three shortlisted commercial parties. Given the nature of the exercise - a competition for the right to build the first major runway in London since the Second World War - there are differences of view as to the precise magnitudes of the costs of shortage of capacity and the benefits that will arise from new capacity. But these are differences of degree which are most relevant to the choice of a particular proposal. There is a significant degree of agreement about the substantial costs that lack of investment creates and the very large benefits that will attend the lifting of capacity constraints. As the CAA has put it, '…the differences in estimated consumer benefit between the three schemes are of much lesser scale than the costs of doing nothing.'[2]

The story around terminal under-investment is even clearer, with the delayed Terminal 5 ('T5') at Heathrow having been opened in 2008 and the benefits of that, and the other investment and operational improvements it enabled, demonstrable from subsequent airport performance.

For clarity the two stories about T5 and runways are told separately. However, there are some common threads to the history of terminal and runway investment in London. Enhancement of airport facilities in a very crowded corner of England has tended to be subject (as in some other European countries) to political, planning and environmental constraints. Under-investment in terminals and runways have also both contributed to the costs arising from service shortcomings.

[2] CAA response to the Airports Commission consultation: Increasing the UK's long-term capacity (CAP 1263), p.4

1.3 Shortage of runway capacity

1.3.1 The history

The history of T5 told later in this section illustrates the impact of delayed terminal investment. Yet, in general, construction of terminals and other investments in the London area have been easier to achieve than increases in runway capacity. This is because increasing the number of runways more fundamentally alters the footprint of aviation, particularly in terms of noise and other environmental costs. In the words of Sir Howard Davies, Chair of the UK's Airports Commission, 'airports are noisy neighbours and greedy for space'.[3]

In a crowded part of the UK, this perception has dogged the debate around runway capacity. With the exception of the niche development at London City which, even after more than 25 years' operation, caters for less than 3 per cent of London's 140m passengers, London's airports are, in the Airports Commission's succinct summary, 'still reliant on runway capacity which was built in the middle of the twentieth century'.[4] The Airports Commission recognised that while other countries had faced similar issues to London they had 'been better able to provide infrastructure to keep pace with the growing demands of an expanding aviation market'.[5]

London's airports have responded to runway capacity constraints in a number of ways. First, airports have increasingly competed with one another to attract airlines in a way that has enabled the speedy development in the UK of different airline business models requiring different types of infrastructure and airport location. The result has been to increase usage of more 'marginal' London airports, providing alternatives to Heathrow and Gatwick and competition with them. Second, Heathrow and Gatwick have fulfilled commercial demands from airlines and filled up the available capacity, in the process sacrificing (particularly at Heathrow) both journey times (which are lengthened by the stacking required to manage throughput onto overly busy runways) and resilience, as the impact of disruption is increased the tighter the baseline capacity constraint. Third, London's airports have operated scarce runway capacity as efficiently as possible through collaboration with airlines and air traffic control. Technical innovation continues with the introduction this year of Time Based Separation of aircraft (developed by NATS, the UK's air traffic control organisation) which will reduce delays caused by the frequent strong head winds at Heathrow. In the assessment of the Airports Commission, 'The largest UK airports operate their runway infrastructure more efficiently than any others in the world'.[6] However, with Heathrow 'effectively full' and Gatwick operating at more than 85 per cent of its capacity and completely full at peak times there is a limit to what efficient operation can achieve.

The developing problem of scarce airport capacity has been apparent for some time. Government initiated work in the mid-90s to examine the case, and options for, additional runway capacity in the South East of England. This eventually culminated in the 2003 White Paper, 'The Future of Air Transport',[7] which proposed a new runway at Heathrow subject to the fulfilment of environmental

[3] Airports Commission: Final Report, July 2015, p.3
[4] Airports Commission: Interim Report, December 2013, p.54
[5] Airports Commission: Final Report, July 2015, p.3
[6] Airports Commission: Interim Report, December 2013, p.54
[7] Department for Transport: The Future of Air Transport, December 2003

conditions and a new runway at Stansted as soon as possible. (Development at Gatwick was at this stage precluded by an agreement that its then owners, BAA, had concluded with local authorities.)

Despite design and preparatory work at both airports, more advanced at Stansted, little had been achieved before the new Coalition Government withdrew its support for both developments, in fulfilment of election promises, in 2010. The economic recession that began around 2008 also provided breathing space as London traffic declined. It took six years for traffic to approach its previous peak. However, performance at Heathrow (especially) and Gatwick was stronger. Their share of total traffic increased, thereby underlining the fundamental problem of capacity shortage and causing concern to aviation and wider business interests. In particular, questions were raised about the connectivity of London to emerging markets compared to continental European cities. As a result, and in order to delay resolution of the issue until after the 2015 election, the Government set up an independent Airports Commission in September 2012 to consider how the UK could maintain its status as an international hub for aviation.

1.3.2 Costs of runway constraint

Over the last three years the Airports Commission has analysed the UK aviation market and whittled down the options for a new runway in the South East to three – two at Heathrow and one at Gatwick, where the agreement not to develop a new runway runs out in 2019. The Commission has now recommended one of the Heathrow options to the Government, which has promised a decision by the end of this year. Depending on the speed of the resulting decision making, the earliest a new runway will come on stream is around 2025.

The Airports Commission's process has generated a wealth of analysis, in part as a result of its own work but also from the competing propositions. Much of this is intended to enable a comparison of the various options, with relatively fine differences in costs and benefits informing broader judgements between the schemes. However, standing back from these differences, the information at the Commission's disposal illustrated very clearly the benefits of runway expansion and thereby the costs of constrained runway capacity - with the magnitude of these benefits/costs determined by the extent to which runway expansion has been, and will continue to be, delayed.

The most direct beneficiaries of runway expansion in a constrained system are airport users: airlines, but most particularly passengers who bear the brunt of the costs of constraint. These costs take a number of forms.

1.3.3 Costs of delay

First, as identified above, over-scheduled runways lead to delay. Journey times are lengthened in order to ensure that there is always a queue of aircraft ready to use the runway, a process complicated by the mix of aircraft size and the implications of this for the order in which they can be handled. The introduction of the A380 has added a new dimension to this issue. The resulting 'planned' delay is usually accounted for in advance and embedded in airline flight schedules and represents a direct cost to passengers. Additional fuel burn (through 'stacking' outside the airport) also increases airline costs and has environmental implications. In addition, however, the reduced operational resilience involved in such tight scheduling means that there are frequent, unplanned (so called ‘tactical’) delays due mainly to adverse weather conditions.

In 2007/8, according to a CAA report quoted by the Airports Commission, at Heathrow there were 13 'disastrously disrupted' days when arrivals were restricted to less than 90 per cent of the norm and 47 further days of 'severe restriction'.[8] Eurocontrol's 2013 publication on standard inputs for cost benefit analyses suggests values for flight cancellations of between €17,300 and €81,000 per flight, depending on plane size, and for costs of delay of between some €50 and €100 per minute for delays of over 15 minutes.[9] Technical innovation, for instance in improved air traffic management, can mitigate such delays and their costs to some extent, but not entirely. Further mitigation could come from leaving landing slots free as an operational contingency. However, as the Eurocontrol report on 'Challenges of Growth 2013' said in relation to European airport capacity generally, that would leave further demand unaccommodated in a system already struggling to fulfil demand. [10] In practice, commercial pressures always push the number of contingency slots to near zero. As if proof of this were needed, Heathrow in 2015 identified a further slot for use on a runway already 99 per cent full. [11] This is despite the likelihood, as demonstrated by a 2008 SH&E/Helios report for the CAA, that such additional slots destroy value as the greater delay costs imposed on passengers overall at the airport outweigh the benefits to the users of the individual slot.[12] This is because of the exponential increase in holding times and air traffic delays from adding slots at an overscheduled Heathrow.[13]

The Airports Commission has suggested that the economic costs of delay due to capacity constraints over the period to 2080 would amount to £5.1bn in PV terms.[14] It has also calculated PV benefits up to 2050 from a new runway of between £0.1bn and £2.3bn, depending on traffic assumptions, how quickly the new runway fills up and the scheme chosen. A technical annex to the Airports Commission Final Report suggests that the Commission's assumed delay benefits are likely to be at the lower bounds of what is likely, given that data limitations mean that they do not include benefits from 'tactical' delays and the saving of airport costs from reduced terminal requirements entailed by fewer waiting passengers and planes.[15] Frankfurt's experience suggests that capacity expansion can have a significant impact on delays. After Frankfurt's fourth runway opened in 2011 the airport's on time arrival performance increased by 14 per cent and in 2012 on time performance exceeded 80 per cent for the first time since before 1997.[16]

1.3.4 Higher fares for passengers

A second and more substantial cost to passengers in London arises from the higher fares that are necessary to reconcile increasing passenger demand for flights with the constrained supply caused by lack of runway capacity. Where airport charges are broadly limited to cost, whether through formal price control, a more flexible arrangement as currently applies at Gatwick or monitoring arrangements (such as pertain in New Zealand), the scarcity rents that arise from such lack of supply

[8] Airports Commission: Interim Report, December 2013, p.80. Disastrous disruption involved the cancellation of 2000 flights whereas severe disruption involved 'significant but recoverable disruption', that is delays.
[9] Eurocontrol, Standard Inputs for EUROCONTROL Cost Benefit Analyses, September 2013, pp.9, 11. Values will vary over time depending, for example, on fuel prices.
[10] Eurocontrol, Challenges of Growth 2013: Summary report, p.22
[11] NATS blog, Big Data and managing airport capacity, 26 January 2015
[12] SHE/Helios, UK CAA Runway resilience Study – Final Report, December 2008, paras 1.65, 1.80
[13] Ibid. para 1.45
[14] Airports Commission: Final Report, July 2013, p.76
[15] Airports Commission, Economy: Final Delay Impacts Assessment, p.43
[16] Airports Commission: Final Report, July 2013, p.75

will accrue to airlines because of the role they play, in the words of Frontier Economics, 'in adjusting prices so that demand equals supply'.[17] Importantly, such rents arise not merely at capacity constrained airports but also at other airports which may be available to the passengers affected. Runway expansion reduces those rents and with them the ticket prices that passengers pay.

There are differences as between scheme promoters on the magnitude of these impacts but they are all agreed that they are substantial. For example, Frontier Economics in a report for Heathrow Airport suggests that the decline in average ticket prices 'today' at Heathrow that would result from expansion there would be 15 per cent. The comparable figure for expansion at Gatwick is 7 per cent. The Heathrow figure has been corroborated by separate analysis of slot values which represent what airlines are prepared to pay for the fare premia they embody. This analysis suggests, in Frontier's words, that the runway constraint 'already has a significant impact on passengers today'. The longer the delay in releasing the runway constraint, the greater the impact will be. So, Frontier estimates a 38 per cent reduction in average fares at Heathrow in 2030 compared with those that would prevail in the absence of runway development there.[18]

This impact on ticket prices has a number of causes. There is, first, the simple operation of supply and demand as carriers are able to expand services. But layered onto this is the greater competition that additional runway capacity enables. This arises in the first place from the potential for increased airline competition created by additional slots at the airport where expansion takes place. However, this is likely also to impact on airlines at other airports. One of the issues of contention in the London debate is how far expansion at the currently one runway Gatwick would increase competitive pressure within the system, over and above that created by additional capacity *per se,* by providing both a more credible alternative to Heathrow for airlines and passengers and enabling greater diversity of business models and operations than a hub traditionally encompasses. Oxera, in a report for the Airports Commission submitted by Gatwick, has estimated these competition benefits as at least in the range £10-14bn NPV. [19]

1.3.5 Choice of routings

A third related area of advantage for passengers lies in the greater choice that additional capacity and associated airline service expansion and competition enable. The most obvious sources of such benefit lies in both the additional and more direct routings made possible by additional runway capacity. But there should also be benefits in greater frequency to established destinations. The Airports Commission's view is that, outside of North America and Europe, capacity constraints are preventing London achieving the connectivity that the strength of its Origin and Destination market would suggest. The Commission suggests that the London system outperforms its peers in the short haul market but that its long haul network is 'less extensive than might be expected given the scale of the London aviation market'.[20]

Beyond numbers and frequency of routes, additional capacity can enable greater innovation in business models. The classic example of this was the availability of substantial spare capacity at

[17]Frontier Economics, Impact of airport expansion options on competition and choice: A Report prepared for Heathrow Airport, April 2014, p. 11
[18]Ibid., pp. 2, 14-15, 68
[19]Oxera/PA, Economic Impact Assessment, May 2014, p.98
[20] Airports Commission: Final Report, July 2013, p.65

Stansted in the 1990s which enabled the fast growth of low cost airlines and the competitive impact they had on established airlines at other airports. Gatwick Airport argues that, given the greater flexibility of its infrastructure compared with the hub at Heathrow, a second runway there will more readily enable such innovation to the advantage of customers.

1.3.6 Quantifying the costs and benefits

Both commercial parties and the Airports Commission itself have sought to quantify the impacts on passengers and airlines. Some of the gains to passengers come at the expense of airlines as the scarcity rents they earn from constrained capacity are reduced through declining fares. On the other hand, airlines are themselves able to increase their throughput and efficiency in a less constrained environment from which they, and their passengers, benefit. There are inevitably, in a competitive evaluation process, differences in the various parties' assessment of benefits. However, there is no doubt that they are sizeable. The Airports Commission's July 2015 Final Report suggests that its recommended Heathrow option will, through increases in capacity, connectivity and competition, deliver benefits to passengers of £55 billion over 60 years (compared in its assessment with £47billion from another Gatwick runway).[21]

The Airports Commission's methodology is forward looking. Its calculation of benefits relates to periods significantly in the future and therefore to the costs that would arise, particularly for passengers in terms of reduced choice and higher fares, over such periods from the absence of additional capacity. However, it is reasonably clear that costs are already being incurred in a system which (particularly at the two major airports of Heathrow and Gatwick) is already constrained. This is evident in the secondary slot values at Heathrow which the Commission quoted to be £25-30m for a slot pair[22] and also from corporate transactions. A 2013 study by York Aviation/CTAIRA opined that 'The attraction and value in Lufthansa's sale of BMI to British Airways, in what was a significantly loss making business, was the Heathrow slot portfolio of 56 pairs of slots'.[23]

These slot values essentially reflect the future value of the fare premia that can be gained from operation at Heathrow. While the network characteristics of the airport may make some contribution, it is highly likely that for an airport that is 99 per cent full scarcity plays a considerable part. More direct observations of fares appear to bear this out.

Frontier Economics has estimated that in 2012 ticket prices at Heathrow were on average 18 per cent higher than at other London airports and 23.8 per cent higher than at other European hub airports (even when controlling for other factors that might affect fare differentials).[24] Such figures will vary across the cycle (with recession diminishing excess demand) and with changing route patterns, but they are strongly indicative of passengers already bearing the costs of runway constraint. They are also of a piece with the work undertaken by York Aviation/CTAIRA, which showed the premium attaching to fares at Heathrow, and with CAA analysis as far back as 2001 which also identified the fares premium at Heathrow and the resulting positive values attaching to

[21] Ibid., p.24
[22] Airports Commission: Interim Report, December 2013, p.62
[23] York aviation/CTAIRA, The Strategic Importance of London to Airlines: Final Report, October 2013, p.54
[24] Frontier Economics, Impact of airport expansion options on competition and choice: A Report prepared for Heathrow Airport, April 2014, p.41

Heathrow slots.[25] Research on behalf of the Airports Commission has also identified that across Europe higher fares were associated with more capacity constrained airports.[26] This evidence is consistent with the CAA's current view is that 'Consumers are already suffering from increased prices, poor punctuality and weak resilience…'.[27]

1.3.7 Wider economic impacts

The above analysis has focussed on the impact of runway constraint on the aviation sector. But aviation connectivity is a key element of modern economies, enabling the transfer of goods, and of services and ideas through the movement of people. For emerging economies the development of aviation may be a key stimulant of trade and growth. For more mature economies the relationship is likely to be less transformative; more of a two way relationship whereby aviation stimulates trade and patterns of trade help determine connectivity. Even so, aviation connectivity can be an important contributor to economic growth through enabling continuous development of trading and investment relationships and the productivity and agglomeration benefits they bring. Such 'spillovers' are, in general, additional to more direct economic impacts.

Even relatively finely calibrated correlations between aviation and these broader economic magnitudes can produce relatively large overall numbers if magnified through the whole economy. There may also be local benefits to the region surrounding the airport. The Airports Commission has attempted some quantification of these wider economic benefits. While it has suggested that the current level of constraint has had limited impact on the overall economy, it sees larger impacts from new capacity, suggesting for its recommended Heathrow option a NPV of £147bn over 60 years, amounting to an increase in GDP of 0.65 to 0.75 per cent by 2050.[28] The Commission estimated lesser benefits for the Gatwick option. These figures will no doubt be the subject of continuing debate, and the Commission has itself suggested caution in interpreting them given the 'highly innovative' methodology used. Gatwick (which has been disadvantaged in the resulting comparisons) has pinpointed a number of significant potential shortcomings in the methodology (in response to which the Commission has made certain adjustments). Nevertheless, the Commission has both identified the need to bring these wider issues into view given the role that aviation plays in an increasingly interconnected world, and that the figures involved are significant (even though there may be differences about precisely what they are).

An InterVistas report for ACI Europe attempted a similar calculation over a different time period for Europe as a whole. It estimated the economic impact of the gap between constrained and unconstrained demand by 2035 to be just over 2 million jobs, €47 billion in income (wages, salaries, bonuses and other remuneration) and €96.7 billion in GDP, including direct activity at the airport, indirect and induced impacts, and the lost tourism, trade, investment and productivity due to low connectivity growth. [29] IATA has undertaken similar work and has identified the potential for 118m

[25] York aviation/CTAIRA, The Strategic Importance of London to Airlines: Final Report, October 2013, p.18; CAA, Estimating Demand Valuation – Annex, November 2001, p.1
[26] Airports Commission: Interim Report, December 2013, p.82
[27] CAA response to the Airport Commission consultation: Increasing the UK's long-term capacity (CAP 1263), p.4
[28] Airports Commission: Interim Report, December 2013, p.99 ; Airports Commission: Final Report, July 2013, p. 24
[29] InterVistas, Economic Impact of European Airports, January 2015, Section 11

unaccommodated passenger journeys in 2035 (one in ten of passengers wishing to fly) with associated delay, productivity and GDP impacts.[30]

The precise figures in the ACI Europe, IATA and Aviation Commission studies depend upon the methodologies chosen, the traffic forecasts used and the time periods analysed. More important is what they have in common. They all indicate the potential for significant detriment to the wider economy, beyond aviation businesses and their customers, from infrastructure supply constraint in an airport industry which is now vital to any country's connectivity with the broader world economy.

1.3.8 Conclusions from runway constraints in London

The London and South East example indicates that runway constraints can have very significant costs, particularly for passengers, but potentially also for the wider economy. Of course, it is at one end of a spectrum. No other major world airport is as constrained as Heathrow. However, the lessons have some wider application.

First, aviation (even in relatively mature economies) tends to grow more quickly than GDP. As a result, capacity constraints often tend to develop more quickly than policy makers expect, or perhaps hope, given the political difficulties associated with resolving them. Eurocontrol has drawn attention to both the developing capacity challenge across Europe and the multiplicative operational impact across the network of having multiple constrained airports.[31] This will not just be a UK problem for long.

Second, runways do not have to be as constrained as Heathrow or Gatwick before issues appear. For example, constraints at peak times may have operational and economic costs. Lesser, but still significant, resilience issues may kick in well before maximum capacity is reached.

Third, capacity constraints may bite at lower levels of throughput if incremental investment is not undertaken in a timely way. For example, failure to invest in taxiway or stand improvements may mean that supply constraints apply at lower levels of runway usage. Some of the negative delay, connectivity and fares impacts seen at Heathrow would then prevail. In the Heathrow case, reaching 99 per cent runway usage followed investment in associated airfield infrastructure in the 1990s to enable greater use of runway capacity. Without such timely investment economic costs would have arisen at lower levels of flight and passenger throughput.

Fourth, the costs of constraint fall disproportionately on passengers through longer journeys than necessary and significantly higher fares. The 2008 SH&E/Helios study suggested that half of the costs of capacity induced delay fell on passengers' value of time. [32] Where airport charges are effectively limited to cost the benefits of rents arising from scarcity accrue to airlines. This is not to say that airlines will necessarily be happy with constrained airport supply. It limits their business development and causes them operational problems. They may also be able to earn larger profits overall from increasing supply. And, with their own cost and competitive pressures, it may not feel as though they are receiving rents. However, the London example suggests the need to keep a clear line of sight through to the passenger impacts of constrained capacity.

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[30] IATA, Foregone Economic Benefits from Airport Capacity Constraints in EU 28 in 2035, February 2015, p.2
[31] Eurocontrol, Challenges of Growth 2013: Summary report
[32] SHE/Helios, UK CAA Runway resilience Study – Final Report, December 2008, para.1.57

1.4 Terminal 5

1.4.1 The history

BAA, the then owner of Heathrow (as well as Gatwick and Stansted airports) began considering a T5 development in the 1980s. A planning application was submitted in 1993 and the planning inquiry (a process which attends major construction in the UK) began in 1995. BAA's expectation was that the inquiry would end in 1997 with a government decision shortly after and the new facilities coming on stream in 2002. In the event, the inquiry was the longest in UK history, lasting some four years, with a decision to proceed with the construction of T5 finally announced by the Secretary of State for the Environment, Transport and the Regions in 2001. The entire process from BAA inception to decision took well over a decade, and from planning application to decision some eight years.

The reasons for this inordinately long process came to be disputed. While BAA pointed to the complexity and difficulties of the planning process, the Competition Commission in its 'break-up' inquiry into BAA sought to lay some of the blame at the airport operator's door. It criticised the time taken by BAA to prepare for the planning inquiry and some of the late changes to the application.[33] BAA's side of the argument is supported by subsequent Government efforts at planning reform. However, the precise reasons for the delay are less important than that it occurred. By the time the new terminal opened in March 2008 Heathrow was straining at the seams. In effect, the delay to T5 resulted in a shortfall in investment across the airport as projects consequential on T5 were also delayed. This was apparent in the outdated and congested nature of many facilities, both passenger and airline facing.

During this period there was continuing investment. The Regulated Asset Base (RAB) continued to increase as investment exceeded depreciation. However, it is questionable whether value was secured for some of this investment as the airport sought to mitigate problems that earlier implementation of T5 would have dealt with; had to incur additional costs from working in close proximity to ongoing operations; and created or maintained assets with limited economic lives. Moreover, the history of the RAB demonstrates the extent of the change required at the airport. In 2003 the RAB was valued at some £4bn. By the time T5 was opened that figure had broadly doubled and now stands at some £14bn – an increase which dwarfs the 15-20 per cent increase in passenger numbers over the same period.[34]

1.4.2 Consequences of the delay

The extent of the delay to the construction of T5 is a matter of conjecture. It is difficult to say when it would have been built had all the processes - BAA and the planning inquiry - worked seamlessly. BAA had assumed an opening date of 2002. By 1996 the regulator's assumption for the purposes of the price cap review was that the planning inquiry would conclude in 1997 and construction begin in 1998.[35] Construction actually began in 2002, four years later, and the terminal opened in 2008, six years later than BAA had assumed. As a result, for much of the first decade of the century Heathrow was operating without the additional terminal capacity it required. In March 2002 the CAA was

[33] Competition Commission (CC), BAA Airports Market Investigation: Provisional Findings Report, August 2008, para. 5.37
[34] CAA Airport Statistics
[35] CC, BAA plc: a report on the economic regulation of the London airports companies, November 2002, para. 9.4

already saying (six years before T5 opening) that passenger throughput 'well exceeds' the declared capacity of the existing terminals, a position it expected to worsen.[36] Moreover, T5 delay meant that much needed modernisation of existing terminals was delayed, as completing this required decanting of passengers, and the continuation of an outdated airfield layout with consequences for operational resilience.

1.4.3 Service quality

The most obvious impact of T5 delay was on service quality provided to passengers. This can be considered both through the prism of the service delivered to passengers during the 2000s but also against the improved quality that has been delivered since T5's opening.

By 2008 Heathrow's reputation was dire. It was the subject of constant media attack: the phrase 'Heathrow hassle' entered the public lexicon.[37] This was not solely about terminal issues but broader problems of resilience and runway capacity.[38] But perceptions of terminal service quality played their part.

The service provided by Heathrow (and Gatwick) had long been a source of tension with airlines. This had led to Service Level Agreements covering particular service metrics and, in the 2003 regulatory settlement, to service quality becoming part of the regulatory regime, with standards set and penalties exacted for shortfalls. Interestingly, throughout this period of terminal congestion, most of the standards set by the CAA were met most of the time (with the exception of security queuing, dealt with below). However, this did not tell the whole story. First, the standards set were themselves conditioned by what was possible rather than by what passengers wanted or by comparisons with other airports. Second, passenger perceptions may well have been at variance with some of the standards, as the Competition Commission found in relation to security queuing (see below). Third, and most telling, Heathrow was well adrift from the developing norm for European airports. The Airport Service Quality (ASQ) survey, run by ACI (the international airport trade body) showed Heathrow in 2007 Q1 ranked a 'relatively low' 7th out of the 10 largest European airports.[39]

The fact that Gatwick, another BAA airport, was ranked 9th in the same survey suggests that delay to T5 was not the only factor affecting service quality at Heathrow. There may also have been issues around management focus and performance. However, Gatwick was a very different airport from most of the top 10 in Europe - leisure-oriented rather than a business travel focussed hub. And even BAA's most severe critic, the Competition Commission in its 'break up' inquiry, conceded a role to capacity issues generally in generating poor service and resilience performance.[40]

The crucial piece of evidence, however, is Heathrow's service performance since the opening of T5. After a rocky first week and the inevitable bedding in of new infrastructure, Heathrow's positioning has been transformed. At the aggregate level this is most apparent in the increase in overall

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[36] CAA, Heathrow, Gatwick and Stansted Airports' Price Caps, 2003-2008; CAA Recommendations to the Competition Commission, March 2002, para. 1.4
[37] CC, BAA Airports Market Investigation: Provisional Findings Report, August 2008, para. 2.15
[38] Ibid., para. 2.14
[39] CC, BAA Ltd – A report on the economic regulation of the London airport companies, November 2007, Annex L, para.37
[40] CC, BAA Market Investigation: Emerging Thinking, April 2008, para. 24

passenger satisfaction with the airport which has increased from a score of less than 3.5 (out of 5) in the ASQ survey before the opening of T5 to 4.12 in the first quarter of 2015. That improvement took place in stages over the years, reflecting not only satisfaction with T5 itself but other improvements made, including the opening of the new T2 in 2014. Interestingly, the increase in satisfaction has been greater amongst the (more critical) business passenger group than amongst leisure passengers.

The improvement has been reflected across the range of passenger facing performance measures and the role played by terminal development and refurbishment in this is perhaps best indicated by the increase in the ASQ score for 'airport ambience' from 3.20 in 2007 to just over 4 in 2015. Perhaps most striking are the punctuality statistics. Where punctuality is defined as flights within +/-15 minutes of schedule, departure punctuality has increased from 63.2 per cent in 2007 to 78.2 per cent and arrivals punctuality from 57.2 per cent to 76.5 per cent - figures which will have been crucial to business passengers' assessment of the airport. There will have been a number of factors behind this, including improved processes and coordination with airlines (so-called Collaborative Decision Making (CDM)). However, the scale of punctuality improvement has been assisted by the improved 'toast rack' airfield layout enabled by the T5 development, as well as the associated greater availability of stands and apron space - all indicating the extent to which facilities overall had fallen behind. [41]

This evidence, which post-dates the Competition Commission 'break up' inquiry, strongly suggests that it was delay to T5 that was the most important contributor to poor service quality, and the detriment to passengers and airlines that entailed. As the results post-T5 indicate, that detriment was significant. Prior to T5's opening, Heathrow's passengers were offered significantly lower standards of service than comparable, commercially focussed international airports felt it right to offer their passengers and that Heathrow itself wished to offer. The UK media is no longer focussed on Heathrow hassle.

1.4.4 Resilience

Transport infrastructure has to deal with the unexpected. This can frequently be weather related, or tied to events such as terrorist attacks or policy interventions by Government designed to foil such attacks. The operators of transport infrastructure require the processes, systems and management capability to deal with the unexpected. But they also need a degree of flexibility in the infrastructure itself. The more tightly stretched that infrastructure is the less resilient it will be to stress, no matter how good the underlying management. Heathrow's resilience in the 2000s was severely challenged by the over-scheduling of runway capacity (which remains) as well as overcrowding within its terminals. Frequent weather related disturbances caused delays to arrivals and departures. These had knock on consequences for already congested terminals. But the most telling example was the implementation of enhanced (liquids) security standards overnight in August 2006. The result was a sharp increase in passenger security queuing at airports throughout the UK, as passengers took significantly longer to process. Many airports restored some equilibrium to their processes within a relatively short time[42] but problems persisted at Heathrow (and Gatwick) for many months. This was partly a matter of staffing and equipment but also of the cramped and confined space within which

[41] Quantitative information supplied by Heathrow Airport
[42] CC, BAA Market Investigation: Emerging Thinking, April 2008, para.57

passengers were processed. Lack of physical capacity contributed to the problems that Heathrow faced given the need to provide more security lanes.

During, and for a significant time after, this crisis there was a significant increase in the amount of time passengers spent queuing for security at Heathrow. Whereas the target for security queues was that queues should be less than 10 minutes long on 95 per cent of occasions surveyed, at certain times and in some terminals queues were substantially longer than that for much of the time Moreover, the Competition Commission analysis suggested a sharp discrepancy between the airport's figures and passenger perceptions. So while the airport's figures indicated that by 2007 performance had returned to normal with queues of less than 10 minutes on more than 95 per cent of occasions surveyed, the Competition Commission found that 30-40 per cent of passengers perceived their wait as longer than 10 minutes.[43] Some of this may have originated in shortcomings in the airport's measurement systems[44] but it was also instructive of the way the general and pervasive poor quality of Heathrow's facilities was moulding passenger attitudes.

Even had T5 been on stream in 2006 Heathrow would have struggled with the security crisis more than other airports, given its greater complexity and the sheer scale of recruitment and re-equipment it had to undertake. However, physical constraints both compounded these problems and contributed to the poor passenger perceptions of the airport's response.

1.4.5 Unlocking further airport modernisation

The opening of T5 was the key to unlocking a series of subsequent improvements at the airport that contributed further to enhancing the passenger experience and operational efficiency at the airport. Decanting some 30m passengers into T5 enabled decompression of other terminals, movement of airlines and therefore the better grouping of alliances by terminal (so facilitating improved passenger transfer), the construction of a further new Terminal 2 (opened in 2014) with a 30m passenger capacity and creation of a more efficient 'toast rack' aircraft parking arrangement across much of the airport. For the airport to make these changes it needed the room for manoeuvre that was precluded by terminal congestion. In the absence of relief for overcrowding, existing terminals could not be modernised or replaced, airlines could not easily be moved and the costs of even minor improvement works were increased by such close proximity to existing operations.

1.4.6 Conclusions from the T5 delay

The construction of T5 was a major strategic investment at Heathrow and its significant delay had major effects on both the airport's performance and media and public perceptions of it. The reputational damage to BAA was considerable. The break-up of the company mandated by the Competition Commission in 2009 was probably inevitable given the prevailing climate in favour of increased competition more broadly, but poor service to passengers not only contributed to the evidence against BAA but undoubtedly made the Competition Commission's job easier. The company had few defenders.

The airport's poor performance also damaged the regulator during this period. Despite the CAA having done everything it reasonably could have to resource and incentivise construction of T5 that

[43] Ibid., para.55

[44] There had been airline complaints on this score although CAA review had generally confirmed fitness for purpose. CAA, Airport Price Control Review: CAA recommendations to the CC for Heathrow and Gatwick airports, March 2007, para. 5.35

was insufficient defence during the media and political hue and cry that attended Heathrow's security problems in particular. The Competition Commission was critical of the CAA in its break up inquiry, and reform of the CAA in the 2012 Civil Aviation Act and the 2008 Government initiated strategic review of its operation had their origins in this difficult period.

These were big problems at a big airport. They had their roots in the specifics of Heathrow's infrastructure backlog and the inexorable growth in traffic to and from one of the world's most important cities, but there are some generic lessons that can be applied to airport investment and infrastructure generally.

First, physical infrastructure is often a key determinant of the level of service that passengers receive. The better configured that infrastructure is the more likely it will be conducive to movement of planes and passengers. Further, the 'ambience' that infrastructure creates may itself play an important role in creating passenger perceptions of the service they receive. The nature of air travel means that passengers are able easily (indeed in one journey) to make comparisons between airports. This is perhaps particularly true of frequent flying business travellers. The result is a relatively well informed customer base, likely to be critical of poor performance. As a result, adverse perceptions and comparisons are likely to contribute to passenger detriment as well as poor performance itself.

Second, the physical environment can contribute significantly to infrastructure resilience. It is not the only element. People, processes and management also matter. But if they are working within overly confined physical space or outdated facilities the result is likely to be sub-optimal. Moreover, resilience matters because of the disproportionate effect of very poor performance on airlines and passengers. The T5 case shows how investment delay can contribute to resilience issues particularly where (as the previous section showed) the airport has multiple performance issues.

Third, the interconnectedness of airport systems, processes and facilities means that failure to invest in one area in a timely way may have knock on consequences on others. This may be because (as in the T5 case) one investment is needed to create 'space' for others. Or it may be because the connection is more direct, for example in enabling modernisation of a particular process or system.

1.5 Overall conclusions from the London case studies

The evidence presented here in relation to runway and terminal under-investment suggests that there are significant - potentially very significant - costs from under-investment in airport infrastructure. These costs most clearly fall on passengers in terms of price, route and product choice, delay and overall travel experience. But there may also be wider economic costs, particularly where airport infrastructure constrains wider connectivity.

Of course, the London experience is a product of its particular infrastructure issues and economic development. It cannot be read across unthinkingly to other situations. London’s global economic position places a premium on its air connectivity and creates a substantial economic detriment from constraining it; and the crowded nature of the south east of England, along with processes that give ample play to opponents of airport development, creates issues for airport expansion that may not apply to the same degree elsewhere.

However, some factors play the other way and have meant that the UK has been able to mitigate the impacts of capacity constraints for longer than may be possible elsewhere:

- the historical accident of a multiplicity of airport sites in the London area has provided a safety valve for Heathrow (and, to a lesser extent, Gatwick);
- low cost airline business models have thrived at Stansted and Luton providing a lot of the short haul connectivity that historically would have been provided from the two larger airports. London City airport has, in its small way, provided a similar service in relation to high end financial business in the City of London; and
- for transfer traffic, the UK's geographic proximity to European hubs has meant that there are alternative hubbing possibilities for passengers beginning their journeys in the UK regions. These have been well-utilised.

In the absence of these 'safety valves' the effects of under-investment and capacity constraint would have kicked in earlier and could have been more severe. The overall context - market and geographic - within which an airport operates may therefore be very relevant to the costs that are likely to arise from under-investment at it.

That said, the key issues that need to be considered are: the multiplicity of potential impacts, often reinforcing one another; that service failure more often takes the form of degradation than outage but with considerable impacts in terms of higher airline operating costs and longer and uncertain passenger journey times; that passengers are likely to suffer disproportionately as the main 'victims' of delay, reduced choice of connections and destinations and of higher fares where capacity shortage creates scarcity; and that there are knock-on effects to the wider economy which, if under-investment persists, can be long lasting and quite pervasive.

The mix of effects will vary airport by airport but, in assessing how far under-investment is likely to give rise to such impacts, it is worth considering two general lessons from the London examples set out in this section.

The first is that of investment interconnectedness. Airports are complex operational entities, with multiple processes and facilities that need to be operating in balance with one another. Failure to invest in one area can produce constraints in others. So the delay to T5 rippled through Heathrow, meaning that needed improvements in many areas could not be progressed. In other airports this interconnectedness may not be so obvious, but may be no less significant for that. For example, without enabling investments in terminals, taxiways and stand capacity, throughput constraints and the associated detriments may well kick in at lower levels of runway usage than those experienced at Heathrow and Gatwick.

Second, the relationship between under-investment and associated detriment is unlikely to be linear. This is most readily apparent in the area of delay where increasing throughput in constrained facilities is likely to lead to more than proportionate (potentially exponential) increases in costs, particularly to passengers. But it also applies, more qualitatively, to passengers' subjective assessments of the airport (and those propagated through the media). The cumulative effect of individual detriments may over time have a more than proportionate reputational impact on the airport but also on other key players in the aviation sector. Airport performance can affect - for good

and ill - the commercial reputations of airlines as well as those of policy and regulatory decision makers in the aviation sector.

2. WACC DISTRIBUTIONS FOR REGULATED AIRPORTS

The preceding section has dealt with costs that are likely to arise from under-investment. This section covers the second link in Oxera's chain which requires an assessment of the probability that the Commission has under- (or over-) estimated the true WACC. As noted above, Oxera's 2014 work drew on the stated standard error in the Commission's WACC estimate and the properties of the normal distribution to establish the probability of error at any percentile in the range.

2.1 Background

The Commission has previously acknowledged that it is a significant challenge to calculate the standard error in its WACC estimates.[45]

> The WACC must be estimated since its components, for example the cost of equity, cannot be observed directly. This raises the prospect of error since it is not possible to know the true cost of equity. To allow for this estimation error, it is usual practice to estimate a range for the WACC.
>
> The Commission has previously used estimates of the standard errors of the components of the WACC, to estimate a standard error of the WACC ...
>
> A wide variety of submissions were made on the approach to estimating a range. Some submissions called for the use of Monte Carlo simulations, others for the Commission to use its judgement to choose a point estimate of the WACC from a range of WACC estimates that reflected ranges for certain parameters. Some submissions criticised the Commission's approach as implying greater precision than was possible in practice. Other submissions took the Commission's approach and called for different values for particular parameter estimates and the addition of more variables to the analysis. In short, there was no consensus on what a better methodology of establishing a range would be. The Cost of Capital Expert Panel generally supported the Commission's statistical approach.
>
> It is a matter of judgement as to which approach is best.
>
> (emphasis added)

We would not wish to take issue with this conclusion. However, we do wonder whether the Commission has been sufficiently cognizant of the difficulties there are in calculating airport betas and whether, as a consequence, the Commission has made sufficient allowance for the margin of error that there is likely to be around its central WACC estimates. This is important because any mis-statement of the "standard error" in the Commission's allowable WACC for the three regulated airports will result in a misidentification/mislabelling of WACC percentiles and a misunderstanding of the probability that the Commission has under-estimated the true WACC.

[45] Commerce Commission, Input methodologies (airport services), 2010, paras 6.7.3 to 6.7.6

2.2 Airport heterogeneity

The key issue in this regard is that airports are not homogeneous in the way that electricity networks may be. Heterogeneity presents a major problem in WACC estimation whenever a regulator is seeking to obtain insights into the riskiness of a company via analysis of comparator betas. Whereas in other sectors, it can be reasonable to think that investors will view companies carrying out broadly similar activities as a single class of asset with a common cost of capital (a 'service beta', to use the language adopted by the Commission), such assumptions are much more difficult to sustain in an airport setting.

Factors that can differentiate airports include:

- capacity utilisation – airports can be in very different positions with respect to capacity utilisation. At one extreme, there are some established airports where demand for take-off and landing slots exceeds supply. These airports are relatively robust in the face of economic shocks. Other airports are less mature and cater to more marginal traffic. These airports typically exhibit much greater sensitivity to systematic risks. (This was apparent, for example, in the differing fortunes of UK airports in the recent recession.);

- competitive constraints – a closely related factor that defines the riskiness of an airport to an investor relates to the degree of competitive constraint on pricing. An airport that faces limited threat from competition and which can price to some extent independently from the market may be in a better position to maintain its profitability over the economic cycle (though even such airports may be constrained in a downturn by the economics of their airlines). An airport facing greater competition will be more exposed to market uncertainty;

- passenger and airline mix – such differences can be exacerbated by the passenger and/or airline mix at an airport, which will, in turn, vary depending on the mix of international versus domestic traffic. Business and leisure travellers exhibit different sensitivity to systematic risks. The same is true of full-service scheduled carriers, charter carriers and low-cost carriers. This will normally feed through into investor perceptions of an airport's riskiness;

- buyer power – some airports are heavily dependent on one or two airline customers. This can give rise to buyer power and constrain an airport's ability to alter its prices in response to economic events. Other airports with a more diverse client mix may not face the same constraints;

- state involvement – an airport's response to economic shocks can sometimes be conditioned by government involvement in the aviation sector. There is a spectrum between airports that operate on a fully commercial basis and airports whose pricing and other decisions are made with wider economic and social considerations in mind;

- regulatory framework – the allocation of risk between airport and users is also very heavily influenced by economic regulation. It is noticeable that there tends to be much greater diversity of regulatory approach in the airport sector as compared to other regulated industries, including: the use of dual till / hybrid till / single till regulation; monitoring versus

price cap approaches; and the protections that airports have against other uncertainties. This naturally leads to different exposures to risk and different betas; and

- country location – some of these factors will present themselves through the prism of country location which may also reflect different stages of economic development and the effect this may have on investor perceptions.

Together, these factors mean that it is very difficult to identify commonality in risk profiles across airports.

Case study: London airports

Our experience in the UK since the London airports have been regulated individually rather than as a system has been that regulators (i.e. the CAA and the Competition Commission) have found it feasible and necessary to use different beta estimates and apply different WACCs to individual regulated airports.[46] The hierarchy has been:

Lowest beta

Heathrow – capacity constrained, price regulated, lower-risk client airlines, evidence of muted impact from previous aviation industry volume shocks

Gatwick – price regulated, medium-risk client airlines, evidence of modest impact from previous aviation industry volume shocks

Stansted –price regulated (until 2014), higher risk-client airlines, evidence of greatest impact from previous aviation industry volume shocks

Highest beta

Heterogeneity can present a major challenge if a regulated airport does not have a stock market listing and/or if a regulator chooses to rely on comparator beta analysis when estimating an airport's cost of capital. In particular, there can be no assurance that the risk profile of the 'average' comparator from within a large sample of peer companies bears a close resemblance to the risk profile of the airport in question.

Such considerations have in the past led the airport regulators that we have experience of to be quite cautious about using international comparator evidence. Notably, the UK's Competition Commission expressed the following opinion in its last airport price cap review:[47]

> BAA argued that we should treat data on the historical equity beta for erstwhile BAA plc, and figures derived from it, cautiously and instead give much more weight to indirect asset beta estimates ... One method estimates the betas for regulated airports from similar estimates for other airport companies from around the world. We are not persuaded by this methodology. Other airports have different risk profiles from Heathrow and Gatwick and we are especially

46 See, for example Competition Commission, BAA Ltd: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd), 2007, appendix F, and Competition Commission, Stansted Airport Ltd: Q5 price control review, 2008, appendix L.
47 Competition Commission, BAA Ltd: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd), 2007, appendix F

> uncomfortable with the setting allowed returns for these two UK regulated airports in line with betas for airports that are subject to different forms of regulation or, in certain cases, no regulation at all.

In the CAA's most recent price review for Q6, carried out in 2013/14, the CAA's consultants, PwC, were quite clear that it was inappropriate to expect Heathrow's and Gatwick's betas to align to international comparator betas and, in particular, to Fraport's observed beta, citing:[48]

> … differentials in approach to regulation as well as the impact of competition and restricted ability to price to the cap …

We note that the Commission has acknowledged its own discomfort in the past[49] but that it has still deemed it appropriate to identify and apply a New Zealand airport 'service beta' to each of the three airports it regulates.

The purpose of this paper is not to question the useability of comparator beta evidence or to produce a review of the alternative methods that might be used to calibrate an airport beta and their pros and cons. It is, rather, to highlight (a) the margin of uncertainty that there is in an airport 'service beta' and (b) further, in the application of this to estimation of the WACC for *individual* regulated airports, to emphasise the need therefore to factor the margin of uncertainty into any determination of the appropriate WACC percentile.

2.3 A comparison of airports and energy networks

The best way we can bring this out is to compare the Commission's calculation of electricity and gas network service beta to the Commission's calculation of airport service beta under the Commission's existing Input Methodologies.

2.3.1 Heterogeneity

A cursory inspection of the Commission's lists of comparator companies makes it clear that the electricity and gas companies are more homogeneous than the airport companies.

First of all, the electricity and gas sample consists only of companies from New Zealand, Australia, the UK and the US, while the airport sample comprises companies from 13 countries.

[48] PwC , Estimating the cost of capital for designated airports, October 2013

[49] Commerce Commission, Input methodologies (airport services) – reasons paper, paragraph E8.91

Table 1: The Commission's comparator companies

Electricity and gas comparators	Airport comparators
Total comparators = 79 New Zealand x 2 Australia x 6 UK x 1 US x 70	Total comparators = 25 New Zealand x 1 Australia x 2 Austria x 1 China x 6 Denmark x 1 France x 1 Germany x 1 Italy x 3 Japan x 2 Malta x 1 Mexico x 3 Slovenia x 1 Switzerland x 1 Thailand x 1

Source: Commerce Commission (2010), Input methodologies (electricity distribution and gas pipeline services) – reasons paper; Commerce Commission (2010), Input methodologies (airport services).

It is especially noticeable that the regulatory regimes in the selected countries for gas and electricity networks are converging to an increasingly common form of incentive-based regulation. As the Commission has itself noted:[50]

> The empirical evidence considered by the Commission has not shown a significant difference between the systematic risks associated with regulated US and UK entities or for regulated US entities subject to different regulatory regimes.
>
> In part, the current results may reflect that:
>
> • in practice, the difference between the two types of regulation [in the US and the UK] may be minimal;
>
> • over the past decade there has been a strong movement by US state-based regulators towards more incentive-based forms of regulation; and
>
> • price-cap regulation has evolved in the UK with new variants of price-cap regulation being introduced, and refinements to RPI-X being made, which have been designed to mitigate risk.

Given the comparability of regulation, we can understand why the Commission has in the past felt comfortable assuming that investors see a broadly common risk profile when looking across utilities in the UK, the US, Australia and New Zealand. We do not think it is tenable to draw the same conclusion in the case of airports given the diversity of the comparator sample.

[50] Commerce Commission, Input methodologies (electricity distribution and gas pipeline services) – reasons paper, 2010, paras H8.134 to H8.143.

Table 2 shows that sampling variation is noticeably larger in the case of airport betas. Comparisons to overseas electricity and gas networks enabled the Commission to pin electricity and gas network asset betas straight away down to a relatively narrow range of 0.10 to 0.64. The vast majority of the sample were in an even narrower range of 0.2 to 0.4, assisting the Commission still further. In the case of airports, the range was 0.25 to 1.29, with no discernible bunching of the data in a narrower range within the extremes.

Table 2: Comparator asset beta estimates

Electricity and gas comparators	**Airport comparators**
Monthly data Low = 0.10 Mean = 0.28 High = 0.55 Standard deviation = 0.10	Monthly data Low = 0.32 Mean = 0.72 High = 1.29 Standard deviation = 0.22
Weekly data Low = 0.10 Mean = 0.32 High = 0.64 Standard deviation =.0.10	Weekly data Low = 0.25 Mean = 0.62 High = 1.19 Standard deviation = 0.21

Source: ibid.

The picture that Table 2 presents is consistent with the preceding observations about heterogeneity and differences between airports. Even with the difficulties that there are in obtaining accurate empirical beta estimates from a real-life data set, the availability of multiple networks undertaking similar activities to the New Zealand electricity networks in a similar economic climate and under similar regulatory rules makes it possible to obtain at least a rough and ready assessment of an applicable energy network 'service beta' quite quickly. By contrast, the paucity of listed airport comparators, their different operating characteristics, and differences in prevailing economic conditions, make it very difficult to claim that there is a standard airport 'service beta', which is applicable to all suppliers of airport services in New Zealand and elsewhere.

2.3.2 Standard error in WACC estimate`

Against this backdrop, one would instinctively say that the standard error that arises when applying the Commission's common 'service beta' to each of Auckland, Christchurch and Wellington airports is naturally going to be much higher than the standard error in the Commission's electricity/gas network asset beta estimate. It is a surprise, therefore, that the Commission has identified broadly similar standard errors, as shown in Table 3. We would have expected a more pronounced differentiation based on both a qualitative and quantitative examination of the evidence base, as set out above.

Table 3: Asset beta point estimates and standard errors

Sector	Asset beta point estimate	Standard error
Electricity networks	0.34	0.13
Gas pipelines	0.44	0.14
Airports	0.60	0.16

We note that the estimate of 0.16 is a figure that the Commission selected through judgement, rather than statistical analysis. We think that the Commission ought to look at this assumption afresh as part of the upcoming review of Input Methodologies. We do not object per se to the use of a determined figure, rather than an empirically derived estimate, but we do think that the standard error calculation needs to be in tune with the qualitative and quantitative uncertainty that we bring out in the preceding discussion. As a minimum, we would expect there to be a recognition that the standard error within each airport WACC estimate is going to sit naturally at a higher level than the standard error around electricity and gas network betas.

2.3.3 Implications

Without greater confidence in the standard error calculation, a discussion about the appropriate percentile to select from within a wider distribution might quickly be rendered contrived and meaningless. That is to say that labels like the 67th percentile or 75th percentile only have the meaning that is usually ascribed to them if one is reasonably happy that the standard error on which the percentile calculations are based is accurate and reflective of the margin of error in the WACC calculation. As things stand, we would have to say that the required level of confidence has not (yet) been attained.

Our view is that the Commission ought to acknowledge a wider standard error in its beta estimate and stand ready to select a point estimate from well above the mid-point so as insure against the risk of under-estimating the WACC. The evidence set out above suggests that it is very difficult to portray any average beta among listed airport companies as a sort of fundamental 'service beta'. Accordingly, we would be concerned that this kind of average listed airport beta is only a very approximate estimate of any of the New Zealand airports' betas with a very high attendant risk of mis-estimation.

2.4 Asymmetry

In addition to heterogeneity, an additional factor that can be relevant when calculating airport betas is asymmetry of risk.

On a day-to-day, or week-by-week basis, the risks that airports face around costs, volumes and revenues might be thought of having a reasonably symmetrical distribution – i.e. there is a roughly equal probability of actual numbers beating expectations as there is of numbers falling short of projections. Over a longer horizon, however, it is not clear that there is this same symmetry. This is for two reasons:

- first, airports and the wider aviation market have been observed to have a marked exposure to severe downside shocks, whether in the form of terrorist incidents, natural disasters like

earthquakes or volcanic eruptions, pandemics (e.g. SARS) or major economic recessions. The risks that airports face in these areas are inherently asymmetric – i.e. it is difficult to argue that there is the potential for an airport to encounter countervailing upside shocks of a similar magnitude; and

- second, even if one momentarily ignores the scope for airports to incur losses when such events occur, it is apparent that the opportunity that is given to equity in airport investments is one in which upside gains are capped but downside losses are not. This is most clear in major capacity expansions, where the investor runs the risk that anticipated volumes might not materialise and/or the market price might not be high enough to pay for the investment in full, but knows that in good states of the world the airport will not be permitted by competition, regulators or government policymakers to earn supernormal returns indefinitely. But it can also be a relevant consideration at more mature airports, where the existence of capacity constraints may mean that there is only limited opportunity to benefit from even modest economic upsides, whereas even modest economic downsides can lead temporarily to lower volumes and lower profits.

The Commission gave recognition to the first of these considerations in its 2010 input methodology determination (labelling the risk "Type I asymmetric risk").[51]

The second consideration has been acknowledged by both the UK Airports Commission and by the UK CAA. As part of its analysis of the business case for new runway and terminal investment at Gatwick Airport, the Airports Commission has modelled a relatively high cost of capital (in comparison to the required return at Heathrow) on account of uncertainties about the achievability of projected increases in charges.[52] And in the recent Q6 review, there was lengthy discussion about coskewness in Heathrow Airport's returns and the need for a small uplift in Heathrow's beta estimate.[53]

In the presence of asymmetries in the distribution of risk, a conventional CAPM cost of equity calculation based on a conventional estimate of beta may only partially capture the risks that investors face and lead to an under-statement of the true WACC. The Commission has in the past been wary of conflating this issue with that of uncertainties around estimation of the WACC. However, absent any other form of compensation for asymmetry, its acknowledged presence in the airport sector may mean that it is prudent for a regulator to aim up in its cost of capital calculation to ensure that investors are not under-rewarded for the totality of the risks that they take on in airport investments.

[51] We note that the Commission concluded that the most appropriate way of allowing for such risk was to make adjustments in expected cash flow modelling. In practice, it is not at all clear to us how this has happened.

[52] See PwC, Cost and commercial viability: funding and financing, 2014

[53] In the end the CAA did not make an explicit uplift to beta because it judged that its preferred asset beta of 0.5 was sufficient to allow for any historical coskewness in returns. See CAA, Estimating the cost of capital: a technical appendix to the CAA's Final Proposals for economic regulation of Heathrow and Gatwick after April 2014, 2013.

2.5 Conclusion

The conclusion that we draw from the above analysis is that the greater likelihood of mis-estimation of the WACC range, and the percentiles within it, argues for a greater degree of regulatory caution in applying the results of any comparator beta calculation.

Insofar as the Commission wishes to avoid a marked under-estimate of the WACC for any individual airport supplier, the estimation issues and uncertainties highlighted above all point in the direction of a higher point estimate from within a calculated 'service beta' range.

3. RELIANCE ON AIRLINE CONSULTATION

3.1 Introduction

The previous sections of this report have identified the potentially considerable costs for passengers and airlines that arise from delays to investment and the uncertainties around WACC estimation, particularly as they apply to individual airports. The Commission has suggested that 'a small number of engaged customers (airlines)' is, through consultation, 'likely to help ensure that appropriate levels of investment are taking place'.[54] In this section, we assess how far reliance could reasonably placed on such consultation and identify a number of reasons why it may not provide sufficient safeguard against under-investment.

In considering this issue it is first important to assess what is meant by appropriateness. 'Appropriate' investment might include investment that delivers service to passengers as well as airlines, ensures sustainability of airport services across time and enables the development of new airline entry and the competition it brings, to the benefit of passengers. These are all issues where, while recognising the general benefits of airline-airport consultation, there are likely to be risks in relying upon it to overcome any inherent disincentive effects that may arise from mis-estimation of the WACC.

3.2 Nature of airport-airline consultation

Consultation with airlines is an important part of regulatory systems. Such consultation can take place either through the development of regulatory policy and submissions to the regulator or, increasingly, between airport and airlines (either as a substitute for regulation or as a complement to it). In regulatory systems in Denmark and the Netherlands significant weight has been attached to such consultation for some time, as it has over recent years in the UK for both airports and NERL. The EU Airports Directive, which covers all airports with over 5m passengers, mandates certain consultation requirements. In this latter case, these requirements have been imposed without a prior market power test and so may apply to airports that have limited market power. To that extent they may be seen as an expression of good business practice.

While consultation between airlines and airports is often attended by a good deal of commercial tension, argument and disagreement, both parties usually see sense in their perspectives and plans being informed by those of their interlocutors. Airlines can bring their commercial and operational insights to the airports' plans and so help improve and refine them. For their part, airports can

[54] Commerce Commission, Input Methodologies Review, June 2015, para. 395.2

similarly inform airlines about the advantages of making (potentially costly) investments. However, such interactions usually take place within an overall system - whether commercial or regulatory - where the airport is, through the returns the regulator allows or that are available in the market, incentivised to invest. Often, airlines will be challenging the airport's investment plans from the perspective of minimising costs as well as securing operational and service benefits. This is because airlines will see themselves as at some point paying for the resulting infrastructure. This will apply particularly where RAB-style, single till regulation may be perceived as tending to incentivise over-investment. Even where such arrangements do not exist airlines will have concerns about ending up with the bill.

Against this general background, the position set out in para 395.2 of the Commission paper appears to be positing a rather different dynamic. Specifically, reliance would be placed on airlines, in the absence of sufficient incentive on an airport, to promote necessary investment. As customers they would effectively be asking their supplier to increase its costs. While, of course, airlines sometimes do this, for instance where they wish to have specific facilities built or a premium service provided, as a general matter it is somewhat counter-cultural - at least in the aviation industry. Moreover, it would effectively involve placing responsibility for evolution of the airport's strategy on parties other than its owners - parties that have different and specific commercial interests, which will affect their behaviour.

Such general considerations would suggest some caution in relying upon airlines to help ensure appropriate investment levels. There are also a number of specific factors, which would tend to reinforce the need for such caution.

3.3 Potential divergence between airline and passenger interests

First, there is the question of how far airlines can be relied upon always to act in the interests of all airport consumers, including passengers. The development of airport/airline consultation arrangements within regulation suggests that regulators have been willing to place some reliance on airlines acting in the general user interest. The UK CAA's approach has been to recognise that the interests of passengers and airlines are broadly aligned but that there will also be areas where airline commercial interests align with those of passengers only partially or not at all. [55] One such might relate to the interests of future as opposed to current passengers.[56] Moreover, as noted above, this consideration has been in a context where the airport is itself incentivised to invest and the airline role in relation to investment tends to be one of prioritisation, refinement of specifications and challenge to costs, rather than its promotion. In the rather different circumstances posited by the Commission, more weight might well need to be attached to areas where the interests of passengers and airlines could well diverge:

- airlines may have interests similar to passengers in areas relating to efficient operation of infrastructure whether in the terminal or on the airfield. However, as indicated in the London case studies, the costs of certain types of congestion may fall disproportionately on

[55] Review of Price Regulation at Heathrow, Gatwick and Stansted Airports (Q6): Policy Update, May2012, para. 3.20

[56] Ibid., para. 3.24 for this and other examples. See also CAA, Economic regulation at Gatwick from April 2014: final proposals, para. 4.35 for identification of differing airline and airport interests in regulatory decisions on investment.

passengers. Airlines may in such cases take a view focussed more on the costs that they bear, rather than those that apply to consumers generally. Such an approach could lead to a less than socially optimal investment level. While investments in such areas will tend to reduce costs for airlines and delays for their passengers, the views of airlines may be narrowly focussed on their own bottom lines rather than the broader benefit to all of the airport's customers;

- such an approach might apply particularly to investment in passenger comfort and the overall ambience of the airport, where the airline commercial interest is less direct than in more operational areas of investment where cost advantages accrue to airlines through, for instance, improved turn-round times;

- as also indicated in the London case studies, capacity constraints may lead to airlines operating from a constrained airport being able to raise their fares to passengers and so capitalise on the scarcity rents that regulation or price monitoring denies to the airport. In such circumstances, there may be a degree of airline ambivalence about investment which would act to reduce such rents, even while they might gain to some degree from increased capacity. (Note that in the recent debate around London runways the airline operating nearly half the slots at Gatwick supported expansion at Heathrow where it currently operates no services. In this stance it will have been, understandably, guided by its own wider commercial interests rather than the interests of Gatwick airport despite its significant presence there)[57]; and

- the UK CAA's experience in the regulation of Gatwick airport at the most recent (Q6) review is a cautionary tale. The airport's capex programme was the subject of prolonged discussion between airports and airlines. By the time of the CAA's initial regulatory proposals the gap between the airport and the airlines remained significant. While the airport was proposing a programme of £911m, the airlines were supporting only £414m of this. At that stage of the regulatory process the CAA came down more on the airport's side, with a proposition for some £794m of capex.[58] Despite what might be regarded as pretty clear regulatory guidance, there was no narrowing of the gap by the time of the CAA's final proposals. The airport by this stage had increased its 'bid' to £1064m largely due to a (security) regulatory requirement around hold baggage screening. The airlines, however, continued to support only some £400m. The CAA's final view was £920m. It made some adjustments to the airport's plans but effectively approved large swathes of investment that it deemed were clearly in passengers' interests despite airline views. [59]

[57] IAG, owner of BA, has questioned the cost of the Airport Commission's recommended option for Heathrow where it operates the majority of slots.
[58] CAA, Economic regulation at Gatwick from April 2014: initial proposals (CAP 1029), April 2013, paras. 5.6-8, 5.41
[59] CAA, Economic regulation at Gatwick from April 2014: final proposals, chapter 4

3.4 Airline competition

Airlines operating at an airport will have less interest than an airport operator (and passengers) in investments which might increase airline entry and therefore competition at the airport. This is likely to be more true where the number of airlines is already limited, and there is therefore a market position to be protected. To the extent that there is market power at the airport such airlines may wish effectively to share in that power by restricting airline entry and the choice that would give passengers. The greater the competition there is between airports and therefore the more choice that passengers have of services at other airports (and of airlines there) the less this will apply. The risk will therefore be greater for more geographically dispersed airports where passengers' choice is constrained. In some instances, airlines will therefore have clear incentives to block investment requested by other carriers or intended to provide for headroom growth for a new competitor.[60]

3.5 Airport-airline time horizons

The operating and commercial models of airlines are very different. Airports are intrinsically long term businesses, investing in infrastructure for long term returns while recognising that the economic climate may lead to some short term perturbation. Airlines operate in markets which are more consumer focussed, more susceptible to the short term economic environment and, as a result, have, shorter term horizons. This is no criticism - simply a recognition of the market in which they operate. Of course, not all airlines will be in the same commercial position. Some with stronger market positions will be able to take a longer view. But it is unlikely to match that of an airport which is fundamentally more interested in the number of passengers going through the airport, than in which airline, in a competitive and often fast moving market, is carrying them. Indeed, an airport may prefer to have a more diverse carrier base as it provides greater protection against airline market turbulence and therefore enables a longer term view to be taken. The resulting mismatch in time horizons would be likely to feed into airline views on investment.

3.6 Diversity of airline interests

The diversity of the airline market means that it is often misleading to think of airlines at an airport as holding a common position. They may all tend to want lower charges and better service but, beyond such generalities, there may be significant differences of view on how the airport should develop, which will reflect different commercial positioning (including relative to each other). This has become even more apparent in recent years with the development of low cost operating models. It also applies within the full service category where business models have become more differentiated over recent years, not least as airlines respond differently to the competitive threats they face.

3.7 Information and leadership asymmetries

Airlines are informed users of airport facilities. They can provide useful input into airport decision-making. However, they are not experts in airport operations and development. Those capabilities rest with airport operators. In January 2014 the CAA gave, as one of its reasons for basing its

[60] See, for example, the reported views of the former Qantas chief economist in Aviation Business at http://www.aviationbusiness.com.au/news/why-airport-congestion-is-good-for-airlines-even-if-they-don-t-know-it

decisions on Heathrow's Business Plan rather than the Airline Community Plan, that it 'has been produced by the airport operator, which will be responsible for delivering it, and which has experience in running an airport'.[61]

Properly incentivised, operators will bring forward proposals for discussion with airline customers. In doing so they will need to take account of the various environmental and other regulations, as well as the 'political' pressures to which airports are subject. In the absence of such airport leadership it is not clear that airlines, accustomed to responding to airport proposals, could fill a capability gap spanning airport operations, regulation and politics. This is not an airline core competence. They could therefore experience difficulty in defining necessary and appropriate investment. Moreover, it is not clear what, in the absence of incentivisation and proactive airport engagement, would be the means of delivering upon any preferred airline investment.

Even in more tightly regulated environments than New Zealand, regulators have recognised the crucial nature of incentivisation in drawing forth, from operators in utilities generally, investment programmes which serve customers' interests. Where in the UK penalty mechanisms, such as investment triggers have been developed, they have been as a complement to – rather than replacement for – an overall incentive framework that encourages investment. To the extent that the Commission might be relying upon airports setting prices above those implied by its WACC range (in line with the freedoms implied by information disclosure), that would entail the Commission proceeding on the basis that its WACC judgment would not impact investment. A safer regulatory assumption might be that it would.

3.8 Conclusion

The challenge provided by airlines through consultation has been a valuable feature of aviation regulation (and good business practice) in a number of jurisdictions. However, the weight placed on such engagement has been in the context of airports that are incentivised to invest and are therefore able to take a pro-investment view across the airport's activities. To rely on such consultation to provide a counterweight to mis-estimation of the WACC would be placing on it a weight and responsibility that would be at variance with how such processes have generally worked and with the airline behaviours elicited by consultation to date. Account would also need to be taken of the factors that might count against airlines ensuring appropriate levels of investment. Some of these factors, such as the discrepancy between airport and airline time horizons, the risks to passenger interests, and the gaps in airline expertise would be likely to apply generally. The weight attaching to others might depend more on the circumstances of individual airports and their investment agendas. However, the range of potential views and issues arising suggests applying significant caution to generalisations about the remedial role of airline consultation in the event of mis-estimation of the WACC. Certainly, it is likely to fall significantly short of helping *ensure* appropriate investment.

[61] CAA, Economic Regulation at Heathrow from April 2014: notice of the proposed licence, January 2014, p.211. The CAA recognised that all the projects would be discussed and agreed with the airlines, but clearly ascribed the leadership role to the airport for the reasons given.

4. THE RELEVANCE OF DUAL TILL

4.1 Introduction

The earlier sections of this report have identified (through the London case studies) the potential costs of airport underinvestment and the barriers that airports need to surmount to bring significant investment to fruition, the greater uncertainties than in other sectors attaching to estimation of the WACC, and the issues surrounding reliance on consultation with airlines to safeguard investment. All argue for caution in selecting a point estimate from within a wider WACC range and for maintaining a wider rather than narrower range in the context of New Zealand's information disclosure system.

The Commission has suggested that the dual-till nature of economic regulation might buttress an airport's willingness to invest, even where there is inadvertent under-estimation of the aeronautical WACC. It is worth recognising that such an approach would effectively amount to a modification of the dual till regime because the risks around WACC estimation would effectively be borne by commercial revenues. There is a broader question of whether this is consistent with the current approach of not applying regulation to airports' commercial activities. This section of the report does not address this wider question of principle but focusses on whether, in practice, reliance could be placed on dual till to mitigate the investment impact of mis-estimation of the aeronautical WACC.

4.2 Understanding the dual till argument

The Commission's assumption – although not explicitly stated – appears to be that the threshold at which under-estimation of the WACC would cause an airport to withhold investment might be somewhere in excess of the 50-100 basis points posited by Oxera on electricity and gas networks.

It may be helpful to depict this proposition in the following way. Airport investments will sometimes (but not always – see below) take the character of joint investments, with both an aeronautical component and a non-aeronautical component. Project cashflows can be thought of as taking the form:

$$NPV_{project} = NPV_{aeronautical} + NPV_{non\text{-}aeronautical}$$

where NPV denotes the net present value of revenues less expenditure at project level and for aeronautical and non-aeronautical businesses respectively.

We are concerned in this paper with the possibility that the Commission might under-estimate the aeronautical WACC to the extent that an airport becomes unwilling to take on aeronautical investments – i.e. a situation where the value of $NPV_{aeronautical}$ is rendered negative. The suggestion that dual till regulation helps preserve the incentive to invest seems to us to be a suggestion that the value of $NPV_{non\text{-}aeronautical}$ will typically be both positive and of a sufficiently high monetary value to offset and outweigh the (negative) contribution coming from $NPV_{aeronautical}$, thus turning $NPV_{project}$ positive.

4.3 Dual till and investment incentives

This proposition seems to derive simply from the observed demand complementarity between aeronautical and non-aeronautical activities at airports and the locational rents that airports can

sometimes earn. It is important to note that the analysis of this phenomenon in Starkie (2001)[62] and Starkie & Yarrow (2000)[63] was used to support the principle of dual till regulation and, in the former, greater deregulation generally. As was noted in Starkie & Yarrow

> 'Identification of a particular economic interdependence/complementarity between core activity and related activity, even if it is large in magnitude, is not, therefore, a sufficient reason for bundling the activities together for regulatory purposes.' [64]

One of the key reasons for this is the inefficiencies and investment distortions that might result - a result that is also supported empirically in Oum, Zhang & Zhang (2004).[65] Therefore, in considering whether the airports' ability, in the Commission's words, 'to earn significant amounts of revenue from unregulated activities' under dual till will effectively counter-act any adverse effect on aeronautical investment from inadvertent WACC underestimation, it is important to move beyond the general characterisation of broad revenue flows to identification of specific changes that might flow from what is in effect a modification of the dual till regime. Such modification means that conclusions relating to investment under dual till cannot be relied upon without first examining the impact on investment incentives of the modification to the regime broached by the Commission. In this context we would highlight a number of potential issues that cast doubt on the general presumption that the existence of dual till revenues mitigates the impact of effectively underestimating the WACC to be applied to aeronautical investment.

First, while it is right still to assume (as the economists quoted earlier in this section did) that non-aeronautical locational rents will tend to arise at many airports, it is also important to recognise today's evolving market circumstances. The growth of digital retailing is challenging the advantages that location previously gave as well as undermining particular segments of the market. These factors are affecting airports as they are the 'High Street' and the mall. These and other 'structural' factors, relating to demographics and market maturity, have been identified in the most recent ACI Europe Economics Report as accounting (along with the disappointing cyclical performance of the European economy) for the slowing of growth in per passenger retail spend over the last few years.[66] There may, of course, be some offsetting trends, for instance in relation to (often lower margin) catering and beverages, and strategies developed to counter these market changes, but the point to note is that non-aeronautical revenues cannot now be assumed to be 'easy money' if they ever were. This may well affect investment incentives, with potentially a focus on defensive investment designed to maintain per passenger spend, rather than promotion of increased footfall. How these pressures play out depends on particular airports and their individual circumstances. But market developments and their effects need to be taken into account before making broad assumptions about dual till revenues.

Second, there will be many cases where the nature of the aeronautical investment means that it does not have a major impact on non-aeronautical profits. In this case, the value of $NPV_{non\text{-}aeronautical}$

[62] David Starkie, Reforming UK Airport Regulation, Journal of Transport Economics and Policy, Volume 35, Part 1, January 2001, pp.119 -135
[63] Starkie, D. &Yarrow, G., The single till approach to regulation of airports
[64] Ibid., p.15
[65] Zhang, A & Zhang, Y, Alternative Forms of Economic Regulation and their Efficiency Implications for Airports, Journal of Transport Economics and Policy, April 2004
[66] ACI Europe, Economics Report 2014, p.18

will be small in comparison to the value of $NPV_{aeronautical}$ and it will not be tenable to argue that unregulated cashflows will shield an airport from the adverse effects of under-estimating the WACC.

Investments of this character might include but not be limited to:

- maintenance of assets or other improvements to the airfield which deliver operational benefits to airlines, for example improved service to planes on stand (such as additional bridges) which deliver quality benefits to passengers and airlines;
- the trading off of capex against opex solutions, as for instance in the choice between air bridges and bussing;
- investments that may be required to deliver for the commercial requirements of (competing) airlines, as for example in building to accommodate peak movements rather than better utilising existing assets through better spreading the load through the day;
- facilities for the servicing of aircraft;
- facilities for the airside facilitation of freight; and
- security or other regulatory requirements, such as may be involved in hold baggage screening (or some years ago equipment required for screening of liquids) or that may affect the runway-end safety areas.

This is a significant, if non-exhaustive, list.

For such investments the existence of commercial revenues has little or no relevance, yet those investments can be critical to ensuring the smooth and efficient operation of the airport to the advantage of airlines and passengers. In some cases regulatory or basic operational requirements may mean that the airport has to make the investment to stay in business. In other cases reduced maintenance and/or a non-optimal trade-off between capex and opex may result. Neither is a desirable or sustainable approach in the long term. The airport thus needs to be adequately incentivised to make such investments on a stand-alone basis, including by permitting the airport to earn a return in line with its WACC

As well as identifying the types of investment where the existence of commercial revenues at the airport is likely to make little or no contribution to the relevant business cases, it is worth taking a more helicopter view of the nature of airport aeronautical investment and the extent to which it can be regarded as capacity enhancing and therefore likely to lead to more commercial revenue. The returns that the New Zealand airports make for information disclosure purposes categorise investment according to whether it is concerned with capacity growth or asset replacement and renewal. The business case for the latter (which incorporates some but not all of the investment types identified above) is likely to be relatively unaffected by commercial revenues (except to the extent that there are secondary effects from passenger well-being from, for example, enhanced terminal ambience or more efficient processing enabled by newer facilities). Yet investment in asset replacement and renewal is significant at all airports. Moreover, it varies over time and between airports. A WACC that therefore under-remunerated aeronautical investment could affect the majority of investment at all airports in some years, and in one case the majority of investment in all years based on recent past and prospective plans.

Third, even it were the case that a particular project has the potential to generate significant non-aeronautical profits, that may not guarantee protection to the aeronautical component of an

investment. Any risk that aeronautical investment will not pay off may be factored into the overall investment decision and effectively distort the investment made. The result will be to encourage non-aeronautical investment at the expense of aeronautical, even where the investment serves both 'tills'. For example, an operator that believes that it has been offered insufficient return on aeronautical activities may be more inclined in any terminal enhancement or improvement schemes to emphasise retail activity at the expense of the under remunerated aeronautical component. This may translate in physical terms to less seating for passengers, more confined walking and waiting areas and the like. In taking such decisions the operator will need to consider whether more cramped spaces will have detrimental knock-on effects, from more disgruntled passengers to retail revenues. Irrespective of how that particular assessment turns out, the under-estimation of the aeronautical WACC would have introduced a distorting effect into investment thinking and decisions, even if the consequences fall short of outright cancellation of investment.

Fourth, the effect of the effective reduction in aeronautical returns needs also to be seen in the context of the more general incentive impacts of dual till relative to Single Till regimes. In the latter the operator is able to pass on the costs of investments of all types to airlines. Regulators go to some lengths to seek to ensure that such costs are efficient but the gold plating effects are believed, certainly by airlines, to be very powerful. Dual till operates differently. For those investments which are shared between aeronautical and non-aeronautical activities or represent an overhead for the whole organisation (for example, utilities or IT infrastructure), the costs attributable to commercial activities affect bottom line performance of the airport. The airport is therefore incentivised to lean against the cost of such investments in the same way as any commercial organisation. There are also likely to be spill over effects from this greater cost consciousness into aeronautical investment since it would be both confusing and potentially counterproductive to seek to maintain two different cost mentalities within one organisation. As a result, it is important (again, as in any commercial organisation) that the incentives to invest are 'right' as there will not be the cultural bias towards investment created by single till regimes. Customers of airports operating under dual till regimes receive over time the benefit of this greater focus on cost consciousness but the result is a need to ensure that the commercial approach taken to each investment is informed by an appropriate WACC.

4.4 Conclusion

Far from the existence of a dual till mitigating for under-estimation of the WACC, the incentives it creates generally and the way they play out as between different types of investment suggests, if anything, a greater need for operators to be properly incentivised to invest appropriately in aeronautical assets. This is because the general effect of dual till is to instil a properly commercial approach to investment as more of its costs affect the airport's bottom line. That reinforces the need for appropriate incentivisation to undertake aeronautical investment. Moreover, there are a range of investments where commercial revenues are weakly, if at all, relevant to the investment decision. These may in some years and at some airports encompass the majority of investment undertaken. Even where commercial revenues might be deemed more relevant (as in shared aero/non-aero terminal development) the result of under-estimation of the aeronautical WACC could be to skew the overall investment towards the non-aeronautical side to the detriment of a balanced development and the interests of passengers and airlines. The weakening therefore of the incentive to investment inherent in a properly calibrated aeronautical WACC could have detrimental

effects for both the composition of investment and the level of aeronautical investment. It follows that the existence of dual till cannot be assumed generally to mitigate for the effects of WACC mis-estimation.